

**Syllabus of Courses offered during the Year 2022-23**

**Semester I (2022-23)**

FIRST SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BBA009B	Quantitative Techniques	3	1	0	4	C
BBA001A	Principles of Management	3	0	0	3	C
BBA004C	Managerial Economics	3	0	0	3	C
BBA101A	Accounting for Managers	3	1	0	4	C
****	Website Development	2	0	0	2	ID
****	Website Development Lab	0	0	2	1	ID
DEN001A	Communication Skills	2	0	2	3	F
DIN001A	Culture Education -1	2	0	0	2	F
	<b>TOTAL</b>	<b>15</b>	<b>1</b>	<b>4</b>	<b>22</b>	

**Semester II (2022-23)**

SECOND SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BBA002C	Financial Management	3	1	0	4	C
BBA 191B	Human Resource Management	3	0	0	3	C
BBA161B	Principles of Marketing Management	3	0	0	3	C
BBA432C	Operation Research	3	0	0	3	C
DCO011A	Presentation Skills using Canva	0	0	4	2	ID
DEN002A	Professional Skills	2	0	2	3	F
DIN002A	Culture Education-2	2	0	0	2	F



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DCH001	Environment Studies	3	0	2	4	F
	<b>TOTAL</b>	<b>22</b>	<b>2</b>	<b>6</b>	<b>24</b>	

## BBA I Semester

### Quantitative Techniques

**SUBJECT CODE: BBA009B**

**CREDITS: (3L+1T = 4)**

**Objectives:** To understand & apply various statistical methods of data summarization and analysis, to gain ability to take decision in diverse aspects of business environment.

#### **UNIT I**

Meaning definition, functions, importance and limitations of Statistics – Collection of data – Primary and Secondary data – Schedule and questionnaire – Frequency distribution – Tabulation, Diagram and graphic presentation of data – Statistical system in India.

#### **UNIT II**

Definition, objectives and characteristics of Measures of Central Tendency – Types of Averages – Arithmetic Mean, Geometric Mean – Harmonic Mean, Median, Mode.

#### **UNIT III**

Meaning, definitions, objectives of Dispersion, Range Quartile Deviation, Mean deviation, Standard Deviation – Co-efficient of variation.

#### **UNIT IV**

Definition and objectives of Skewness – Karl Pearson's and Bowle's measures of skewness. Sets Theory: Meaning of Set - Set Operation – Venn Diagrams.

#### **UNIT V**

Meaning, Definition and use of correlation – types of correlation Karl Pearson's correlation co-efficient – Spearman's Rank correlation probable error – Meaning utility of regression analysis comparison between Correlation and Regression – Regression Equations – Interpretation of Regression Co-efficients.



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**Course outcomes(CO)**

- I CO1: To apply and understand various statistical methods of data summarization and analysis.
- II CO 2: To find ability to take decisions in diverse aspects of business environment.
- III CO3: To understand classification and tabulation of data.
- IV CO4: To know technical terms like skewness, measures of dispersion and co-relation.
- V CO5: To understand correlation and regression techniques.



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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		L
CO2		M		L		L	L
CO3		M			M		L
CO4	H				M		
CO5		L		M		L	

H = Highly Related; M = Medium L = Low

**Reference books:**

1. Statistics: S P Gupta
2. Research Methodology: C R Kothari
3. Quantitative methods in management: Gupta, Agarwal, Khandelwal and Ahmed.



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**BBA I SEMESTER**  
**PRINCIPLES OF MANAGEMENT**  
**SUBJECT CODE: BBA001A**  
**CREDITS: (3L)**

**Objective:** The objective is to provide an understanding of basic concepts, principles and practices of management. The aim is to inculcate the ability to apply multifunctional approach to organizational objectives.

**Unit I**

Introduction: Concept, Significance and Nature of Management, Management Process, Management and Administration, Functions and Principles of Management, Levels of Management, Functional areas of Management.

**Unit II**

Planning and Decision Making: Concept and Nature of planning, Objectives and Components of planning, Nature and Process of planning. Process of Planning, Dimensions / Types of Planning, Tools and Techniques of planning. Decision-Making – Nature, Significance and Process, Techniques of decision making.

**Unit III**

Organizing: Concept, Importance and Elements of Organization, Process and Principles of organization, Theories of Organization, Organization structure, Organization charts and manuals.

**Unit IV**



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Directing and Communication: Concept, Nature, Scope, Principles and Techniques of direction, Concept and Process of communication, Channel / Media of communication, Barriers to effective communication.

## Unit V

Controlling: Concept, Objectives, Process and Principles of control, Various control techniques

### Course outcomes(CO)

- I CO1: Provide an understanding of principles and practices of management
- II CO 2: To understand about planning and decision making.
- III CO3: To know about importance and elements of organization.
- IV CO4: Providing knowledge regarding directing and communication.
- V CO5: To understand about various controlling techniques.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		M
CO2		M		M		L	
CO3	H		L				L
CO4		M	M			L	L
CO5	L			M		M	

H = Highly Related; M = Medium L = Low

### References:

1. Koontz & Weirich, *Essentials of Management*, Tata McGraw Hill, 2010.



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2. L.M. Prasad, *Principles & Practices of Management*, Sultan Chand, 2010.
3. Stephen Robbins, *Management*, Pearson, 2011.

**BBA I SEMESTER**  
**MANAGERIAL ECONOMICS**  
**SUBJECT CODE: BBA004C**  
**CREDITS: (3L)**

**Learning Objective:** The purpose of this course is to apply microeconomics concepts and techniques in evaluating business decisions taken by firms. The emphasis is on explaining how the tools of standard price theory can be employed to formulate a decision problem, evaluate alternative courses of action and finally choose among alternatives. Simple geometry and basic concepts of mathematics will be used in course of teaching.

**Unit I**

Introduction to Managerial economics, nature, significance, scope of managerial economics, role of economics in business decision making. Macro and Micro economics, Macro Economic Variables, Demand & Supply, determinants of demand and supply, movement vs. shift in demand curve, movement along a supply curve vs. shift in supply curve.

Elasticity of Demand & Supply. Price, Income & cross elasticity & advertising elasticity. Methods to calculate price elasticity.

**Unit II**

Utility: Cardinal & Ordinal, Law of diminishing marginal utility, law of equi-marginal utility. Theory of Consumer Behaviour, Indifference curve theory, Indifference curves & its properties

**Unit III**

Production: Technology of Production; Production with one variable input, Production with two variable input, Returns to Scale.

**Unit IV**

Cost: Measuring Costs, Costs in the Short & long run, Long run vs. Short run cost curves, profit maximization & cost minimization, equilibrium of the firm; Economies of Scale.

**Unit V**

Theory of Firm & Market Organization: Perfect Competition: Perfectly Competitive markets, Profit Maximization, Marginal revenue, Marginal Cost, Output in the short run & long run. Monopoly: Monopoly Power & its sources, Monopolistic Competition & Oligopoly. Kinked demand curve, price leadership of a firm



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**Course outcomes(CO)**

I CO1: To understand how to apply microeconomics, concept, and technique in evaluating business decisions.

II CO 2: Understanding the nature, significance and scope of managerial economics

III CO3: Knowing to demand, supply and market equilibrium,

IV CO4: Knowing about production technology and theory of firm & market organization.

V CO5: To understand and analyze market structure.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	L	H				M	H
CO2		M		M			M
CO3	H				M		
CO4		M			L		L
CO5			L	L		M	

H = Highly Related; M = Medium L = Low

**Text books:**

1. D.N. Dwivedi, Managerial Economics, Vikas Publications
2. SPS Chauhan, *Micro Economics, An Advanced Treatise*, Prentice Hall of India, 2009.
3. R.G.Lipsey and K.A. Chrystal. (2008). *Principle of Economics*. (11th ed.). Oxford University Press.
4. Deepashree, *Principle of Micro Economics*, Ane Books Pvt. Ltd, New Delhi.



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**BBA I SEMESTER**  
**Web Development**  
**Course Code: DCA001**  
**Credits: (2L)**

**Course Objectives:**

1. Students will be able to understand and be familiar with client server architecture.
2. Students will be able to understand and able to develop a web application using java technologies.
3. Students will be able to learn the skills and project-based experience needed for entry into web application.
4. Students will be able to learn the concepts of developing a dynamic webpage by the use of java script and CSS
5. Students will be able to learn the concept of XML, MySql and server side scripting.

**Syllabus**

**Unit -1**

HTML5 and CSS3 HTML5- Basic Tags, Tables,Forms.HTML5 Tags,HTML Graphics, HTML media, HTML Graphics,HTML APIs. CSS - Background, Borders,margin, Box model. Styling text, fonts,list,links,tables. CSS overflow,float,inline blocks, pseudoclasses,pseudoelements.CSS border images,rounded corners

**Unit-2**

Java Script Client side scripting using java script, Introduction to java script, internal and external Java script files, variables, control statements, loops, Arrays , string handling , How to write functions in JavaScript, inputting and outputting from form elements to JavaScript. DOM concept, creating html elements using java script. Drawing 2D shapes, handling events. Introduction to AJAX

**Unit-3**

Building Single page applications with Angular JS Single page application – Introduction , two way data binding, MVC in angular JS, controllers, getting user inputs , loops , Client side routing – accessing URL data , various ways to provide data in angular JS.

**Unit -4**



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Server Side Programming Server side scripting, Difference between client side and server side scripting languages. Introduction to PHP, variables, control statements, loops, Arrays, string handling, PHP forms, Global variables in PHP, Regular expression and pattern matching, Database programming: inputting and outputting data from MySQL using PHP, insertion , deletion and updating data. State management in web applications, cookies, Application and session state.

## Unit-5

Introduction to Xml, usage of XML, XML tags, elements and attributes, attribute type, XML validation: DTD and XSD, XML DOM Case study:-Application Development using Laravel framework

Textbook/Reference:

- The Complete Reference, HTML and CSS by Thomas A Powell latest edition

## Course Outcomes( CO's)

After the completion of the course the student will be able to

**CO1:**To create a dynamic webpage by the use of java script and DHTML.

**CO2:** To create a well formed / valid XML document.

**CO 3:** To connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.

**CO 4.** To create a server side java application called JSP to catch form data sent from client and store it on database.

**CO 5.** To write a server side java application called servlet to catch form data sent from client, process it and store it on database

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						
CO2	H						
CO3	M						



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CO4	H						
CO5	M						

H = Highly Related; M = Medium; L = Low

B. Tech. (common to all disciplines)-I Semester Contact Hours (L-T-P): 2-0-2 L-T-P

### **Communication Skills**

Credits 2-0-1 3

#### **Course Objectives**

1. To enhance English language competence in reading, writing, listening and speaking.
2. Switch the approach from teacher-centred to student-centred one.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. To link communication skills with the organizational behaviour.
6. To inculcate skills that are very much required for employability and adjust in the professional Environment.

Course Outcomes (CO): At the end of this course students will have:

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in different contexts.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

Syllabus: Theory

UNIT 1 Basics of Organizational Communication: Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture



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UNIT 2 Basic Writing Skills: Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration

UNIT 3 Composition:, Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,

UNIT 4 Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms

UNIT 5 Professional and Technical Communication : Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

Syllabus: Lab

UNIT 1 Basics of Organizational Communication: Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Timemanagement, Following Deadlines etc

UNIT 2 Write Dialogue from the different contexts of corporate culture: Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc

UNIT 3 Composition:, Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of DraftingRedrafting, Proof Reading, Editing etc

UNIT 4 Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc

UNIT 5 Professional and Technical Communication : Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

Methodology for Evaluation

1. Internal Assessment (Theory) a) Home Assignments: One from each Unit : 15 Marks



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- b) In Semester Tests (Minimum two) : 30 Marks
- c) Attendance : 05 Marks
- 2. Term End (Theory) : 50 Marks
- 3. Internal Assessment (Lab) (a) Daily Performance in the Lab : 50 Marks
- 4. Term End (Lab) : 50 Marks

Suggested Reading:

1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
8. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum:

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### **Cultural Education I**

#### **Semester-I B. Tech I Year B. Tech. (common to all disciplines)-I Semester**

Contact Hours (L-T-P): 2-0-0 L-T-P

Cultural Education I Credits 2-0-0 2

Course Objectives

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

Course Outcomes (CO): At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the richness of Indian Culture

CO2: Ability to represent the culture ethics in real life

UNIT-I Holy Scriptures-A 1. Introduction to Vedanta and Bhagavad Gita, Goals of Life – Purusharthas, Introduction to different Dharm Granthas (Various religious scriptures from



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Hindu, Muslim, Christian, Bodh, Jain religions) 2. Introduction to Yoga, Overview of Patanjali's Yoga Sutras

UNIT-II Society and Culture-I 3. Introduction to Indian Culture and Major Symbols of Indian Culture 4. Major Indian Cultural and Ethical Values- Respect, Compassion, Kindness, Forgiveness, Introspection, Honesty, Justice, Loyalty, Devotion, Self Sacrifice, Hospitality, Vasudhev Kutumbkum

UNIT-III India in Progress-I 5. Education , Science and Technology in Ancient India 6. Values from Indian History- War of Mahabhart, War of Kalinga, Freedom Struggle of India, Major Farmer Movements, Major Religious and Social Upliftment Movements

UNIT-IV Great Indian Personalities-I 7. Life and works of the Great People of Ancient India- Sushruta, Dadhichi, Ashtvakra, Anusuya, Panini, Charaka, Kalidas, Aryabhatta, Samudragupta, Ashoka, Chandragupt Mourya, Porus, Satyabhama, Dhruv, Prahlad, Chankya, Varahmihira, Bhism, Karan, Dronacharya, Meera Bai, Surdas, Dadudayal, Kabir, Mahatma Buddha, Mahavir, Guru Nanak Dev, Guru Gobind Singh, Mohammad Saheb, Jesus Christ, Veer Shivaji, Maharana Pratap, Maharani Laxmi Bai, Maharani Padmini, Hadi Rani Shal Kanwar, Panna Dhai

\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by committee of teachers.

Suggested Reading:

1. Glory of Indian Culture (English) Paperback by Giriraj Shah
2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies by Saroj Bala , Kulbhushan Mishra

References <https://knowindia.gov.in/culture-and-heritage/lifestyle-values-and-beliefs.php>  
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**BBA II SEMESTER**  
**FINANCIAL MANAGEMENT**  
**SUBJECT CODE: BBA002C**  
**CREDITS: (3L+1T=4)**

**Objectives:**

To familiarize the students with the principles and practice of financial management.

**UNIT I**

Meaning, Importance and Objectives of Financial Management; Time value of money; Conflicts in profit versus value maximization principle; Functions of chief financial officer

**UNIT II**

Risk and Return- overview of capital market theory, Beta Estimation, CAPM, and APT.

**UNIT III**

Investment decisions: Capital budgeting- concept & theory; Risk analysis in capital budgeting And Cost of capital.

**UNIT IV**

Management of working capital; Cash and Marketable securities management; Treasury management, Receivables management, Inventory management, Financing of working capital

**UNIT V**

Financing decisions: Concepts of operating and financial leverage; Capital structure Theory and Policy; Dividend Policy Different sources of finance: Asset Based financing- Lease, Hire Purchase and Project Financing. Corporate Restructuring: Merger and Acquisition.

***Course Outcome (CO):***

At the end of this course students will be able:

CO1: To organize, analyze and interpret numerical and financial data.

CO2: proficiency in oral and written communications with the ability to explain complex financial transactions and data to others

CO3: demonstrate the ability to apply financial information to recommend and justify solutions to financial problems

CO4: To calculate the cost of debt, Cost of equity and Cost of Capital.

CO5: To assess the various sources of finance for capital expenditure and evaluate the merits of each proposal to decide which project is best.



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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND COURSE OUTCOME:**

Course Outcome	Program Outcome					PO 6	PO 7
	PO1	PO2	PO3	PO4	PO5		
CO1	H			M			
CO2	H			M			L
CO3		M		H			M
CO4	M			M			
CO5			H		M		

H = Highly Related;  
M = Medium  
L = Low

**Text Books:**

1. Agarwal, M.R., *Financial Management: Principles and Practice*, Garima Publications.

**References:**

- 1) Pandey, I.M., *Finance: A Management Guide for Managing Company Funds and Profits*. Prentice Hall of India, New Delhi. (2003).
- 2) Bhattacharya, *Financial Accounting for Business Managers*. Prentice Hall of India, New Delhi 2003
- 3) Saraswat, Bhatnagar, *Financial Management*, Garima Publications, 2012

**BBA II SEMESTER  
ACCOUNTING FOR MANAGERS  
SUBJECT CODE: BBA101A  
CREDITS: (3L+1T=4)**

**Objectives:**

To acquaint the students with concepts of Financial, Cost and Management Accounting and their applications in managerial decisions making.

**UNIT I**

Introduction to Financial Accounting: Accounting as an Information System; Importance, Scope and Limitations; Generally Accepted Accounting Principles; Basic Accounting Concepts, Techniques and Conventions; Accounting Cycle; Ethics in accounting; Basic Financial Statements; Understanding



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Corporate Annual Reports: Analysis of Financial statements through Ratios and Cash Flow Statement; Understanding and Analyzing Consolidated Financial Statements; Introduction to International Financial Reporting Standards (IFRS); Foreign Currency Accounting.

## **UNIT II**

Introduction to cost accounting: Cost concepts – Meaning, Scope, Objectives and Importance of Cost Accounting; Elements of Cost; Components of Total cost. Classification of Costs: Fixed, Variable, Semi-variable, and Step Cost; Product and Period Costs; Direct and Indirect Costs; Relevant and Irrelevant Costs; Sunk Costs; Controllable and Uncontrollable Costs; Avoidable and Unavoidable Costs; Out-of-pocket Costs; Opportunity Costs; Conversion Cost. Cost Ascertainment: Cost Unit and Cost Center; Cost Allocation; Cost Apportionment; Cost Control and Cost Reduction. Accounting for Overhead Costs; Brief introduction of Techniques and Methods of Costing.

## **UNIT III**

Cost-Volume-Profit Analysis: Contribution; PV Ratio; Margin of Safety; Break-Even Point; Composite Break-Even Point; Cash and Cost Break- Even Point. Decisions relating to key factor; Export order; Make or Buy, Pricing Decision, Cost plus pricing; Cost Management System and Activity-Based-Costing and Management; Target costing, Decisions related to deletion, Addition of products, Services or Departments; Joint Product Costs: Sell or Process further decisions.

## **UNIT IV**

Introduction to Budgets and preparing the Functional Budgets, and Master Budget; Flexible Budgets.

## **UNIT V**

Variance Analysis (Labor, Material): Management Control System and Responsibility Accounting; Management control in decentralized organizations

### ***Course Outcome (CO):***

At the end of this course students will be:

CO1: Able to understand the concepts of accounting theories.

CO2: Able to interpret the business implication of financial statement standard.

CO3: Able to Judge Product, project, divisional & organisational performance using managerial accounting information

CO4: Able to Identifying organisational information technology components and risks that can affect financial system and prescribe appropriate controls

CO5: Able to apply Cost Accounting methods to evaluate and project business performance.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND COURSE OUTCOME:**



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Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H			M			M
CO2	M			M			
CO3		M			H		
CO4		H	M				
CO5			M		H		L

H = Highly Related; M = Medium L = Low

**Text Books:**

- 1.Horngren C T, Sundem G L, Stratton W O, Burgstahler D and Schatzberg J. *Introduction to Management Accounting*. PHI Learning Pvt Ltd.
- 2.Porter G A, Norton C L. *Financial Accounting* (6th ed.). Cengage Learning (IFRS update)

**References:**

1. Horngren C T, Sundem G L and Elliott J A. *Introduction to Financial Accounting* (8th ed.). Pearson Education.
2. Horngren, C.T., Foster, G, and Datar, S.M. *Cost Accounting: A Managerial Emphasis*. New Delhi: Prentice Hall of India Pvt. Ltd.

**BBA II SEMESTER  
HUMAN RESOURCE MANAGEMENT  
SUBJECT CODE: BBA191B  
CREDITS: (3L)**

**Objectives:**

The objective of this course is to help the students to develop an understanding of the concept & techniques of essential functions of human resource management.

**Course Contents:**

**Unit I:**

Introduction, meaning and significance of HRM.Major functions of HRM.Line functions and staff functions.Principles of HRM. HR Competencies, Pre-recruitment functions of HRM,



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Organizational structure, Delaying, Right sizing, Job analysis, HR Planning and budget approval. Strategic decision to outsource, engage contract workers or to recruit people on company role.

### **Unit II:**

Human Resource Planning: Process, Forecasting demand & supply, Skill inventories Human Resource Information System (HRIS) succession planning, Job analysis – Uses, methods, Job description & Job specifications. Recruitment, selection and appointment, Meaning and significance of recruitment, process of recruitment, sources of recruitment, cost-benefit analysis of recruitment. Meaning and significance of selection, process of selection, selection techniques tests, interviews and salary negotiation. Meaning and significance of appointment, process of appointment, legal aspects of employment contract, joining formalities and induction.

### **Unit III:**

Training: Concept, Needs, Systematic approach to training, Methods of training. Management development: Concept & Methods. Performance management system: concept, uses of performance appraisal, performance management methods, factors that distort appraisal, appraisal interview. Career planning: career anchors, career life stages, career planning.

### **Unit IV:**

Compensation: Steps of determining compensation, job evaluation, components of pay structure, factors influencing compensation levels, wage differentials & incentives, profit sharing, gain sharing, employees' stock option plans. Brief introduction of social security, health, retirement & other benefits.

### **Unit V:**

Strategies of employee retention and emerging trend in HRM, Meaning and significance of employee relations. Employee relation in unionized and non-unionized organizations. Handling employee grievances. Employee discipline and domestic enquiry. Legal aspects of employee relations with reference to trade union Act, industrial employment standing orders Act and Industrial Disputes Act. Statutory aspects of health, welfare and safety of employees.

### **Course Outcome (CO):**

At the end of this course students will be able to:

CO1: Explain the importance of HR and their effective management in organisation.

CO2: Demonstrate a basic understanding of different tools used in forecasting and planning HR needs.



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CO3: Describe the meaning of terminology and tools used in managing employee's efficiency.

CO4: Record governmental regulations affecting employees and employers.

CO5: Analyze the key issues related to advertising the human elements such as motivation, compensation, appraisal, career planning, diversity, ethics and training.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND COURSE OUTCOME:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H			M		L	L
CO2		M			H		M
CO3	H	M					
CO4			M		M		
CO5	H		M				L

H = Highly Related; M = Medium L = Low

**Text Books:**

1. De Cenzo, D.A. & Robbins, S.P. (2006). *Fundamentals of Human Resource Management* (10th ed.). New York: John Wiley & Sons
2. Dessler, G. (2008). *Human Resource Management* (9th ed.). New Delhi: Pearson.

**References:**

1. Monappa & Saiyaddin. (2000). *Personnel Management*. New Delhi: Tata McGraw Hill
2. Rao, V.S.P (2007). *Human Resource Management- Text and Cases* (2nd ed.). New Delhi: Excel Books.



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**BBA II SEMESTER**  
**PRINCIPLES OF MARKETING MANAGEMENT**  
**SUBJECT CODE: BBA161B**  
**CREDITS: (3L)**

**Objectives:**

This course aims to familiarize students with the marketing function in organizations. It will equip the students with understanding of the Marketing Mix elements and sensitize them to certain emerging issues in Marketing.

**Unit I:**

Introduction: Nature, Scope and Importance of Marketing, Evolution of Marketing; Core marketing concepts; Company orientation - Production concept, Product concept, Selling concept, Marketing concept, Holistic marketing concept. Marketing Environment: Environment scanning – introduction to Marketing Information System; Demographic, economic, political, legal, socio cultural, technological environment (Indian context); Portfolio approach – Boston Consultative Group (BCG) matrix; Strength Weakness Opportunity Threat (SWOT) analysis, Ansoff's matrix.

**Unit II:**

Segmentation, Targeting and Positioning: Levels of Market Segmentation, Basis for Segmenting Consumer Markets, Difference between Segmentation, Targeting and Positioning; VALS 2 segmentation profile, Requirements for Effective Segmentation.

**Unit III:**

Product & Pricing Decisions: Concept of Product Life Cycle (PLC), PLC marketing strategies, Product Classification, Marketing of Services - Unique Characteristics of Services, Marketing strategies for service firms – 7Ps, Product Line Decision, Product Mix Decision, Branding Decisions, Packaging & Labelling, New Product Development. Pricing Decisions: Determinants of Price, Pricing Methods (Non-mathematical treatment), Adapting Price (Geographical Pricing, Promotional Pricing and Differential Pricing).

**Unit IV:**

Promotion Mix: Factors determining promotion mix, Promotional Tools – basics of Advertisement, Sales Promotion, Public Relations & Publicity and Personal Selling.

**Unit V:**

Place (Marketing Channels): Channel functions, Channel Levels, Types of Intermediaries: Types of Retailers, Types of Wholesalers.

**Course Outcome (CO):**

At the end of this course students will be able to:

CO1: Identify core concept of marketing and the role of marketing in business and society.

CO2: Knowledge of social, legal, ethical and technological forces on marketing decision making.

CO3: Develop marketing strategy based on product, price, place and promotion objectives.

CO4: Create an integrated marketing communication plan which includes promotional strategies and measures of effectiveness.

CO5: Analyze marketing problems and provide solutions based on a critical examination of marketing information.



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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND COURSE OUTCOME:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7
CO1	H				H		
CO2		H	H			M	
CO3	H	M			M		M
CO4		M		M			L
CO5		M		H		L	L

H = Highly Related; M = Medium L = Low

**Text Books:**

1. Kotler, P. & Keller, K. L. (2012). *Marketing Management* (14th ed.). Pearson.
2. Kotler, P., Armstrong, G., Agnihotri, P. Y., & UlHaq, E. (2010). *Principles of Marketing - A South Asian Perspective*. (13th ed.). Pearson.

**References:**

1. Ramaswamy, V.S., Namakumari, S. (2009). *Marketing Management: Global Perspective-Indian Context*. (4th ed.). Macmillan Publishers India Limited.
2. Zikmund, W.G., D' Amico, M. (1999). *Marketing*. (6th ed.). Ohio: South-Western College Publishing.
3. Etzel, Michael J, Walker, Bruce J, Stanton William J and Pandit, Ajay (2009). *Marketing* (14th ed.). Tata McGraw Hill.

**BBA II SEMESTER**  
**Operation Research**  
**SUBJECT CODE: BBA432C**  
**CREDITS: (3L)**



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## Unit I

Nature, definition and characteristics of Operation Research. Methodology of Operation research, Models of operation research, scientific methodology of operations research, scope of operations research, operation research and managerial decision making, operation research techniques.

## Unit II

Linear Programming: Introduction – Mathematical formulation of a problem – Graphical solutions, standard forms the simplex method for maximization and minimization problems. Big-M Method, Method application to management decisions.

## Unit III

Transportation problem – Introduction – Initial basic feasible solution - NWC method – Least cost method – Vogel's method – MODI – moving towards optimality – solution procedure without degeneracy, Assignment problem – Algorithm – Hungarian method – simple problems.

## Unit IV

Decision analysis and Game Theory: Operations Scheduling: Scheduling problems, shop floor control, Gantt Charts, Principles of work center scheduling, principles of job shop scheduling, personnel scheduling, principles of job shop scheduling, personnel scheduling.

## Unit V

Networking: PERT & CPM, Importance of Networking, Guidelines for construction of network diagram, Float Analysis, Cost Analysis

### ***Course Outcome (CO):***

At the end of this course students -

1. CO1: Will have proficiency with tools from optimization, probability, statistics, simulation, and engineering economic analysis, including fundamental applications of those tools in industry and the public sector in contexts involving uncertainty and scarce or expensive resources.
2. CO2: Will be able to have facility with mathematical and computational modeling of real decision-making problems, including the use of modeling tools and computational tools, as well as analytic skills to evaluate the problems



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3. CO3: To critically analyse and interpret results and present this in both oral and written form.
4. CO4: Ability to work in a team: specifically to solve larger problems, communicate technical knowledge, partition a problem into smaller tasks, and complete tasks on time.
5. CO5: Understand how to translate a real-world problem, given in words, into a mathematical formulation

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND COURSE OUTCOME:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H						
CO2		H					
CO3	M				M		H
CO4		M	M				L
CO5				H	M		M

H = Highly Related; M = Medium L = Low

**Reference books:**

1. Operation Research : V K Kapoor
2. Quantitative Techniques: Khandelwal, Gupta, Agarwal and Ahmed
3. Quantitative Techniques: N D Vohra
4. Production and Operation management: S N Charry

**BBA II SEMESTER**

**Course Name: Project Management Lab**

**Course Code (DCA002)**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
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## Course Objective

1. To learn to Create the project
2. To learn the Task Breakdown, and utilization of resources
3. To learn how to Assign resources, calculating costs

## Lab Exercise based on given topic

1. Introduction to ProjectLibre and Project Management
2. Overview of ProjectLibre
3. Introduction to Project Management terminology
4. Tasks, Resources, and Costs
5. Installing ProjectLibre
6. Starting and Saving Projects
7. Navigation
8. Create a Project
9. Tasks
10. Resources
11. Cost
12. Calendars
13. WBS
14. RBS
15. Task Usage
16. Resource Usage
17. Baselines
18. Earned Value
19. Printing
20. Reporting

## Course Outcome( CO's)

After the completion of the course the student will be able to

CO1 Students will be able to identify basic concepts of Project Libre

CO2 Students will learn to describe the project, its cost etc.



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CO3 Students will be able to create installing, creating a project.

CO4 Students will be able to identify task, and resource usages.

CO5 Students will be able to combine Project Libre tasks and will be efficiently use cost and effects.

**BBA II SEMESTER**  
**ENVIRONMENTAL STUDIES**  
**SUBJECT CODE: DCH001**  
**CREDITS: (3L+1P = 4)**

**Objectives:**

Environmental studies deals with every issue that affects an organism. It is essentially a multidisciplinary approach that brings about an appreciation of our natural world and human impacts on its integrity. It is an applied science as it seeks practical answers to making human civilization sustainable on the earth's finite resources. Its components include biology, geology, chemistry, physics, engineering, sociology, health, anthropology, economics, statistics, computers and philosophy. As we look around at the area in which we live, we see that our surroundings were originally a natural landscape such as a forest, a river, a mountain, a desert, or a combination of these elements. Most of us live in landscapes that have been heavily modified by human beings, in villages, towns or cities. But even those of us who live in cities get our food supply from surrounding villages and these in turn are dependent on natural landscapes such as forests, grasslands, rivers, seashores, for resources such as water for agriculture, fuel wood, fodder, and fish.

The basis objective of this course is to provide basic understanding to the students with the nature and the environment.

**UNIT I**

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

**UNIT II**

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.

- a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
- c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.



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e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources. - Equitable use of resources for sustainable lifestyles.

### UNIT III

Concept of an ecosystem- Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

### UNIT IV

Biodiversity and its Conservation

■ Introduction-Definition: genetic, species and ecosystem diversity.

■ Bio-geographical classification of India.

■ Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.

■ Biodiversity at global, National and local levels.

■ India as a mega-diversity nation.

■ Hot-spots of biodiversity.

■ Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

■ Endangered and endemic species of India.

■ Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

### UNIT V

Environmental Pollution:

Definition, Causes, effects and control measures of: -

a. Air pollution

b. Water pollution

c. Soil pollution

d. Marine pollution

e. Noise pollution

f. Thermal pollution

g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides



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**UNIT-VI: Social Issues and the Environment**

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act. - Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Public awareness.

**UNIT-7: Human Population and the Environment**

- Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare.
- Role of information Technology in Environment and human health.
- Case Studies.

**UNIT-8: Field Work (Practical).**

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

**Course outcomes(CO)**

- I CO1: It deals with every issue that affects the organization.
- II CO 2: To understand the multidisciplinary nature of environmental studies.
- III CO3: To understand about the renewable and non renewable resources.
- IV CO4: Knowing about the concept of the ecosystem.
- V CO5: To know impact of population on environment.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7



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CO1		H			M	M	
CO2			H		M	M	
CO3			M		H	L	L
CO4		M		H		M	L
CO5			L		M	L	

H = Highly Related; M = Medium L = Low

### Reference Books:

1. Agarwal K.C. 2001 Environmental Biology, Nidi publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Map in Publishing Pvt. Ltd. Ahemdabad-380013, India, E-mail: Mapincenet, net.
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.480p.
4. Clark R.S., Marine pollution, Clanderson Press Oxford.
5. Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T. 2001, Environmental & Encyclopedia, Jaico Publ. House, Mumbai, 1196p
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev.,Environment& Security. Stockholm Env. Institute. Oxford Univ. Press, 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay .
10. Heywood, V.H & Watson, R. T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press1140p
11. Jadhav, H &Bhosale, V.M.1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p
12. Mckinney, M.L. &Schoeb, R.M. 1996. Environmental Science systems & solutions, Web enhanced edition 639p.
13. Mhaskar A.K. Matter Hazardous. Techno-Science Publications.
14. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co.
15. Odium, E.P. 1971. Fundamentals of Ecology, W.B.Saunders Co. USA. 574p
16. Rao M.N. &Datta, A.K. 1987. Waste Water Treatment. Oxford & IBH Publ .Co. Pvt. Ltd. 345p.
17. Sharma B.K., 2001. Environmental Chemistry Goel Publ. House, Meerut.
18. Townsend C.,Harper J, and MichealBegon, Essentials of Ecology, Blackwell Science
19. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and standards, Vol I an II, Enviro Media
20. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications



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21. Wagner K.D., 1998. Environmental Management. W.B. Saunders Co. Philadelphia, USA  
499p

A small, square, light-colored stamp containing a handwritten signature in dark ink. The signature is stylized and appears to be a single letter 'S' followed by a horizontal line.

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## **BBA I SEMESTER**

### **Principles of Banking**

**SUBJECT CODE: BBA603A**

**CREDITS: (3L)**

**Learning Objective:** Banking systems and processes have undergone a paradigm change during the last couple of decades. With the ever increasing economic pressures, banking has assumed paramount importance. The course aims at acquainting the students with the basic banking structure India and the rules and laws that govern banking as a structure. Further, the course introduces the students with the recent changes and developments in the banking processes and their impact on various stakeholders.

Unit 1: Introduction to Financial Systems: Introduction to Financial Systems, structure of financial systems, financial markets and financial intermediaries. taxonomy of financial intermediaries, structure of financial markets.

Unit 2: Evolution of Financial Systems: Market based vs bank based systems, financial crises and bubbles

Unit 3: Role of financial Intermediation: Why do financial intermediaries exist? Asset transformation, transaction costs, liquidity, future of financial intermediaries

Unit 4: Regulation of Banks: Why regulate/, traditional regulation mechanisms, international regulation. Risk Management in Banking: Types of risk, how to manage risk, challenges

Unit 5: Forex and Derivatives: Foreign exchange markets, derivatives, hedging. Money: What is money and how this has changed over time, future of money.

**Course Outcomes:** At the end of the course, students will be able to

**[CO.1]** Understand banking structure of the country and the various functions performed by the banks.

**[CO 2]** Understand the various dimensions of special and general relationship between customer and banker and the various functions performed by the banks.

**[CO.3]** Elaborate Banking Regulation Act, 1949 and RBI Act, 1934 in terms of Indian Banking System.

**[CO.4]** Understand the importance of Negotiable Instrument Act and its provisions which are applicable to Banks in India.



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**[CO.5]** Narrate various types of services offered by the banks to the customers and their related attributes to develop their employability. Describe Retail Banking and its various dimensions.

## REFERENCE BOOKS

- 1: Mishra Sukhvinder, Banking Law and Practice, 2nd ed, S. Chand, 2014
- 2: Muraleedharan D, Modern Banking: Theory and Practice, PHI Learning, 2014
- 3: Trivedi I.V., Jatana Renu, Indian Banking System, RBSA Publishers, 2012
- 4: Sharma Deendayal, Principles of Banking, Rajat Publications, 2014
- 5: Heffernan Shelagh, Modern Banking in Theory and Practice, Wiley Publication, 2016
- 6: Choudhry Moorad, The Principles of Banking, Wiley Finance, 2015

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M					L	L
CO2		M		L			L
CO3	H		M				M
CO4	M				L		L
CO5	M			L			L



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**BBA I SEMESTER**  
**Fundamentals of Travel and Tourism**  
**SUBJECT CODE: BBA801A**  
**CREDITS: (3L)**

**Learning Objective:** This course shall introduce learner to tourism phenomenon. The course also highlights the role of tourism as an economic intervention and its significance in economy; Course discusses the global nature of tourism and government support to it. It is also important to appreciate the socio- economic, ecological impacts of tourism.

**Syllabus**

Unit –1: Tourism: Concepts:

Definitions and Historical development of tourism; Types of tourist-Visitor-Excursionist, Types and Forms of Tourism; Tourism system: Nature, Historical development of tourism, Components of tourism and its characteristics and classification of tourist

Unit – 2: Domestic and International tourism:

Domestic tourism; features, pattern of growth, profile. International tourism; Generating and Destination regions. Pattern of growth and Profile. Historical development of tourism of Himachal Pradesh, Madhya Pradesh, Gujarat, Goa & Kerala and analysis of International destination of USA, UK, France, China & Malaysia



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Unit – 3: Travel statistics & Motivation

Tourism Statistics, type and method of measurement. Classification on elements of tourism. Types of tourist motivation and classification.

Unit – 4: Tourism Impacts:

Impacts: Positive and Negative Impacts of Tourism; Socio Cultural, Economic, Environmental and Political- Impact Assessment: Social Impact Assessment, Environmental Impact Assessment and Environmental Impact Assessment. – Environmental and Social Accounting and Auditing-Tourism Satellite Accounting (TSA)

Unit – 5: Tourism Organizations:

Objectives and Role of ITDC, ASI, TFCI, Ministries of Railways and Civil Aviation in development; an overview of National and International organizations and associations: IATO, TAAI, FHRAI, WTO, ICAO and IATA, FAITH.

**Course Outcomes:** At the end of the course, students will be able to

[CO 1]. Describe the Historical development of tourism&Historical development of tourism.

[CO.2]. To understand the Domestic and International tourism.

[CO.3]. Describe and apply Tourism Statistics, type and method of measurement. Classification on elements of tourism

[CO.4]. Recognize the importance and Positive and Negative Impacts of Tourism

[CO.5]. Tounderstandoverview of National and International organizations and associations of Tourism.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		
CO2	M			L		M	
CO3	H		M				
CO4		M		H			M



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CO5		L		H			M
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H = Highly Related; M = Medium L = Low

**Suggested Readings :**

1. Travel Industry : Chunky Gee et-al
2. Tourism Systems - Mill and Morisson
3. Successful Tourism Management - Prannath Seth
4. Tourism Management Vol - 4 - P.C. Sinha
5. Tourism Development - R. Gartner
6. Tourism Planning and Development - J.K. Sharma
7. Studies in Tourism - Sagar Singh



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**BBA II SEMESTER**  
**Fundamentals of Hospitality Management**  
**SUBJECT CODE: BBA802A**  
**CREDITS: (3L)**

**Learning Objective:** The purpose of this course is to acquire an indepth knowledge about the Mice Management and to become familiar with the techniques and approaches for successful MICE Management.

**Syllabus**

**Unit – 1**

Introduction to Hospitality– Concept, Historical evolution of Hospitality industry – Global and Indian Context

**Unit – 2**

Hotel – Definition, classification of accommodation establishments based on – Location, Size, Affiliation and Accreditation, Ownership, Management contracts. Grading Star category of hotels in India. Major National/international hotels chains in India Hotel plans (AP, MAP, CP, EP) Hotel guest room types and status: Menu types of menu

**Unit -3**

Departments/Functional units in Hotel and organizational Structure  
Hotel Organisation – Organisational Structure- Front of the house and back office departments in a hotel, function of the core departments of the hotel- Room division and food and beverage depts.

**Unit – 4**

Timeshare and vacation ownership- Concept of Vacation ownership, Definition of time share and condominiums, marketing of timeshares, exchange companies-RCI and Intervals international, developing Vacation ownership concept in India, Government's/industry role

**Unit – 5**

Guest Relationship Management – Skills and personality traits of hospitality staff, complaint handling emergencies importance and use of PMS in hospitality industry-Opera/IDS.

**Course Outcomes:**

CO 1: To provide students with the supervisory skills and competencies necessary to meet the needs of the ever demanding Hospitality industry.

CO 2: Identify and assess relationships and networks relative to National/international hotels chains in India Hotel.



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CO 3: To understand the departments and functional units in Hotel and organizational Structure of Hospitality industry

CO 4: To provide a broad understanding of the basic principles of guest relationship Management related to the Tourism.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		
CO2	H		M				
CO3	H	M			L		M
CO4	H	L					M

Importance of Networking, Guidelines for construction of network diagram, Float Analysis, Cost Analysis

***Course Outcome (CO):***

At the end of this course students -

6. CO1: Will have proficiency with tools from optimization, probability, statistics, simulation, and engineering economic analysis, including fundamental applications of those tools in industry and the public sector in contexts involving uncertainty and scarce or expensive resources.
7. CO2: Will be able to have facility with mathematical and computational modeling of real decision-making problems, including the use of modeling tools and computational tools, as well as analytic skills to evaluate the problems
8. CO3: To critically analyse and interpret results and present this in both oral and written form.
9. CO4: Ability to work in a team: specifically to solve larger problems, communicate technical knowledge, partition a problem into smaller tasks, and complete tasks on time.



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- 10.CO5:Understand how to translate a real-world problem, given in words, into a mathematical formulation

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND COURSE OUTCOME:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H						
CO2		H					
CO3	M				M		H
CO4		M	M				L
CO5				H	M		M

H = Highly Related; M = Medium L = Low

**Reference books:**

5. Operation Research : V K Kapoor
6. Quantitative Techniques: Khandelwal, Gupta, Agarwal and Ahmed
7. Quantitative Techniques: N D Vohra
8. Production and Operation management: S N Chatterjee



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## **JECRC University Cultural Education II**

### **Semester-II B. Tech I Year B. Tech. (common to all disciplines)-II Semester**

Contact Hours (L-T-P): 2-0-0 L-T-P Cultural Education II

Credits 2-0-0 2

Objectives 1. To make the students feel gratitude towards the rich religious and cultural heritage of India.

2. To understand the role of great personalities and movements in the progress of India.

Course Outcomes (CO): At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the richness of Indian Culture

CO2: Ability to represent the culture ethics in real life

UNIT-I Holy Scriptures-II 1. Bhagavad Gita and Life Management 2. Highlights of Indian Scriptures - Major Incidents and terms from various religious scriptures including Ramayana, Mahabharata, Guru Granth Saheb, Bible, Quran, Jain Scriptures, Bodh Scriptures 3. Historicity of Ramayana and Mahabharata

UNIT-II Society and Culture-II 4. Indian Society: Its Strengths and Weaknesses 5. Health and Lifestyle related issues 6. Conservation of cultural heritage

UNIT-III India in Progress-II 7. Role & Position of Women in Indian Society- Rituals like Sati, Dakin, Kanyavadh, Pardah, Devdasi, Child Marriage, Measures of Women Empowerment including Education, Constitutional and other Rights 8. Indian Models of Economy, Business and Management

UNIT-IV Great Indian Personalities-II 9. Life and works of the Great People of Modern India- Raja Ram Mohan Roy, Swami Vivekanand, Madan Mohan Malviya, Ishwarchand VidyaSagar, JyotibaPhule, HomiBhabha, B.R. Ambedkar, Mahatma Gandhi, Chandra Shekhar Aazad, Abdul Hamid, Badshah Khan, Bhagat Singh, Ashfaqullah, Vir Sawarkar, Vir Banda Bahadur, Vir Haqiqat Rai, Subhash Chandra Bose, Mother Teresa, Jagdish Chandra Basu, JRD Tata, Ratan Tata, Dada Saheb Phalke, Major Dhayan Chand, A P J Abdul Kalam, Kailash Satyarthi, Aruna Roy, Mahasweta Devi, Udaya Kumar, Narayan Murthy, Azim Premji

\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by a committee of teachers.



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Suggested Reading:

1. Glory of Indian Culture (English) Paperback by Giriraj Shah
2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies by Saroj Bala , Kulbhushan Mishra

References <https://knowindia.gov.in/culture-and-heritage/lifestyle-values-and-beliefs.php>

**Semester III (2021-2022)**

THIRD SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BBA341A	Financial Markets & Services	3	1	0	4	C
BBA007B	Organization Behaviour	3	0	0	3	C
BBA017A	Corporate Strategy	3	0	0	3	C
BBA011A	Research Methodology	3	1	0	4	C



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DCA004A	Advanced Spread Sheet Lab	0	0	2	1	ID
DEN003A	Life Skills1	2	0	0	2	F
DIN003A	Value Education-1	1	0	0	1	F
	Open Elective-I	3	0	0	3	ID
	<b>TOTAL</b>	<b>18</b>	<b>2</b>	<b>4</b>	<b>21</b>	

**Semester IV (2021-22)**

<b>FOURTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA431A	Operation Management	3	0	0	3	C
	Discipline Elective 1	4	0	0	4	S
	Discipline Elective 2	4	0	0	4	S
DCO012A	Bloggin/Vlogging/Poscasting	0	0	2	1	ID
DEN004A	Life Skills-2	2	0	2	3	F
DIN004A	Value Education-2	1	0	0	1	F
BBA999A	Project	0	0	8	4	C
	<b>TOTAL</b>	<b>14</b>	<b>0</b>	<b>12</b>	<b>20</b>	

**BBA III Semester**  
**FINANCIAL MARKETS AND SERVICES**  
**SUBJECT CODE: BBA341A**  
**CREDITS: (3L+1T=4)**



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**Learning Objective:** The objective of this paper is to introduce students to the different aspects and components of financial markets and financial services in the financial system. This will enable them to take the rational decision in financial environment.

### **Unit I**

Introduction to Financial Markets in India: Role and Importance of Financial Markets, Financial Markets: Money Market; Capital Market; Factors affecting Financial Markets, Linkages Between Economy and Financial Markets, Integration of Indian Financial Markets with Global Financial Markets, Primary & secondary market, Currency Market, Debt Market- role and functions of these markets.

### **Unit II**

Primary Market for Corporate Securities in India: Issue of Corporate Securities: Public Issue through Prospectus, Green shoe option, Offer for sale, Private Placement, Rights Issue, On-Line IPO, Book Building of Shares, Disinvestment of PSU, Employees Stock Options, Preferential Issue of Shares, Venture Capital, Private Equity, Performance of Primary Market in India, Corporate Listings : Listing and Delisting of Corporate Stocks.

### **Unit III**

Secondary Market in India: Introduction to Stock Markets, Regional and Modern Stock Exchanges, International Stock Exchanges, Demutualization of exchanges, Comparison between NSE and BSE, Raising of funds in International Markets: ADRs and GDRs, FCCB and Euro Issues; Indian Stock Indices and their construction, maintenance, adjustment for corporate actions (rights, bonus and stock split;) on index with numerical, free float vs. full float methodology, Classification of Securities to be included in the Index, Bulls and Bears in Stock Markets, Factors influencing the movement of stock markets, indicators of maturity of stock markets, Major Instruments traded in stock markets: Equity Shares, Debentures, Myths attached to Investing in Stock Markets. Trading of securities on a stock exchange; Selection of broker, capital and margin requirements of a broker, MTM and VAR Margins, kinds of brokers, opening of an account to trade in securities, DEMAT System, placing an order for purchase/sale of shares, margin trading and margin adjustment, contract note and settlement of contracts, Algorithmic trading, Settlement mechanism at BSE & NSE

### **Unit IV**

Money Markets & Debt Markets in India: Money Market: Meaning, role and participants in money markets, Segments of money markets, Call Money Markets, Repos and reverse Repo concepts, Treasury Bill Markets, Market for Commercial Paper, Commercial Bills and Certificate of Deposit. Role of STCI and DFHI in money market, Debt Market: Introduction and meaning, Market for Government/Debt Securities in India, Secondary market for government/debt securities, Over subscription and devolvement of Government Securities, Switch deals, Government securities issued by State Governments, Municipal Bonds, Corporate Bonds vs. Government Bonds

### **Unit V**



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Mortgage Market and Securitization, Leasing and Hire Purchase :Concepts of leasing, types of leasing – financial & operating lease, direct lease and sales & lease back, advantages and limitations of leasing, Lease rental determination; Finance lease evaluation problems (only Lessee's angle), Hire Purchase interest & Installment, difference between Hire Purchase & Leasing, Choice criteria between Leasing and Hire Purchase mathematics of HP, Factoring, forfaiting and its arrangement, Housing Finance : Meaning and rise of housing finance in India, Fixing the amount of loan, repricing of a loan, floating vs. fixed rate, Practical problems on housing finance.

#### Course outcome-

1. To know about the financial markets and be equipped with the knowledge of financial system.
2. To enable the students to take rational decision while being in financial system
3. To understand about the stock exchange markets and insights of trade world.
4. To understand the mechanism of mortgages market and securitization.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H		M				
CO2		H		M		M	
CO3	M		M				
CO4		M					M
CO5	L			M		L	

H = Highly Related; M = Medium L = Low

#### Text Books:



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1. Saunders , Anthony & Cornett , Marcia Millon (2007). *Financial Markets and Institutions* (3rd ed.). Tata McGraw Hill
2. Khan, M Y. ( 2010). *Financial Services* (5th ed.). McGraw Hill Higher Education

#### **References:**

1. Shahani, Rakesh( 2011). *Financial Markets in India : A Research Initiative*. Anamica Publications
2. Goel, Sandeep. (2012). *Financial services*. PHI.
3. Gurusamy,S. (2010). *Financial Services*. TMH.
4. www.allbankingsolutions.com
5. The study material available from RBI, various stock exchanges, Market regulators and Govt. agencies.

**BBA III SEMESTER  
ORGANISATION BEHAVIOUR  
SUBJECT CODE: BBA007B  
CREDITS: 3L (3)**

#### **Objectives:**

This course is designed to equip the students with the tools necessary to understanding the dynamics of individual and group behavior for efficient and effective utilization of human resources in the organizations.

#### **UNIT I: Introduction**

Definition, Need and Importance of Organizational Behavior, Contributing disciplines of OB, Nature and Scope, Organizational Behavior Models

#### **UNIT II: Individual Behaviour**

Personality – Type A and B, Big five personality types, Factors influencing personality.  
Values and Attitudes– Concept and types of values: Terminal value and instrumental value.  
Components of attitude, job related attitudes, measurement of attitude.  
Learning – Concept and learning theories and reinforcement.  
Perceptions And Emotions – Importance, factors influencing perception, perpetual distortions, emotional intelligence.

#### **UNIT III: Motivation and Interpersonal Behaviour**

Motivation – Meaning and importance of motivation, Maslow's need hierarchy theory, Herzberg's two factor theory, Theory X Theory Y, Intrinsic and Extrinsic motivation by Ken Thomas, Measurement of motivation using standard questionnaire. Communication and feedback, Transactional Analysis (TA), Johari Window.

#### **UNIT IV: Group Behaviour**

Conflict: Sources of conflict, resolution strategies  
Leadership: Meaning and concept of leadership, trait theory, transactional, charismatic and transformational leadership.

#### **UNIT V: Dynamics of Organisational Behaviour**

Organizational Climate and Culture – Concept, Factors affecting organizational climate and culture and developing organizational culture



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Organizational Change – Importance, Stability vs. Change, Proactive vs Reaction change, Change process, Resistance to change, Managing change.

Stress – Work Stressors, Consequences, Prevention and Management of stress

**Course Outcome (CO):**

At the end of this course students will be:

CO1: Able to understand the fundamental concepts and importance of Organizational Behavior.

CO2: Able to identify and understand the various types of employee behavior and measures to control such behavior.

CO3: Able to understand the concept of Leadership and to develop critical thinking skills.

CO 4: Able to understand and develop the positive organisational behavior.

CO 5: Able to understand and control the measures of organisational climate & climate change.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND COURSE OUTCOME:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H		M				L
CO2	H			M			M
CO3	M						L
CO4		M		M			
CO5	H				H	L	

H = Highly Related; M = Medium L = Low

**Text Books:**

1. Robbins, S.P., *Organisational Behaviour*, Prentice Hall of India Pvt. Ltd., New Delhi.
2. Greenberg, Jerald, and Robert A Baron, *Organisational Behaviour*, Prentice Hall of India Pvt. Ltd., New Delhi.



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3. Luthans, F., *Organisational Behaviour*; McGraw Hill International. New York.

**References:**

1. Chhabra, T. N., *Organisational Behaviour*; Sun India Publications.

2. Singh, A.K., and B. P. Singh, *Organizational Behavior*, Excel Books Pvt. Ltd, New Delhi.

3. Hersey, P.K., Blanchard, H. and D. E. Johnson, *Management of Organisational Behaviour: Leading Human Resources*, Pearson Education.

4. Moshal, B.S., *Organisational Behaviour*; Ane Books Pvt. Ltd., New Delhi

5. Sekaran, Uma, *Organisational Behaviour: Text and Cases*, Tata McGraw Hill, New Delhi

**BBA III SEMESTER  
CORPORATE STRATEGY  
SUBJECT CODE: BBA017A  
CREDITS: 3L**

**Objective:** To understand the concepts underlying how strategy is implemented in the business environment.

**Unit I**

Introduction to Strategy: Nature & importance of business policy & strategy, Introduction to the strategic management process, Strategic Management & related concepts, Characteristics of corporate, business & functional level strategic management decisions. Company's mission statement, Need for a mission statement, Criteria for evaluating a mission statement, Formulation of a mission statement

**Unit II**

Environmental Analysis & Diagnosis: Analysis of company's external environment-Environmental impact on organization's policy and strategy, Organization's dependence on the environment. Analysis of remote environment, Analysis of specific environment- Michael E.Porter's 5 Forces model, Positioning against five forces.Analysis of internal environment-Importance of organization's capabilities, competitive advantage and core competence, Michael E. Porter's Value Chain Analysis.

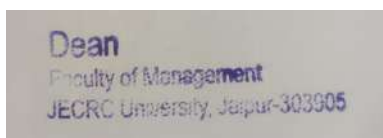
**Unit III**

Competitive Strategies: Perspectives to competition- industry, marketing & strategic group; Competitive strategies- Michael E. Porter's generic competitive strategies, Implementing competitive strategies- offensive & defensive moves.

**Unit IV**

Corporate Strategies: Formulating corporate strategies, Introduction to strategies of growth, stability and renewal, types of growth strategies – concentrated growth, product development, integration, diversification, international expansion (multi domestic approach, franchising, licensing and joint ventures), strategic fundamentals of merger & acquisitions(M&A), types of renewal strategies – retrenchment and turnaround.

**Unit V**



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Strategic Frameworks: Strategic analysis & choice, Strategic gap analysis, Portfolio analysis – MECE approach, BCG, GE, product market evolution matrix, experience curve, directional policy matrix, life cycle portfolio matrix, Grand strategy selection matrix; Behavioral considerations affecting choice of strategy. Culture and strategic leadership: Implementing & operationalizing strategic choice, Impact of structure, culture & leadership; Functional strategies & their link with business level strategies.

### Text Books:

1. Pearce, J.A., Robinson, R.B. & Mittal Amita. *Strategic Management: Formulation, Implementation and Control* (12th ed.). India: Tata McGraw-Hill Publishing Company Ltd.
2. Ghosh, P.K. (10th ed.). *Strategic Management*. India: Sultan Chand and Sons.

### References:

1. Michael Porter. *Competitive Strategy*.
2. Thompson, Arthur A., Strickland III, A. J., Gamble, John E. and Jain A.K. (2006). *Crafting and Executing Strategy: Concepts and Cases* (14th ed.). India: Tata McGraw Hill.

### Course Outcomes: (CO)

CO1- Have knowledge of and understand different corporate strategies

CO2- Understand the challenges and opportunities of multinational enterprises in relation to corporate strategy

CO3 -Understand and be able to apply different analytical techniques in a global context vis-à-vis strategic decisions in corporations

CO4- Be able to analyse different industry settings and relate this to corporate level strategic decision-making

CO5- Have an ability to develop models for corporate strategies and evaluate the consequences of these models.

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		M				L	H			
CO2	M			M						
CO3	H			L		L	M			
CO4		L	L				H			
CO5	L			M	L					



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**BBA III Semester**  
**RESEARCH METHODOLOGY**  
**SUBJECT CODE: BBA011A**  
**CREDITS: (3L+1T=4)**

**Unit I**

Meaning, Objective and Motivation in research, Type of research, research approaches, Significance of research, research process, criteria for good research, Define the research problem, selecting a problem, research design, meaning of research design, need of research design, features of good design.

**Unit II**

Sampling Designing: Census and sample survey, implications of sample design, steps in sample design, criteria of selecting a sample, characteristic of a good sample design, Different type of sample design, random sampling. Data collection techniques: collection of data, interview, schedule and questionnaire method, difference between questionnaires and schedules, Collection of secondary data, selection of appropriate method for data collection.

**Unit III**

Processing and analysis of data, type of analysis, statistics in research, type of series, measurement of central tendency, measurement of dispersion, regression analysis, least square method, Mean based method, correlation analysis, Karl Pearson coefficient of correlation, Spearman single rank method, repeated rank method, relationship between correlation and regression analysis.

**Unit IV**

Hypothesis Design, Basic concept concerning hypothesis testing, procedure of hypothesis testing, Important Parametric test: Z test, T test and F test, Non parametric test: Chi square test, Sign test, run test, mann- whitney U test, Limitation of the testing of hypothesis.

**Unit V**

Scaling technique, measurement in research, type of measurement scales, techniques of developing measurement tools, Interpretation and report writing, technique of interpretation, Significance of report writing, Different steps in writing a report, Lay out of the research report, types of report.



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**Course outcomes(CO)**

- I CO1: To know about the various approaches to research and its significance.  
 II CO 2: To understand the various implications of various parameters of research.  
 III CO3: To help in analysis of various datas and their corelation  
 IV CO4: To help students in knowing design and procedure of hypothesis and subsequent research.  
 V CO5: To understand the report writing in research

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H						
CO2		M		M		M	
CO3		H		H			
CO4				L			M
CO5	L		M		L		

H = Highly Related; M = Medium L = Low

**Reference Books:**

1. Research Methodology: C R Kothari.
2. Business Statistics for managers: Lavin and Rubin.
3. Business Research Methods: Coopers & Swindlers.

**BBA III Semester**


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**Course Name: Advanced Spread Sheet Lab**

**Course Code (DCA003)**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
0	0	2	1

**Course Objective:**

1. Students will be able to understand the basics of Excel.
2. Students will be able to understand the concepts of working with the functions of advanced excel.

**Syllabus**

**Advanced Excel Course - Overview of the Basics of Excel**

Customizing common options in Excel, Absolute and relative cells, Protecting and un-protecting worksheets and cells

**Advanced Excel Course - Working with Functions**

Writing conditional expressions (using IF), Using logical functions (AND, OR, NOT),

Using lookup and reference functions (VLOOKUP, HLOOKUP, MATCH, INDEX), VlookUP with Exact Match, Approximate Match, Nested VlookUP with Exact Match

VlookUP with Tables, Dynamic Ranges, Nested VlookUP with Exact Match, Using VLookUP to consolidate Data from Multiple Sheets

**Advanced Excel Course - Data Validations**

Specifying a valid range of values for a cell, Specifying a list of valid values for a cell, Specifying custom validations based on formula for a cell

**Advanced Excel Course - Working with Templates**

Designing the structure of a template, Using templates for standardization of worksheets

**Advanced Excel Course - Sorting and Filtering Data**

Sorting tables, Using multiple-level sorting, Using custom sorting, Filtering data for selected view (AutoFilter), Using advanced filter options

**Advanced Excel Course - More Functions**



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Date and time functions, Text functions, Database functions, Power Functions  
(CountIf, CountIFS, SumIf, SumIFS)

#### **Advanced Excel Course – Formatting**

Using auto formatting option for worksheets, Using conditional formatting option for rows, columns and cells

#### **Advanced Excel Course – Macros**

Relative & Absolute Macros, Editing Macro's

#### **Advanced Excel Course - WhatIf Analysis**

Goal Seek, Data Tables, Scenario Manager

#### **Advanced Excel Course – Charts**

Using Charts, Formatting Charts, Using 3D Graphs, Using Bar and Line Chart together, Using Secondary Axis in Graphs, Sharing Charts with PowerPoint / MS Word, Dynamically, (Data Modified in Excel, Chart would automatically get updated)

#### **Advanced Excel Course - Working with Reports**

Creating subtotals, Multiple-level subtotals, Creating Pivot tables, Formatting and customizing Pivot tables, Using advanced options of Pivot tables, Pivot charts, Consolidating data from multiple sheets and files using Pivot tables, Using external data sources, Using data consolidation feature to consolidate data, Show Value As ( % of Row, % of Column, Running Total, Compare with Specific Field), Viewing Subtotal under Pivot, Creating Slicers ( Version 2010 & Above), Designing the structure of a template, Print Titles Repeat Rows / Columns

#### **Analysis ToolPak**

Use of the Analysis ToolPak to perform complex data analysis

#### **Course Outcome( CO's)**

- CO1.** Students will learn to use spreadsheet concepts and explore the Microsoft Office Excel environment.
- CO2.** Students will apply the concepts of to create, open and view a workbook.
- CO 3.** Students will Illustrate different advanced excel formatting.
- CO 4.** Students will be apply date and time functions
- CO 5.** Students will learn to describe basic uses of advanced excel functions



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**Value Education and Ethics I Semester-III**

**B. Tech II Year B. Tech. (common to all disciplines)-III Semester**

**Contact Hours (L-T-P): 1-0-0 L-T-P**

**Value Education and Ethics I Credits 1-0-0 1**

**Course Objectives**

1. To give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.
2. Making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

Course Outcomes (CO): At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the ethical beauty of India

CO2: Ability to incorporate the values of human lives in real life applications

Lessons from the Ramayana Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

Lessons from the Mahabharata Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

Lessons from the Upanishads Introduction to the Upanishads: Sruti versus Smrti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, Satyakama Jabala, Aruni, Shvetaketu.

Message of the Bhagavad Gita Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War – The anguish of Arjuna – Counsel by Sri.



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Krishna – Key teachings of the Bhagavad Gita – Karma Yoga, Jnana Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

Life and Message of Swami Vivekananda Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji's life.

Life and Teachings of Spiritual Masters India Sri Rama, Sri Krishna, Sri Buddha, Adi Shankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda.

Insights into Indian Arts and Literature

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

\*Each student shall write a detailed Report/ Critique on one topic leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce.

Alternatively a Student may undertake a Project on any one of the topics and submit a detail Project Report leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. If the topic is related to Performing Arts including Yoga, the performance on stage may be given instead of PPT. In case of Fine Arts, an exhibition or a portfolio may be presented in place of PPT.

On the basis of the above points, a panel of experts from the department will award the credits.

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Life Skills-I

Semester-III

B. Tech II Year B. Tech. (common to all disciplines)-III Semester

Contact Hours (L-T-P): 1-0-2 L-T-P



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## Life Skills I Credits 1-0-1 2

### Objectives

1. To prepare the students as per the industry demands.
2. Switching to Activity and Task based Teaching modules.
3. To focus on the linguistic aspects in relation to life situations.
4. Facilitating the aspects of behavioral skills in language.
5. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
6. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

Course Outcomes (CO): At the end of this course students will have:

CO1: Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields.

CO2: Ability to learn by doing it practically in the classroom.

CO3: Ability to learn by creating an environment and adapting to the environment.

CO4: The ability to prepare the students as per the need of the Multi-cultural scenario around.

### Syllabus: Theory

UNIT 1 Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion  
Basics of Narrating and describing things

UNIT 2 Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview CV/Resume Drafting and HR Interview advance theory Basics of Video Interviews and Video Profiles for Job

UNIT 3 Types of listening, advantages and disadvantages



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UNIT 4 Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report

UNIT 5 Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc

Syllabus: Lab L-T-P Life Skills I Lab Credits 1-0-1 2

UNIT 1 Debates / Speeches / Addressing the public / Extempore/Group Discussion  
Describing a hypothetical situation / theme / surroundings / appearance/personality traits/company/ a professional Concept/New Idea, / New Project through PPT and video aids

UNIT 2 Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview CV/Resume Drafting and HR Interview practice sessions elaborating the points as per the CV and industry demand Video Interviews and Video Profiles for Job-Practice session for Online Interviews

UNIT 3 Listening to variety of audio/video conversations including interviews, news, reports, reports, GDs, dialogues from body language, logic, wit and vocabulary perspectives

UNIT 4 Group Discussion-Practice sessions, Presenting New Idea/Concept/Proposal/ Project/ Report

UNIT 5 Activities on how to be a strong Personality, Motivation, Case studies for Resourcefulness and out of the box thinking, Role plays and Case studies on Risk taking, Self confidence and Self-esteem, Decision Making, Emotion Management, Cultural Adaptability, Multicultural Perspective towards things, ideas, views, codes etc

Methodology for Evaluation

1. Internal Assessment (Theory)

a) Home Assignments: One from each Unit : 15 Marks

b) In Semester Tests (Minimum two) : 30 Marks

c) Attendance : 05 Marks

2. Term End (Theory) : 50 Marks



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3. Internal Assessment (Lab) (a) Daily Performance in the Lab : 50 Marks

4. Term End (Lab) : 50 Marks

Suggested Readings:

1. A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.

2. Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.

3. Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.

4. The Hard Truth about Soft Skills, by Amazone Publication.

5. 101 Great Answers to the Toughest Interview Questions. Ron Fry. High Bridge Company. 1996.

6. Michael Swan. Practical English Usage, Oxford University Press.

**BBA IV Semester**  
**OPERATION MANAGEMENT**  
**SUBJECT CODE: BBA431A**  
**CREDITS: 3L**

**Unit I**

Introduction to Production and Operation Management: Products & Services, The product/Process Continuum, The Transformation Process, Product Design, Process Design, Automation, The Production Manager, Services Scenario in India, Medical Tourism in India, Characteristic of Services, Classification of Services, Service Capacity, Designing Service Processes, Service Blueprinting, Service Quality. Measuring Service Quality using SERVQUAL.

**Unit II**

Demand Forecasting: Quantitative methods of Forecasting, Qualitative methods of Forecasting, Aggregate Planning, Nature, Aggregate Production Planning, Production Planning Strategies, Disaggregating the Aggregate Plan, Assembling Line Balancing.



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### Unit III

Facility Location Planning: Introduction, Operations Strategies for Multiple Facilities, Factors Affecting Facility Location Planning, Locating Foreign Operation Planning. Facility Capacity and Layout Planning: Capacity and Capacity Planning, Facility Layout Planning.

### Unit IV

Inventory Management: Introduction, Uses of Inventory, Role of Other Functional Department, Types of Cost, Inventory Management System, Material Requirement Planning, Just-in-time, Supply Chain Management. Work Design: Job Design, Work Measurement.

### Unit V

Quality Management: A conceptual Framework, Dimensions of Quality, Cost of Quality, Quality at Average Stage, Quality System Standards, Bureau of Indian Standards, International Organization for Standardization, ISO 14000, COPC-2000. Project Management: Introduction, Role of Project management in other functional areas of management, Network Diagrams, Critical Path Method, Programme evaluation and review techniques, Limitations of PERT and CPM, Crashing of the project.

### Reference books:

1. Operation Research : V K Kapoor
2. Quantitative Techniques: Khandelwal, Gupta, Agarwal and Ahmed
3. Quantitative Techniques: N D Vohra
4. Production and Operation management: S N Charry

Corse Outcomes :Operation Management:

CO1: To acquaint the students with the basic manufacturing terms and technicality.

CO2: To increase the analytical skills with respect to the technicality.

CO3: To enable the students with the analytical skills in manufacturing process.

CO4: To make students understand the close relation between production process and cost control.

CO5: To understand the importance of planning with respect to the outcomes required.

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7			
CO1	M									
CO2				H		M				



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CO3		H			L					
CO4				M			M			
CO5	L	M				L				

### **BBA III Semester**

#### **Food and Beverage Management**

**SUBJECT CODE: BBA803A**

**CREDITS: (3L+1T=4)**

**Learning Objective:** To study of Food & Beverage management help to prepare students to meet the challenges associated with the Food and Beverage Industry. Students will gain a basic understanding of the Food and Beverage industry by analyzing the industry.

#### **Syllabus**

Unit I: The Food & Beverage Service Industry: Introduction to the Food & Beverage Industry, Classification of Catering Establishments (Commercial & Non- Commercial), Introduction to Food & Beverage Operations (Types of F&B Outlets).

Unit II: Food & Beverage management in a Hotel: Restaurant, Coffee Shop, Room Service, Bars, Banquets, Snack Bar, Executive Lounges, Business Centers, Discotheques & Night Clubs, Auxiliary areas; Food & Beverage management techniques, Type & Usage of techniques, Food & Beverage Service Personnel.

Unit III: Food & Beverage management Organization Structure - Job Descriptions & Job Specifications, Attitudes & Attributes of Food & Beverage personnel, competencies,

Unit IV: Basic Etiquettes, Interdepartmental relationship; Types of Food & Beverage management Service, Table management Service – English / Silver, American, French, Russian, Self-management Service – Buffet & Cafeteria, Specialized management Service – Gueridon, Tray, Trolley, Lounge, Room etc.,



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Unit V: Single Point management Service – Take Away, Vending Kiosks, Food Courts & Bars, Automats, Mis-en-place & Mis-en-scene.

### Course Outcomes:

CO 1: Develop general knowledge on the origins and development of food Management in hotels, restaurants, and institutions

CO 2: Identify trends likely to affect food management in the coming years.

CO 3: Identify a variety of managerial, production, and service positions that are typical of the food service industry and describe the roles these positions play in providing food service

CO 4: Identify and describe the various types of table management service, and develop service.

### Reference Books

- Singaravelavan, R. (2011). Food & Beverage Servicer (08 ed.). Oxford Unuversity Press
- Lillicrap& Cousins, Food & Beverage Service, ELBS, 2011 editionkills for employability & entrepreneurship.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		
CO2		M		M		M	
CO3	H		M				
CO4	M			H	L		M

- H = Highly Related; M = Medium L = Low



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**BBA III SEMESTER**  
**Front Office Management**  
**SUBJECT CODE: BBA806A**  
**CREDITS: 3L**

S.No.	Topic	
01	<b>COMPUTER APPLICATION IN FRONT OFFICE OPERATION</b> A. Role of information technology in the hospitality industry B. Factors for need of a PMS in the hotel C. Factors for purchase of PMS by the hotel D. Introduction to Fidelio & Amadeus	
02	<b>FRONT OFFICE (ACCOUNTING)</b> A. Accounting Fundamentals B. Guest and non-guest accounts C. Accounting system <ul style="list-style-type: none"> <li>• Non-automated – Guest weekly bill, Visitors tabular ledger</li> <li>• Semi-automated</li> <li>• Fully automated</li> </ul>	
03	<b>CHECKOUT PROCEDURES</b> <ul style="list-style-type: none"> <li>• Guest accounts settlement <ul style="list-style-type: none"> <li>- Cash and credit</li> <li>- Indian currency and foreign currency</li> <li>- Transfer of guest accounts</li> <li>- Express check out</li> </ul> </li> </ul>	
04	<b>CONTROL OF CASH AND CREDIT</b>	
05	<b>NIGHT AUDITING</b> A. Functions B. Audit procedures (Non-automated, semi-automated and fully automated)	



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06	<b>FRONT OFFICE&amp;GUESTSAFETYAND SECURITY</b>  A. Importance ofsecuritysystems B. Safedeposit C. Key control D. Emergency situations (Accident,illness,theft, fire,bomb)	
07	<b>FRENCH</b>  A. Expressions de politesse et les commander et Expressions d'encouragement B. Basic conversationrelatedtoFrontOfficeactivities such as <ul style="list-style-type: none"> <li>Reservations(personal andtelephonic)</li> <li>Reception(Doorman, BellBoys,Receptionistetc.)</li> <li>CleaningofRoom&amp;change ofRoometc.</li> </ul>	
<b>TOTAL</b>		

#### Course outcomes(CO)

- I CO1: To know the role of information technology in the hospitality management.  
II CO 2: Learning about accounting fundamentals in hospitality department.  
III CO3:Knowing about audit procedure in various types of hospitality industry.  
IV CO4: Making students learn about guest safety and security.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H		L				
CO2	M		L			M	
CO3	M	M					



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CO4	H						M
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**BBA IV Semester**  
**Tourism Trends & Issues (Domestic & International)**

**SUBJECT CODE: BBA807A**

**CREDITS: 4L**

**Learning Objectives:** To acquaint the students with concepts of Travel and Tourism Industry. To provide a broad understanding of the basic principles of management related to the Travel and Tourism Industry in Domestic & International

**Syllabus**

Unit I :Indian Culture: General Features, Sources, Relationship of culture and tourism. Cultural Heritage: Meaning, Scope and Significance of Heritage, Criteria for selection as heritage sites, Monuments and zone by UNESCO (WHO), Types of heritage property.

Unit II: World famous heritage sites and monument in India and abroad, National and International Organizations engaged in Heritage Management (UNESCO, ICOMOS, ASI, and NGOs) Architecture Heritage: Hindu Architecture-Famous Temple in India, Islam and Indo-Islamic Architecture -Famous Monuments in India, British and Indo British Architecture-Famous Public Buildings and monuments.

Unit III: Indian Museums: Concept and classification. Heritage Hotels and its classification, Indian Music, Fair and Festivals, Classical dance Introduction to Tourism: Definition & concepts of Tourism, Components & linkages of Tourism, Growth of tourism industry and historical development, through ages, Future of tourism industry.

Unit IV: General Tourism Trends. Types of Tourists, Visitor, Traveler, and Excursionist-Definition and differentiation. Tourism, recreation and leisure, their inter-relationships, sustainable tourism. Tourism Products & Attraction: Nature, Characteristics and Components of Tourism Industry. Elements and characteristics of tourism products. Tourism Product Life Cycle. Typology of tourism product.

Unit V: Types and Forms of Tourism: Inter- regional and intra-regional tourism. Inbound and outbound tourism, domestic, international tourism. Forms of Tourism: religious, historical, social, adventure, health, business, conferences, conventions, incentives, sports and adventure, senior tourism, special interest tourism. Alternative Tourism like culture or nature oriented, ethnic or 'roots' tourism and VFR. A study of Tourism Organizations: Government



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Organizations- DOT, ITDC, MTDC, ASI, TFCL, Domestic Organizations- TAAI, FHRAI, IATO; International Organizations- WTO, IATA, PATA.

### Course Outcomes:

CO 1: To provide students with the supervisory skills and competencies necessary to meet the needs of the ever demanding Travel and Tourism industry.

CO 2: Identify and assess relationships and networks relative to building tourism capacity.

CO 3: To develop necessary skills & Manage travel industry operations, either as a professional or an entrepreneur, using professional communication skills and travel industry knowledge.

CO 4: To provide a broad understanding of the basic principles of management related to the Tourism

### Reference Books

- K. Bhatia, International Tourism – Fundamentals & Practices, Sterling Publishers Private Limited, 1996
- K. Goswami & G. Raveendran Har, A Textbook of Indian Tourism, Anand Publications Pvt. Ltd., 2003
- Ratandeep Singh, Dynamics of Modern Tourism, Kanishka Publishes, Distributors, New Delhi, 1998 Travel and Tourism Industry.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		
CO2	M			M		M	
CO3	H		M				L
CO4		M		H			M

• H = Highly Related; M = Medium L = Low



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**BBA IV Semester**  
**Travel agency and Tour Operation**

**SUBJECT CODE: BBA808A**

**CREDITS: 4L**

**Learning Objective:** The course is very imperative as it shall orient the student with the basic understanding of the typical functioning of a travel concern. The course basically deals with various aspects of travel agency like its origin, setting up of travel agency, its functions like itinerary preparation, client handling etc.

**Unit -1**

History and growth of travel agency business, emergence of Thomas Cook. Emergence of Travel Intermediaries, Indian travel agents and tour operators - an overview.

Definition of travel agent and tour operator; differentiation, interrelationship of TA/TO and principles of present business trends and future prospects, problems and issues.

**Unit – 2**

How to set up principles of present business trends and future prospects, problems and issues  
Market research, sources of funding, Comparative study of various types of organisation proprietorship, partnership, private limited and limited , Govt. rules for getting approval, IATA rules, regulation for accreditation, Documentation, Practical exercise in setting up a TA/TO, Sources of earning : commissions, service charges etc., Entrepreneurial skill for travel, tourism and hospitality trade; problems of entrepreneurship in travel trade.

**Unit – 3**

Itinerary preparation, important considerations for preparing itinerary, costing, packaging and promotion.

**Unit - 4**

Tourism bills of Rights, tourism code, Manila declaration, International conventions: Warsaw convention 1924, Chicago convention 1944, Brussels convention 1961 and 1966 International convention on travel contract, Athens convention 1974, Helsinki accord 1976, The IATA general conditions of carriage (passenger and baggage)

**Unit - 5**

Consumer protection law, 1986, and Competition act applicable to the tourist as consumers. Master Key on customer care and master key proposed by WATA and ASTA. Corporate Travel Policy.

**Course Outcomes:**



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**[CO.1]** Understanding the growth of travel agency business, principles of present business trends and future prospects, problems and issues in tour industry.

**[CO.2]** Identifying and applying principles and regulations relating to principles of present business trends and future prospects, problems and issues in travel trade.

**[CO.3]** Understanding the Tourism bills of Rights, tourism code, Manila declaration, International conventions.

**[CO.4]** Understanding the processes of Consumer protection law, 1986 and Competition act applicable to the tourist as consumers.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M			L			L
CO2	H		M				M
CO3	M				L		L
CO4	M			L			L

**BBA IV Semester**

**Course Name :Python programming**

**Course Code (DCA004)**

<b>L (Hr.)</b>	<b>T (Hr.)</b>	<b>Pr (Hr.)</b>	<b>Credits</b>
2	0	2	3

**Course Objectives:**

1. Student will be able to understand the basic concepts of Python.
2. Student will be able to learn the concepts of programming by using loops and conditional blocks.



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3. Student will be able to demonstrate the use of complex data types, dictionary and codes.
4. Student will be able to describe the concepts of database.
5. Student will be able to understand the basics of python programming and packages.

## **Syllabus**

### **Unit 1**

Introduction to Python: Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc.

### **Unit 2**

Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.

### **Unit 3**

Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.

### **Unit 4**

Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations. Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, Exception Handling in Databases.

### **Unit 5**

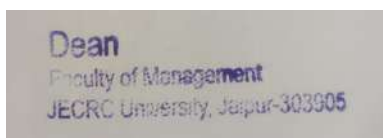
Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc. GUI Programming: Tkinter introduction, Tkinter and Python Programming, Tk Widgets, Tkinter examples. Python programming with IDE.

### **Text Book :**

- Introduction to Computing and Problem Solving Using Python, E. Balagurusamy McGrawHill Publication

### **Reference Books:**

- Wesley J. Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education, 2016





- Charles Dierbach, "Introduction to Computer Science using Python", Wiley, 2015
- Jeeva Jose & P. Sojan Lal, "Introduction to Computing and Problem Solving with PYTHON", Khanna Publishers, New Delhi, 2016
- Downey, A. et al., "How to think like a Computer Scientist: Learning with Python", John Wiley, 2015
- Mark Lutz, "Learning Python", 5th edition, O'Reilly Publication, 2013, ISBN 978-1449355739

### **Course Outcomes (CO's)**

After the completion of the course the student will be able to

CO1. To understand python variables, operators and data types

CO2. To apply python control structures

CO3. To use python complex data types

CO4. To apply Python files and databases

CO5. Student will apply python packages and GUI programming

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H						
CO2	H						
CO3	M						
CO4	H						
CO5	M						

H = Highly Related; M = Medium; L = Low

### **BBA V SEMESTER (2020-21)**

### **INTERNATIONAL BUSINESS MANAGEMENT**

**SUBJECT CODE: BBA251A**

**CREDITS: 3L (3)**

### **Objectives:**

The basis objective of this course is to provide understanding to the students with the global dimensions of management.



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## **UNIT I**

Overview: International Business- Introduction, Concept, Definition, Scope, Trends, Challenges and opportunities; Nature, Meaning and Importance of International competitive advantage, Multidimensional view of Competitiveness- Financial Perspectives- International monetary systems and financial markets, IMF, World Bank, IBRD, IFC, IDA, existing international arrangements; Globalization and foreign investment- Introduction FDI, national FDI policy framework, FPI, Impact of globalization.

## **UNIT II**

Globalization- Technology and its impact, Enhancing technological capabilities, Technology, generation, Technology transfer, Diffusion, Dissemination and spill over, Rationale for globalization, Liberalization and Unification of World economics, International Business theories, Trade Barriers- Tariff and Non- Tariff Barriers.

## **UNIT III**

Strategy making and international business- Structure of global organizations, Types of strategies used in strategic planning for achieving global competitive advantage, Meaning, Concept and scope of distinctive competitive advantage, Financial Integration, Cross border merger and acquisitions.

## **UNIT IV**

Socio cultural Environment- Managing Diversity within and across cultures, Country risk analysis, Macro environmental risk assessment, Need for risk evaluation; Corporate governance, globalization with social responsibility- Introduction, Social responsibility of TNC, Recent development in corporate social responsibility and policy implications.

## **UNIT V**

Global Human Resource Management- Selection, Development, Performance Appraisal and compensation, Motivating employees in the global context and managing groups across cultures, Multicultural management.

### **Reference Books:**

1. Bhalla, V.K. & Shivaramu, S., "International Business: Environment and Management", Anmol Publication Pvt. Ltd., Seventh Revised Edition, 2003.
2. Rao, P. Subba, "International Business", Himalaya Publishing House, Second Revised Edition, 2002
3. Goldsmith, Arthur A., "Business Government Society", Erwin Book Team.
4. Berry, Brian J L, Conkling, Edgar C & RD Michael, "The Global Economy in Transition", Prentice Hall International Ltd.

### **Course Outcomes: (CO)**



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1. Each student will be able to assess the role of social, cultural, political, legal, and technological environment in aiding or hindering international business.
2. Each student will be able to understand the theoretical relationship underlying international business transactions and the integration of functional activities in international firms.
3. Each student will be able to identify important opportunities and challenges in the international environment and design strategies to deal effectively with them.
4. Each student should be able to lead and implement internationalization.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		
CO2		M		M			
CO3	H		L			L	M
CO4		M	M			L	L

H = Highly Related; M = Medium L = Low



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**BBA V SEMESTER**  
**LEGAL ENVIRONMENT FOR BUSINESS**  
**SUBJECT CODE: BBA016A**  
**CREDITS: 3L(3)**

**Objective:** The purpose of this paper is to acquaint the students with the legal environment of India which dictates the conditions of doing business. The content aims at giving sufficient knowledge to the students, helpful in averting the potential legal problems.

**Unit I**

The Indian Contract Act, 1872: Meaning and Essentials of contract; law relating to offer, acceptance consideration, competency to contract, free consent, agreements declared void, performance of contracts, discharge of contracts, breach of contracts and quasi contract. Special contracts: contract of indemnity and guarantee, bailment and pledge, and agency.

**Unit II**

Sale of Goods Act 1930: Sale and agreement to sell, implied conditions and warranties, sale by non-owners, rights of unpaid seller. Negotiable Instruments Act, 1881: Meaning of negotiable instruments, type of negotiable instruments, promissory note, bill of exchange, cheque & bouncing of cheques.

**Unit III**

The Indian Companies Act, 1956: Meaning and types, incorporation, memorandum & articles of association, prospectus, issue of shares and bonus shares, rights issue, sweat equity, role of directors, share qualification, company meetings and management. The Limited Liability Partnership Act, 2008: meaning and nature of limited partnership, formation, partners & their relations, extent and limitation of liability.

**Unit IV**

Information Technology Act, 2000: Scheme of the act, definitions, digital signature, electronic governance. Competition Act, 2002: objectives, definitions, competition policy, prohibition of certain agreements and abuse of dominant position. Consumer Protection Act 1986: Objectives and machinery for consumer protection, defects and deficiency removal, rights of consumers.

**Unit V**

Intellectual Property Rights: The Patents Act, 1970, The Copyright Act, 1957, The Trade Mark Act, 1999, & The Right to Information Act, 2005: Salient features of the act and its redressal mechanism.

**Text Books:**

1. M.C.Kuchhal (2010). *Business Law* ( 5th ed.). Vikas Publishing House Pvt.Ltd.
2. S.S.Gulshan (2013). *Business Law*( 3rd ed.). Excel Books.

**References:**

1. Avtar Singh (2007). *Principles of Mercantile Law*( 8th ed.). Eastern Book Company.
2. Rohini Aggarwal (2007). *Mercantile and Commercial Law* (1st ed.). Taxmann.



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**Course Objective: (CO)**

1. Understand the legal framework which the International business operate.
2. Develop an understanding of the international legal environment.
3. Learn how to think clearly and logically about how business and legal matters intertwine.
4. Be able to recognize and apply basic principles of law to various problems which business faces

<i><b>Course Outcom e</b></i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	L		L		L	H
CO2		L	M			M	
CO3	H	M		M	M		L
CO4	L	M			L		H



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**BBA V SEMESTER**  
**INVESTMENT AND RISK MANAGEMENT**  
**SUBJECT CODE: BBA105A**  
**CREDITS: 3L+1T (4)**

**Objective:** The aim of this course is to provide a conceptual framework for analysis from an investor's perspective of maximizing return on investment – a sound theoretical base with examples and references related to the Indian financial system.

**Unit I Lectures:**

Basics of risk and return, concept of returns, application of standard deviation, coefficient of variation, beta, alpha. Bonds-, present value of a bond, Yield to Maturity, yield to call, yield to put, systematic risk, Price Risk, Interest rate risk, Default risk. Yield curve. Unsystematic risk and non-risk factors that influence yields. Duration and Modified Duration; Bond Convexity, Immunization.

**Unit II Lectures:**

Fundamental analysis: EIC framework; Economic analysis: Leading lagging & coincident macro-economic indicators, Expected direction of movement of stock prices with macroeconomic variables in the Indian context; Industrial analysis: stages of life cycle, Porter's five forces model, SWOT analysis, financial analysis of an industry; Company analysis. Share valuation: Dividend discount models- No growth, constant growth, two stage growth model, multiple stages; Relative valuation models using P/E ratio, book value to market value.

**Unit III Lectures:**

Technical analysis: meaning, assumptions, difference between technical and fundamental analysis; Price indicators- Dow theory, advances and declines, new highs and lows- circuit filters. Volume indicators- Dow Theory, small investor volumes. Other indicators- futures, institutional activity, Trends: resistance, support, consolidation, momentum- Charts: line chart, bar chart, candle chart, point & figure chart. Patterns: head & shoulders, triangle, rectangle, flag, cup & saucer, double topped, double bottomed, Indicators: moving averages (no numerals in technical analysis) Efficient market hypothesis; Concept of efficiency: Random walk, Three forms of EMH and Implications for investment decisions (No numerals). Portfolio analysis: Portfolio risk and return, Markowitz portfolio model: 2 and 3 asset portfolio, concept of efficient frontier & Optimum portfolio. Market Model: concept of beta systematic and unsystematic risk. Investor risk and return preferences: Indifference curves and the efficient frontier, Traditional portfolio management for individuals: Objectives, constraints, time horizon, current wealth, tax considerations, liquidity requirements, and anticipated inflation, Asset allocation: Asset allocation pyramid, investor life cycle approach, Portfolio management services: Passive – Index funds, systematic investment plans. Active – market timing, style investing.

**Unit IV Lectures:**

Capital asset pricing model (CAPM): Single period classical model. Characteristic line, Capital Market Line, Security market Line. Mutual Funds-Introduction, Calculation of Net Asset Value of a Fund, Classification of Mutual Fund Schemes (Open end & closed end, income & growth schemes, sectorial schemes, index Schemes, Fund of Funds Schemes, Gold Exchange Traded Fund, Hedge Funds, Faith based funds, Arbitrage funds) Tracking Error, Tactical Asset Allocation, diversification



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vs asset allocation, Portfolio Rebalancing . Performance Evaluation: Sharpe's Treynor's Jensen's & Sortino measures.

### Unit V Lectures:

Derivatives with respect to stocks and indices: Forwards and Futures, Options and related terminology; in the money, at the money and out of the money options. Calculating the payoff from options and diagrammatic representation. Factors that influence put and call prices. Black and Scholes Model demonstrated using templates in Excel (No Derivations or manual calculations of B& S model). Some motivations for buying and selling options; Simple combinations of underlying asset & options; Option spreads: Covered call, Bull & Bear spreads with puts and calls, Straddle, Collars.

### Text Books:

1. Fischer, D.E. & Jordan, R.J. (2006). *Security Analysis & Portfolio Management* (6th ed.). Pearson Education.
2. Sharpe, W.F., Alexander, G.J. & Bailey, J. (1998). *Investments* (6th ed.). Prentice Hall of India.

### References:

1. Singh, R. (2009). *Security Analysis & Portfolio Management* (1st ed.). Excel Books.
2. Shahani, R. (2011). *Financial Markets in India, A Research Initiative* (3rd ed.). Anamika Publishers & Distributors (P) Ltd
3. Frank K Reilly & Keith C Brown (2006). *Investment Analysis and Portfolio Management*. (8th ed.). Cenage India Pvt. Ltd.

### Course Outcomes: (CO)

1. Provide a detailed explanation of financial instruments such as options, futures, swaps and other derivative securities.
2. Describe the economic environment in which such instruments operate.
3. Develop and employ theoretical valuation methods to price these financial instruments.
4. Apply these instruments in managing the risk of investing and hedging activity at the individual and the corporate level.

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	M					L	L			
CO2		M	L			H				
CO3	H				L		L			
CO4		L		M	L					



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## **Event Management**

**CREDITS: (3L)3**

**Paper code: BBA025A**

**Objective :** To make students capable enough to understand the management and operational aspects pertaining to event management.

### **Unit I**

Event Management: - Concept, Importance and Advantages, Type of events Cultural, festivals, religious, business etc, Qualities of Event managers.

### **Unit II**

Event Planning: Concept and Design- purpose of an event, Analysis of need of audience, Process of event planning, Venue selection and Contracting Event Venue.

### **Unit III**

Event Analysis: Market Research, Market Analysis, Competitors Analysis in Event Planning, SWOT Analysis in Event Planning, Project planning and development

### **Unit IV**

Event Marketing: Introduction, Steps involved in creating a promotional campaign, Event promotion: advertising and public relation, formulation of event marketing budget and budget plan. Identifying funding resources,

### **Unit V**

Introduction, Trade shows and exhibitions, principal purpose, types of shows, benefits.

**Books Recommended :**



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- 1) Corporate Events, Sohini Singh
- 2) Event marketing & mgt – Sanjaya Singh Gaur, Sanjay V. Saggere
- 3) Best Practices in Modern Event Management.-Goldblatt-, John Wiley & Sons.
- 4) Allen, J. (2000). Event Planning : The Ultimate Guide to Successful Meetings, Corporate Events, Fundraising Galas, Conferences, Conventions, Incentives and Other Special Events. Canada : Wiley.
- 5) Armstrong, J. S. (2001). Planning Special Events. New York : Josse Bass Wiley

**Course Outcomes(CO):**

- Student will understand the role of management in past and present media.
- This subject will provide management students an insight about current scenario of various types of Events organised.
- This Syllabus will make students understand about business dynamics of Event management..
- By reflexive learning, students can have opportunity to explore their future career possibilities in Event Management Sector.
- With this interdisciplinary subject students will come to know about the intimate relations between Event and management sector.

<b>Course Outcome</b>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L					M			
CO2	L			M						
CO3	M					L	M			
CO4						L				
CO 5	H		M		H	M				



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**BBA V SEMESTER**  
**CORPORATE STRATEGY**  
**SUBJECT CODE: BBA017A**  
**CREDITS: 3L(3)**

**Objective:** To understand the concepts underlying how strategy is implemented in the business environment.

**Unit I**

Introduction to Strategy: Nature & importance of business policy & strategy, Introduction to the strategic management process, Strategic Management & related concepts, Characteristics of corporate, business & functional level strategic management decisions. Company's mission statement, Need for a mission statement, Criteria for evaluating a mission statement, Formulation of a mission statement

**Unit II**

Environmental Analysis & Diagnosis: Analysis of company's external environment-Environmental impact on organization's policy and strategy, Organization's dependence on the environment. Analysis of remote environment, Analysis of specific environment- Michael E.Porter's 5 Forces model, Positioning against five forces. Analysis of internal environment-Importance of organization's capabilities, competitive advantage and core competence, Michael E. Porter's Value Chain Analysis.

**Unit III**

Competitive Strategies: Perspectives to competition- industry, marketing & strategic group; Competitive strategies- Michael E. Porter's generic competitive strategies, Implementing competitive strategies- offensive & defensive moves.

**Unit IV**

Corporate Strategies: Formulating corporate strategies, Introduction to strategies of growth, stability and renewal, types of growth strategies – concentrated growth, product development, integration, diversification, international expansion (multi domestic approach, franchising, licensing and joint ventures), strategic fundamentals of merger & acquisitions(M&A), types of renewal strategies – retrenchment and turnaround.

**Unit V**

Strategic Frameworks: Strategic analysis & choice, Strategic gap analysis, Portfolio analysis – MECE approach, BCG, GE, product market evolution matrix, experience curve, directional policy matrix, life cycle portfolio matrix, Grand strategy selection matrix; Behavioral considerations affecting choice of strategy. Culture and strategic leadership: Implementing & operationalizing strategic choice, Impact of structure, culture & leadership; Functional strategies & their link with business level strategies.

**Text Books:**

1. Pearce, J.A., Robinson, R.B. & Mittal Amita. *Strategic Management: Formulation, Implementation and Control* (12th ed.). India: Tata McGraw-Hill Publishing Company Ltd.
2. Ghosh, P.K. (10th ed.). *Strategic Management*. India: Sultan Chand and Sons.



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**References:**

1. Michael Porter. *Competitive Strategy*.
2. Thompson, Arthur A., Strickland III, A. J., Gamble, John E. and Jain A.K. (2006). *Crafting and Executing Strategy: Concepts and Cases* (14th ed.). India: Tata McGraw Hill.

**Course Outcomes: (CO)**

1. Analyze the main structural features of an industry and develop strategies that position the firm most favorably in relation to competition and influence industry structure to enhance industry attractiveness.
2. Recognize the different stages of industry evolution and recommend strategies appropriate to each stage.
3. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable competitive advantage and formulate strategies that leverage a firm's core competencies.
4. Analyze dynamics in competitive rivalry including competitive action and response, first-mover advantage, co-opetition and winner-take-all and make appropriate recommendations for acting both proactively and defensively.

<b>Course Outcome</b>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		M				L	H			
CO2	M			M						
CO3	H			L		L	M			
CO4		L	L				H			



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**BBA521A**  
**TRAINING & DEVELOPMENT**  
**(L, T, P) = 3 (3, 0, 0)**

Unit	Course Contents	Total Contact Hours-36
I	<b>Introduction to Training &amp; Development</b> :Training and Training needs Assessment ,Training Design and Administration ,Training methods,	6
II	<b>Performance Appraisal &amp; Training</b> :Learning through training, Adult Learning (Andragogy, Learning Styles	7
III	<b>Trainer &amp; Training Institutions</b> ., Types of Training, Trainer as a change Agent, MDP and EDPs.	8
IV	<b>Evaluation of Training</b> : Training Evaluation & ROI, Trainer of Training, Measurement Tools & Technique, Feedback Mechanism.	8
V	<b>Effectiveness of Training &amp; Development</b> : Meaning ,effectiveness ,Cost of Training , Training & Employee Relation	7

**Reference/Text Books:**

1. Effective HR training and development strategy-Dr B.Rathan Reddy ,Himalya pub house 2005
- 2.Udai Pareek- Training and development
- 3.Lynton, R.P.and Pareek U-Training for Development Vistaar Publication N.Delhi
- 4.Bhatnagar, O.P- evaluation methodology for Training-Oxford and IBM



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### **E-Business (BBA552F)**

**(L, T, P) = 3(3 0, 0)**

<b>Unit</b>	<b>Course Contents</b>	<b>Total Contact Hours - 36</b>
<b>I</b>	<b>Introduction to E-Commerce:</b> Meaning and concept, electronic versus traditional commerce, Media convergence, E-commerce and E-Business, Channels of e-commerce, Business applications of e-commerce.	7
<b>II</b>	<b>Internet Concepts and Technologies:</b> Concept and Evolution of internet, Web technologies, Client server concept, Hypertext information to network, Benefits of hypertext, HTTP, HTML potential competitors and entry barriers, Internal resource and competitive advantage	8
<b>III</b>	<b>Business Models of E-Commerce and infrastructure:</b> E-Commerce Models, Supply chain Management remote servicing, E-commerce Resources and infrastructure resourced and planning for infrastructure	7
<b>IV</b>	<b>E-Business Architecture &amp; E-CRM,</b> Decision Support in E-Business: Web analytics	7
<b>V</b>	Technologies for E-Business: Security and payment systems.	7

#### **Books Recommended:**



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1. Sudhir Sharma – E-Commerce (Tata McGraw Hill)
2. Agarwal, K.N and Deeksha Agarwal – Business on Net – What's & How's of E-Commerce (McMillan)
3. Kosivir, David – Understanding Electronic Commerce, Microsoft Press.

### **Banking Concept & Finance (BBA 501A)**

**C (L, T, P) = 3(3, 0, 0)**

<b>Unit</b>	<b>Course Contents</b>	<b>Total Contact Hours – 36</b>
<b>I</b>	<b>Introduction:</b> Evolution of Commercial Banks, Meaning and definition of Banking, Features and classification of banks	7
<b>II</b>	<b>Banking System:</b> Basic Concept of different Types of Banking Systems, An overview and structure of Indian Banking System, Recent development in Banking Sector	7



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<b>III</b>	<b>Commercial Banking:</b> Basic Concepts of Commercial Banks, Role of Commercial banks in Financial Market, Creation of Credit, Factors affecting credit creation	7
<b>IV</b>	<b>Commercial Banks and Customer Relationships:</b> Definition of customer, Features of contractual customer relationships, Customer orientation, Rights of a customer and a banker, Protection to collecting and paying under NI Act, Banking Ombudsman, Consumer forums	8
<b>V</b>	<b>Recent Trends :</b> Recent regulations on Commercial Banks in India, Capital Adequacy Norms, SARFAISI Act 2002	7

**Books Recommended:**

1. Varshney. P.N. – Banking Law and Practice
2. Paramemeswaran, R & Natarajan, R – Indian Banking
3. Vaish, M.C – Money, Banking and International Trade

**International Marketing (BBA 511B)**

**C (L, T, P) = 3 (3, 0, 0)**

<b>Unit</b>	<b>Course Contents</b>	<b>Total Contact Hours – 36</b>
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<b>I</b>	<b>Introduction:</b> An overview to international business and trade theories - introduction to marketing communication, free trade v/s protection, classical, modern theories, gain and terms of trade.	7
<b>II</b>	<b>International Business Management:</b> International business management - the economic environment, social & cultural, political legal and regulatory environment, competitive advantage in global environment, market entry expansion and partnership.	7
<b>III</b>	<b>International Finance &amp; Institutional Systems:</b> International finance & institutional systems - foreign exchange, balance of payments, importing and exporting, trade blocks, international monetary fund & world bank, the triad and other manner.	7
<b>IV</b>	<b>International Marketing Mix Elements:</b> International marketing mix elements - product decisions, pricing decisions, marketing channel & place decision promotion decisions, organizing & controlling.	7
<b>V</b>	<b>Strategic Issue for International Marketing:</b> Strategic issue for international marketing - marketing information system & research, segmentation, targeting & positioning, planning process.	8

#### **Books Recommended:**

1. Cherunilam, F: International Business (or International Marketing) – PHI, New Delhi
2. Varshney, R.L and Bhattacharya, B – International Marketing Management – Sultan Chand, New Delhi
3. Terpstra, V – International Marketing



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## Advertising Management (BBA 512B)

C (L, T, P) = 3 (3, 0, 0)

Unit	Course Contents	Total Contact Hours – 36
I	<b>Introduction:</b> Definition of Advertising, Characteristics and Benefits, The advantage world – advertisers, advertising agencies, Media and the target of audience	7
II	<b>Advertising Planning:</b> Setting of Advertising Objectives, Definition of the target audiences, Product personality and perceptions, Marketing objectives, Applying DAGMAR, Advertising appropriation – methods.	7
III	<b>Creative Strategy:</b> The Positioning Strategy, The choice of appeal and the mode of message, The theme, Use of comparative messages	7
IV	<b>Media Decisions:</b> Concept, role of media, Types of media, media characteristics, Media planning models (press models & cinema models), Concept of Media Scheduling	7
V	<b>Evaluation of Advertising Effectiveness:</b> Areas of assessment of Effectiveness, Basic approaches for testing advertising, Methods of pre and post testing.	8

### Books Recommended

1. Aakar, DA, Myers, JG & Batra R – Advertising Management – PHI, New Delhi
2. Mohan, M – Advertising Management – Concept and causes – TMH, New Delhi
3. Kazmi & Batra – Advertising Sales Promotion – Excel, New Delhi



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## Organizational Change & Intervention Strategies (BBA 522C)

C (L, T, P) = 3 (3, 0, 0)

Unit	Course Contents	Total Contact Hours – 36
I	<b>Organization Change:</b> Understanding Change, Factors Influencing Change, Managing Resistance to Change, Change Agents, Disruptive Innovations	7
II	<b>Introduction to OD:</b> Concept & Definition of OD, Process of OD, <b>Organizational Diagnosis:</b> Diagnosing Organization, Diagnosing Groups and Jobs, Collecting and Analyzing Diagnostic Information	7
III	<b>Human Process Interventions:</b> Interpersonal and Group Process Approaches, Process Consultation, Third-party, TeamBuilding. <b>Organizational Process Approaches:</b> Organization Confrontation, Intergroup Relations, Grid OD, Large Group Intervention	7
IV	<b>Techno Structural Interventions:</b> Restructuring Organization, Reengineering, Employee Involvement, Parallel Structures, Total Quality Management, Work Design, Motivational Approach, Sociotechnical Systems Approach, Job Design Approach	8
V	<b>Strategic Interventions:</b> Transorganizational Development, Mergers & Acquisitions, Transformational Change, Cultural Change	7

### Books Recommended:

Wendell L.French  
Cummings & Worley  
Alderter  
S. Neelmeghani

Organizational Development  
Organizational Development & Change  
Organizational Development  
Management Development



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## Computer Networks (BBA 552F)

C (L, T, P) = 3 (3, 0, 0)

Unit	Course Contents	Total Contact Hours-36
I	Network, Network protocols, Edge, Access networks and physical media. Protocol Layers and their services models	7
II	Application layer: protocol and service provided by application layer, transport protocol. The world wide web. Electronic mail, SMTP, mail message formats and MIME and mail access protocols.	7
III	Transport layer: Transport layer service and principles, multiplexing and demultiplexing applications. Connectionless transport. UDP segment structure and UDP checksum. Principles of reliable data transfer-GO back to N and selective repeat.	7
IV	Network layer and routing: Network service model, routing principles. Link state routing algorithm, A distant vector routing & OSPF algorithm.	7
V	Router components; input port, switching fabric and output port. IPV6 packet format. Point to point protocol (PPP), transition states, PPP layers-physical layer and data link. Authentication PAP and CHAP, network control protocol (NCP)	8

### Recommended books:-

1. J.F. Kurose and K.W. ross-computer networking, pearson eduction Asia.
2. B.A. Forouzan Data communications and networking, Tata Mc-Graw Hill.
3. Garcia and Widjaja-Communication networks, Tata Mc-Graw Hill



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**Personal Financial Planning (BBA 502A)**

**C (L, T, P) = 3 (3, 0, 0)**

<b>Unit</b>	<b>Course Contents</b>	<b>Total Contact Hours – 36</b>
I	Understanding the financial planning process:- The rewards of sound financial planning-planning for a life time-the planning environment-determinants of personal income financial statements and plans mapping the financial future-time value of money preparing personal income statement and balance sheet-making cash budgets Managing Tax:-Principles of income taxes computation of salary, rental income & capital gains, other income-filling return tax planning-other income-filling returns tax planning-other forms of personal taxes provisos of wealth tax act & computation of net wealth & wealth tax.	7
II	Making decisions regarding purchase of automobiles and houses: - deciding whether to lease or buy-finding an affordable house-the house-buying process-housing finance. Managing credit-opening an overdraft account using credit carefully consumer loans.	7
III	Managing insurance needs:- Basic insurance concepts-deciding on the amount of life insurance required-key features of life insurance policies-buying life insurance types and sources of health insurance plans-principles of property insurance-automobile insurance other types of insurance. Managing investments:-Investment planning securities markets-transaction in the securities markets-online investing-mutual funds –financial planner’s Advice, stock brokers research and advice, portfolio tracking, private banking options of different banks, and discretionary portfolio management services-sharp’s ratio, treynor’s ratio, jensen’s measure, information ratio.	8
IV	Alternate Investment Options- Art, Gold, antiques, commodities, real estate, REITS, real e related mutual funds, charity, investments outside India. Retirement planning-estimating needs at retirement-social security –pension plans and retirement plans-annuities, reverse mortgage.	8
V	E planning:-Wills-trusts-gift taxes-e taxes and tax planning. Marketing of Financial Products:-Relationship marketing-selling in a competitive	6



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	environment-steps in the relationship management process-segment, profile, expose, strategize, execute, monitor and review-personal selling skills.	
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**Sustainable Development (BBA 531D)**  
**C (L,T,P) = 3(3,0,0)**

<b>UNIT</b>	<b>Course Contents</b>	<b>Total Contact Hours = 36</b>
<b>I</b>	<b>Introduction</b> <ul style="list-style-type: none"> <li>• Ethics, Business Ethics, Corporate Governance, Governance through Inner Consciousness and Sustainability</li> </ul> <b>Ethical Principles in Business</b> <ul style="list-style-type: none"> <li>• Role of Board of Directors</li> <li>• Organization Climate and Structure and Ethics</li> <li>• Case Studies and Contemporary Developments</li> </ul>	<b>7</b>
<b>II</b>	<b>Sustainability</b> <ul style="list-style-type: none"> <li>• Meaning and Scope</li> <li>• Corporate Social Responsibility and Corporate Sustainability</li> <li>• Sustainability Terminologies and Meanings</li> <li>• Why is Sustainability an Imperative</li> <li>• Sustainability Case Studies</li> <li>• Triple Bottom Line (TBL)</li> </ul>	<b>7</b>
<b>III</b>	<b>Corporate Sustainability Reporting Frameworks-I</b> <ul style="list-style-type: none"> <li>• Global Reporting Initiative Guidelines</li> <li>• National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business</li> </ul>	<b>7</b>
<b>IV</b>	<b>Corporate Sustainability Reporting Frameworks-II</b> <ul style="list-style-type: none"> <li>• International Standards</li> <li>• Sustainability Indices</li> <li>• Principles of Responsible Investment</li> <li>• Challenges in Mainstreaming Sustainability Reporting</li> <li>• Sustainability Reporting Case Studies</li> </ul>	<b>7</b>
<b>V</b>	<b>Legal Framework, Conventions, Treaties on Environmental and Social Aspects</b> <b>Principle of Absolute Liability – Case Studies</b> <b>Contemporary Developments – Integrated Reporting</b>	<b>8</b>



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## Startup Principals (BBA532D)

C (L, T, P) = 3 (3, 0, 0)

Unit	Course Contents	Total Contact Hours – 36
I	<b>Introduction:</b> Definition, meaning, importance and relevance types & characteristics and classification of entrepreneurship, identification of business barriers to entrepreneurship. Opportunities, environment scanning in rough 7 Domains of market attractiveness & porter's 5-forcus model	8
II	<b>Needs, Tools techniques:</b> For market assessment & survey, entrepreneurship motivations & environment innovations & creativity for startups.	7
III	<b>Business plan writing,</b> scope, type, process of identifying target market, survey industry & competition analysis.	7
IV	<b>Entrepreneurship development program:</b> Objectives, Programs of EDP, Entrepreneurial development cause Relevance & Accruements or EDP	7
V	<b>Small business management:</b> Starting up a new business venture, Scope of fund raising to start up a new venture.	7

### Books Recommended:

1. Jain P.C handbook for New Entrepreneurs: Oxford University Press
2. Drucker Peter F: Innovation & Entrepreneur
3. Lalitha D Rani : Women Entrepreneur. APH Publishing Corporation

**MEDIA MANAGEMENT**  
**SUBJECT CODE: BBA401A**  
**CREDITS: 3L+1T [4]**

**Objectives:** Student will understand the role of management in past and present media.

### UNIT I



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Pre- print era:- Characteristics of oral cultures and communication, Brief history of printing, Development of newspapers and magazines, Growth of Indian press, Post independent press Language newspapers and magazines in India, Business of the press today.

## UNIT II

Content for Mobile Devices: Client focused content development for business, Basic underlying creative processes for delivery of content on mobile devices, Interactive Mobile content: consumption, design, animation, multimedia, games, video, photographs and images, sound and music on mobile, Conceptual design and creativity for the marketing campaign, Short Form Mobile Content, Blended Mobile Video.

## UNIT III

The Animation Industry: An overview, The trends in animation industry, Prospects and markets, Production planning for animation, Problems and cost implications, Development of animation in India, Animation- success stories.

## UNIT IV

The rise of television, Experimental work with educational television in Latin America and Africa, Television in India. A tool for education and public service, SITE and post SITE developments, Emergence of foreign satellite channels and cable network.

## UNIT V

Current issues of autonomy, deregulation and DTH. Business of the television industry today. The internet and future of mass media, Historical background and issues of convergence and new media

### References:

1. John Durie, Annika Pham, Neil Watson, *Marketing And Selling Your Film Around The World: A Guide For Independent Filmmakers*, Silman-James Press, 1998.
2. Harvard Business School Publishing, *Guide To Managing Creativity And Innovation: Harvard Business*, Harvard Business School Press, 2003.
3. Robert Marich, *Marketing to Moviegoers: A Handbook of Strategies and Tactics*, Southern Illinois University Press, 2009.

COURSE OUTCOME: Media Management

- Student will understand the role of management in past and present media.



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- This subject will provide management students an insight about current scenario of various types of Media houses.
- This Syllabus will make students understand about business dynamics of Media Houses i.e. Print, TV, Radio, New Media, Advertising, Public Relations(PR) and Convergent Media.
- By reflexive learning, students can have opportunity to explore their future career possibilities in Media Management Sector.
- With this interdisciplinary subject students will come to know about the intimate relations between media and management sector.

<b>Course Outcome</b>	<b>Program Outcome</b>							<b>Program Specific Outcome</b>		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L					M			
CO2	L			M						
CO3	M					L	M			
CO4						L				
CO 5	H		M		H	M				



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**CUSTOMER RELATIONSHIP MANAGEMENT**  
**SUBJECT CODE: BBA162A**  
**CREDITS: 3L [3]**

**Objective-**

The objective of this course is to: understand the relationship marketing as a means of building relations with all the stakeholders; and understand the promotion mix objectives.

**Syllabus**

**UNIT I**

Fundamental Concepts in Relationship Marketing, Customer Acquisition and Retention Strategies. Customer Loyalty. Analyzing Profitability of Customers. Overview of CRM and Web Based Technologies.

**UNIT II**

Integrated Relationship Marketing Strategies. Retail Marketing Communication. Role of Retail Promotion Program- Methods for Communicating with the Customers, Sales promotion, Public relations, Personal selling.

**UNIT III**

Planning Retail Communication Program- Establishing objectives, determining promotional budget, assigning the Promotional Budget, objectives and task method, thumb rule method.

**UNIT IV**

Implementing advertising programs - creating message advertising agencies, selecting advertising media, determining the frequency and timing of advertisements. Evaluating the effectiveness of advertisements, Implementing Sales Promotion Programs, Implementing Publicity Programs, Learning Organization.

**UNIT V**

CRM Implementation – A comprehensive model - Developing CRM vision and strategy Management support, Introduction: ERP- An Overview - Enterprise- An Overview - Benefits of ERP - ERP and Related Technologies.

**Recommended Texts**



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- Barnes James G., *Secrets of Customer Relationship Management*, McGraw-Hill, 1<sup>st</sup> Edition, 2000.
- Balasubramanian, K., *Essence of Customer Relationship Management*, learn Tech press
- Swift Ronald S., *Accelerated Customer Relationships*, Prentice-Hall of India, New Delhi, 2000.
- Gosney, John W., and Boehm, Thomas P., *Customer Relationship Management Essentials*, Prentice-Hall of India, New Delhi, 2000.
- Berman B. and Evans J. R., *Retail Management*, Pearson Education, New Delhi, 2002.

## 2. Customer relationship management:

- To know the requisite of customer relations in management.
- To understand the basic of building relations with all the stakeholders.
- To analyze the abrupt demands of the customers.
- To provide the importance of customer loyalty.
- To acquaint the results of effective communication.

<b>Course Outcome</b>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			M			L	L			
CO2		L	M	L						
CO3	M					L				
CO4					H	M				
CO 5		H	L				L			

### **Banking Law & Practice** **Subject Code: BBA503A** **3L**

**Learning Objective:** This course is targeting students who wish to pursue research& development in the field of banking and Finance and at Globe level. This course offers an



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introductory level knowledge on working of banking sector India and also deals with the various Tools and techniques used for marketing by Banking Institutions of India. This course also deals with the basic knowledge about the role of various regulators and emerging areas of banking sector in India.

### **Syllabus**

#### **Unit I**

Banking Legislation: Introduction, evaluation of Banking Law in India Banking Regulation Act, 1949: Scope of the Act: Definition of Banking. Licensing of Banking Companies, Maintenance of Assets and Liabilities, Bank Balance Sheet,

#### **Unit II**

RBI Act, 1934; Reserve Bank's Powers of Inspection and Directions. Restriction on Loans and Advances, Collection and Furnishing of Credit Information Scheme of Management for Nationalized Banks.

#### **Unit III**

Law Relating to Negotiable Instruments: The Negotiable Instruments Act, 1881, Provisions relating to Bills of Exchange, Promissory Notes and Cheques, their Acceptance and Endorsements. Holder and holder in-due-course. Circumstances under which the banker may/must refuse to pay the cheques of customers, statutory protection to paying banker, position of collecting bankers. Rules regarding the instruments obtained by fraud, misrepresentation, forgery and illegal means.

#### **Unit IV**

Organizations: Banks-Their organization and performance appraisal. Organizational structure of Banks Formulation of Policies & their integration. Policies of Nationalized Banks or Mobilization of Deposits, Advances of Loans and Credit expansion.

#### **Unit V**

Administration: Principles of Management: Their application to Bank Management. Delegation of Authority - Centralization V/s Decentralization. Board of Directors: Concept of balance Board- Their Advantages to Banks

### **Course Outcomes:**

CO. 1: Describe the Basic of Indian Banking Sector and their structure.

CO 2: To understand the basic role, functions and marketing of Indian Banking sector to enhance employment.

CO 3: Students are able to recognize importance of Contemporary issues in Banking services in India.

CO.4: Students are able to understand the role of various regulators of Indian Banking Sector and also about the emerging professional skills in the field of banking.



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**Suggested Readings:**

1. Brech, E.F.L. : The Principles & Practice of Management
2. Drucker, P.F. : The Practice of Management
3. Khertamwala, J.S. : The Negotiable Instruments Law
4. Tannan, M.L. : Banking Law & Practice in Industries
5. Davar, S.R. : Law & Practice of Banking
6. Sherlekar : Business Administration & Management.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		L
CO2	M			L		L	
CO3	H		M				M
CO4	M				L		L



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**E – COMMERCE**  
**SUBJECT CODE: BBA019A**  
**CREDITS: 3L [3]**

**Objectives:** A student should become familiar with mechanism for conducting business transactions through electronic means.

**UNIT I**

Introduction: Conceptual Framework of E-Commerce, General Model of Business, Electronic Means of doing Business-Defining E-commerce-Emergence of E-Commerce on Private Networks, Forces Effecting E-Commerce, E.D.I:Nature ,Benefits& Demerits of E.D.I,

**UNIT II**



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Types of E-Commerce: Inter Organisation (B2B) E-Commerce, Intra- Organisational E-Commerce and Business to Consumer (B2C) E-Commerce.

### UNIT III

Building on E-Commerce Enterprise: Ascertain the Need for E-Commerce, Competition, Global Reach, Customer Service, Value Additions, Operations Oriented Process, and Products Setting up a Website, Domain Name Registration, Developing Static Web Pages, and Integration with Operational Databases, Dynamic Websites, Registering the Website with Search Engines.

### UNIT IV

Electronic Payment Systems: Overview of Electronic Payment Technology.

### UNIT V

Introduction to legal and Security Issues in E-Commerce, Legal issues:Laws for E-Commerce, Issues of Trademarks & Domain Names, E-commerce in India: The Internet in India , Barriers to Growth of E-Commerce in India.

### References:

1. Agarwala, *E-Commerce*, Macmillian India Limited, 2000.
2. RaviKalakota and Marcia Robinson, *e-Business Roadmap for Success*, Addison Wesley, 1999.
3. AbhijitChaudhury, Jean- Pierre Kuilboer, *E business and E commerce, Infrastructure : Technologies Supporting the e- Business Initiative*, Tata Mc-Graw Hill, 2001.

### 3. E- Commerce:

- A student should become familiar with mechanism for conducting business transactions through electronic means.
- To analyze the dynamically changing trends in the technology and its impact on business.
- To acquaint the emerging opportunities worldwide for business.
- To identify active approach adopted for start-ups these days.
- The understand combination of creativity and technology required for emerging entrepreneur.



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<b>Course Outcome</b>	<b>Program Outcome</b>							<b>Program Specific Outcome</b>		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	M			L	L	L	H			
CO2	H		L			H	M			
CO3	M			M		H				
CO4	L	L			L	M				
CO5	M	M					H			

**PROJECT MANAGEMENT**  
**SUBJECT CODE: BBA020A**  
**CREDITS: 3L [3]**

**Objectives:**



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The aim is to provide a suitable framework for gaining insight in the process of preparation, appraisal, monitoring and control of a project.

### **Unit I**

Introduction to Project Management: Definition, functions, evolution of Project Management, classification of projects, Project management in different environments. The Project Management Systems, Methodologies & Systems Development Cycle: Systems approach, systems analysis, systems development, project feasibility, project life cycle, project appraisal, project contracting, phases of system development life cycle.

### **Unit II**

Project Feasibility Study: Developing a project plan, market and technical analysis, financial analysis evaluation of project proposals, risk analysis, sensitivity analysis, and social cost benefit analysis. Project Planning: Planning fundamentals, project master plan, work breakdown structure & other tools of project planning.

### **Unit III**

PERT, CPM, Resource allocation: Tools & techniques for scheduling development, crashing of networks, time-cost relationship, and resource leveling multiple project scheduling.

### **Unit IV**

Cost Estimating Budgeting : Cost estimating process, elements of budgeting, project cost accounting & management information systems, cost schedules & forecasts. Managing Risks in Projects: Risk concept & identification, risk assessment, risk priority, risk response planning, risk management methods.

### **Unit V**

Project Control: Information monitoring, internal & external project control, cost accounting systems for project control, control process, performance analysis, variance limits, and issues in project control. Project Management Information System: Computer based tools, features of PMIS, using project management software(MS Projects), Project Evaluation, Reporting & Termination: Project reviews & reporting, closing the contract.

### **References-**

1. S. Choudhury, Project Scheduling and Monitoring in Practice.
2. P. K. Joy, Total Project Management: The Indian Context, Macmillan India Ltd.
3. HoraldKerzner, Project Management: A Systemic Approach to Planning, Scheduling and Controlling, CBS Publishers, 2002.
4. Wiest and Levy, Management guide to PERT/CPM, PHI.



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## COURSE OUTCOMES: Project Management

- To provide a suitable framework for gaining insight in the process of preparation of a projects.
- To analyse the close relationship between project scheduling and the cost of project.
- To acquaint with various tools and techniques of project management.
- To provide the requisite knowledge of project related issues.
- To understand the various process like appraisal, monitoring and control of a project.

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	M		M			M	L			
CO2	H	L			L					
CO3				M		L	M			
CO4	M	L	L		M					
CO5		L			L	M	L			

## LEADERSHIP SKILL

**Paper Code: BBA194A**

**Credits: 3**

Unit	Course Contents
I	<b>Organizational Learning :</b> The Learning Organization, Leading a learning Organization, Creativity & Innovation
II	<b>Leadership:</b> Understanding Leadership, Leadership Style, Leadership Skills & Tactics, The making of a Leader
III	<b>Effective Leadership Processes:</b> Historical studies on Leadership, Coaching Leaders, Developing Performing Teams
IV	<b>Leadership Culmination :</b> Leadership Succession, Level 5 Leadership, Narcissistic Leaders, Leadership Challenges



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V	Case Studies on leading business houses and their leadership style- Reliance, Infosys, wipro, Tata.
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### Course outcomes: Leadership Skills

- To understand the implementation of an effective leadership style.
- To acquaint the relationship between the effective leadership and increased productivity.
- Nurture future leaders.
- Increase employee engagement.
- Make better decisions.

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		M	L				M			
CO2	H			L		H	L			
CO3		M		M	L		H			
CO4		L	M			L				
CO5	H			L	L		H			

## Semester 5

### International Tourism

**Learning Objectives:** Basically know ledge of International Tourism shall provide an insight to the students about the destinations of the world; their climates etc. The study shall enable the students to relate the application of geography in tourism.

### Syllabus



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#### Unit 1: Globalisation& tourism sector

Globalisation& the business world, the tourism industry, challenges, Factors affectingGlobal & regional tourist movements, Demand and origin factors, destination &resourcefactors. Contemporary trends in international tourist movements.The emergence of international hotels & tourisms

Unit 2: Historical aspects, development of chains, development abroad, airline connectionPolitical aspects of the international travel, tourism, Barriers to travel, tourism investment & business, regulations, internationalorganisations dealing with barriers viz : WTO, IMF, IHA, need for governmentsupport of tourism, national tourism organizations, political stability, travel

Advisories, political risk, crisis management, International hotels, Balancing global & local perspectives

#### Unit 3

Operating in a multinational environment, International rules & regulations -a brief study, Human resources & cultural diversity, Understanding cultural diversity, cultural perceptions, business protocol, cultural, considerations in negotiations, International tourism sales & marketing.

#### Unit 4

Market research, developing an international marketing strategy, understandingvarious travel distribution systems viz GDS, product positioning, Global competition & the future

#### Unit 5:

Long -term tourism growth trends, tourism growth in major regions, transportationdevelopments, technology & automation, Development issues, tourism & theenvironment.

**Course Outcomes:** At the end of the course, students will be able to

[CO.1]: Understanding the meaning Globalisation& the business world, the tourism industry, challenges, Factors affectingGlobal & regional tourist movements.

[CO.2]: Understanding cultural diversity, cultural perceptions, business protocol, cultural, considerations in negotiations, International tourism sales & marketing

[CO.3]: Explaining the Political aspects of the international travel, tourism, Barriers to travel, tourism investment & business, regulations, internationalorganizations dealing with barriers.

[CO.4]: Explaining in-depth understanding of the characteristics and types of Market research, developing an international marketing strategy.

[CO.5]: Understanding the Long -term tourism growth trends, tourism growth in major regions.



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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		L
CO2	M	L		L			
CO3	H		M				M
CO4	M				L		L
CO5	M			L			L

**Total Quality Management – Tourism & Hospitality**

Learning Objectives: The course is very imperative as it shall orient the student with the basic understanding of the Quality Management & typical functioning of a Tourism & Hospitality.

**Syllabus**

Unit 1: Quality Management: Concept, need & importance, Quality Management in Urban Tourism, Season ability in tourism: Problems & Measurement, • Improving the tourist experience

Unit 2: Quality Management applied to tourist destinations, Attraction & land use management, Project Management: Managing resources, time, Quality Project Management, techniques & skills.

Unit 3: The role of manager and management style, Application of service quality in managing tourist destination, Tourist destination life cycle and quality management.

Unit 4: Total Quality Management & Tourism: ISO, Importance of quality Management in developing and tourist destination, Concept of service: Definitions & Meaning, Types of service, Classifications of services, Growing importance of services in Future Societies & impact of service in daily life, Role of customers in Service Process, Service Quality, Deterioration of quality.

Unit 5: Productivity & quality improvement, Management challenges in service sector, Key elements of Managerial skill in Tourism & hospitality Industry, Tourism and crises Management.



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**Course Outcomes:** At the end of the course, students will be able to:

[CO.1]. Understand the Concept, need & importance, Quality Management in Urban Tourism, Season ability in tourism.

[CO 2]. Learn Quality Management applied to tourist destinations, Attraction & land use management, Project Management.

[CO.3]. Understand the total Quality Management & Tourism, importance of quality Management in developing and tourist destination, Concept of service

[CO.4]. Explain various challenges in service sector, Key elements of Managerial skill in Tourism & hospitality Industry, Tourism and crises Management.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		L
CO2	M			L			L
CO3	H			M			M
CO4	M				L		L



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## Semester 6

### Marketing of Airlines and cruise

**Learning Objectives:** Study of Marketing of Airlines and cruise helps to prepare students to meet the challenges associated with the Airlines and cruise. Students will gain a basic understanding of the Airlines and cruise industry by analyzing the industry's: marketing, growth and development, reviewing its organizational structure, investigating its relationship with the hotel's other departments, And by focusing on industry opportunities and future trends marketing.

### Syllabus

Unit-1 History of Airlines - The Evolution of Aviation, Issues and Challenges, Global Aviation Industry, Aviation Industry in India - An Overview, Aircraft Types and Structures, Aircraft Manufacturers.

Unit-2 World Airlines and Airports, World Aviation Bodies- Airports - Domestic and International, World Airlines, World Major Airports, IATA and ICAO, National Aviation Authorities. General Subjects – Layout of an Airport and Ground handling, Airport and Aircraft Security, Managerial Operations, Airline catering and Various Bodies.

Unit-3 Marketing of Airlines and cruise - Definition, Marketing Concepts (Need, Want, Demand, TQM, Product, Customer value, Customer satisfaction, Exchange & Transaction, Market), Difference between marketing and Selling, Marketing Orientation (Product concept, Production concept, Selling concept, Marketing of Airlines and cruise concept, Societal marketing of Airlines and cruise concept), Modern marketing concepts (Green marketing, Mobile marketing, Cross-cultural marketing, Web marketing, Tele marketing, Relationship marketing, Buzz marketing)

Unit 4: Analysis and selection of market of Airlines and cruise: Measuring and forecasting tourism demand; forecasting methods, Managing capacity and demand. Market segmentation and positioning (STP).

Unit 5: Airlines and cruise Marketing Mix Elements- 7 P's of marketing –Product (Levels, Classification, Branding, Packaging, PLC), Place (Distribution channels Definition, Why use intermediaries? , How they add value? Channel functions, Marketing intermediaries in hospitality industry) Price ( Definition, Marketing strategies, Initiating price change), Promotion ( Definition, Functions, Promotion mix – Advertising, Sales Promotion, Personal Selling, Public Relations), People, Processes, Physical Evidence.



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**Course Outcomes:** At the end of the course, students will be able to

**CO. 1 :** Describe the Basic of Airlines and cruiseSector and their structure.

**CO. 2:** To understand the basic role, functions and marketing of Airlines and cruise sector to enhance employment.

**CO. 3:** Students are able to recognize importance of Contemporary issues in Airlines and cruise services in India.

**CO.4:** Students are able to understand the role of various regulators of Airlines and cruise sector and also about the emerging professional skills in the field of banking.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		
CO2	M			M		M	
CO3	H		M				
CO4		L		H			M

- H = Highly Related; M = Medium L = Low

**Marketing of Hotels, Resorts and Tours**

**Learning Objectives:**The core emphasis of this course is to develop strategic thinking to solve complex Hospitality Marketing problems and exPO it opportunities. Forecast and evaluate the effects of Hospitality Marketing on business decisions, assess the benefits and



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problems of integrating corporate and functional Marketing strategies, and to formulate approaches for managing Marketing of Hotels, Resorts and Tours.

## **Syllabus**

Unit 1 : Introduction of Marketing of Hotels, Resorts and Tours: Definition of Marketing of Hotels, Resorts and Tours, Customer Orientation, Core concept of Marketing of Hotels, Resorts and Tours, Marketing Management-definitions, philosophies and pillars of Hotels Marketing management, Introduction to 7 P's of Marketing mix;

Unit 2: Consumer Behavior: Consumer Behavior Model, Factors affecting Consumer Behavior- cultural, social, personal, psychological;

Unit 3 :Market Segmentation Hotels, Resorts and Tours: Product, Definition, Hospitality products, Levels of product, Branding, New product development, Product lifecycle, Product Differentiation,

Unit 4: Distribution: Definition and Importance of Distribution system, Channel Levels of distributions, Intermediaries for Hospitality Industry, Travel Agents, Tour Wholesalers, Hotel Representatives, National, Regional, Local Tourist agencies, Centralized Reservation Systems, Airline based reservation systems, Internet;

Unit 5: Promotion: Publicity & Public relation- tools & opportunities in the hotel, resorts & travel industry, Principles of personal selling, Direct Marketing-Telemarketing and Internet, Definition & need for market segmentation, Basis for segmentation- geographic, demographic, behavioral & psychographics.

## **Course Outcomes:**

CO 1: Develop an understanding of the Hotels, Resorts and Tours Marketing process.

CO 2: Prepare Hotels, Resorts and Tours Marketing strategy for an organization.

CO 3: Evaluate various strategic Hotels, Resorts and Tours Marketing options & Design a strategy and plan for an organization.

CO 4: Execute the Hotels, Resorts and Tours Marketing strategies.

CO 5: Apply Hotels, Resorts and Tours Market evaluation & control process to develop hospitality marketing skills for employability & entrepreneurship.

## **References Books**



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- Philip Kotler , Bowen & Makens Prentice, *Marketing for Hospitality & Tourism*, Hall Inc.
- S.M.Jha, *Hotel Marketing* , Himalaya publishing House – Mumbai.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		
CO2	M			M		M	
CO3	H		M				
CO4	M			H			M
CO4		L		H			M

- H = Highly Related; M = Medium L = Low

**Entrepreneurship and Venture Management**

**Learning Objectives:** The course on Entrepreneurship Management intends to inculcate in graduates an advanced level of entrepreneurial vision and entrepreneurial will. Further, this course enables students with the ability to identify entrepreneurial opportunities that exist, those that represent untapped markets and underserved markets, and those that can be created by applying existing technologies to new fields and new markets.

**Syllabus**

**Unit 1**

Tourism industry and business ideas; business strategy- understanding customers and analyzing competition;

**Unit 2**

Tourism marketing mix; tourism marketing planning; financial planning; planning for people and operations.



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### Unit 3

Form of organisation and legal considerations; networking and collaboration; good business practices;

### Unit 4

Feasibility; Writing a business plan- marketing, financial, operations, people, etc. Financial requirements and sources of finance;

### Unit 5

Setting up a tourism enterprise- steps, procedures, licenses, registration etc.

**Course Outcomes:** At the end of the course, students will be able to

[CO.1] To provide understanding of the relevance of Entrepreneurship as a means of management practice in the context of a fast changing organizational structure in a global environment.

[CO.2] To identify & develop of opportunities for an entrepreneur in an uncertain & inflexible environment.

[CO.3] To find out the ways to minimize the external threats.

[CO.4] Use critical thinking skills & apply ethical understanding perspective in business situations with professional skills.

[CO.5] Develop a well-presented business plan that is feasible for the budding entrepreneurship to create employable situations for them.

### REFERENCE BOOKS

- Arora, R. and Sood, S.K. Fundamentals of Entrepreneurship and Small Business Management. Kalyani Publishers, Ludhiana.
- Desai, V. Small-Scale Industries and Entrepreneurship. 3/re, Himalayan Publishing House, Mumbai.
- Ramachandaran, K. Managing a New Business Successfully. Global Business Press, New Delhi.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		L
CO2	M			L			L

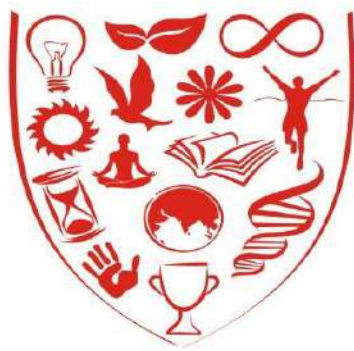


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CO3	H		M				M
CO4	M				L		L
CO5	M			L			L



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## **School of Management**

### **Syllabi and Course Structure**

### **Bachelor of Commerce**

### **Academic Programmes**

### **Batch (2022-2025)**

**Total Credits for the Batch 2022-  
2025= 132 Credits**

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1. Minimum Credit required = 132 Credits (10% credit relaxation for MOOC courses)
2. No relaxation in Core and Foundation subjects
3. Option can be availed in Specialization, Interdisciplinary and General subjects.

### Summary Sheet

Semester	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	Total	Min. Credit req. for degree
Credit	21	23	21	22	25	20	132	132

Type	Foundation	Core	Specialization	Interdisciplinary
Total Credit				

*(Signature)*

*(Signature)*

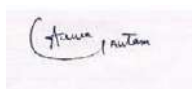
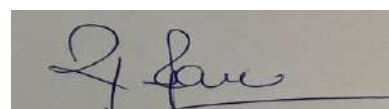
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### Semester I

FIRST SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM001C	Corporate Law	3	0	0	3	C
BCM118B	Financial Management	3	0	0	3	C
BCM114B	Accounting for Managers	3	1	0	4	C
BCM112B	Managerial Economics	3	0	0	3	C
DCA001A	Website Development	2	0	0	2	ID
DCA002A	Website Development Lab	0	0	2	1	ID
DEN001A	Communication Skills	2	0	2	3	F
DIN001A	Culture Education -1	2	0	0	2	F
	<b>TOTAL</b>	<b>18</b>	<b>1</b>	<b>4</b>	<b>21</b>	

### Semester II

SECOND SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM101C	Cost Accounting	3	0	0	3	C
BCM115A	Principles of Marketing Management	3	0	0	3	C
BCM129A	Business Statistics	3	0	0	3	C
BCM119A	Organisation Behaviour	3	0	0	3	C
DCO011A	Presentation Skills using Canva	0	0	4	2	ID
DEN002A	Professional Skills	2	0	2	3	F
DIN002A	Culture Education-2	2	0	0	2	F
DCH001	Environment Studies	3	1	0	4	F
	<b>TOTAL</b>	<b>19</b>	<b>1</b>	<b>6</b>	<b>23</b>	

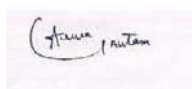
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### Semester III

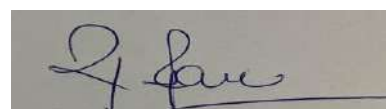
THIRD SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM102C	Corporate Accounting	3	1	0	4	C
BCM281B	Banking Law & Practice	3	0	0	3	C
BCM103C	E-Accounting	3	0	0	3	C
BCM119B	Research Methodology	3	0	0	3	C
<b>DCA004A</b>	<b>Advance Excel</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>ID</b>
DEN003A	<b>Life Skills1(Personality Development)</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>F</b>
DIN003A	Value Education-1	1	0	0	1	F
	Open Elective-I	3	0	0	3	ID
	<b>TOTAL</b>	<b>18</b>	<b>1</b>	<b>4</b>	<b>21</b>	

### Semester IV

FOURTH SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BHM044B	Open Elective 2(Travel and Tourism Management)	3	0	0	3	ID
BCM128B	Discipline Elective 1(Tax Planning for Business)	4	0	0	4	S
BCM183A	Discipline Elective 2(Management Accounting)	4	0	0	4	S
DCA012A	Blogging/Vlogging LAB	0	0	2	1	ID
BCM185A	International Trade & Finance	3	0	0	3	C
DMA011C	<b>Life Skills-2 (Aptitude)</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>F</b>
DIN004A	Value Education-2	1	0	0	1	F
BCM998C	Project	0	0	8	4	C
	<b>TOTAL</b>	<b>17</b>	<b>0</b>	<b>12</b>	<b>22</b>	



### Semester V



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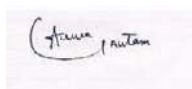
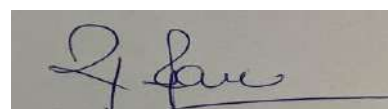
FIFTH SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM104B	Income Tax	3	0	0	3	C
<b>BCM126A</b>	<b>Audit &amp; Assurance</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>C</b>
BCM106B	Goods And Service Tax	3	0	0	3	C
	Discipline Elective 3	4	0	0	4	S
	Discipline Elective 4	4	0	0	4	S
	Discipline Elective 5	4	0	0	4	S
	Open Elective III	3	0	0	3	ID
BCM997B	Seminar	0	0	2	1	C
	<b>TOTAL</b>	<b>24</b>	<b>0</b>	<b>2</b>	<b>25</b>	

### Semester VI

SIXTH SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM 127A	Industry Internship	0	0	40	20	C

### Proposed Discipline Electives for BBA(Regular)

#### (3 Year Program)

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It is proposed that the student will elect any two groups in the final year.

The Student will study one paper each of the elective group in Vth and VI th Semester.

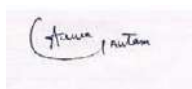
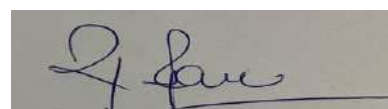
<b>Discipline Elective</b>	<b>Accounting and Finance</b>	<b>BSFI</b>	<b>Marketing</b>	<b>Information Technology</b>	<b>International Business</b>
<b>Discipline Elective 1</b>	E-Filing of Return (BCM107C)	Corporate Finance (BBA614A)	Advertising Management (BBA512A)	E-Commerce (BBA019B)	International Business Management (BBA251A)
<b>Discipline Elective 2</b>	Tax Planning for Business (BCM128A)	Regulatory Frame Work, Insurance Regulations (BBA610A)	Product & Brand Management (BBA422A)	Management of Technology Innovation and Change (BBA462A)	Global Business Environment (BBA482A)
<b>Discipline Elective 3</b>	Management Accounting (BCM128A)	Banking Laws and Practices (BBA612A)	Digital Marketing (BBA423A)	Database Management System (BBA463A)	Entrepreneurship Startups(BBA483A)
<b>Discipline Elective 4</b>	Cost Audit (BCM101B)	Introduction to International Banking and Forex (BBA613A)	Customer Relationship Management (BBA162B)	e-Supply Chain Management (BBA464A)	International Trade and Finance (BBA484A)
<b>Discipline Elective 5</b>	Financial derivatives (BCM 130A)	Financial derivatives (BBA405A)	International Marketing (BBA511A)	Management Information System(BBA 465A)	International Human Resource Management (BBA485A)

**\*Minimum of 20% must opt to start an elective. However, the department reserves the right to allow student to opt a particular Elective group in case of any issue.**

**The elective papers of any group may be changed if found necessary by BOS**

#### **Program Educational Objective (PEO)-B.Com**

- I. To build a strong footing of understanding in different areas of Commerce
- II. To develop the skill of applying concepts and practices used in Commerce
- III. To develop an attitude for working commendably and proficiently in a business surroundings
- IV. To integrate knowledge, skill and attitude that will stand an environment of learning and creativity among the students

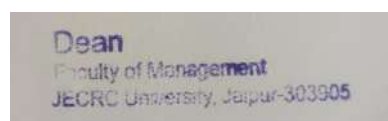
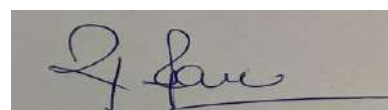
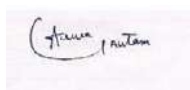
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- V. To enable a student to be capable of making decisions at personal and professional level.

**Program Outcome (PO) – B.Com**

- [PO.1]. **Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives. Ability to engage in reflective and independent thinking by understanding the concepts in every area of Commerce. Ability to examine the results and apply them to various problems appearing in different branches of Commerce and Business.
- [PO.2]. **Effective Communication:** Ability to communicate long standing unsolved problems in commerce. Ability to show the importance of commerce as precursor to various market developments since the beginning of the civilization.
- [PO.3]. **Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings
- [PO.4]. **Effective Citizenship:** Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering
- [PO.5]. **Ethics:** Ability to ascertain unethical behaviour, falsification, and manipulation of information. Ability to manage self and various social systems.
- [PO.6]. **Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development
- [PO.7]. **Self-directed and Life-long Learning:** Capability to work independently in diverse projects and ensure detailed study of various facets of Commerce and Business. Capability of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling in all areas of Commerce.

**BCOM I SEMESTER**  
**CORPORATE LAWS**  
**SUBJECT CODE: BCM001C**  
**CREDITS: 3L**



**Objective:** The objective of the course is to impart basic knowledge of the provisions of the Companies Laws and the Depository Laws along with relevant case law.

**Note** – The Companies Act, 1956 shall be replaced by the New Companies Bill 2012 as and when enacted.

#### **UNIT I:**

Important definitions: Prospectus and Share Capital, Allotment of securities, Private Placement, share capital, basic requirements, alteration of share capital, Sweat Equity, Bonus issue, issue of shares at premium and discount, Further issue of shares, buy-back of shares.

#### **UNIT II:**

Board Meetings, Annual General Meeting, Extra Ordinary General Meeting, Requisites of a valid meeting, Convening of Meetings, Minutes and Resolutions; Postal ballot; voting through electronic matters.

#### **UNIT III:**

Declaration and Payment of Dividend, Accounts of Companies, Maintenance and authentication of Financial Statement, Corporate social Responsibility, Appointment of Auditor, qualification, disqualifications, rotation, removal, duties and responsibilities, Auditors report, Constitution and functions of Audit committee.

#### **UNIT IV:**

Board of directors, appointment and qualifications of directors; Director Identification Number (DIN); Disqualifications, Removal of directors; Legal positions, Powers, Duties and responsibilities; Additional Director, Alternate Director, Nominee Director, Director appointed by casual Vacancy, Key Managerial Personnel, Managing Director, Manager and Whole Time Director.

#### **UNIT V:**

(a): Oppression, Mismanagement, Corporate Restructuring, and Winding Up Oppression, Mismanagement, Rights to apply, Powers of Tribunal, Provisions related to Compromises, Arrangement and Amalgamations, Concept and Modes of Winding Up; Provisions of winding up under Insolvency and Bankruptcy Code, 2016. (b): National Company Law Tribunal and Appellate Tribunal Definitions; Constitution of National Company Law Tribunal; Constitution of Appellate Tribunal; Appeal from orders of Tribunal; Power to punish for contempt.

#### **Course Outcomes(CO)**

I CO1: Explain relevant definitions and provisions relating to issue of prospectus and allotment of shares;

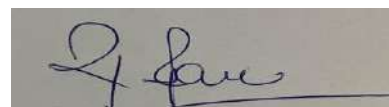
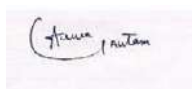
II CO 2: Synthesize company processes, meetings, and decisions;

III CO3: Describe the framework of dividend distribution, Accounts of the company and Audit and Auditors of company;

IV CO4: Determine the role of Board of directors and their legal position;

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	M					M
CO2	H				M		
CO3	M			M			
CO4			M		H		

H = Highly Related; M = Medium L = Low

### Reference Books:

1. Hicks, Andrew & Goo S H, *Cases and Material on Company Law*, Oxford University Press, UK
2. Gower, LCB, *Principles of Modern Company Law*, Stevens & Sons, London.
3. Majumdar, A.K., and G.K. Kapoor, *Company Law and Practice*, Taxmann, New Delhi
4. Kershaw, David, *Company Law in Context*, Oxford University Press, UK
5. Hanningan, Brenda, *Company Law*, Oxford University Press, UK
6. RamaiyaA *Guide to Companies Act*, Wadhwa and Company Nagpur
7. Kannal, S., & V.S. Sowrirajan, *Company Law Procedure*, Taxman's Allied Services (P) Ltd., New Delhi.

## BCOM I SEMESTER

### FINANCIAL MANAGEMENT

SUBJECT CODE: BCM118B

CREDITS: 3L

**Objective:** To familiarize the students with the principles and practices of financial management.

#### Unit I:

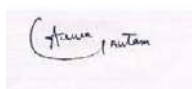
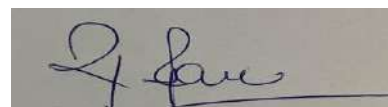
Nature, scope, and objectives of financial management- profit maximization Vs wealth maximization; Value maximization- concept and implications, Economic Value Added (EVA), Market Value Added (MVA). Functions and Responsibilities of Finance Manager. Responsible Investment – concept and significance; Triple Bottom Line Concept-People, Planet and Profit. Time value of money, Risk and Return Analysis; Emerging dimensions in finance area- Crypto currencies, block chain. b. Sources of Finance Different Sources of Finance including internal sources, external sources, other sources like Venture capital, Lease financing, Financial institution, Private equity, Bonds- Indian as well as International, Masala bond, Bridge finance

#### Unit II:

Capital Budgeting Process, Cash Flow Estimation, Payback Period Method, Discounted Payback Period Method, Accounting Rate of Return, Net Present Value (NPV), Net Terminal Value, Internal Rate of Return (IRR), Profitability Index, Capital budgeting under Risk & Uncertainty-Certainty Equivalent Approach and RiskAdjusted Discount Rate Method. Responsible Investment-Environmental, Social and governance (ESG) factors into investment decisions, to better manage risk and generate sustainable long-term returns. Use of expert system in Capital Budgeting Decisions.

#### Unit III:

Sources of long-term financing, Components of cost of capital, Method for calculating Cost of Equity, Cost of Retained Earnings, Cost of Debt and Cost of

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Preference Capital, Weighted Average Cost of Capital (WACC) and Marginal Cost of Capital. Capital Structure- Theories of Capital Structure (Net Income, Net Operating Income, MM Hypothesis, Traditional Approach). Operating Leverage, Financial Leverage and Combined Leverage. EBIT-EPS Analysis. Cost-Benefits Analysis including social cost. Determinants of Optimum Capital Structure. Use of expert system in financing decisions.

#### Unit IV:

Theories for relevance and irrelevance of dividend decision for corporate valuation- Walter's Model, Gordon's Model, MM Approach, Forms of dividend payment, types of dividend policies and Determinants of Dividend policy. Corporate Social Responsibility (CSR) –Policy, Strategy, Implications and Governance.

#### Unit V:

Concept of Working Capital, Operating & Cash Cycles, Risk-return Trade off, working capital estimation, cash management, an overview of receivables management, factoring and inventory management. Use of expert system in working capital decisions.

#### Course outcomes(CO)

- I CO1: Explain the nature and scope of financial management;
- II CO 2: Analyze capital budgeting process and apply capital budgeting techniques for business decisions;
- III CO3: Discuss the various sources of finance in today's competitive industry;
- IV CO4: Explain various capital structure theories and analyze factors affecting capital structure decisions;

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				M		M
CO2		M		M		L	
CO3	H				M		
CO4	H				M		L

H = Highly Related; M = Medium L = Low

#### READINGS:

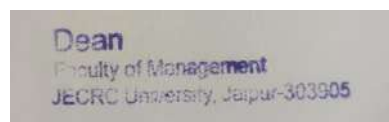
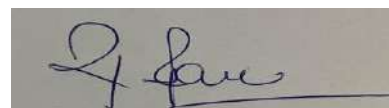
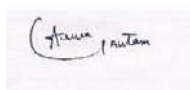
##### Text Books:

1. Khan, M.Y. and P.K. Jain, *Financial Management: Text and Problems*, Tata McGraw Hill
2. Pandey, I.M. *Financial Management*. Vikas Publications.

#### B.Com (N) I SEMESTER ACCOUNTING FOR MANAGERS SUBJECT CODE: BCM114B

CREDITS: 3L+1T (4)

#### Objectives:



To acquaint the students with concepts of Financial, Cost and Management Accounting and their applications in managerial decisions making.

### **UNIT I Introduction to Accounting**

– Meaning, Importance and Need, Its objectives and relevance to business establishments and other organisations, and individuals. Accounting information: meaning, users and utilities, sources of accounting information. Some Basic Terms –Transaction, Account, Asset, Liability, Capital, Expenditure & Expense, Income, Revenue, Gain, Profit, Surplus, Loss, Deficit. Debit, Credit, Accounting Year, Financial Year.

### **UNIT II Transactions and recording of transactions**

Features of recordable transactions and events, Basis of recording – vouchers and another basis. Recording of transactions: Personal account, Real Account and Nominal Account; Rules for Debit and Credit; Double Entry System, journalizing transactions; Preparation of Ledger, Cash Book including bank transactions and Bank Reconciliation Statement.

### **UNIT III Preparation of Financial Statements**

Fundamental Accounting Equation; Preparation of Trial Balance; Concept of revenue and Capital; Preparation of Trading and Profit & Loss Account, Balance Sheet and Cash Flow Statement manually and using appropriate software.

### **UNIT IV Computerized Accounting Systems**

Computerized Accounting Systems: Computerized Accounts by using any popular accounting software: Creating a Company; Configure and Features settings; Creating Accounting Ledgers and Groups; Creating Stock Items and Groups; Vouchers Entry; Generating Reports - Cash Book, Ledger Accounts, Trial Balance, Profit and Loss Account, Balance Sheet, Cash Flow Statement. Selecting and shutting a Company; Backup and Restore data of a Company.

### **UNIT V Company Accounts**

Explanation of certain terms – Public Limited Company, Private Limited Company, One Person Company, Share, Share Capital, Shareholder, Board of Directors, Stock Exchange, Listed Company, Share Price, Sensex - BSE, NSE; Annual report, etc. Contents and disclosures in Annual Report, Company Balance Sheet and Statement of Profit and Loss. Content Analysis based on annual report including textual analysis.

#### **Text Books:**

1. Horngren C T, Sundem G L, Stratton W O, Burgstahler D and Schatzberg J. *Introduction to Management Accounting*. PHI Learning Pvt Ltd.
2. Porter G A, Norton C L. *Financial Accounting* (6th ed.). Cengage Learning (IFRS update)

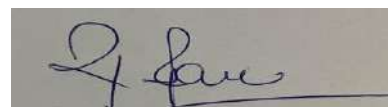
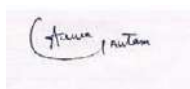
#### **References:**

1. Horngren C T, Sundem G L and Elliott J A. *Introduction to Financial Accounting* (8th ed.). Pearson Education.
2. Horngren, C.T., Foster, G, and Datar, S.M. *Cost Accounting: A Managerial Emphasis*. New Delhi: Prentice Hall of India Pvt. Ltd.

#### **Course Outcome (CO):**

At the end of this course students will be:

- I. CO1: Analyze various terms used in accounting;



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- II. CO2: Make accounting entries and prepare cash book and other accounts necessary while running a business;
- III. CO3: Prepare profit and loss account and balance sheet;
- IV. CO4: Prepare accounts based on accounting software;
- V. CO5: Analyze information from company's annual report.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND COURSE OUTCOME:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H		H				
CO2		M	M			L	
CO3	M		M		H		
CO4				M	M		L
CO5	H		M				L

H = Highly Related; M = Medium L = Low

**BCOM I SEM  
MANAGERIAL ECONOMICS  
SUBJECT CODE: BCM112B  
CREDITS: 3L**

**Learning Objective:** The purpose of this course is to apply microeconomics concepts and techniques in evaluating business decisions taken by firms. The emphasis is on explaining how the tools of standard price theory can be employed to formulate a decision problem, evaluate alternative courses of action and finally choose among alternatives. Simple geometry and basic concepts of mathematics will be used in course of teaching.

**Unit I**

Introduction to Managerial economics, nature, significance, scope of managerial economics, role of economics in business decision making. Macro and Micro economics, Macro Economic Variables, Demand & Supply, determinants of demand and supply, movement vs. shift in demand curve, movement along a supply curve vs. shift in supply curve.

Elasticity of Demand & Supply. Price, Income & cross elasticity & advertising elasticity. Methods to calculate price elasticity.

**Unit II**

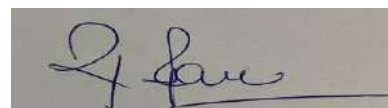
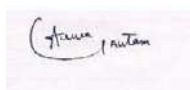
Utility: Cardinal & Ordinal, Law of diminishing marginal utility, law of equi-marginal utility. Theory of Consumer Behaviour, Indifference curve theory, Indifference curves & its properties

**Unit III**

Production: Technology of Production; Production with one variable input, Production with two variable input, Returns to Scale.

**Unit IV**

Cost: Measuring Costs, Costs in the Short & long run, Long run vs. Short run cost curves,





profit maximization & cost minimization, equilibrium of the firm; Economies of Scale.

### Unit V

Theory of Firm & Market Organization: Perfect Competition: Perfectly Competitive markets, Profit Maximization, Marginal revenue, Marginal Cost, Output in the short run & long run. Monopoly: Monopoly Power & its sources, Monopolistic Competition & Oligopoly Kinked demand curve, price leadership of a firm

### Course outcomes(CO)

I CO1: To understand how to apply microeconomics, concept, and technique in evaluating business decisions.

II CO 2: Understanding the nature, significance and scope of managerial economics

III CO3: Knowing to demand, supply and market equilibrium,

IV CO4: Knowing about production technology and theory of firm & market organization.

V CO5: To understand and analyze market structure.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	L	H				M	H
CO2		M		M			M
CO3	H				M		
CO4		M			L		L
CO5			L	L		M	

H = Highly Related; M = Medium L = Low

### Text books:

1. D.N. Dwivedi, Managerial Economics, Vikas Publications
2. SPS Chauhan, *Micro Economics, An Advanced Treatise*, Prentice Hall of India, 2009.
3. R.G.Lipsey and K.A. Chrystal. (2008). *Principle of Economics*. (11th ed.). Oxford University Press.
4. Deepashree, *Principle of Micro Economics*, Ane Books Pvt. Ltd, New Delhi.

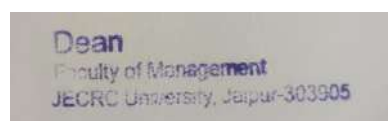
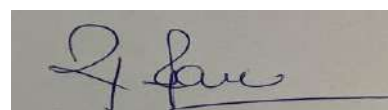
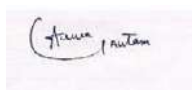
### B.COM I SEMESTER

#### Web Development

Course Code: DCA001

Credits: (2L)

### Course Objectives:





1. Students will be able to understand and be familiar with client server architecture.
2. Students will be able to understand and able to develop a web application using java technologies.
3. Students will be able to learn the skills and project-based experience needed for entry into web application.
4. Students will be able to learn the concepts of developing a dynamic webpage by the use of java script and CSS
5. Students will be able to learn the concept of XML, MySql and server side scripting.

## Syllabus

### Unit -1

HTML5 and CSS3 HTML5- Basic Tags, Tables,Forms.HTML5 Tags,HTML Graphics, HTML media, HTML Graphics,HTML APIs. CSS - Background, Borders,margin, Box model. Styling text, fonts,list,links,tables. CSS overflow,float,inline blocks, pseudoclasses,pseudoelements.CSS border images,rounded corners

### Unit-2

Java Script Client side scripting using java script, Introduction to java script, internal and external Java script files, variables, control statements, loops, Arrays , string handling , How to write functions in JavaScript, inputting and outputting from form elements to JavaScript. DOM concept, creating html elements using java script. Drawing 2D shapes, handling events. Introduction to AJAX

### Unit-3

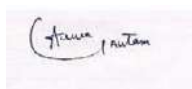
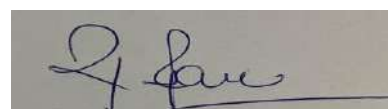
Building Single page applications with Angular JS Single page application – Introduction , two way data binding, MVC in angular JS, controllers, getting user inputs , loops , Client side routing – accessing URL data , various ways to provide data in angular JS.

### Unit -4

Server Side Programming Server side scripting, Difference between client side and server side scripting languages. Introduction to PHP, variables, control statements, loops, Arrays, string handling, PHP forms, Global variables in PHP, Regular expression and pattern matching, Database programming: inputting and outputting data from MySQL using PHP, insertion , deletion and updating data. State management in web applications, cookies, Application and session state.

### Unit-5

Introduction to Xml, usage of XML, XML tags, elements and attributes, attribute type, XML validation: DTD and XSD, XML DOM Case study:-Application Development using Laravel framework

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Textbook/Reference:

- The Complete Reference, HTML and CSS by Thomas A Powell latest edition

### Course Outcomes( CO's)

After the completion of the course the student will be able to

**CO1:**To create a dynamic webpage by the use of java script and DHTML.

**CO2:** To create a well formed / valid XML document.

**CO 3:** To connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.

**CO 4.** To create a server side java application called JSP to catch form data sent from client and store it on database.

**CO 5.** To write a server side java application called servlet to catch form data sent from client, process it and store it on database

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						
CO2	H						
CO3	M						
CO4	H						
CO5	M						

H = Highly Related; M = Medium; L = Low

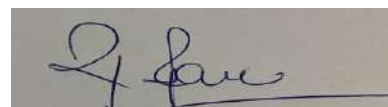
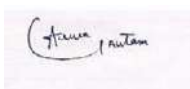
### B.COM II SEMESTER COST ACCOUNTING SUBJECT CODE: BCM101C CREDITS: 3L

#### Objectives:-

- To understand the basic concepts and processes used to determine product cost.
- To be able to interpret cost accounting statements.

#### Unit 1: Concept and Nature of Cost Accounting

Concept of cost and costing, Importance and features of costing, Cost classification, Concept of cost unit, cost center, meaning of 'unit' from the view point of producer, Establishment of an



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ideal cost accounting system, Cost Reduction, Cost Control, Installation of Costing System, Application of IT in Cost Accounting. Preparation of Cost Sheet for manufacturing and service sector. Material Cost Direct and indirect material, Valuation of materials, Principles of valuation of material as per AS- 2/ Ind AS- 2; CAS- VI, Material control, purchases, Objectives and functions of purchase department, Inventory control: Meaning and techniques including latest techniques like Just in Time (JIT) Inventory Management, Kanban, Kaizen, Determination of Economic Order Quantity (EOQ). Treatment of waste, scrap, spoilage, defective and obsolesce.

## Unit 2: Employee Cost and Overheads

Meaning and classification of employee cost, Requisite of a good wage and incentive system, Time and piece rate plans, Profit sharing, Employee productivity and cost. Labor cost control – techniques, Employee turnover, Remuneration and Incentive schemes (Rowan & Halsey Plan only).

Overheads: Definition and classification, Production overheads – allocation and apportionment of cost, Meaning and Methods of cost absorption, Treatment of over- absorption & under-absorption of overheads, Administration and selling & distribution overheads – methods of ascertainment, Treatment of Research & Development cost in Cost Accounting.

## Unit 3: Methods of Costing: Job Costing, Batch Costing and Process Costing

Meaning of Job Cost, its application and accounting, Preparation of Job cost sheet. Meaning of Batch Cost and its application in today's industry. Meaning and application of process costing, Methods of determination of cost in process costing, Normal and abnormal loss and gain, Inter process costing and profit ascertainment. Choice between process and job costing.

## Unit 4: Methods of Costing: Contract Costing, Service Costing

Meaning, features and types of contract, Methods of cost determination in contract costing, Escalation clause and cost-plus contract. Meaning and scope of service costing, Factors in ascertaining service cost, Ascertainment of service cost of following services: 1. Transport 2. Hospital 3. Canteen 4. Toll 5. Education institution 6. IT industry 7. Hotel Any other contemporary service industry.

## Unit 5: Activity Based Costing (ABC)

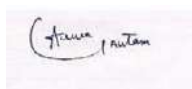
Concept, significance and salient features; Stages and flow of costs in ABC; Basic components of ABC - resource drivers and cost drivers; Application of ABC in a manufacturing organisation and service industry.

## Course outcomes(CO)

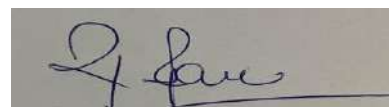
- I CO1: Determine various types of cost of production;
- II CO 2: Compute unit cost and total cost of production and prepare cost statement;.
- III CO3: Compute employee cost, employee productivity and employee turnover;
- IV CO4: Determine cost under job costing, batch costing, process costing, contract costing and service costing

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		
CO2	M		L				
CO3	L				M	M	
CO4		L			H		M



H = Highly Related; M = Medium L = Low



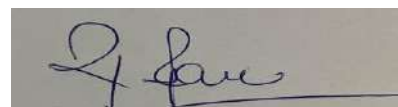

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Suggested Readings:

**J.K. Pareek** Cost Accounting, Ramesh Book Depot, Jaipur.

**Agarwal N.K.** Cost Accounting” Asian Books (2010),

**Arora M N**, A Text Book of Cost & Management Accounting, Vikas Publishing House Pvt Ltd., New Delhi



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**B.Com II SEMESTER**  
**Principles of Marketing Management**  
**SUBJECT CODE: BCM115A**  
**CREDITS: (3L)**  
**Principles of Marketing Management**  
**SUBJECT CODE: BCM115B**  
**CREDITS: (3L)**

**Objectives:**

This course aims to familiarize students with the marketing function in organizations. It will equip the students with understanding of the Marketing Mix elements and sensitize them to certain emerging issues in Marketing.

**UNIT I**

Fundamentals of marketing - Role of Marketing - Relationship of Marketing with other functional areas - concept of marketing mix-Marketing approaches - Various Environmental factors affecting the marketing functions.

**UNIT II**

Buyer Behaviour - Consumer goods and Industrial goods - Buying motives - Factors influencing buyer Behavior, Market segmentation - Need and basis of Segmentation - Targeting - positioning.

**UNIT III**

The Product - Characteristics - benefits - classifications - consumer goods - industrial goods - New Product Development process - Product Life Cycle - Branding –Packaging- Labeling– Pricing: Meaning, Objectives and Types of Pricing.

**UNIT IV**

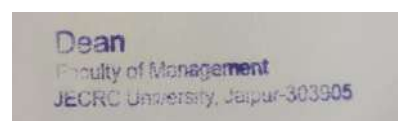
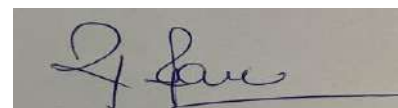
Promotion –Meaning, Objectives – Types - A brief overview of: Advertising - Publicity - Public Relations - personal Selling - Direct selling and Sales promotion.

**UNIT V**

Physical Distribution: Importance – Channels of Distribution: Distribution of consumer goods, Distribution of industrial goods and Distribution of Agriculture goods – Levels of channels: Zero level, one level, two level and three level channel - distribution issues

**Text Books:**

1. Kotler, P. & Keller, K. L. (2012).  
*Marketing Management* (14th ed.). Pearson.



2. Kotler, P., Armstrong, G., Agnihotri, P. Y., & UlHaq, E. (2010). *Principles of Marketing - A South Asian Perspective*. (13th ed.). Pearson.

### References:

1. Ramaswamy, V.S., Namakumari, S. (2009). *Marketing Management: Global Perspective-Indian Context*. (4th ed.). Macmillan Publishers India Limited.
2. Zikmund, W.G., D' Amico, M. (1999). *Marketing*. (6th ed.). Ohio: South-Western College Publishing.
3. Etzel, Michael J, Walker, Bruce J, Stanton William J and Pandit, Ajay (2009). *Marketing* (14th ed.). Tata McGraw Hill.

### Course Outcome (CO):

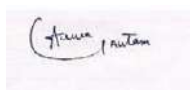
At the end of this course students will be able to:

- I. CO1: Identify core concept of marketing and the role of marketing in business and society. Develop an understanding of basic concepts of marketing, marketing philosophies and environmental conditions affecting marketing decisions of a firm;
- II. CO2: Explain the dynamics of consumer behaviour and process of market selection through STP stages;
- III. CO3: Analyze the process of value creation through marketing decisions involving product development;
- IV. CO4: Analyze the process of value creation through marketing decisions involving product pricing and its distribution;
- V. CO5: Analyze the process of value creation through marketing decisions involving product promotion and also to equip them with the knowledge of various developments in marketing area that may govern marketing decisions of a firm.

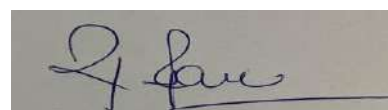
### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND COURSE OUTCOME:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M					L	H
CO2		H	H	M		M	
CO3			M	M			
CO4	M			M			
CO5	L	M			H		

H = Highly Related; M = Medium L = Low



**B.Com II Semester**



## Business Statistics

SUBJECT CODE:BCM129A

CREDITS: (3L+1T)4

**Objectives:** To understand & apply various statistical methods of data summarization and analysis, to gain ability to take decision in diverse aspects of business environment.

### UNIT I

Meaning & Definition of Statistics, Functions, Applications, Limitations and Distrust of Statistics. Census and sampling, methods of sampling, Methods of collections of Primary and secondary data, Schedule & Questionnaire,

### UNIT II

Classification and tabulation of Data, Diagrams and Graphs, concept of central tendency: meaning, definition, determination of Mean including Geometric Mean and Harmonic Mean, Median, Mode.

### UNIT III

Measures of Dispersion, Meaning, Objectives, Importance, Absolute and relative measure of dispersion, essential characteristics of a good measure of dispersion, selective of an appropriate measure of dispersion.

### UNIT IV

Skewness: meaning, measures of Skewness, difference between Dispersion and Skewness.

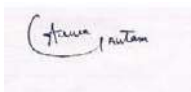

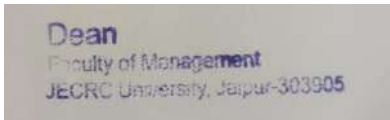
### UNIT V

Correlation: meaning, Definition, types, methods of determining correlation. Regression Analysis: meaning, utility, types, difference between correlation and regression, methods of computing regression lines, conceptual frame work and their application in business.

### Course outcomes(CO)

- I CO1: To apply and understand various statistical methods of data summarization and analysis.
- II CO 2: To find ability to take decisions in diverse aspects of business environment.
- III CO3:To understand classification and tabulation of data.
- IV CO4: To know technical terms like skewness, measures of dispersion and co-relation.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

<i>Cours e Outco</i>	Program Outcome
	 

<i>me</i>							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		L
CO2		M		L		L	L
CO3		M			M		L
CO4	H				M		

H = Highly Related; M = Medium L = Low

### Reference books:

1. Statistics: S P Gupta
2. Research Methodology: C R Kothari
3. Quantitative methods in management: Gupta, Agarwal, Khandelwal and Ahmed.

## B.Com II SEMESTER Organisational Behaviour SUBJECT CODE: BCM119A CREDITS: (3L)

### Objectives:

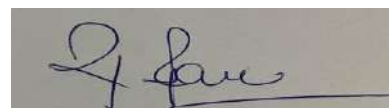
This course is designed to equip the students with the tools necessary to understanding the dynamics of individual and group behaviour for efficient and effective utilization of human resources in the organizations.

### UNIT I: Introduction and Individual Behaviour

Organisational Behaviour: concepts, determinants, challenges and opportunities of OB. Contributing disciplines of OB. Organisational Behaviour Models. Personality- Type A and B, Big Five personality types, Factors influencing personality. Values and Attitudes Concept and types of values: Terminal value and Instrumental Value. Components of attitude, job related attitudes. Learning- Concept, Learning theories, and reinforcement. Perception and Emotions- Concept, Perceptual process, Importance, Factors influencing perception, Emotional Intelligence



### UNIT II: Decision making and Communication



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Concept and nature of decision making process, Individual versus group decision making. Communication and Feedback, Transactional Analysis (TA), Johari Window.

### **UNIT III: Motivation**

Meaning and Importance, Equity theory of Motivation, Vroom's Valence Expectancy theory, Ken Thomas' Intrinsic Motivation theory, McClelland's theory of Motivation. Motivation and organisational effectiveness.

### **UNIT IV: Leadership, Power, and Conflict**

Meaning and concept of Leadership, Trait theory, Transactional, Charismatic, and Transformational Leadership. Power and conflict, Power tactics, Sources of conflict, Conflict Resolution Strategies.

### **UNIT V: Dynamics of Organisational Behaviour**

Organisational Culture and climate- Concept and determinants of organisational culture. Organisational change Importance, Managing Change. Individual and organisational factors to stress; Prevention and Management of stress. Organizational Change – Importance, Stability vs. Change, Proactive vs Reaction change, Change process, Resistance to change, Managing change.

### **Text Books:**

1. Robbins, S.P., *Organisational Behaviour*, Prentice Hall of India Pvt. Ltd., New Delhi.
2. Greenberg, Jerald, and Robert A Baron, *Organisational Behaviour*, Prentice Hall of India Pvt. Ltd., New Delhi.
3. Luthans, F., *Organisational Behaviour*, McGraw Hill International. New York.

### **References:**

1. Chhabra, T. N., *Organisational Behaviour*, Sun India Publications.
2. Singh, A.K., and B. P. Singh, *Organizational Behavior*, Excel Books Pvt. Ltd, New Delhi.
3. Hersey, P.K., Blanchard, H. and D. E. Johnson, *Management of Organisational Behaviour: Leading Human Resources*, Pearson Education.
4. Moshal, B.S., *Organisational Behaviour*, Ane Books Pvt. Ltd., New Delhi
5. Sekaran, Uma, *Organisational Behaviour: Text and Cases*, Tata McGraw Hill, New Delhi.

### **Course Outcome (CO):**

At the end of this course students will be:

- I. CO1: Differentiate between various types of personality using standard tools;
- II. CO2: Appreciate the applicability of decision making process in real life situations and use TA and Johari Window;
- III. CO3: Have knowledge to understand the level of motivation in employees;
- IV. CO 4: Describe characteristics of a leader;
- V. CO 5: Learn how to build a supportive organisational culture

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND COURSE OUTCOME:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M			M			
CO2		M			H		L
CO3	H			M	M		

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CO4			M		H		
CO5		H			H	M	

H = Highly Related; M = Medium L = Low

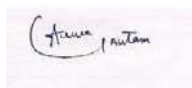
**B.Com II SEMESTER**  
**Course Name: Project Management Lab**  
**Course Code (DCA002)**  
**CREDITS: (1L)**

**Course Objective**

1. To learn to Create the project
2. To learn the Task Breakdown, and utilization of resources
3. To learn how to Assign resources, calculating costs

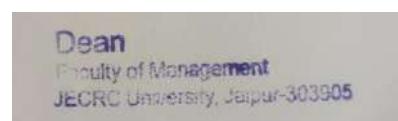
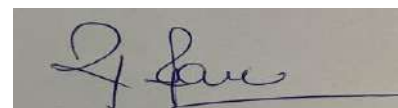
**Lab Exercise based on given topic**

1. Introduction to ProjectLibre and Project Management
2. Overview of ProjectLibre
3. Introduction to Project Management terminology
4. Tasks, Resources, and Costs
5. Installing ProjectLibre
6. Starting and Saving Projects
7. Navigation
8. Create a Project
9. Tasks
10. Resources
11. Cost
12. Calendars
13. WBS
14. RBS
15. Task Usage
16. Resource Usage
17. Baselines
18. Earned Value
19. Printing
20. Reporting



**Course Outcome( CO's)**

After the completion of the course the student will be able to



CO1 Students will be able to identify basic concepts of Project Libre  
CO2 Students will learn to describe the project, its cost etc.  
CO3 Students will be able to create installing, creating a project.  
CO4 Students will be able to identify task, and resource usages.  
CO5 Students will be able to combine Project Libre tasks and will be efficiently use cost and effects.

**B.Com III SEMESTER  
CORPORATE ACCOUNTING  
SUBJECT CODE: BCM102C  
CREDITS: 3L**

**Objective:** To make the students familiar with corporate accounting procedures.

**Unit 1: Accounts of Holding Company**

Concept and meaning of different terms: holding company, subsidiary company, pre-acquisition profit/loss, postacquisition profit/loss, minority interest/non-controlling interest; cost of control/Goodwill or gain on bargain purchase. Meaning and need for consolidation of financial statements; Preparation of consolidated financial statements as per AS 21 / Ind AS 110 (with one subsidiary company).

**Unit 2: Winding up of a Company**

Meaning and modes of winding up; Types of winding up; Procedures of winding up; Contributories; Preferential payments; Voluntary winding up; Preparation of Liquidator's Final Statement of Account; Preparation of Statement of Affairs.

**Unit 3: Accounts of Banking Companies**

Statutory books to be maintained; Special features of Bank book keeping; Advances – its classification and provisions to be made against advances; Rebate on Bills Discounted, Income recognition; Preparation and presentation of Financial Statements using appropriate software

**Unit 4: Accounts of Insurance Companies**

Books maintained by a life insurance companies and general insurance companies. Accounts of Life insurance company – Revenue Account and Profit and loss Account and ascertainment of profit under Life insurance business; preparation of Balance Sheet using appropriate software; Accounts of general insurance business – Revenue Account, Profit and Loss Account, and Balance Sheet using appropriate software.

**Unit 5: Investment Accounts**

Meaning of Investment Accounts; cum-interest, ex-interest, cum-dividend and ex-dividend. Accounting for fixed interest earning securities and variable earning securities, bonus shares and right shares.

**READINGS:**

**Essential Readings:**

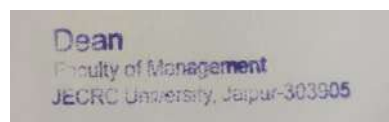
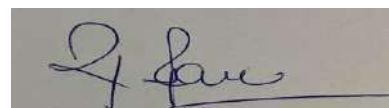
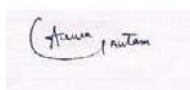
1. Monga, J.R., *Fundamentals of Corporate Accounting*, Mayur Paper Backs, New Delhi.

**Suggested Readings:**

1. Sehgal, Ashok and Deepak Sehgal, *Corporate Accounting*, Taxman Publication, New Delhi.  
2. Maheshwari, S.N. and S. K. Maheshwari, *Corporate Accounting*, Vikas Publishing House, New Delhi.

1. Corporate Accounting:

CO1: Prepare consolidated balance sheet of holding company with one subsidiary



CO2: Make accounting entries related to winding up of a company;.

CO3: Make accounting entries related to winding up of a company;

CO4: Provide services to corporate investors in preparing necessary accounts relating to investment in securities.

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	L				H	M
CO2	H	L				H	M
CO3	M	L		M	L	L	L
CO4	H	M	M				
CO5	H	L	L	M	M	L	M

**B.COM III SEMESTER**  
**BANKING LAW AND PRACTICES**  
**SUBJECT CODE: BCM281B**  
**CREDITS: 3L**

**Objective:-**

- To acquaint the students with fundamental of banking & banking system in India.
- To familiarize them with the role of Negotiable Instruments, Non nationalized Banks, RBI in Banking development.

**Unit I Banking Business**

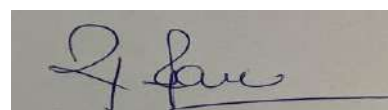
Definition and function of banks, need for banks; legal framework; structure, organisation and working of banks, need for proper regulation and supervision; banker and customer relationship, general and special types of customers. Types of Deposits: Types of banks in India; Role of Foreign Banks in India; Advantages and Disadvantages of Foreign banks, Road Map for Foreign Banks in India; India's approach to Banking Sector reforms; Achievements of financial sector reforms and areas of concern, Credit Allocation Policies of Commercial banks, Credit Market Reforms.

**Unit II Banking Operations**

Cheque: definition, features and types of cheque; Endorsement: meaning and essentials of a valid endorsement, types of endorsement; Era of Internet Banking and



its benefits, Mobile Banking, Home banking, Virtual Banking, Electronic Clearing System



(ECS), E-payments, Electronic Fund Transfer (EFT), E-money, Unified Payment Interface (UPI), Safeguard for internet banking, Critical comparison of traditional banking methods and ebanking; Balance Sheet of a Bank, special items of a Balance Sheet, off Balance Sheet Items; Anti-money Laundering Guidelines. Basics of Negotiable Instruments

### **Unit III Loans and Advances**

Principles of sound lending, Types of loans and advances, Advances against various securities; Securitization of Standard Assets and its Computation; Basel Accord: merits and weaknesses of the Basel II, Basel III, and Basel IV. Meaning of Non-performing assets, types of non-performing assets, treatment in balance sheet of bank and provisioning requirements, Non-performing assets in Indian Banking system- issues and resolution

### **Unit IV Insurance Business**

Basic concept of Risk-kinds of Business Risks; Insurance Business: concept, characteristics, functions; Fundamental principles- Indemnity, Insurable Interest, Utmost Good faith, Proximate Cause, Contribution, Subrogation. Reinsurance and Coinsurance: features, objectives, methods; Bancassurance: features and merits.

### **Unit V Life and Non-Life Insurance**

Types of Insurance, Life and Non-Life: Features, needs, policies of different types of Insurance, Control of Malpractices and Mis-Selling, Negligence, Loss Assessment and Loss control, Computation of Insurance Premium, Dematerialization of Insurance Policies; Claims and Settlement Procedure; Regulatory Framework of Insurance: IRDA Act, 1999; Objectives of IRDA, Composition of IRDA, Duties, Powers and Functions of IRDA; Role of IRDA: Delegation of Powers, establishment of Insurance Advisory Committee, Power to make Regulations

### **Course outcomes(CO)**

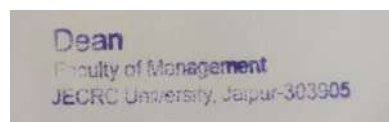
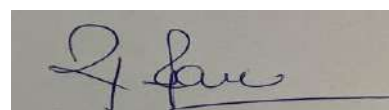
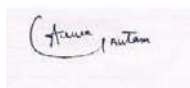
- I CO1: Explain the meaning, scope and functions of Banking along with legal framework;
- II CO 2: Assess the operations of banking and its services;
- III CO3: Evaluate the lending operations of banks and identify causes of NPA in banks;
- IV CO4: Explain the concept of insurance and its principles;

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1			M		L		
CO2		L		L	M		L
CO3	H				L		M
CO4	M						

H = Highly Related; M = Medium L = Low

### **Suggested Readings**



**D.M. Mithani;** Money, Banking & International Trade ,Himalya Publishing House, Mumbai.

**Trivedi, Choudhary& Kumar;** Indian Bank System; Ramesh Book Depot, Jaipur.

**Varshney P.N.;** Banking Law & Practice,

**B.COM III SEMESTER**  
**E- ACCOUNTING**  
**SUBJECT CODE: BCM103C**  
**CREDITS: 3L**

**Objective:** To impart conceptual and practical knowledge of E-Accounting that uses database system resources and also the software to store, maintain and process accounting data for providing various accounting reports.

**Unit I:**

Meaning, Basics of Computerized accounting, Concepts of Accounting groups, Hierarchy of accounts, Codification in accounting. Accounting package - Setting up an accounting entity, Creation of groups and accounts, Accounting standards.

**UNIT II**

Designing and creating vouchers Data Entry operations using the vouchers .Processing for reports to prepare ledger accounts, trial balance and balance sheet.

**Unit III:**

Identifying and appreciating the data content in accounting transactions; overview of database concepts, ER model; creating and implementing RDM for Financial Accounting; SQL to retrieve data and generate accounting information.

Documenting transactions using vouchers; System of vouchers and database design for accounting; Storing and maintain transaction data.

**Unit IV:**

Decomposing Accounting reports to appreciate information content, Identifying accounting, information and appropriate queries, Forming and executing the SQL , Generating Accounting information for a report

**Unit V**

Creating data table defining relationships and constraints

Designing Accounting Vouchers

Designing Accounting Reports;

☐ Cash Book

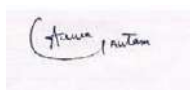
☐ Journal Book

☐ Ledger

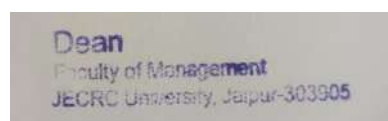
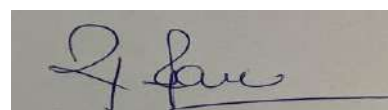
☐ Trial Balance

☐ Profit & Loss Account

☐ Balance Sheet



Suggested Readings:-



- FINANCIAL ACCOUNTING : A MANAGERIAL PERSPECTIVE , R NARAYAN SWAMY, PHI LEARNING PVT. LTD
- E-Accounting:

CO1: To impart conceptual and practical knowledge of E-Accounting that uses database system resources.

CO2: To acquaint with the software to store, maintain and process accounting data for providing various accounting reports.

CO 3: Students will explore performance, liquid assets, inventories, fixed assets, intangible assets, long-term obligations, investments, equity, and cash flows using different kind of software.

CO 4: Identifying and appreciating the data content in accounting transactions.

CO5: Understanding the meaning, Basics of Computerized accounting, Concepts of Accounting groups.

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	M	L			M	M
CO2	M	L	L			L	L
CO3	M	L	L	M	L	M	L
CO4		L		M			
CO5			L				M

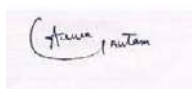
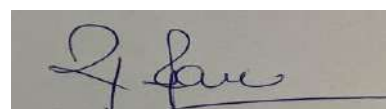
**B.Com III SEMESTER  
RESEARCH METHODOLOGY  
SUBJECT CODE: BCM119B  
CREDITS: 3L**

**Unit I**

Meaning, Objective and Motivation in research, Type of research, research approaches, Significance of research, research process, criteria for good research, Define the research problem, selecting a problem, meaning of research design, need of research design, features of good design.

**Unit II**

Sampling Designing: Census and sample survey, implications of sample design, steps in sample design, criteria of selecting a sample, characteristic of a good sample design, Different type of sample design, random sampling. Data collection techniques: collection of data, interview, schedule and questionnaire method, difference between questionnaires and

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schedules, Collection of secondary data, selection of appropriate method for data collection.

### Unit III

Processing and analysis of data, type of analysis, statistics in research, type of series, measurement of central tendency, measurement of dispersion, regression analysis, least square method, Mean based method, correlation analysis, Karl Pearson coefficient of correlation, Spearman single rank method, repeated rank method, relationship between correlation and regression analysis.

### Unit IV

Hypothesis Design, Basic concept concerning hypothesis testing, procedure of hypothesis testing, Important Parametric test: Z test, T test and F test, Non parametric test: Chi square test, Sign test, run test, mann- whitney U test.

### Unit V

Scaling technique, measurement in research, type of measurement scales, techniques of developing measurement tools, Interpretation and report writing, technique of interpretation, Significance of report writing, types of report, Different steps in writing a report, Lay out of the research report,

### Course outcomes(CO)

- I CO1: To know about the various approaches to research and its significance.
- II CO 2: To understand the various implications of various parameters of research.
- III CO3: To help in analysis of various data and their correlation
- IV CO4: To help students in knowing design and procedure of hypothesis and subsequent research

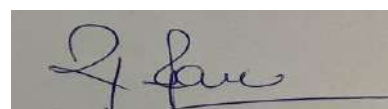
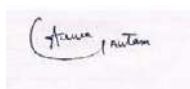
### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H						M
CO2	M	M	L	M	H	L	
CO3		H					
CO4	M			L			

H = Highly Related; M = Medium L = Low

### Reference Books:

1. Research Methodology: C R Kothari.
2. Business Statistics for managers: Lavin and Rubin.
3. Business Research Methods: Coopers & Swindlers



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**B.COM III Semester**  
**Course Name: Advanced Spread Sheet Lab**  
**Course Code (DCA003)**  
**CREDITS: 2P**

**Course Objective:**

1. Students will be able to understand the basics of Excel.
2. Students will be able to understand the concepts of working with the functions of advanced excel.

**Syllabus**

**Advanced Excel Course - Overview of the Basics of Excel**

Customizing common options in Excel, Absolute and relative cells, Protecting and un-protecting worksheets and cells

**Advanced Excel Course - Working with Functions**

Writing conditional expressions (using IF), Using logical functions (AND, OR, NOT),

Using lookup and reference functions (VLOOKUP, HLOOKUP, MATCH, INDEX),

VlookUP with Exact Match, Approximate Match, Nested VlookUP with Exact Match

VlookUP with Tables, Dynamic Ranges, Nested VlookUP with Exact Match, Using VLookUP to consolidate Data from Multiple Sheets

**Advanced Excel Course - Data Validations**

Specifying a valid range of values for a cell, Specifying a list of valid values for a cell, Specifying custom validations based on formula for a cell

**Advanced Excel Course - Working with Templates**

Designing the structure of a template, Using templates for standardization of worksheets

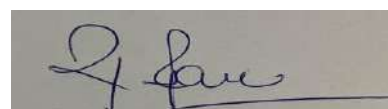
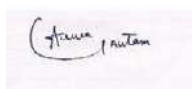
**Advanced Excel Course - Sorting and Filtering Data**

Sorting tables, Using multiple-level sorting, Using custom sorting, Filtering data for selected view (AutoFilter), Using advanced filter options

**Advanced Excel Course - More Functions**

Date and time functions, Text functions, Database functions, Power Functions (CountIf, CountIFS, SumIf, SumIFS)

**Advanced Excel Course – Formatting**



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Using auto formatting option for worksheets, Using conditional formatting option for rows, columns and cells

### **Advanced Excel Course – Macros**

Relative & Absolute Macros, Editing Macro's

### **Advanced Excel Course - WhatIf Analysis**

Goal Seek, Data Tables, Scenario Manager

### **Advanced Excel Course – Charts**

Using Charts, Formatting Charts, Using 3D Graphs, Using Bar and Line Chart together, Using Secondary Axis in Graphs, Sharing Charts with PowerPoint / MS Word, Dynamically, (Data Modified in Excel, Chart would automatically get updated)

### **Advanced Excel Course - Working with Reports**

Creating subtotals, Multiple-level subtotals, Creating Pivot tables, Formatting and customizing Pivot tables, Using advanced options of Pivot tables, Pivot charts, Consolidating data from multiple sheets and files using Pivot tables, Using external data sources, Using data consolidation feature to consolidate data, Show Value As ( % of Row, % of Column, Running Total, Compare with Specific Field), Viewing Subtotal under Pivot, Creating Slicers ( Version 2010 & Above), Designing the structure of a template, Print Titles Repeat Rows / Columns

### **Analysis ToolPak**

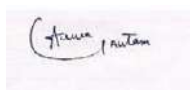
Use of the Analysis ToolPak to perform complex data analysis

### **Course Outcome( CO's)**

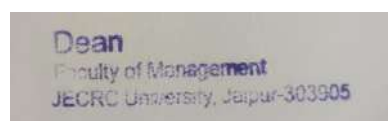
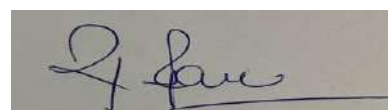
- CO1.** Students will learn to use spreadsheet concepts and explore the Microsoft Office Excel environment.
- CO2.** Students will apply the concepts of to create, open and view a workbook.
- CO 3.** Students will Illustrate different advanced excel formatting.
- CO 4.** Students will be apply date and time functions
- CO 5.** Students will learn to describe basic uses of advanced excel functions

**B.COM V SEMESTER  
INCOME TAX  
SUBJECT CODE: BCM104B  
CREDITS: 3L+1T (4)**

**Objective:** The students should be able to demonstrate an understanding of the tax provisions enabling them to make use of legitimate tax shelters, deductions, exceptions, rebates and allowances.



#### **Unit 1: Basic Concepts**



Tax: concept, types – direct and indirect; canons of taxation; Direct Tax: Need, features and basis of charges. Income Tax (as per Income Tax Act 1961 and amendments): Basic Concepts; Residential status; Scope of Total Income, Heads of Income; Income which do not form a part of Total Income; Agriculture Income and its taxability.

### **Unit 2: Income from Salary and House Property**

- a. Meaning of salary, Basis of charge, conditions of chargeability, Allowances, Perquisites, Deductions and exemptions, Computation of taxable Income from Salary.
- b. Income from house property Basis of charge, Determinants of Annual Value, Deductions and exemptions, computation of taxable income House Property.

### **Unit 3: Profits and gains from business or profession, capital gains and income from other sources**

- a. Meaning of business income, methods of accounting, Deductions and Disallowances under the Act, Computation of presumptive income under Income-tax Act, Computation of taxable income from Business and profession.
- b. Meaning of Capital Asset, Basis of Charge, Exemptions related to capital gains; Meaning of Transfer, Computation of taxable capital Gain.
- c. Income from Other Sources Basis of charge - Dividend, Interest on securities, winning from lotteries, Crossword puzzles, Horse races, Card games etc., Permissible deductions, impermissible deductions.

### **Unit 4: Computation of Total income and Tax Liability of individual and HUF**

Income of other persons included in assessee's total income, Aggregation of income and set-off and carry forward of losses; Deductions from gross total income; Rebates and reliefs; Computation of total income and tax liability of individuals and HUF.

### **Unit 5: Preparation of Return of Income**

Filing of returns: Manually and on-line filing of Returns of Income & TDS; Provision & Procedures of Compulsory on-line filing of returns for specified assesses

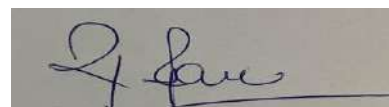
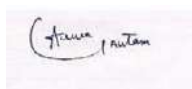
### **Books Recommended:**

- 1) Agarwal, Shah, Jain, Managal, Sharma – Income Tax (RBD, Jaipur)
- 2) Gupta, Khatri, Goyal –Income Tax (Kailash Book Depot)
- 3) Patel, Choudhary –Income Tax (ChoudharyPrakashan)
- 4) Singhanian, Vinod K. and Monica Singhanian -- Students' Guide to Income Tax (Taxmann Publications Pvt. Ltd., New Delhi)
- 5) Ahuja Girish and Ravi Gupta -- Systematic Approach to Income Tax (Bharat Law House, Delh)

### **Course Outcomes: (CO)**

1. Comprehend the concepts of taxation, including assessment year, previous year, assesses, person, income, total income, agricultural income and determine the residential status of persons;
2. Compute income under different heads, applying the charging provisions, deeming provisions, exemptions and deductions;
3. Apply the clubbing provisions and provisions relating to set-off and carry forward of losses to determine the gross total income;
4. Calculate the tax liability of an individual and HUF as well as deductions from gross total income and determine the total income of an individual and HUF;

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**



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Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M				L		
CO2		M		M	L	L	L
CO3	H		L				L
CO4		M	M		H		

H = Highly Related; M = Medium L = Low

## B.COM V SEMESTER

### Auditing & Assurance

Subject Code: BCM126A

Credit: 3

#### A.

**Introduction:** This course is offered by Dept. of Commerce as a compulsory subject, targeting students who wish to pursue a career in accounting and auditing. As Auditing is an independent investigation of some particular activity. Although auditing has a precise meaning only when used with a limited modifier, such as tax auditing or financial auditing, generally auditing is defined as a systematic process of objectively obtaining and evaluating evidence regarding assertions about economic actions and events to ascertain the degree of correspondence between those assertions and established criteria and communicating the results to interested users.

**B. Course Outcomes:** At the end of the course, students will be able to-

1. Describe the audit and other assurance engagements, corporate governance, internal and statutory audit.
2. Recognize risk assessment, audit planning, documentation and audit evidence.
3. Describe internal control, internal check, test of control and other audit procedures.
4. Explain sampling, audit of non-current assets, inventory, cash & bank.
5. Discuss the finalization of audit report and types of audit report for creating employability.

#### SYLLABUS

<b>Unit 1</b>	<b>Auditing:</b> Meaning, definition, Importance, Accounting and Auditing, Limitations, Detection and Prevention of Frauds and Errors: Fraud and fraudulent behavior and their prevention in business,
<b>Unit 2</b>	<b>Basic principles</b> governing an audit (SA200), Type of audit, Internal Control, Internal Check and Internal Audit, Evaluation of Internal Control System (SA-256), Internal Control System regarding Purchases, Sales, salaries and wages. <b>Audit Procedure:</b> Audit planning, Audit Programme, Audit working paper, Audit files, Audit Evidence: Methods of obtaining Audit evidence (SA-500 & 501), Financial statement assertions and audit evidence

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**Bachelor of Commerce**

**B.Com Scheme 2022-25**

<b>Unit 3</b>	<b>Vouching</b> -Meaning, Importance, Vouching of cash and trading transactions, Routine Checking and Test Checking, Verification and valuation of Assets and Liabilities,
<b>Unit 4</b>	<b>Elementary knowledge</b> of Management Audit, Operational Audit, Efficiency Audit, Corporate Social Audit. Rights, Duties and Liabilities of an auditor and rules. Investigation: Investigation on behalf of perspective purchaser of business and banker and prospective. Audit Reports and Audit Certificates.
<b>Unit 5</b>	<b>Audit of Joint Stock Companies:</b> Appointment, Removal and Remuneration of company auditor, Audit of share capital, debentures and managerial remuneration, Audit of Government Companies with reference to Section 619 of the Company Act 1956. Divisible Profits Including Audit of Reserves & Provisions.

**J. TEXT BOOKS**

T1. Basu S K; Fundamental of Auditing, Pearson publication.

T2. Tandan,B.N. : A hand book of practical Auditing, S. Chand & Co. Delhi

**G. REFERENCEBOOKs**

**K.** R1. Kumar A, Sharma Rs: Auditing  
theory & Practice, Atlantic Publishing.

R2. Goyal S: Text book of auditing:  
Theory & Practice, Subline publishing

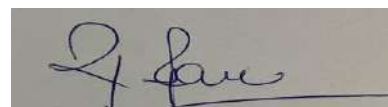
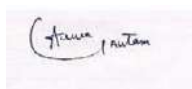
**L.** R3. Kamal Gupta: Contemporary Auditing, Tata McGraw Hill Publishing Co.

**PROGRAM OUTCOMES**

**[PO1].Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

**[PO2].Effective Communication:** Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

**[PO3]. Social Interaction:** Elicit views of others, mediate



**B.Com Scheme 2022-25**

disagreements and help reach conclusions in group settings.

**[PO4]. Effective Citizenship:** Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

**[PO5]. Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

**[PO6]. Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.

**[PO7]. Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio technological changes

**PROGRAM SPECIFIC OUTCOMES**

**[PSO1]:** To understand concept, theories and operation of business using appropriate supportive technologies.

**[PSO2]:** To Prepare, analyse and interpret business problems and draw appropriate conclusions.

**[PSO3]:** To develop the capabilities required to apply cross-functional business knowledge and technologies in solving real- world business problems

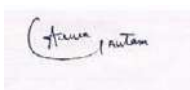
**[PSO4]:** Making Student capable of recognizing and resolving ethical issues that arise in business

**B.COM IV SEMESTER**  
**Goods and Service Tax**  
**Subject Code: BCM106B)**  
**Credits: 3L**

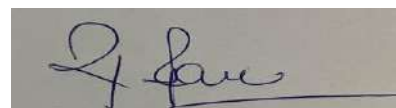
**Learning Outcomes:** After the completion of the course, the learners will be able to:

1. Explain concept, need, and utility of indirect taxes and understand and analyse the taxable event, i.e., supply under GST;
2. Describe the provisions relating to levy of GST;
3. Identify exemptions for different types of goods and services and examine the various provisions of input tax credit;
4. Analyze provisions regarding penalties and interest and to prepare and file GST return on-line;
5. Understand the significant provisions of the customs law.

**Unit 1: Basic Concepts**



Concept and features of Indirect Taxes,  
Difference between Direct and Indirect Taxes,



**School of Business Studies**  
**Bachelor of Commerce**

**B.Com Scheme 2022-25**

Concept of GST, Relevant Definitions under GST law, Constitutional aspects of GST. GST Council: Constitution, Structure and functioning.

**Unit 2: Concept of supply and levy of GST**

Concept of supply including composite and mixed supply, Place, Time and Value of taxable supply, Significance of consideration.

**Unit 3: Levy of GST**

Basis of Charge of GST, Inter-State Supply, Intra-state supply, GST rates notified for supply of various goods and services, Reverse charge mechanism, Composition levy, Exemptions from GST, Power to grant exemptions, Exempted goods under exemption notifications, Exempted services under exemption notifications, Input tax credit

**Unit 4: Procedures under GST**

Registration under GST law, Tax invoice credit and debit notes, Different GST returns, Electronic liability Ledger, Electronic credit Ledger, Electronic cash ledger, Different assessment under GST, Interest applicable under GST (Period), Penalty under GST, Various provisions regarding e-way bill in GST, Mechanism of Tax Deducted at Source (TDS) and tax collected at source (TCS), Audit under GST. **Unit 5: Customs Law**

Custom Law: Concepts; Territorial waters; High seas; Levy of customs duty, Types of custom duties; Valuation; Baggage rules & exemptions.

**Suggested readings:**

Custom Act 1962 and Rules

Commercial's GST, Commercial law publisher (India) Pvt Ltd, New Delhi. Datey V.S.:

GST Ready Reckoner, Taxman Publication, New Delhi

Koolwal, Ashish&Ritu: Goods and Services Tax (2017) Commercial Law Publisher (India) Pvt. Ltd.

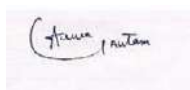
Patel, Chaudhary: Indirect Taxes, Chaudhary Publication, Jaipur

GoelPankaj, GST Ready Referencer, (2017) Commercial Law Publisher (India) Pvt. Ltd.

Rastogi, Abhishek: Professionals guide to GST Ideation to reality (2017)

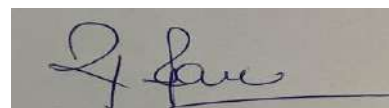
**E-FILING OF RETURNS**  
**SUBJECT CODE: BCM 107B**  
**CREDITS: 3L**

**Objective:** The objective of this paper is to provide a basic conceptual and practical knowledge about electronic filing of returns.



**Unit I: Conceptual Framework**

Meaning of e-filing; difference between e-filing and regular filing of returns; benefits





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**Bachelor of Commerce**

**B.Com Scheme 2022-25**

and limitations of e-filing, types of e-filing; e-filing process; relevant notifications.

**Unit II: Basic concepts of Income tax**

Introduction to income tax – basic terminology, types of assessee, income taxable under different heads, basics of computation of total income and tax liability, deductions available from gross total income, PAN card, due date of filing of income tax return.

**Unit III: TDS and E-filing of TDS returns**

Introduction to the concept of TDS; provision regarding returns of TDS; types of forms for filling TDS returns; practical workshop on e-filing of TDS returns.

**Unit IV: E-filing of ITRs**

Instructions for filling out form ITR-1, ITR-2, ITR-3, ITR-4, ITR-4S, ITR-5, ITR-6; Introduction to Income tax Portal; preparation of electronic return (practical workshops).

**Unit V:**

Goods and Service tax. Different forms filled in GST. Intra state GST and Interstate GST Integrated GST. Different Calculations under GST. Custom Act after GST.

**READINGS:**

**Suggested Readings:**

1. Ahuja, Girish and Ravi Gupta., *Systematic Approach to Income Tax*, Bharat Law House, Delhi.

**Softwares:**

1. Singhania, Vinod K., and KapilSinghania, *TDS Computation and E- filing of TDS Returns*, Taxmann Publications Pvt. Ltd., New Delhi.
2. Singhania, Vinod K., *Tax Computation and E-filing of Income Tax Returns*, Taxmann Publications Pvt. Ltd., New Delhi.

CO1: Describe the different entities subject to tax and reporting requirements.

CO2: Understand and apply the tax formula for individuals.

CO3: Identify individuals who must file tax returns.

CO 4: Determine filing status and understand the calculation of tax according to filing status.

CO 5: Calculate the number of exemptions and the exemption amounts for taxpayers.

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	L						
CO2			M				L
CO3		L			H	L	



**School of Business Studies**  
**Bachelor of Commerce**

**B.Com Scheme 2022-25**

CO4				M			
CO5	L				L	L	

**B.Com VI SEMESTER**  
**TAX PLANNING FOR BUSINESS**  
**SUBJECT CODE: BCM 106B**  
**CREDITS: 3L [3]**

**Learning Objective:** The objective of this course is to acquaint the students with the tax structure for individuals and corporate and also its implications for planning.

**Course Contents:**

**Unit I**

Income tax concepts: Previous Year, Assessment Year, Person, Assessee, Income (including agricultural income), Residential Status and their incidence of tax, Gross Total Income, Total Income; Income which do not form part of total income, Tax Evasion, Tax Avoidance.

**Unit II**

Computation of Income under the head: salary.

**Unit III**

Computation of Income under the Head: House Property and Profits and gains from Business or Profession. Computation of Income under the Head: Capital gains and Income from other sources.

**Unit IV**

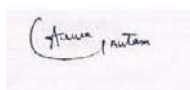
Clubbing of Income, Set-off and carry-forward of losses , Deductions from gross total income as applicable to an individual and Business Units; Computation of total income and tax liability of an individual and Business Units, Procedure for assessment: E-filing of return, Introduction to Goods and Services Tax (GST) and Direct Tax Code (DTC).

**Unit V**

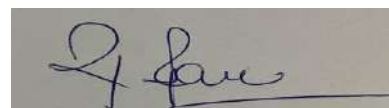
Nature, scope and justification of corporate tax planning; Computation of taxable income and tax liability of companies: Minimum Alternative Tax, Introduction to tax planning with reference to financial decisions; tax planning with reference to amalgamation or de-merger of companies (only theory)

**Text Books:**

1. Singhania, V.K. *Student Guide to Income Tax*. Taxmann Publications Pvt. Ltd. (Latest ed.)
2. Ahuja& Gupta. *Simplified Approach to Corporate Tax*.Flair Publications Pvt. Ltd.( Latest ed.)



**References:**



**School of Business Studies**  
**Bachelor of Commerce**

**B.Com Scheme 2022-25**

1. Ahuja & Gupta. *Simplified Approach to Income Tax*. Flair Publications Pvt. Ltd.
2. Mahesh Chandra & Shukla, D.C. *Income Tax Law & Practice*. Pragati Publications.
3. Goyal, S.P. *Tax Planning and Management*. Sahitya Bhawan Publications.
4. Singhanian, V.K. *Student Guide to Income Tax*. (University ed.). Taxmann Publications Pvt. Ltd.

**Online Readings/Supporting Material:**

1. Finance Act for the relevant assessment year.
2. CBDT Circulations.
3. Latest Court Judgements for the relevant Assessment year.

Tax Planning for Business:

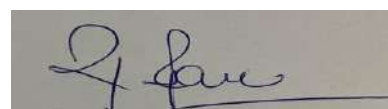
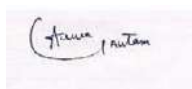
CO1: Demonstrate knowledge of the concepts, principles, and rules of taxation of individuals and small businesses;

CO 2 Prepare tax forms for individuals and sole proprietorships;

CO 3: Recognize tax planning opportunities and recommend appropriate tax-saving strategies for decision making;

CO 4: Address tax situations for a variety of taxpayers, such as wage earners, salespersons, owners of small business, professionals, investors, home and rental property owners, farmers, etc

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M			L		L	
CO2			L		H		M
CO3	L	L					
CO4	H			L	M		L



**B.Com**  
**Management Accounting**  
**Subject Code: BCM128A**  
**Credit : 3L**

**A. Introduction:** This course is designed as a foundation course of Management accounting for the students of graduate program. It will begin with a general overview of accounting and then go into more detail about Management Accounting concepts and techniques used for financial decision-making in the business. In order to even have a hope of success, a company has to know what are sources and uses of funds. That's the importance of accounting and of the financial statements.' The course's objective is to provide a theoretical & practical framework for considering business finance, marketing, HR problems and issues and to apply these concepts in decision making of a company. In this course, students will enhance their knowledge and understanding about the Management of a business.

**B. Course Outcomes:** At the end of the course, students will be able to

**Read and interpret Basic concept of Management Accounting**

Identify and apply principles and regulations relating to management accounting and the preparation of financial statements; Ratio, Fund Flow & Cash Flow

Critically analyze and interpret case information and be able to develop a convincing argument to present their views on relevant business issues;

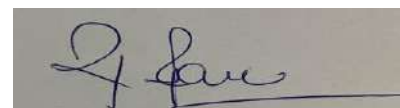
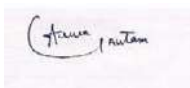
Apply various cost concepts and financial tools in decision making process of a business for developing skill for employability.

**SYLLABUS**

**Unit-I**

Introduction, Definition, Meaning, Scope, Relationship between Cost and Management Accounting.

**Unit-II**



**School of Business Studies**  
**Bachelor of Commerce**

**B.Com Scheme 2022-25**

Analysis and Interpretation of financial Statement: Ratio Analysis, Meaning Objective, Limitation.

Classifications, Computation and Interpretation, Liquidity, Leverage, Activity and Profitability Ratios. Return on Capital Employed Computation and Uses, Du Point Control Chart.

**Unit-III**

Fund Flow and cash Flow Analysis, Concept of Fund, Meaning of Flow of Fund, Techniques and preparation, Uses, Limitation.

Cash Flow Statement, Meaning, Preparation, Uses, Limitations. Marginal costing and managerial decisions:

**Unit-IV**

The basic concept of Marginal Cost and Marginal Costing, Break Even Analysis and Cost volume profit analysis, Break even charts and profit charts, managerial decisions, application of marginal costing in decision making. Standard Costing and Variance Analysis: Concept of Standard Costs, Uses, Cost Variances, Profit and Sales Variances.

**Unit-V**

Budgets and Budgetary Control: Definition, Objectives, Advantages. Preparation of Budget Manual, Key Factor. Limitations Preparation of different classes of Budgets, Budgetary Control Reports. Introduction of zero Based Budgeting and Performance Budgeting, Responsibility accounting : Meaning and Objectives, Responsibility centers, Types, Expenses Centre, Profit Centre, Investment Centre.

**L. TEXTBOOKS**

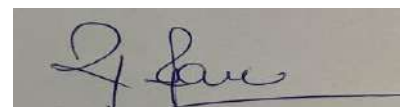
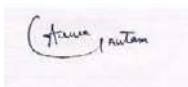
T1. Maheshwari S.N.: Cost & Management Accounting, Sultan Chand & Sons. New Delhi. T2 Rajpurohit, Joshi : Management Accounting, Rajasthan Pathya Prakashan Jodhpur.

**M. REFERENCE BOOKS**

R1 Manmohan & Goyal, S.N: Principles of Management Accountancy, Sahitya Bhawan, Agra.

R2 Anthony, R.N. and Welsh, G.A.: Fundamentals of Management Accounting, Richard D. Irwin, 3rd Edition, 1981.

R3 Horngren, C.T.: Introduction to Management Accounting, Prentice – Hall, 4th Indian Reprint, 1981.



**School of Business Studies**  
**Bachelor of Commerce**

**B.Com Scheme 2022-25**

R4 Rajpurohit B.S & Joshi H.K, Management Accounting, RPP Jodhpur.

**B.Com IV Sem**  
**INTERNATIONAL TRADE & FINANCE**  
**SUBJECT CODE: BCM185A**  
**CREDITS: 3 L**

**Learning Objective:** This paper will provide the understanding of various aspects of international trade, finance and currency derivatives.

**Unit I**

International Trade Theories and Introduction to Forex Markets: Absolute advantage, Relative advantage, and H-O theory, Leontief Paradox, Porter's Diamond paradox; Foreign Exchange (Forex) Market, Communication in Forex Markets, Currency Quotes- both in global and domestic market; types of quotations in forex markets, calculation of forward rates using spot rates, calculation of discount/premium on spot rate using spot and forward rates, Spot Rates with and without transaction costs, synthetic quotes.

**Unit II**

Arbitrage: one point, two point and three point arbitrage; Interest rate Parity (explanation of borrowing and lending criteria, diagrammatic presentation) PPP Principle (both absolute and relative versions), International Fischer Effect. The International Monetary System: Bretton Wood system; Exchange Rate Regimes, Euro Market, International Banking, Concept and Development of Universal banking; Syndicate loan; parallel loan. Euro currency market- Euro loan, Euro deposits, American depository receipt, Global depository receipt, Indian depository receipt. International Trade Financing: Letter of Credit (LoC), buyers credit, sellers credit, pre and post shipment line of credit.

**Unit III**

Currency Exposure and its Management: Types of Forex Exposures: Transaction, Translation, and Economic Exposure and their management; Country Risk-Analysis and Management. Multinational payments Management: Leading, Lagging, Pooling and Netting.

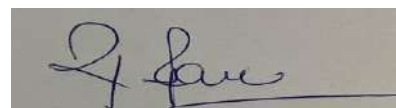
**Unit IV**

Financial Derivatives with respect to currency: Forwards and Futures, Interest rate futures and currency futures; Determination of forward and futures prices; Options and related terminology, Calculating the pay-off from options and diagrammatic representation.

**Unit V**



Pricing of Options- Binomial model and Black-Scholes model; trading strategies



**School of Business Studies**  
**Bachelor of Commerce**

**B.Com Scheme 2022-25**

involving options; Introduction to Swaps, Interest rate swaps, currency swaps, cross currency swaps; Forward rate agreements (FRA). Interest rate caps, floors, collars.

**Course outcomes(CO)**

- I CO1: Understanding of various aspects of international trade and finance.
- II CO 2: To understand the concept of trade theories and forex market
- III CO3:To develop an understanding about international monetary system.
- IV CO4: To know about pricing and interest future

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H		L				
CO2	M		L				
CO3		M					
CO4	M						

H = Highly Related; M = Medium L = Low

**Text Books:**

1. Maurice, Levi. *International Finance* (4th ed.). McGraw Hill.
2. Hull, John C. *Options, Futures and Other Derivatives* (7th ed.). Pearson Education

**References:**

1. Apte, PG. *International Finance*. TMH
2. Madura, Jeff. *International Financial Management*. Cengage Learning
3. Shapiro, Alan C. *Multinational Financial Management* (6th ed.). Wiley publication.

**COST AUDIT**  
**SUBJECT CODE: BCM 101B**  
**CREDITS: 3L**

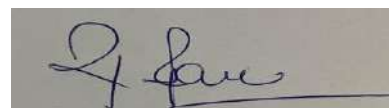
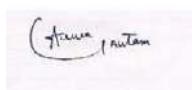
**Objectives:-**

- M.** To provide knowledge about the principles & methods of Cost Audit & Management Audit.
- N.** To make aware about the audit procedure of various public sector companies.

**Unit 1**

Cost Audit : Nature , Objectives & Scope, cost audit leading to other services, Cost Audit and Financial Audit.

**Unit 2**



**School of Business Studies**  
**Bachelor of Commerce**

**B.Com Scheme 2022-25**

Cost Auditor : Qualification, Appointments & engagement, Rights, Duties and responsibilities – Professional and legal – under companies Act 1956, relationship between statutory financial auditor, cost auditor and internal auditor. Cost Audit Report.

**Unit 3**

Concept of management audit, nature & Purpose, management audit Programme, specific areas audit involving internal control, purchasing operations, manufacturing operations, selling & distribution of policies, personal policies.

**Unit 4**

Appraisal of management decisions. Special Audit, problems of banks, performance / efficiency audit of companies.

**Unit 5**

Audit of Public sector companies by Audit Boards Comprising a spectrum of professional discipline. Requirement of Audit under sec. 227 (4A) of companies Act 1956. The cost Audit Reports : contents of reports as per cost Audit records Rules u/s 233 (b) of companies Act 1956, review of cost audit reports by Government.

**References-**

Choudhary D.; Management Audit & Cost Audit, New Central Book Agency, Calcutta.

Ramanathan; Cost & Management Audit, Tata McGraw Hill, New Delhi. Kolkata.

Tikhe J.G.; Cost Audit & Management Audit, Bangalore.

Cona W.L. ; Management Audit, Prentic Hall.

Rose T.G.; Management Audit, Gel & Co. London.

**Course Outcomes:**

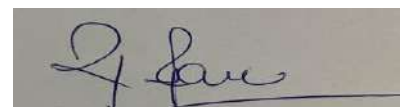

CO1: Examining the records to ensure that they adhere to the cost accounting principles, plans, procedures and objectives.

CO2: Determination accurate cost of jobs, materials, finished products, comparing present cost with previous experience.

CO3: Making of accurate periodical financial statements for information and guidance of management.

CO4: Help in determining prices of finished products by furnishing all relevant data.

CO5: Determination and evaluation of production processes and find out what are profitable and what not profitable items are and determine their extent.



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**Bachelor of Commerce**

**B.Com Scheme 2022-25**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H						
CO2		M			M	L	L
CO3		L	H				
CO4	L			M			L
CO5	L				M		

*(Signature)*

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Dean  
Faculty of Management



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**B.Com Scheme 2021-2024**

**BCOM**

**FINANCIAL DERIVATIVES**

**PAPER CODE: BCM130A**

**CREDITS: (3)**

**Objectives:**

This course sets up study in the field of investments related to options, futures and other derivative securities. The course will acquaint students with derivative securities, markets, pricing, hedging and trading strategies of derivative instruments.

**Unit I:**

Definition of Derivative Securities- Brief history of derivatives, Evolution of Commodity, Structure of derivative markets, forwards, futures, options, swaps etc.

**Unit II:**

Market Characteristics- Futures and Options contract specifications, underlying asset, contract size, and delivery specifications. Marking to market using margin accounts. Familiarizing with market quotes.

**Unit III:**

Trading Strategies involving Options and Futures. Interest rate derivatives, Contractual specification: floating and fixed rate. Valuation of interest rate derivatives. Derivatives Pricing Theory- Option Pricing: Black-Scholes formula for option pricing: derivation and properties..

**Unit IV:**

Continuous-Time Models. Futures Pricing: Pricing by arbitrage: relationship between futures and spot price (cost of carry and reverse cost of carry), difference between futures and forward price, futures on dividend-paying assets.

**Unit V:**

Risk Analysis and Management- Risk Measurement and Management Framework, Option's delta, gamma, Vega, theta, rho. Hedging with futures.

Course outcome-

1. CO1: Understanding of the motives, reasons and explanations for corporate hedging activity.
2. CO2: Knowledge of key financial building blocks, used in constructing complex derivative instruments (eg futures, forwards, options and swaps).
3. CO3: Analysis of payoffs and strategies involved in trading derivative instruments and combinations of derivatives.

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4. CO4: Application of the pricing of individual and combinations of derivative securities and Use and benefits of derivatives in a portfolio context.

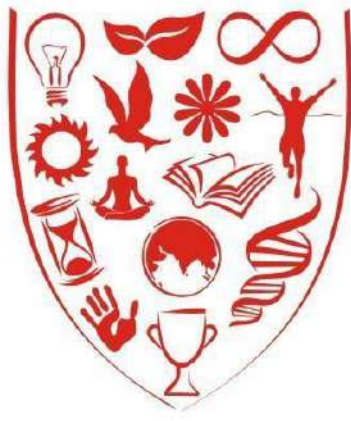
**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	L	L	M	H	M	L
CO2	H	—	—	L	—	H	M
CO3	M	H	L	M	L	H	H
CO4	M	L	—	L	—	M	—

H = Highly Related; M = Medium; L = Low

**Text/ Reference Books**

1. Financial Derivatives: Theory, Concepts and Problems by S.L. Gupta, PHI Publications.
2. Financial Derivatives: The Currency and Rates Factor by Aman Chugh and Divik Maheshwari, Pearson Publications.



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**Department of Management**

**Syllabi and Course Structure**

**Master of Business Administration**

**Academic Programmes**

**Batch (2022-2024)**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**Total Credits for the Batch 2022-2024= 101 Credits**

- 1. Minimum Credit required = 101 Credits**
- 2. Total Relaxation = Student may opt for UGC approved online SWAYAM / MOOC course and is required to submit credit sheet for the same.**

**Summary Sheet**

<b>Semester</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>Total</b>
<b>Credit</b>	<b>27</b>	<b>30</b>	<b>24</b>	<b>20</b>	<b>101</b>

<b>Type</b>	<b>Foundation</b>	<b>Core</b>	<b>Specialization</b>	<b>Interdisciplinary</b>	<b>General</b>
<b>Total Credit</b>	<b>15</b>	<b>30</b>	<b>50</b>	<b>3</b>	<b>3</b>

Abbreviation: F=Fundamental, G=General, C=Core, ID=Interdisciplinary, S=Specialization

**Jaipur School of Business**  
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**Semester I**

<b>FIRST SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
MBA 014 B	Principles of Economics & Markets	3	0	0	3	F
MBA 003A	Organizational Behavior	3	0	0	3	C
MBA 101 A	Managerial Accounting in Management	3	0	0	3	C
MBA 161 B	Marketing Management	3	0	0	3	F
MBA 001 A	Principles & Practices of Management	3	0	0	3	G
MBA 015 A	Business Statistics and Analytics for Decision Making	3	0	0	3	F
MBA 005 C	Business Communication & Skills	3	0	0	3	ID
MBA 016 A	Analytical tools for Managers	2	0	0	2	C
MBA024A	Analytical tools for Managers Lab			2	1	C
MBA 131 A	Entrepreneurship and Startups	3	0	0	3	ID
	<b>TOTAL</b>	<b>26</b>	<b>0</b>	<b>1</b>	<b>27</b>	

**Semester II**

<b>SECOND SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
MBA102A	Financial Management	3	0	0	3	F
MBA191A	Human Resource Management	3	0	0	3	F
MBA221B	Information Technology for Management	3	0	0	3	C
MBA018A	Quantitative Techniques & Analytics	3	0	0	3	C
	<b>Elective- I</b>	3	0	0	3	S
	<b>Elective-II</b>	3	0	0	3	S
	<b>Elective- III</b>	3	0	0	3	S
	<b>Elective- IV</b>	3	0	0	3	S
	<b>Elective- V</b>	3	0	0	3	S
	<b>Elective- VI</b>	3	0	0	3	S
	<b>TOTAL</b>	<b>30</b>	<b>0</b>	<b>0</b>	<b>30</b>	

Abbreviation: F=Fundamental, G=General, C=Core, ID=Interdisciplinary, S=Specialization

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**Master of Business Administration**  
**MBA Scheme 2022-2024**

**Semester III**

<b>THIRD SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
MBA198A	Strategic Management and Corporate Social Responsibility	3	-	-	3	C
MBA009 A	Business Law	3	-	-	3	C
MBA431B	Production & Operations Management	3	-	-	3	C
MBA013A	Management Research Methodology	3	0	0	3	C
	<b>Elective- VII</b>	3	-	-	3	S
	<b>Elective- VIII</b>	3	-	-	3	S
	<b>Elective- IX</b>	3	-	-	3	S
	<b>Elective- X</b>	3	-	-	3	S
	<b>TOTAL</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>24</b>	

**Semester IV**

<b>FOURTH SEMESTER</b>						<b>Type</b>
MBA999A	Dissertation	-	-	40	20	C
	<b>TOTAL</b>		-	<b>40</b>	<b>20</b>	

Abbreviation: F=Fundamental, G=General, C=Core, ID=Interdisciplinary, S=Specialization

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**MBA Scheme 2022-2024**  
**ELECTIVE SUBJECTS**

Sub Code	Specialization	L	T	P	C	N
	<b>FINANCE</b>					
MBA109A	Security Analysis and Portfolio Management	3	0	0	3	S
MBA107A	International Financial Management	3	0	0	3	S
MBA104A	Financial Derivatives	3	0	0	3	S
MBA105A	Indian Financial System	3	0	0	3	S
MBA103A	Financial Decision Making	3	0	0	3	S
MBA106A	Insurance & Risk Management	3	0	0	3	S
MBA108A	Mergers, Acquisitions and Corporate Restructuring	3	0	0	3	S
MBA110A	Financial Risk Management	3	0	0	3	S
	<b>MARKETING</b>					
MBA165B	Product Management and Brand Building	3	0	0	3	S
MBA162A	Advertising Management	3	0	0	3	S
MBA167A	Sales and Distribution management	3	0	0	3	S
MBA163A	Consumer Behavior and Market Research	3	0	0	3	S
MBA164A	International Marketing	3	0	0	3	S
MBA166A	Rural Marketing	3	0	0	3	S
MBA461A	Retail Management	3	0	0	3	S
MBA 440 A	Marketing of Services	3	0	0	3	S
	<b>HUMAN RESOURCE</b>					
MBA194A	Organizational Development and Management of Change	3	0	0	3	S
MBA196A	Sourcing, Training and Development	3	0	0	3	S
MBA371A	Knowledge Management	3	0	0	3	S
MBA195A	Performance Management and Retention Strategies	3	0	0	3	S
MBA197A	Strategic Human Resource Management	3	0	0	3	S
MBA193A	Industrial Relations & Labour Laws	3	0	0	3	S
MBA192A	Compensation Management	3	0	0	3	S
MBA 190A	HR Analytics	3	0	0	3	S
	<b>INFORMATION SYSTEMS</b>					
MBA229A	System Analysis and Design	3	0	0	3	S
MBA222A	Business Intelligence and Data Mining	3	0	0	3	S
MBA225A	ERP & Data Base Management System	3	0	0	3	S
MBA223A	Business Process Re-engineering	3	0	0	3	S
MBA228A	IT Strategy & E-Business	3	0	0	3	S
MBA226A	Information System Audit	3	0	0	3	S
MBA227A	Strategic Management of Information Technology	3	0	0	3	S
	<b>PRODUCTION AND OPERATION MANAGEMENT</b>					
MBA438A	Purchasing & Materials Management	3	0	0	3	S
MBA441A	Total Quality Management	3	0	0	3	S

Abbreviation: F=Fundamental, G=General, C=Core, ID=Interdisciplinary, S=Specialization

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

MBA437A	Production Planning & Control	3	0	0	3	S
MBA432A	Applied Operations Research	3	0	0	3	S
MBA434A	Logistics Management	3	0	0	3	S
MBA442A	Transportation Management	3	0	0	3	S
MBA439A	Service Operations Management	3	0	0	3	S
	<b>ENTREPRENEURSHIP AND FAMILY BUSINESS MANAGEMENT</b>					
MBA301A	Entrepreneurship Process & Behaviour	3			3	S
MBA302A	Creativity & Innovation in Entrepreneurship	3			3	S
MBA303A	Small Business Management	3			3	S
MBA304A	Family Business Management	3			3	S
MBA305A	Leading Change in Family Business	3			3	S
MBA306A	Social Entrepreneurship	3			3	S
MBA307A	Financing New Business Ventures	3			3	S

## **PROGRAM OUTCOMES (POs)**

A Management graduate will be able to demonstrate:

**PO1: Management Knowledge:** To provide students with comprehensive management knowledge that can help them to be a business leader and manager

**PO2: Analytical Skills:** To required conceptual, analytical, technical, entrepreneurial and human relation skills to be an effective management professional and ethical and responsible citizen.

**PO3: Research Aptitude:** An ability to demonstrate a critical awareness of current issues (diversity, social responsibility, sustainability, innovation, knowledge management, etc.) in business and management which is informed by leading edged research and practice in the field.

**PO4: Leadership Skills:** Display leadership competencies in implementing, coordinating and inspiring subordinates to manage change.

**PO5: Culture, Values and Ethics:** Naturalization with social responsibility issues that manager must address, including business ethics, cultural diversity, environmental concerns and sustainable development.

**PO6: Application Skills:** Demonstrate analytical skills applying business analysis, data management and diagnostic problem-solving skills in order to support management decision-making.



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**PO7: Entrepreneurship Skills:** Apply the entrepreneurial, analytical, managerial skills for effective business management.

**PO8 Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO9: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO10: Life Long Learning:** Ability to integrate business knowledge and management techniques and aid planning and control in a changing business environment.

**Program Specific outcomes- Human Resource Management**

- I. Students who undertake this programme will:
- II. PSO 1: Demonstrate an understanding of key terms, theories/concepts and practices within the field of HRM and Demonstrate competence in development and problem-solving in the area of HR Management;
- III. PSO 2: Provide innovative solutions to problems in the fields of HRM and Be able to identify and appreciate the significance of the ethical issues in HR.
- IV. PSO 3: Work effectively with colleagues with diverse skills, experience levels and way of thinking;
- V. PSO 4 Be able to evaluate HRM related social, cultural, ethical and environmental responsibilities and issues in a global context.

**Program Specific outcomes — Finance**

- I. PSO 1: Understanding of the concept of the time value of money and be able to use basic time value concepts to make basic capital investment decisions, and
- II. PSO 2: Analyse and value securities, including debt and equity instruments and Understanding of the relationship between risk and expected return generally and for specific security classes.
- III. PSO 3: Knowledge of the characteristics of the principle asset classes and key securities to be able to evaluate their appropriateness as investments in a broad range of portfolio applications.
- IV. PSO 4: Ability to use the concepts of the time value of money, the risk/expected return relationship and asset-class and security diversification, to construct an investment portfolio that satisfies a hypothetical client's objectives and constraints.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**Program Specific outcomes — Marketing Management**

- I. PSO1: Identify core concepts of marketing and the role of marketing in business and society. To gain Knowledge of social, legal, ethical and technological forces on marketing decision-making.
- II. PSO 2: Appreciation for the global nature of marketing and appropriate measures to operate effectively in international settings. Ability to develop marketing strategies based on product, price, place and promotion objectives.
- III. PSO 3: Ability to communicate the unique marketing mixes and selling propositions for specific product offerings.
- IV. PSO 4: Ability to formulate marketing strategies incorporating psychological and sociological factors influencing consumers. Ability to collect, process, and analyze consumer data to make informed marketing decisions
- V. PSO 5: Ability to analyse marketing problems and provide solutions based on a critical examination of marketing information.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome												Program Specific Outcome				
CO	Po 1	Po 2	Po 3	Po 4	Po 5	Po 6	Po 7	Po 8	Po 9	Po 10	Po 11	Po 12	Pso 1	Pso 2	Pso 3	Pso 4	Pso 5
CO1	H		H	L				H			L		H		H		M
CO2		H				M		H		H				H		H	L
CO3				M			M		H			H	H	M	H	L	

H = Highly Related; M = Medium L = Low

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**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**M.B.A I Semester**

**PRINCIPLES AND PRACTICES OF MANAGEMENT**  
**PAPER CODE: MBA 001A**  
**CREDITS: (3)**

**Objective:**

The objective of this course is to expose the students to basic concepts of management and to enable them to gain an appreciation for emerging ideas, techniques, procedures and practices in the field of management.

**UNIT-I**

Management an Overview, Management Defined, Functions of Management, Managerial Roles and responsibilities, System and Contingency Approach for understanding organizations. Management Thought-Classical Perspective, Scientific Management, Administrative Management, Bureaucratic Management, Behavioural Perspective. Managerial processes, functions, skills and rules in an organization, social responsibilities of Business.

**UNIT -II**

Fundamentals of Planning – Objectives, Strategies, Policies, Decision making, Strategic organizing design, line and staff authority and decentralization

**UNIT-III**

Fundamentals of Organizing- Nature and purpose, departmentation, Span of Management.

**UNIT-IV**

Direction-concept, Leadership- Meaning and Importance, transitions in leadership theories, trait theories, behavioural theories, contingency theories, leadership styles and skills, managerial culture and leadership.

**UNIT-V**

Coordination. Control- concept, nature and purpose, control technique, control of overall performance, span of control.

**Course Outcomes:**

Upon successful completion of the requirements for this course, students will be able to:

CO1: Examine systematically the dynamics of entry, diagnosis, planning, intervention, and sustainability that occur during organization change efforts.

CO2: Recognize and understand the intricate relationship between the strategic business plan of the organization and the role of organization development.

CO3: Develop and enhance conceptual and behavioural skills to implement system-wide organization Control efforts.

CO4: An understanding the concept of direction and leadership.

CO5: understand the process by which the manager achieves harmonious group efforts and unity of actions through balancing the activities of different individuals and groups.

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**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12
CO1	M	H	H	L	H	M	M	L	—	M	M	L
CO2	M	H	H	L	H	M	L	—	L	H	L	L
CO3	M	H	L	L	H	M	L	—	L	H	L	H
CO4	-	L	-		M	L	-	L	L	M	H	M
CO5	M	-	H	L	H	M	M	L	M	-	L	-

H = Highly Related; M = Medium, L = Low

**Suggested Books:**

1. Koontz & Weinrich, *Essentials of Management*, Tata McGraw Hill, 2010.
2. L.M. Prasad, *Principles & Practices of Management*, Sultan Chand, 2010.
3. Stephen Robbins, *Management*, Pearson, 2011.

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**MBA Scheme 2022-2024**  
**M.B.A I Semester**

**Principles of Economics and Markets**  
**PAPER CODE: MBA 014 A**  
**CREDITS: (3)**

**Objectives:**

To equip the students of management with time-tested tools and techniques of managerial economics to enable them to appreciate its relevance decision making. To explore the economics of information and network industries and to equip students with an understanding of how economics affect the business strategy of companies in these industries.

**UNIT I**

Introduction to economics: concept of scarcity- trade-offs, opportunity cost, basic economic problems, microeconomics and macroeconomics, managerial economics-meaning and nature. Sectoral Composition: Characteristics of Indian economy as developing economy, Economic growth vs Economic development, causes and solutions for economic development,

**UNIT II**

Demand & Supply Analysis and Estimation

Demand Analysis- meaning of demand, determinants of demand, demand equation, Law of Demand, elasticity of demand, types of elasticity, measurement of elasticity, Demand forecasting-meaning, types and measurement, supply- meaning, determinants, Law of Supply, market equilibrium.

**UNIT III**

Production-meaning, production function, laws of production-law of variable proportions and laws of returns to scale, isoquants, economies of scale; Cost analysis- Meaning of cost, Cost concepts, (problems), cost function- SR & LR, LAC curve; Break-even analysis- BEP (numerical), Cost & Economies of scale.

**UNIT IV**

Types of markets: perfect competition, monopoly, monopolistic competition and oligopoly; profit-maximization-alternative forms of organization; marginal revenue, marginal cost, and profit maximization, profit maximization by a competitive firm: short-run profit maximization by a competitive firm and long-run profit maximization. Oligopoly Market: Oligopoly-price searchers-meaning, cartels, conditions for cartel success; price rigidity and kinked demand; price leadership, volume pricing.

**UNIT V**

Overview: Overview of the Financial System, Financial Institutions, Financial Markets, Financial Instruments and Services, Role of financial Intermediaries, Source of Funds, Application of Funds, Role of Financial Regulatory and Promotional Institutions like RBI, SEBI, IRDA, PFRDA.

Financial Markets;

**Course Outcomes:**

After the completion of the course, students will be able to –

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- CO1: Understand the roles of managers in firms  
 CO2: Understand the internal and external decisions to be made by managers  
 CO3: Analyse the demand and supply conditions and assess the position of a company  
 CO4: Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and tshe structures of the markets.  
 CO5: Understand the nature of financial market ,institutions and role of financial regulators.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	M	L	L	-	L	L	L	L	L
<b>CO2</b>	L	M	-	M	M	M	L	L	M	-	M	L
<b>CO3</b>	L	H	-	L	H	H	-	L	M	M	H	L
<b>CO4</b>	L	M	H	-	H	H		L	M	-	H	L
<b>CO5</b>	L	M	-	H	-	-	L	-	-	L	M	L

H = Highly Related; M = Medium, L = Low

**Reference books:**

1. Pindyck, Rubinfeld& Mehta (2009). *Microeconomics* (7th ed.). Pearson.
2. Principles of Economics2016
3. Principles of Economics2015, N. Gregory Mankiw (Author)

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA I**  
**ORGANIZATIONAL BEHAVIOR**  
**PAPER CODE: MBA 003A**  
**CREDITS: (3)**

**Objective:**

This course is designed to equip the students with the tools necessary to understand the dynamics of individual and group behaviour for efficient and effective utilization of human resources in the organizations. Broadly, the course intends to help the students to be able to understand and analyse the individual needs, feelings, aspirations and to develop skills needed to plan for the implementation of change in an organization.

**UNIT I**

Definition, Need and Importance of Organizational Behaviour, Contributing disciplines of OB.

Nature and Scope, Organizational Behavior Models.

**UNIT II**

**Personality** – Type A and B, Big five personality types, Factors influencing personality.

**Values And Attitudes**– Concept and types of values: Terminal value and instrumental value. Components of attitude, job related attitudes, measurement of attitude.

**Learning** – Concept and learning theories and reinforcement.

**Perceptions And Emotions** – Importance, factors influencing perception, perpetual distortions, emotional intelligence.

**UNIT III**

**Motivation** – Meaning and importance of motivation, Maslow's need hierarchy theory, Herzberg's two factor theory, Theory X Theory Y, Intrinsic and Extrinsic motivation by Ken Thomas, Measurement of motivation using standard questionnaire. Communication and feedback. Transactional Analysis (TA), Johari Window.

**UNIT IV**

Group Dynamics, Cohesiveness and Productivity. **Conflict:** Sources of conflict, resolution strategies. **Leadership:** Meaning and concept of leadership, trait theory, transactional, charismatic, and transformational leadership.

**UNIT V**

**Dynamics of Organisational Behaviour**

**Organizational Climate and Culture** – Concept, Factors affecting organizational climate and culture, Developing organizational culture. **Organizational Change** – Importance, Stability vs. Change, Proactive vs Reaction change, Change process, Resistance to change, Managing change.

**Stress** – Work Stressors, Consequences, Prevention and Management of stress

**Course Outcome:**

At the end of this course students will have:

CO1: analyze the behaviour of individuals and groups in organizations in terms of organizational

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

behaviour theories, models and concepts;

CO2: apply organizational behaviour concepts, models and theories to real-life management situations through case analysis;

CO3: demonstrate a critical understanding of organizational behaviour theories and current empirical research associated with the topics covered in this course.

CO4: Manage conflict in organizational context and deal with stress.

CO5: Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind the behavior of people in the organization.

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L		—		M	H
CO2	L	M	-	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	-	H	L	M	H	H	-	M	L	M
CO5	L	M	L	H	L	L	H	L	—	M	L	M

H = Highly Related; M = Medium, L = Low

**Essential Readings:**

1. Robbins, S.P., *Organisational Behaviour*, Prentice Hall of India Pvt. Ltd., New Delhi.
2. Greenberg, Jerald, and Robert A Baron, *Organisational Behaviour*, Prentice Hall of India Pvt. Ltd., New Delhi.
3. Luthans, F., *Organisational Behaviour*, McGraw Hill International. New York.

**Suggested Readings:**

1. Chhabra, T. N., *Organisational Behaviour*, Sun India Publications.
2. Singh, A.K., and B. P. Singh, *Organizational Behavior*, Excel Books Pvt. Ltd, New Delhi.

**Suggested Books:-**

1. Marketing In A Nutshell By Mike Meldrum, Elsevier Science Publications.
2. Marketing Management : An Indian Perspective By Prof. Vijay Prakash Anand, Wiley Publications.
3. Principles of Marketing By Prof. S.A. Sherlekar & R. Krishnamoorthy, Himalaya Publishing House Pvt. Ltd.



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MBA I**  
**BUSINESS COMMUNICATION**  
**Subject Code: MBA005A**  
**Credit: (3)**

**Objective**

To develop communication competence in prospective managers and to make them enable the prospective managers to communicate information as well as their thoughts and ideas with clarity and precision.

**UNIT I**

Business communication covering Role of communication in information age; concept and meaning of communication; skills necessary for technical communication; Communications in a technical organization; Barriers to the process of communication. (6 Lectures)

Style and organization in technical communication covering, Listening, speaking, reading and writing as skills; Objectivity, clarity, precision as defining features of technical communication; Various types of business writing: Letters, reports, notes, memos; Language and format of various types of business letters; Language and style of reports; Report writing strategies; Analysis of a sample report; (8 Lectures)

**UNIT II**

Communication and personality development covering, Psychological aspects of communication, cognition as a part of communication; Emotional Intelligence; Politeness and Etiquette in communication; Cultural factors that influence communication; Mannerisms to be avoided in communication; Language and persuasion; Language and conflict resolution; (7 Lectures)

**UNIT III**

Applications of Listening and comprehension skills; Reading Skills; Sound Structure of English and intonation patterns; (5 lectures)

Oral Presentation and professional speaking covering, Basics of English pronunciation; Elements of effective presentation; Body Language and use of voice during presentation; Connecting with the audience during presentation; Projecting a positive image while speaking; Planning and preparing a model presentation; Organizing the presentation to suit the audience and context; Basics of public speaking; Preparing for a speech; (3 Lectures)

**UNIT IV**

Career Oriented Communication covering, Resume and bio-data: Design & style; Applying for a job: Language and format of job application. Job Interviews: purpose and process; How to prepare for interviews; Language and style to be used in interview; Types of interview questions and how to answer them; Group Discussion: structure and dynamics; Techniques of effective participation in group discussion; Preparing for group discussion; (5 Lectures)

**UNIT V**

Advanced Techniques in Technical Communication covering, Interview through telephone/video-conferencing; Power-point presentation: structure and format; Using email

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

for business communication; Standard email practices; Language in email; Using internet for collecting information; Referencing while using internet materials for project reports; Writing for the media; (2 Lectures)

**Course Outcome:**

**At the end of this course students will have:**

CO1: Learn to develop communication competence in prospective managers.

CO2: To enable the prospective managers to communicate information as well as their thoughts and ideas with clarity and precision. It will equip the applications of communication such as applying for a job, writing reports and proposals, facing an interview and participating in a group discussion.

CO3: To make them aware of the new developments in technical communication that have become part of business organizations today.

CO4: Apply technical style in writing and note making.

CO5: Compose official notes, letters, emails, resume, job applications and MOM with the usage of advanced grammar.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM-SPECIFIC OUTCOMES:**

<i>Course Outcome</i>		Program Outcome										
CO	Po1	P02	Po3	P04	Po5	Po6	Po7	P08	Po9	Po10	P11	P012
CO1	H	H	H		H			H			L	
CO2		L				M	L			H		
CO3				M					H			H
CO4			L						M			
CO5	L	M	H		L				L		L	

H = Highly Related; M = Medium L = Low

**Text/Reference books:**

1. Fred Luthans, Organizational Behaviour, McGraw Hill
2. Lesikar and petit, Report writing for Business
3. M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill
4. Wallace and masters, Personal Development for Life and Work, Thomson Learning
5. Hartman Lemay, Presentation Success, Thomson Learning
6. Malcolm Goodale, Professional Presentations
7. Farhathullah, T. M. Communication skills for Technical Students
8. Michael Muckian, John Woods, The Business letters Handbook
9. Herta A. Murphy, Effective Business Communication
10. MLA Handbook for Writers of Research Papers

Abbreviation: F=Fundamental, G=General, C=Core, ID=Interdisciplinary, S=Specialization

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**M.B.A. I Semester**  
**MANAGERIAL ACCOUNTING IN MANAGEMENT**  
**PAPER CODE: MBA101A**  
**CREDITS: (4)**

**Objectives:**

The objective of this course is to acquaint the students regarding various accounting concepts and its application in managerial decision making. They can assess and apply their strengths in accounting.

**UNIT I**

Financial Accounting – Concept, Importance and Scope. Generally accepted accounting principles, Preparation of Financial Statements with special reference to analysis of a Balance Sheet and Measurement of Business Income. Management Accounting – concept, need, importance and scope. Cases and Problems

**UNIT II**

Financial Statement Analysis- Concept, objectives and types. Ratio analysis- study of liquidity, solvency and profitability ratios.

**UNIT III**

Funds Flow Analysis – uses and preparation of funds flow statement. Cash Flow Analysis – uses and preparation of cash flow statement. Cases and Problems

**UNIT IV**

Cost Accounting – Records and Processes, Preparation of cost sheet. Marginal costing and absorption costing. Marginal costing equation, Managerial application of marginal costing. Break even analysis – Computation of breakeven point, margin of safety. Profit graphs. Cases and Problems

**UNIT V**

Budgetary control-meaning, need, objectives, essentials of budgeting, different types of budgets; Variance Analysis- Classification of variances, Material cost, Labour cost, Overhead cost variances. Causes and Disposition of variances. Cases and Problems

**Course Outcomes:**

At the end of this course the students will be able to -

CO1: Develop a functional knowledge of basic managerial accounting principles which will include at a minimum.

CO2: The ability to calculate costs in job order and a process cost accounting system and understand how the costs flow through the system

CO3: An understanding of the types of costs and how they behave in order to calculate cost-volume-profit relationships

CO4: An understanding of the types of budgets and be able to prepare operating budgets, financial budgets and capital budgets.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO5: The study will explain and analyse general costs and cost variance analyses, to assess the price and quantity of materials, labour and overhead costs.

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L		—		M	H
CO2	L	M		M	L	M	M	M	—	M	M	H
CO3	L	H		H	L	M	H	M	—	M	L	M
CO4	L	M		H	L	M	H	H	—	M	L	M
CO5	H	L	M		L		L	L	—	L		

**Suggested Books:-**

1. Ray Garrison, Eric Noreen, Peter Brewer: Managerial Accounting, MC Graw Hill Education (India) Private Limited, 13<sup>th</sup> Edition.
2. Kuppapally Jelsy Joseph: Accounting For Managers, PHI Publications.
3. R.C. Shekhar, A.V. Rajagopalan: Management Accounting, Oxford University Press.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA I Semester**  
**Entrepreneurship Skills & Startups**  
**Subject Code: MBA 131A**  
**Credit :(3)**

**Objective**

To Develop and Strengthen Entrepreneurial Quality And Motivation In Students And To Impart Basic Entrepreneurial Skills And Understanding To Run A Business Efficiently And Effectively

**UNIT I**

Entrepreneur – Types Of Entrepreneurs – Difference Between Entrepreneur And Intrapreneur  
Entrepreneurship In Economic Growth, Factors Affecting Entrepreneurial Growth.

**UNIT II**

Generating business ideas – sources of new ideas, methods of generating ideas, creative problem solving, opportunity recognition, environment scanning, competitor and industry analysis. Intellectual Property Strategy for the Innovation- Driven Enterprise. Managing the Productive Core of the Firm: Innovation

**UNIT III**

Managing the Productive Core of the Firm: Innovation.

**Executing innovations** — the structures and incentives organizations must put into place to effectively allow talented individuals (from different functions) to execute innovation processes.

**Exploiting innovations** — the strategies that a firm must consider to most effectively exploit the value of their innovation, including innovation platforms that incorporate multiple product options, portfolios and standards.

**Renewing innovations** — the processes, structures and strategies for exploring, executing and exploiting innovations that established firms can use to renew their innovation foundations in the face of potentially disruptive innovations.

**UNIT IV**

Need – Sources Of Finance, Term Loans, Capital Structure, Financial Institution, Management Of Working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.

**UNIT V**

Sickness In Small Business – Concept, Magnitude, Causes, And Consequences, Corrective Measures – Business Incubators – Government Policy For Small Scale Enterprises – Growth Strategies In Small Industry – Expansion, Diversification, Joint Venture, Merger And Sub Contracting.

**Course Outcomes:**

After studying this course, you should be able to:

CO1: Understand the nature of entrepreneurship

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO2: Understand the function of the entrepreneur in the successful, commercial application of innovations

CO3: Confirm an entrepreneurial business idea

CO4: Identify personal attributes that enable best use of entrepreneurial opportunities.

CO5 :To develop understanding about reason in sickness in small business and incubators.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome											
CO	Po1	P02	Po3	P04	Po5	Po6	Po7	P08	Po9	Po10	P11	P012
CO1	H	H	H		H			H			L	
CO2		L				M	L			H		
CO3				M					H			H
C04		L	M		H			H				
CO5					M	H			L			M

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA I**

**MARKETING MANAGEMENT**  
**SUBJECT CODE: MBA 161A**  
**CREDITS: (3)**

**Objectives:**

The course is designed to promote understanding of concepts, philosophies, processes and techniques of managing marketing operation and to develop a feel of the market place.

**UNIT I**

Introduction Meaning, Definition, Philosophies of Marketing, Scanning the Marketing Environment, Ethical and Social issues of Marketing. , Introduction to Marketing research: Meaning, Definition, Process of Marketing research & MIS. Rural Marketing: The profile of rural market of India. The main problem area in rural marketing, Market Segmentation & Marketing communication in Rural Markets.

**UNIT II**

Determining alternative market or segment attractiveness, Bases of segmentation – Making, market and segment choices - Principles of competitive positioning - Communicating the competitive position Targeting, Alternative targeting strategies Positioning: Meaning, Definition, Requirement ,Product Positioning, Types of Positioning, Positioning Process

**UNIT III**

Understanding Consumer Behavior, Factors Influencing consumer behavior, Consumer Decision Making Process, Organizational Consumer Behavior, Factors Influencing Organizational Consumer Buying Behavior.

**UNIT IV**

Product Decision: Meaning, Definition, Classification, Product Mix & Product Line decision, Product Life cycle, New Product Development, Branding, Packaging & Labeling Decisions. Pricing: Meaning, Definition, Learning Objectives, Factors Affecting Pricing Decisions, Price Setting Procedure, Selecting Pricing Strategies, Selection of Pricing Method.

**UNIT V**

Market Channel Decisions: Meaning, Definition Functions and Types, Factors Affecting in Selection of Channel, Channel Process, Introduction to VMS, HMS, MLM. Managing the Marketing Promotion Decisions: Advertising, Sales Promotion, Personal Selling, Public Relations, Direct & Online Marketing

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**Course Outcome (CO):**

At the end of this course students will have:

CO1: Identify and respond to marketing its objectives by applying principles of marketing and communications.

CO2: Develop a marketing plan and present and defend it persuasively.

CO3: Contribute to evaluating the effectiveness of marketing initiatives.

CO4: Participate in the development of creative solutions to address marketing challenges.

CO5: Explain Channel functions & flows, channel levels.

Course Outcome	Program Outcome											
CO	Po1	P02	Po3	P04	Po5	Po6	Po7	P08	Po9	Po10	P11	P012
CO1	H	H	H		H			H			L	
CO2		L				M	L			H		
CO3				M					H			H
CO4		L	M		H			H				
CO5			M		H			M				

H = Highly Related; M = Medium L = Low

**Essential Readings:**

1. Marketing Management: A South Asian Perspective – Kotler, Keller, Koshy & Jha, 13/e, Pearson Education, 2012
2. Marketing Management, Ramaswamy V. S. & Namakumari S, 4/e, TMH, 2014
3. Fundamentals of Marketing Management, Etzel M.J BJ Walker & William J. Stanton, 14/e, TMH, 2012
4. Marketing Management Concepts & Cases, S.A.Sherlekar, HPH

**Suggested Readings:**

1. Marketing Management, Arun Kumar & Meenakshi N, 2/e, Vikas, 2012
2. Applied Case Studies in Marketing – Shajahan S, Primus BOOKS, 2011.
3. Marketing Management – Karunakaran, HPH.
4. Marketing in India: Text and Cases- Neelamegham S, 4/e, Vikas.

**Suggested Books: -**

1. Marketing In A Nutshell By Mike Meldrum, Elsevier Science Publications.
2. Marketing Management: An Indian Perspective By Prof. Vijay PrakashAnand, Wiley Publications.
3. Principles of Marketing By Prof. S.A. Sherlekar& R. Krishnamoorthy, Himalaya Publishing House Pvt. Ltd.



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA I Semester**

**PRINCIPLES AND PRACTICES OF MANAGEMENT**  
**PAPER CODE: MBA001A**  
**CREDITS: (3)**

**Objective:**

The objectives of this course is to expose the students to basic concepts of management and to enable them to gain appreciation for emerging ideas, techniques, procedures and practices in the field of management.

**UNIT I**

Management an Overview, Management Defined, Functions of Management, Managerial Roles and responsibilities, System and Contingency Approach for understanding organizations. Management Thought-Classical Perspective, Scientific Management, Administrative Management, Bureaucratic Management, Behavioral Perspective. Managerial processes, functions, skills and rules in an organization, social responsibilities of Business.:

**UNIT II**

Fundamentals of Planning – Objectives, Strategies, Policies, Decision making, Strategic organizing design, line and staff authority and decentralization:

**UNIT III**

Fundamentals of Organizing- Nature and purpose, departmentation, Span of Management.

**UNIT IV**

Direction-concept, Leadership- Meaning and Importance, transitions in leadership theories, trait theories, behavioral theories, contingency theories, leadership styles and skills, managerial culture and leadership.

**UNIT V**

Coordination. Control- concept, nature and purpose, control technique, control of overall performance, span of control.

**Course Outcomes:**

Upon successful completion of the requirements for this course, students will be able to:

CO1: Examine systematically the dynamics of entry, diagnosis, planning, intervention, and sustainability that occur during organization change efforts

CO2: Recognize and understand the intricate relationship between the strategic business plan of the organization and the role of organization development

CO3: Develop and enhance conceptual and behavioral skills to implement system-wide organization Control efforts.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MBA I Semester**  
**Business Statistics and Analytics for Decision Making**  
**SUBJECT CODE: MBA015A**  
**CREDITS: (3)**

**Objectives:** To understand & apply various statistical methods of data summarization and analysis, to gain ability to take decision in diverse aspects of business environment.

**UNIT I**

Meaning & Definition of Statistics, Functions, Applications, Limitations and Distrust of Statistics. Census and sampling, methods of sampling, Methods of collections of Primary and secondary data, Schedule & Questionnaire,

**UNIT II**

Classification and tabulation of Data, Diagrams and Graphs, concept of central tendency: meaning, definition, determination of Mean including Geometric Mean and Harmonic Mean, Median, Mode.

**UNIT III**

Measures of Dispersion, Meaning, Objectives, Importance, Absolute and relative measure of dispersion, essential characteristics of a good measure of dispersion, selective of an appropriate measure of dispersion.

**UNIT IV**

Correlation, introduction, types of correlation, Scatter Diagram, Karl Pearson Coefficient, Spearman's correlation.

**UNIT V**

Business forecasting introduction, theories of business forecasting, techniques of business forecasting and business statistics case studies.

**Course outcomes(CO)**

CO1: To apply and understand various statistical methods of data summarization and analysis.

CO2: To find ability to take decisions in diverse aspects of business environment.

CO3: To understand classification and tabulation of data.

CO4: To know technical terms like skewness, measures of dispersion and co-relation.

Course Outcome	Program Outcomes									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	L	H	H	H		L		M
CO2			L	M	M	H	H		H	
CO3	M	L				L				H
CO4		M	M	L			M		L	

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA I Semester**  
**ANALYTICAL TOOLS FOR MANAGERS**  
**Paper Code: MBBA016A**  
**Credits: (2-0-2-3)**

**Course Objectives:**

1. This course aims to provide students with an exposure to the advanced features in MS Excel.
2. To equip students with knowledge on basic software for business communication with in-hands training.
3. To provide an understanding on how to analyse quantitative data using Microsoft excel.
4. To gain proficiency in creating solutions for Data Management and Reporting

**UNIT I**

**Introduction** Meaning of Data analytics tools, Introduction of MS excel, Excel interface (Title bar, Menu bar, Tool bar, Formula Bar, Calculation Bar), Data Entry and editing, formatting of data, Auto fill, Cell Referencing, Paste special

**UNIT II**

**Basic functions of excel** Mathematical function, Statistical functions, Logical functions, Date & Time Functions, Filters and sort (Standard, Custom, Multiple)

**UNIT III**

Charts ( Bar chart, Stock chart, Area chart, Statistic Chart, Combo chart, Pie chart), Graphs (Line scatter), Data tables, Tables, Page Layout & Views ( Margins, Break, Background, Landscape, Portrait, Theme colors, Theme effects, Fonts

**UNIT IV**

**Data Analysis using Lookup, Pivot table and Data Security** Lookup Functions, Introduction to Pivot table, Filter, sort and group Pivot table data, Uses of Pivot chart , Organizing & Presenting Data Interpretation using Pivot, Printing the sheet, Password protection

**UNIT V**

**Excel for Financial data and Dashboard** Working with Tables, Basic Financial Function, Loan amortization, Depreciation (SLN, SYD, DB, DDB, VDB), Capital budgeting, Dashboard, Types of dashboard.

**Reference Books:**

- John walkenbach, **Microsoft Excel 2016 Bible**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

- Stephen James Nelson, **Excel Data Analysis for Dummies**
- Nancy Muir. **Teach Yourself VISUALLY Excel 2007**

<i>Course Outcome</i>	Program Outcome									
CO	Po1	P02	Po3	P04	Po5	Po6	Po7	P08	Po9	Po10
CO1	H	H	H		H			H		
CO2		L				M	L			H
CO3				M					H	
C04		L	M		H			H		

# **II SEMESTER**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA II Semester**  
**Quantitative Techniques and Analytics**  
**SUBJECT CODE: (MBA018A)**  
**CREDITS: (3)**

**Objectives**

The course is designed to make the students familiar with the basic quantitative and linear programming techniques. The focus of this paper is to enable the students to give an exposure to operations research techniques to support business decisions and to understand simulation and its application in decision making.

**UNIT I**

**Introduction to OR;** Scope, Techniques, Characteristics and Limitations of Operation Research; Methodology and Models in OR (only theory). **Theory of Games:** Introduction- Two Person Zero Sum Games – Pure Strategies – Games with Saddle Points – Rules to Determine Saddle Points – Mixed Strategies – Game Without Saddle Points – the Rules of Dominance – Methods of Solution for Games Without Saddle Points – Algebraic Methods, Graphical Methods.

**UNIT II**

**Transportation Problems:** Introduction: Mathematical Formulation of Transportation Problem, the Transportation Method for Finding Initial Solutions- North West Corner Method, Least Cost Method, Vogel's Approximation Method. **Assignment Problems:** Introduction, Mathematical Statement of the Problem, Hungarian Method of Solution, Maximization case in Assignment Problem, Unbalanced Assignment Problem

**UNIT III**

**Linear Programming:** Formulating Maximization/minimization Problems, Graphical Solution, Simplex Method, Artificial Variables – Big M – Method, Special Cases of LP, Duality of LP and its Interpretation, Post Optimality/Sensitivity Analysis, Applications of LP

**UNIT IV**

**Networking:** Terminology; Networking Concepts; Rules for drawing network diagram; CPM Computations: CPM Terminology, Finding critical path - Different Floats; PERT Computations: Computation of earliest and latest allowable times, Probability of meeting the scheduled dates; difference between PERT and CPM, Concept of Project Crashing (Theory only)

**UNIT V**

**Decision Theory:** Decision-making under uncertainty- Maximin, Maximax, Laplace and Hurwicz criteria; decision-making under Risk- Expected Value (EMV, EOL, EVPI), decision tree analysis

**Course Outcomes:**

- CO1: Apply quantitative tools in managerial decision making.
- CO2: Apply decision theory for business decisions.
- CO3: Effectively use networking tools in relevant application areas.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO4: Effectively use the resource allocation techniques as transportation and assignments in related areas.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM-SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1		M	H	L		H	M		H	
CO2	H		L	M	L	M		L	M	
CO3	H	L		H	M		L	M		M
CO4	M			L			H			H

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA II SEMESTER**  
**FINANCIAL MANAGEMENT**  
**PAPER CODE: MBA102B**  
**CREDITS: (3)**

**Objective:** To familiarize the students with the principles and practice of financial management.

**UNIT I**

Financial Management: Meaning & Scope of FM. Objectives of FM, Functions of Financial Managers, Financial Decisions, Time value of money: Present Value & Future Value of Rupee one & Annuity. Risk and Return- overview of capital market theory, Beta Estimation, CAPM, and APT.

**UNIT II**

Funds Raising Decision: Cost of Capital: Cost of Debt Capital, Preference Capital, Equity Capital, Retained Earnings & Weighted Average Cost of Capital. Capital Structure – Determination of capital structure, optimum capital structure, over capitalization & under capitalization, return on capital employed, Capital Gearing, Trading on equity.

**UNIT III**

Capital Budgeting (Traditional & modern Techniques): Pay Back Period, ARR, NPV, IRR, PI & Terminal Value techniques. Theories of capital structure: Net Operating Income, Net Income, Traditional & MM Theory.

**UNIT IV**

Working Capital Management: Meaning, Components of WC, Operating Cycles Method of estimation of WC. Inventory Management: Concept, Objectives & Inventory Control Techniques. Receivable Management: Concept & Objectives.

**UNIT V**

Leverages: Meaning, Types of leverages, calculation of Leverages: Operating Leverage, Financial Leverage & Combined Leverage. Dividend Policy: Concept of Dividend & Dividend Policy, Determinants of Dividend Policy, Dividend Model: Gordon Model, Walter Model & M-M Model

**Suggested Books:**

- 1) Khan, M.Y. Jain, P.K. *Financial Management: Text, Problems and Cases*, Tata McGraw Hill Publishing Company Limited.
- 2) Pandey, I.M. *Finance: A Management Guide for Managing Company Funds and Profits*. Prentice Hall of India, New Delhi. (2003).
- 3) Bhattacharya, *Financial Accounting for Business Managers*. Prentice Hall of India, New Delhi 2003



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

- 4) Saraswat, Bhatnagar, *Financial Management*, Garima Publications, 2012.
- 5) M.R. Agarwal, *Financial Management*, Garima Publications Jaipur, 2009.

**Course outcome –**

At the end of this course the student will be able to learn

CO1: Apply and critically evaluate corporate finance techniques and critically evaluate theories of financial statements and related analysis;

CO2: Identify, define and analyse problems and identify and create process to solve them and Exercise critical judgement in creating new understanding;

CO3: Demonstrate advanced numeracy and quantitative skills and identify and evaluate social, cultural, global, ethical and environmental responsibilities and issues

CO4 : Select and apply techniques in assessing and managing working capital.

CO5 :Develop analytical skills this would facilitate the decision making in business situations.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM-SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	L	H	M	H	L	M	—	H	—	M
CO2	H	H	L	H	H	H	L	M	—	M	—	M
CO3	H	H	L	M	M	L	M	M	—	M	L	M
CO4	H		L	M		M		L	—			
CO5		H	L		L		L		—		M	

H = Highly Related; M = Medium L = Low

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA II Semester**

**HUMAN RESOURCE MANAGEMENT**  
**PAPER CODE: MBA 191A**  
**CREDITS: (3L)**

**Objective:**

The objective of this course is to help the students to develop an understanding of the concept & techniques of essential functions of human resource management.

**UNIT I**

**Introduction to Human Resource Management** HRM – Nature and Scope of HRM, Using HR Analytics for recognizing changing trends in HRM - Strategic HRM, Managing Global Human Resources Role of HR in Internationalization of Business - Staffing Global Organizations - Implementing Global HR System

**UNIT II**

**Recruitment and Selection** HR forecasting, Recruitment and Selection, Human Resource Planning - Job Analysis – Job Evaluation - Recruiting Talent – Selecting Right Talent Application Forms, Selection Test, Interviews, Evaluation, Placement, Induction

**UNIT III**

Training and development approaches, Training Budget, Training -ROI, Evaluation of Training and Management Development, Performance Management and Appraisal, Concept of Employee Growth, Managing Career Planning, Elements of a Career Planning Programme, Succession Planning.

**UNIT IV**

**Compensation** Concept of compensation, Elements of Compensation, Process of Determining Compensation , Managing Wages, Concept of Rewards and Incentives,

**UNIT V**

**Practical aspects of HRM** Preparing recruitment forms, Drafting offer letter, Appointment letters, Job Description and Specification Forms, Preparing Training & placement Doc, Performance Appraisal Forms

**Course outcome –**

At the end of this course the student will able to learn-

CO1: Demonstrate an understanding of key terms, theories/concepts and practices within the field of HRM;

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO2: Demonstrate competence in development and problem-solving in the area of HR Management; Provide innovative solutions to problems in the fields of HRM;

CO3: Work effectively with colleagues with diverse skills, experience levels and way of thinking and be able to identify and appreciate the significance of the ethical issues in HR

CO4: Be able to evaluate HRM-related social, cultural, ethical and environmental responsibilities and issues in a global context.

CO5: To develop the necessary skill set for application of various HR issues.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	H	H		H	M	L				M	L	H
CO2	H	M	M	L	M		L	H	H	H	H	H
CO3	L	L	H	M	L	H		H	H	M	H	H
CO4		L	H		L		M				H	
CO5		H		L		M				H		

H = Highly Related; M = Medium; L = Low

**Text Books:**

1. De Cenzo, D.A. & Robbins, S.P. (2006). *Fundamentals of Human Resource Management* (10th ed.). New York: John Wiley & Sons

**Suggested Readings:**

1. Monappa&Saiyaddin. (2000). *Personnel Management*. New Delhi: Tata McGraw Hill
2. Rao, V.S.P (2007). *Human Resource Management- Text and Cases* (2nd ed.). New Delhi: Excel Books.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MBA II Semester**  
**INFORMATION TECHNOLOGY FOR MANAGEMENT**  
**PAPER CODE: - MBA 221B**  
**CREDITS: (3)**

**Objectives**

The objective of this course is to develop micro-level individual competency amongst the participants with regard to contemporary Information Technology Tools and to develop an understanding of the data processing systems existing in organizations.

**UNIT I**

Information & System Concepts-Introduction --Concepts, Classification of Information, Methods of Data & Information Collection, Value of Information, Organization and Information.

**UNIT II**

System: A Definition. Types of Systems, System Decomposition, Integration of Sub Systems, Elements of a System, Human as an Information Processing System. International Business and IT. Management Information System-MIS: Definition, Nature & Scope, MIS Characteristics,

**UNIT III**

Functions, Structure of MIS, Role of MIS, MIS as a Control System, Process of Management, Application of MIS, ERP & IT's Benefits. Internet-Introduction to Internet, Why We Need Internet, Internet Tools & Services, www, Internet in India, Security, Web Browser, Future of Internet.

**UNIT IV**

E-Comm. an Introduction, E Business Fundamentals. New Information Technology: Interconnection and networking, Multimedia, Neural Networks,

**UNIT V**

Artificial Intelligence, Executive Information System, Decision Support System (DSS) and Expert Systems. Issues for Senior Management: Management Control, Management Issues, Security Issues: Viruses, Worms and other creatures, I T issues for Management, Management in a Technological Environment, the changing world of Information.

**Course Outcomes –**

At the end of this Course the students will

CO1: Able to develop micro-level individual competency of contemporary Information Technology Tools

CO2: able to develop an understanding of the data processing systems existing in organizations.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

H = Highly Related; M = Medium L = Low

<i>Course Outcome</i>	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	L	M			M	M	H	H	L
CO2	H	M	H	M	M		L	M	M	M

**Suggested Readings:-**

1. George W. Reynolds, Course Technology, USA: Informational Technology for Managers
2. Information Technology For Management: Advancing Sustainable, Profitable Business Growth, 9<sup>th</sup> Edition, Wiley Publications, New Delhi.

# III SEMESTER

**MBA III SEM**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA III SEMESTER**  
**Strategic Management and Social Capital**  
**Subject Code: MBA008A**  
**Credit: (3)**

**Objectives:**

The objective of this course is to develop a holistic perspective of an organization and to enable the students to analyse the strategic situation facing the organization, to access strategic options available to the organization and to implement the strategic choices made by it.

**UNIT I**

Introduction: Business policy-evolution of the concept. Difference between business policy and strategic management. Corporate governance- concept, issues, models, evolution and significance. Introduction to Strategic Management-Concept importance of strategic Management, Strategy & Competitive Advantage, Strategy Planning & Decisions, strategic Management Process.

**UNIT II**

Top management perspective: Establishing company direction-developing strategic vision, setting objectives and crafting a strategy-Internal & External Environment, Formulating Long Term objective & Strategy, Strategic Analysis & Choice.

**UNIT III**

Analysing business environment: Analysis of Business environment at 3 levels-Macro external environment analysis, external environment analysis (Industry analysis and competitor analysis) porter's five forces and competitor analysis framework, and firm level internal analysis. Identifying alternative strategies: Grand strategies: stability, growth, retrenchment & combination strategies, Generic strategies. Organization structures and strategy.

**UNIT IV**

Competitive strategy and competitive advantage: Industry and competitive analysis, strategy and competitive advantage, Principles of Competitive Advantage-Identifying Value Activities, Competitive Scope and the Value Chain.

**UNIT V**

Social Capital-Social theory and social structure, Concept and characteristics, concept of bonding-bridging & linking: Putnam's theory, A paradigm for social capital, Leveraging social capital in Business set-up & NGO's, Social capital in the organisation, social capital outside the organisation, social capital, exchange and contribution, social capital, intellectual capital and the organizational advantage.

**Course outcome-**

CO1: Analyse and evaluate an organization in its context from a strategic perspective.

CO2: Determine appropriate strategic directions for an organization.

CO3: Define and recommend a course of action that is consistent with the recommended strategic direction.

CO4: Ability to integrate and apply knowledge gained in basic concepts to the formulation and implementation of strategy from holistic and multi-functional perspectives.

CO5 : Acquisition of skills to analyze and evaluate critically real life company situations and develop creative solutions, using a strategic management perspective.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	H	H	L	H	H	H	L	L	M	H		H
CO2	H	H	H	M		M	L	L	M	H	M	H
CO3	H	H	M	H	M	L	L	H		M		M
CO4	H	H	M	M	L	M	L	M		L		L
CO5	H	H	L	H	M	M	L	M	L	M	M	M

H = Highly Related; M = Medium; L = Low

**Reference Books:**

- 1.G.Saloner,A.ShepardandJ.Padolny,*StrategicManagement*,WileyIndia,New Delhi,2008
- 2.AnthonyHenry,*Understanding Strategic Management*,OUP,New Delhi,2011
- 3.A.Haberberg and A.Rieple,*StrategicManagement:Theory and Application*,OUP,New Delhi,2008



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA III SEMESTER**

**MANAGEMENT RESEARCH METHODOLOGY**

**SUBJECT CODE: MBA013A**

**CREDITS: (3)**

**Objective**

Research methodologies tell the systematic method for acquiring data and studying it for deriving out crucial findings. This is an important process that helps in solving problems and making business decisions. It enables management for properly organizing their efforts in a right direction for generating an idea.

**UNIT I**

Meaning, Objective and Motivation in research, Type of research, research approaches, Significance of research, research process, criteria for good research, Define the research problem, selecting a problem, research design, meaning of research design, need of research design, features of good design.

**UNIT II**

Sampling Designing: Census and sample survey, implications of sample design, steps in sample design, criteria of selecting a sample, characteristic of a good sample design, Different type of sample design, random sampling. Data collection techniques: collection of data, interview, schedule and questionnaire method, difference between questionnaires and schedules, Collection of secondary data, selection of appropriate method for data collection.

**UNIT III**

Processing and analysis of data, type of analysis, statistics in research, type of series, measurement of central tendency, measurement of dispersion, regression analysis, least square method, Mean based method, correlation analysis, Karl Pearson coefficient of correlation, Spearmen single rank method, repeated rank method, relationship between correlation and regression analysis.

**UNIT IV**

Hypothesis Design, Basic concept concerning hypothesis testing, procedure of hypothesis testing, Important Parametric test: Z test, T test and F test, non-parametric test: Chi square test, Sign test, run test, Mann- Whitney U test, Limitation of the testing of hypothesis.

**UNIT V**

Scaling technique, measurement in research, type of measurement scales, techniques of developing measurement tools, Interpretation and report writing, technique of interpretation, Significance of report writing, Different steps in writing a report, Lay out of the research report, types of report.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**Course outcome-**

CO1: Apply a range of quantitative and / or qualitative research techniques to business and management problems / issues

CO2: Understand and apply research approaches, techniques and strategies in the appropriate manner for managerial decision making

CO3: Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process

CO4: Conceptualise the research process

CO5: Develop necessary critical thinking skills in order to evaluate different research approaches utilised in the service industries

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	H	H	L	H	H	H	L	L	M	H		H
CO2	H	H	H	M		M	L	L	M	H	M	H
CO3	H	H	M	H	M	L	L	H		M		M
CO4	H	H	M	M	L	M	L	M		L		L
CO5	H	H	L	H	M	M	L	M	L	M	M	M

H = Highly Related; M = Medium; L = Low

**Reference Books:**

1. Research Methodology: C R Kothari.
2. Business Statistics for managers: Levin and Rubin.
3. Business Research Methods: Coopers & Swindlers.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**M.B.A. III SEMESTER**  
***Project Management***  
**Subject Code: MBA011A**  
**Credit: (3)**

**Objectives:**

The aim is to provide a suitable framework for gaining insight in the process of preparation, appraisal, monitoring and control of a project. The role project management techniques and how to mobilize finance for domestic and international projects shall be highlighted.

**UNIT I**

Introduction to Project Management: Definition, functions, evolution of Project Management, classification of projects, Project management in different environments. The Project Management Systems, Methodologies & Systems Development Cycle: Systems approach, systems analysis, systems development, project feasibility, project life cycle, project appraisal, project contracting, the phases of system development life cycle.

**UNIT II**

Project Feasibility Study: Developing a project plan, market and technical analysis, financial analysis evaluation of project proposals, risk analysis, sensitivity analysis, and social cost benefit analysis. Project Planning: Planning fundamentals, project master plan, work breakdown structure & other tools of project planning, work packages project organization structures & responsibilities, responsibility matrix.

**UNIT III**

PERT, CPM, Resource allocation: Tools & techniques for scheduling development, crashing of networks, time-cost relationship, and resource levelling multiple project scheduling.

**UNIT IV**

Cost Estimating Budgeting: Cost estimating process elements of budgeting, project cost accounting & management information systems, cost schedules & forecasts. Managing Risks in Projects: Risk concept & identification, risk assessment, risk priority, risk response planning, risk management methods.

**UNIT V**

Project Control: Information monitoring, internal & external project control, cost accounting systems for project control, control process, performance analysis, variance limits, and issues in project control. Project Management Information System: Computer based tools, features of PMIS, using project management software, (MS Projects) Project Evaluation, Reporting & Termination: Project reviews & reporting, closing the contract.

**Course outcome-**

CO1: Manage the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders.

CO2: Align the project to the organization's strategic plans and business justification throughout its lifecycle.

CO3: Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.

CO4: Adapt projects in response to issues that arise internally and externally.

CO5: Implement general business concepts, practices, and tools to facilitate project success.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES:**

	Course Outcome	Program Outcomes												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
	<b>CO1</b>	H	H	M	L	L	L	M	L	—	H	L	M	
	<b>CO2</b>	M	H	M	M	M	M	M	L	—	L	—	M	
	<b>CO3</b>	M	H	M	L	M	M	M	L	—	L	—	M	
	<b>CO4</b>	L	H	M	M	M	H	H	M	—	M	L	H	
	<b>CO5</b>	M	H	M	L	H	M	H	L	—	M	L	H	

H = Highly Related; M = Medium; L = Low

**Reference Books:**

- 1.R.B. Khanna, *Project Management*, PHI, New Delhi, 2011
2. Roel Grit, *Project Management: A Practical Approach* (2012), Akshara Books, New Delhi
3. Joseph Phillips, *PMP Project Management Professional Study Guide*, McGraw Hill Education (India) 2009

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MBA III Semester**  
**PRODUCTION AND OPERATIONS MANAGEMENT**  
**PAPER CODE: MBA 431A**  
**CREDITS: (3)**

**Objectives:**

The course is designed to familiarize the students with decision making in planning, scheduling, control and productivity improvement in production and operations function in both manufactories and service organizations. Emphasis would be on to bring about effectiveness and efficiency of operations by job and work design, process design, layout design and design and control of systems related to production resources planning ,quality, scheduling, maintenance, inventory and environment and safety.

**UNIT I**

Operations Management: An Introduction: Introduction to Production & Operations Management: Definition, need, responsibilities, key decisions of OM, goods vs. services, Operations as a key functional area in an organization. Operation Strategies-Definition, relevance, strategy formulation process, order qualifying and order winning attribute. Definition of lean production, lean Demand, Pull logic, waste in operations, elements that address elimination of waste, 2 card Kanban Production Control system.

**UNIT II**

Forecasting and Scheduling: Forecasting-Definition, types, qualitative (grass roots, market research and Delphi method) and quantitative approach (simple moving average method, weighted moving average and single exponential smoothing method), forecast error, Mean Absolute Deviation (MAD). Scheduling: Operation scheduling, goals of short-term scheduling, job sequencing (First Cum First Serve (FCFS), Shortest Processing Time (SPT), Earlier Due Date (EDD), Longest Processing Time (LPT), Critical Ration (CR)) & Johnson's rule on two machines, Gantt charts.

**UNIT III**

Planning Techniques: Aggregate Planning: Definition, nature, strategies of aggregate planning, methods of aggregate planning (level plan, chase plan and mixed plan, keeping in mind demand, workforce and average inventory. Capacity Planning: Definition, measures of capacity (input and output), types of planning over time horizon, Decision trees analysis. Queuing and Inventory Models: Elementary Queuing Theory Models: Poisson- Exponential Single Server Model with Infinite Population; M/M/1, M/M/C, Inventory Management: Economic Order Quantity with finite and infinite supply

**UNIT IV**

Operations and Services Design: Process Selection: Definition, Characteristics that influence the choice of alternative processes (volume and variety), type of processes- job shop, batch, mass and continuous, product-process design Matrix and Services design matrix, technology issues in process design, flexible manufacturing systems (FMS), computer integrated manufacturing (CIM). Layout Decision: Layout planning – Benefits of good layout, importance, different types of layouts (Process, Product, Group technology and Fixed position layout). Assembly line balancing by using Longest Operating Time (LOT) rule. Location Decisions & Models: Facility Location – Objective, factors that influence location decision, location evaluation methods- factor rating method.

**UNIT V**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Maintenance Management & Quality Control: Maintenance Management: Need of maintenance management, equipment life cycle (Bathtub curve), measures for maintenance performance (Mean Time before Failure (MTBF), Mean Time to Repair (MTTR) and availability), Reliability: Definition and function of series and parallel. Statistical Quality control: Variations in process (common & assignable causes), Variable measures (mean and range chart), Attribute measures (proportion of defects and no. of defects) using control tables control charts, single sampling plan: OC curve Acceptance sampling.

**Course outcome –**

At the end of this course the student will able to learn-

CO1: To analyse the various process characteristics and identify how they support operations strategy through cases and Project work

CO2: Apply decision-making techniques in Business Management with emphasis on decision making under risk and sensitivity analysis, in business cases & Apply workforce management techniques with emphasis on Learning curves in business cases.

CO3: To explain the concept of capacity management and apply capacity techniques in business examples. Identify and apply layout techniques for different types of Process strategies in business examples.

CO4: Apply forecasting techniques as applied in the business environment. Through cases apply inventory Management techniques including Just - In Time (JIT) systems in optimizing inventory levels.

CO5: Apply network models and techniques in Project Management problems

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	L	M	M	M	L	—	—	L	L	M
CO2	H	L	H	H	M	H	—	M	—	M	—	H
CO3	H	L	M	H	L	H	M	H	—	M	—	H
CO4	H	L	M	H	L	H	H	H	—	M	L	H
CO5	H		L		L	M		M	—			H

H = Highly Related; M = Medium; L = Low

**Text Books:**

1. Mahadevan B (2006). *Operations Management Theory & Practice* (2nd ed.). Pearson Education.
2. S.N. Chary(2000). *Production & operations management* (3rd ed.). New Delhi: Tata McGraw Hill.

**Suggested Readings:**

1. S.C. Gupta & V.K. Kapoor (2010). *Fundamentals of Applied Statistics* (4th ed.). Sultan Chand & Son
2. Heizer Jay & Render Barry (2005). *Production & Operations Management* (8th ed.). Pearson Education

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

3. Chase R B, Aquilano N J, Jacobs F R and Agarwal N(2006): *Production & Operation Management Manufacturing and Services*(11th ed.), Tata McGraw Hill
4. V.N.A Naikan (2011): *Reliability Engineering and Life Testing*, Eastern Economy edition, PHI

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**Event Management**  
**MBA406A (3 credits)**

**Objective**

Course Description: The purpose of this course is to enable the students to acquire a general knowledge about the "event management" and to become familiar with management techniques and strategies required for successful planning, promotion, implementation and evaluation of special events.

**UNIT I**

**Principles of Event Management** Historical Perspective, Introduction to event Management, Size & type of event, Event Team, Code of ethics Principles of event Management, concept & designing. Analysis of concept, Logistics of concept. Feasibility.

**UNIT II**

**Event Planning & Team Management** Aim of event, develop a mission, Establish Objectives Preparing event proposal, Use of planning tools Protocols, Dress codes, staging, staffing Unit III Leadership, Traits and characteristics

**UNIT III**

**Event Marketing and Advertising:** Nature of Marketing, Process of marketing, Marketing mix, Sponsorship Unit II Image, Branding, Advertising Publicity and Public relations

**UNIT IV**

**Organization of Events:** Concept, theme, Types and category, Sports, Rallies, Wedding, Fabrication of Events, light & sound, handling vendors

**UNIT V**

**EVENT LAWS & LICENSES:** Relevant legislations, liquor licenses, trade acts, stake holders and official bodies, contracts

**Course outcome**

CO1: Define the basic concepts related to event management in sports.

CO2: Analyse financial management in events.

CO3: Evaluate the event management process.

CO4: Compose a sample event.

CO5: understand relevant laws and licenses.



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Course Outcome	Program Outcomes											PO12
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	
CO1	H	H	M	L	L	L	M	L	—	H	L	M
CO2	M	H	M	M	M	M	M	L	—	L	—	M
CO3	M	H	M	L	M	M	M	L	—	L	—	M
CO4	L	H	M	M	M	H	H	M	—	M	L	H
CO5	L	H	M	M	M	H	H	M	—	M	L	H

H = Highly Related; M = Medium; L = Low

**Reference & Text Book**

- Lynn Van Der Wagen & Brenda R. Carlos, Event Management for Tourism, Cultural, Business and Sporting Events, Pearson Prentice Hall, 2005 2.
- Anton Shone & Bryn Parry, „ Event Successful Management’, Cengage learning 2002 3. Leonard H. Hoyle, Jr, Event Marketing, John Willy and Sons, New York.
- Avrigh, Barry Event and Entertainment Marketing, Vikas Publishing House New Delhi, 1994 5. Julia Rutherford Silvers Professional Event Coordination, John Willey & Sons 2003

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA IV SEMESTER**

**Dissertation**

Project Report submission and viva – voce on six months industrial training done.

The objective is to develop their skills in identifying issues in concrete management situations, collecting and analysing data and apply management concepts and techniques to deal constructively with management problems and suggest solutions

During the months of January to June after completing 3<sup>rd</sup> Semester Examinations, students will have to undergo a 6 months internship/ in plant training on real life problems in business/ industrial organizations.

The programme six months industrial training requires that the candidate would be assigned a project work and guide(s) by the organization under whom the candidate would complete the assigned study. On the satisfactory completion of the work the organization would issue a completion certificate to the candidate concerned. However, the candidate in all cases would be under the joint guidance of a faculty adviser. If and when necessary, the organization guide and the faculty adviser may arrange meeting to discuss necessary details to supervise the study the candidate. On completion of internship, a student will have to submit a report on his work to the department (2 copies) and also a copy of the same to the organization concerned. The student will also have to defend his report at a viva voce examination arranged by the department. The break-up of full marks of 100 assigned for this paper is as follows: -

50 marks for the Report (to be jointly evaluated by the faculty guide and an External examiner)

50 marks for Viva-voce examination (to be awarded by External examiner)

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**M.B.A. (Elective-Finance)**

**FINANCIAL DERIVATIVES**

**PAPER CODE: MBA 104A**  
**CREDITS: (3)**

**Objectives:**

This course sets up study in the field of investments related to options, futures and other derivative securities. The course will acquaint students with derivative securities, markets, pricing, hedging and trading strategies of derivative instruments.

**UNIT I**

Definition of Derivative Securities- Brief history of derivatives, Evolution of Commodity, Currency, Stocks and Interest Rate Derivatives, Structure of derivative markets, forwards, futures, options, swaps etc. Examples of more sophisticated derivatives: barrier options, compound options, options on futures, swaptions, underlying assets: equities, currencies, commodities and interest rates. Reasons for trading: risk management, speculation and arbitrage.

**UNIT II**

Market Characteristics- Futures and Options contract specifications, underlying asset, contract size, and delivery specifications. Marking to market using margin accounts. Familiarizing with market quotes.

**UNIT III**

Trading Strategies involving Options and Futures. Interest rate derivatives, Contractual specification: floating and fixed rate. Valuation of interest rate derivatives. Derivatives Pricing Theory- Option Pricing: Black-Scholes formula for option pricing: derivation and properties. Volatility: estimated vs. implied, options on dividend-paying assets, warrants and convertibles. Binomial models for option prices: definitions and terminology.

**UNIT IV**

Continuous-Time Models. Futures Pricing: Pricing by arbitrage: relationship between futures and spot price (cost of carry and reverse cost of carry), difference between futures and forward price, futures on dividend-paying assets.

**UNIT V**

Risk Analysis and Management- Risk Measurement and Management Framework, Option's delta, gamma, Vega, theta, rho. Hedging with futures. Derivatives Disclosure: Accounting Issues in Derivatives. Options and Futures Applications in India- Structure of Indian stock markets and the operational efficiency of options and futures, determination of the fair value of futures and options prices, Interactions between spot equity trading and trading in derivatives.

**Course outcome-**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO1: Understanding of the motives, reasons and explanations for corporate hedging activity.

CO2: Knowledge of key financial building blocks, used in constructing complex derivative instruments (eg. futures, forwards, options and swaps).

CO3: Analysis of payoffs and strategies involved in trading derivative instruments and combinations of derivatives.

CO4: Application of the pricing of individual and combinations of derivative securities.

CO5: Use and benefits of derivatives in a portfolio context.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	L	L	H	H	M	L	L	—	—	—	L
CO2	H	—	—	L	—	H	M	M	—	—	—	L
CO3	M	H	H	M	H	H	H	H	—	M	—	M
CO4	H	L	—	L	—	M	—	M	—	H	—	M
CO5	L	H	L	M	M	L	L	H	—	M	—	H

H = Highly Related; M = Medium; L = Low

**Suggested Readings:-**

1. Financial Derivatives: Theory, Concepts and Problems by S.L. Gupta, PHI Publications.
2. Financial Derivatives: The Currency and Rates Factor by Aman Chugh and Divik Maheshwari, Pearson Publications.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA (Elective-Finance)**  
**INSURANCE AND RISK MANAGEMENT**  
**PAPER CODE: MBA 106A**  
**CREDITS: (3)**

**Objectives:**

This course is intended to develop an understanding among students about identifying analyzing and managing various types of risk. Besides the students will be in a position to understand principles of insurance and its usefulness in business.

**UNIT I**

Concept of Risk, Types of Risk, Managing Risk, Sources and Measurement of Risk, Risk Evaluation and Prediction. Application of Statistical Techniques in Risk Avoidance. Disaster Risk Management.

**UNIT II**

Risk Retention and Transfer, Pooling, Loss Exposure, Legal Aspects of Insurance Contract, Principle of Indemnity, Estoppels, Endowment, Insurance.

**UNIT III**

Concept of Insurance, Need for Insurance, Insurance Industry in India, Globalization of Insurance Sector, Role of IRDA, Regulation of Risk Reduction by IRDA. Reinsurance, Co-insurance.

**UNIT IV**

Nature of Insurance Contract, Utmost Good Faith, Insurable Interest, Types of Insurance, Fire and Motor Insurance, Health Insurance, Distinction between Life Insurance and Marine Insurance.

**UNIT V**

Control of Malpractices, Negligence, Loss Assessment and Loss Control, Exclusion of Perils, Actuaries, Automobile Insurance, Computation of Insurance Premium.

**Course Outcomes**

The student will be able to learn

CO1: The exposures that constitute the overall risk faced by a firm or enterprise and the process of managing the various exposures that affect the firm or enterprise.

CO2: How insurance can be employed to avoid risk and protect the firm or enterprise. And explain how the insurance market is structured and regulated.

CO3: Will be able to Organize, model, and quantify the exposures and risks faced by the firm or enterprise and calculate the effects of the risks and exposures on the value of the firm or enterprise.

CO4: Understanding of the Insurance industry.

CO5: Understanding about calculation of insurance Premium.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	H	M	L	M	L	M	—	M	—	H
CO2	H	M	M	M	L	M	L	M	—	M	—	H
CO3	H	M	M	M	L	M	L	M	—	M	—	H
CO4	M	H	M	H	H	L	L	M	—	L	—	M
CO5	H	L	M	H	H	L	L	M	—	L	—	M

H = Highly Related; M = Medium, L = Low

**Suggested Readings:**

1. Insurance & Risk Management by P K Gupta, Himalaya Publishers
2. Risk Management and Insurance Planning by Jatinder Loomba, PHI Publishers
3. Essentials of Risk Management and Insurance by Emmett J. Vaughan, Wiley Publications.



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L	L	—		M	H
<b>CO2</b>	M	M	L	H	L	M	M	M	—	M	M	H
<b>CO3</b>	H	H	L	H	L	M	H	M	—	M	L	M
<b>CO4</b>	L	M	M	H	L	M	H	H	—	M	L	M
<b>CO5</b>	L	M	L	H	L	L	H	L	—	M	L	M

**Suggested Books:-**

1. Financial Decision Making: Concepts, Problems and Cases by John. J. Hampton, Prentice Hall.
2. Fundamentals of Corporate Finance by Robert Rarrino& David Kidwell, Wiley Publications.
3. Financial Decision Making for Entrepreneurs and Managers by Dr. Tom McKaskill.



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA (Elective-Finance)**  
**INDIAN FINANCIAL SYSTEM**  
**PAPER CODE: MBA 105A**  
**CREDITS: (3)**

**Objectives**

The objective of the course is to understand role of Financial Services in Business organizations and to give an insight into the strategic, regulatory, operating and managerial issues in Indian financial system.

**UNIT I**

Overview of Indian Financial System. Role of Financial Markets in capital formation and economic development; Indian Financial system- An overview. Commercial Banks and Industrial Finance- evolving role.

**UNIT II**

Reserve Bank of India as a Regulator of Banking System and its other functions. Basel –I and Basel-II norms.

**UNIT III**

Markets. Money Market Organization in India nature, constituents and instruments. Industries Securities Market in India: New Issue Market and Stock Exchange. Differences and similarities, functions, methods of New Issues, Regulatory Framework and SEBI.

**UNIT IV**

Mutual Funds, Insurance and others. Investment Policy and performance appraisal of Unit Trust of India,

**UNIT V**

Insurance Industry, IRDA Insurance Regulator. New Developments such as financial instruments, Private foreign investments, case studies and problems.

**Course Outcomes:**

CO1: Subjects gives overview of financial system to students such as flow of funds in financial system, financial system and economic development.

CO2: Students learn different financial system and their framework.

CO3: Students studies non-banking financial institutions, their role in financial system, sources of finance and RBI guidelines.

CO4: Students learn the concept of micro finance and its importance in rural economy

CO5: Students learn different sources of finance.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L	M	—	L	M	H
<b>CO2</b>	L	M	L	M	L	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	L	M	H	M	—	M	L	M
<b>CO4</b>	L	M	L	H	L	M	H	H	-	M	L	M
<b>CO5</b>	L	M	L	H	H	L	H	L	—	M	L	M

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**Suggested Readings: -**

1. Indian Financial System by HR Machiraju, Vikas Publications.
2. Indian Financial System by Bharati V. Pathak, Pearson Education.
3. Indian Financial System by M Y Khan, Tata McGraw Hill Education Private Ltd.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA (Elective-Finance)**

**INTERNATIONAL FINANCIAL MANAGEMENT**  
**PAPER CODE: MBA 107A**  
**CREDIT: (3)**

**Objectives:**

This course has been designed to acquaint the students with the conceptual framework of the key decision areas in international finance. The basic objective of the course is to provide an overview of the financial environment in which multinational firms operate.

**UNIT I**

Foreign Exchange Market and Risk Management: Environment of International Financial Management: Balance of Payments. Means of International Payments, Foreign Exchange Market, Currency Futures and Options Markets.

**UNIT II**

Foreign Exchange Risk Management, Exchange Risk, Political Risk, Interest Rate Risk, Measuring and Managing Foreign Exchange Exposure, Practical Problems.

**UNIT III**

Financing of International Operations: Determination of Exchange Rate, Exchange Market and Arbitrage, Exchange Rate Control, Financing of Exports and International Investments.

International Monetary Systems, European Monetary System, International monetary and Financial Institutions, Practical Problems.

**UNIT IV**

Financial Management of MNCs: Multinational Financial Management: Capital Budgeting Decisions for Multinational Corporation, Financing Decisions- Cost of Capital and Financial Structure.

**UNIT V**

Working Capital Management and Control International Banking, International Transfer Pricing, Cases and Problems.

**Course Outcome:**

CO1: Explain the meaning and concepts of international financial management.

CO2: To know the international monetary system and foreign exchange rate mechanism.

CO3: To estimate values of international investment projects and international investment corporate acquisitions.

CO4: Identify, discuss and various international investment strategies.

CO5: To understand the concept of Balance of Payments (BOP) and remedial measures for correcting the disequilibrium in BOPs.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	M	—	L	M	H
CO2	L	M	M	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	L	H	L	M	H	H	-	M	L	M
CO5	L	M	L	H	H	L	H	L	—	M	L	M

**Suggested Readings: -**

1. International Financial Management by S.P. Srinivasan & Dr. B. Janakiram, Bijtantra Publications.
2. International Financial Management by Thummuluri Siddaiah, Pearson Education.

**MBA (Elective-Finance)**

**SECURITY ANALYSIS & PORTFOLIO MANAGEMENT**

**PAPER CODE: MBA 109A**

**CREDITS: (3)**

**Objective**

To familiarize students with different investment alternatives, introduce them to the framework of their analysis and valuation and also acquaint them with portfolio management and evaluation techniques.

**UNIT I**

**The Investment Environment** - The investment decision process, Types of Investments, the Indian securities market, the market participants, trading of securities, security market indices, Insider Trading.

**UNIT II**

**Security Analysis** – Concept of Return & Risk: Types & Sources.

**UNIT III**

**Fixed Income Securities:** Bond Fundamentals, Valuation of bonds, Estimating bond yields, Credit rating.

**UNIT IV**

**Equity Analysis:** Fundamental Analysis, Technical Analysis. Valuation of equity shares. Efficient Market Hypothesis

**UNIT V**

**Portfolio Management:** Portfolio & Diversification, Markowitz model (2 Security portfolios) & Capital Asset Pricing Model. Performance Evaluation Techniques: Sharpe, Treynor & Jensen Indices

**Course Outcome:**

- CO1: To provide a theoretical and practical background in the field of investments.  
 CO2: Designing and managing the bond as well as equity portfolios in the real world.  
 CO3: Valuing equity and debt instruments.  
 CO4: Computation of risk and return for securities.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO5: Measuring the portfolio performances

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L		—		M	H
CO2	L	M	M	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	M	H	L	M	H	H	—	M	L	M
CO5	L	M	L	H	L	L	H	L	—	M	L	M

**READINGS:**

**Essential Reading:**

1. Chandra, Prasanna, *Investment Analysis and Portfolio Management*, Tata McGraw Hill.
2. Bodie, Kane; Marcus & Mohanty, *Investments*, Tata McGraw Hill.

**Suggested Readings:**

1. Fischer, Donald E. and Ronald J. Jordan, *Security Analysis and Portfolio Management*, 6th Edition, Prentice Hall of India, 2007.
2. Reilly, Frank K., and Keith C. Brown, *Investment Analysis and Portfolio Management*, 8th Edition, Thomson, 2007.

**MBA (Elective-Finance)**

**MERGERS, ACQUISITIONS AND CORPORATE RESTRUCTURING  
CREDITS: (3)**

**Objectives**

Liberalized economy has generated many opportunities of combining businesses to create wealth. The fundamental aim of the course is to prepare students to take advantage of the current scenario and understand how mergers, acquisition and corporate restructuring are implemented.

**UNIT I**

Corporate Restructuring: Concept and strategies, Mergers: Concept, Types of Mergers, Merger Strategy-Growth, Synergy, Operating Synergy, Financial Synergy, Diversification.

**UNIT II**

Takeover: Concept and types, Other Economic Motives, Hubris Hypothesis of Takeovers, Other Motives, Tax Motives Financial Evaluation, Joint Venture and Strategic Alliances.

**UNIT III**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Legal Aspects of Mergers/ Amalgamation and Acquisition / Labour, Provisions of Companies Act, Regulation by SEBI, Takeover Code: Scheme of Amalgamation, Approval from Court. Valuation of a Business.

**UNIT IV**

Due Diligence: Concept, process and types, Methods of Valuation – Cash-flow Basis, Earning Potential Basis, Growth Rate, Market Price etc. Computation of Impact on EPS and Market Price.

**UNIT V**

Determination of Exchange Ratio, Impact of Variation in Growth of the Firms, MBO, LBO, Boot Strapping; Criteria for Negotiating Friendly Takeover, Financing of Merger. Defence Against Hostile Takeover, Poison Pill, Bear Hug, Greenmail, Pacman. Post-Merger H.R. and Cultural Issues.

**Course Outcome:**

CO1: Understanding of different types of mergers and acquisitions and the process involved in executing their deals.

CO2: Develop an ability to understand factors influencing the valuation of a business and different methods used in Business Valuation.

CO3: Basic understanding about regulatory environment of mergers and acquisitions in India.

CO4: Analyze investment opportunities in fixed income securities.

CO5: Assess various case studies to analyze valuation strategies, pre and post-merger issues and challenges.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L		—	M	M	H
CO2	L	M	-	H	H	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	H	H	L	M	H	H	—	M	L	M
CO5	L	M	L	H	L	L	H	L	—	M	L	M

**Suggested Readings:**

1. Mergers, Acquisitions and Corporate Restructuring by Patrick A. Gaughan, Wiley Publications.
2. Mergers, Acquisitions & Corporate Restructuring in India by Rachna Jawa, New Century Publications.

# Elective Marketing

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA (Elective-Marketing)**  
**Advertising Management**  
**Subject Code: MBA162A**  
**Credit: (3)**

**Objectives**

To understand the process of marketing communications. To understand and integrate marketing communications theory and concepts with all elements of the promotional mix. To acquaint students with approaches and methods to develop, execute and evaluate advertising campaigns.

**UNIT I**

Mass communication theory and practices, marketing and promotion mix interrelationship and interdependence advertising. Sales Promotion, Publicity and Public Relations- Scope, Objectives, activities and creative role. Advertising, objectives tasks and process, market segmentation and target audience- Message and copy development.

**UNIT II**

Mass media, selection, planning, budgeting and scheduling. Integrated programme and budget planning. Implementing the programme, coordination and control.

**UNIT III**

Advertising Agencies in India, their services and terms, advertisement campaign development, Agency selection and appointment; Agency Organization and operation, Getting the best of the agency services. Analysis of effectiveness of advertisement and promotional campaign.

**UNIT IV**

Why and when sales promotion support, Sales promotion activities; Consumer Oriented-Sales channel Oriented-Sales staff oriented, Planning, budgeting, implementing and controlling campaigns.

**UNIT V**

Valuation and measurement of advertising and sales promotion effectiveness, Company organization for advertising: sales manager, Sales Promotion Manager, Market Development Manager- Role of Tasks, advertising ethics, economics and social relevance. The Public Relations Activities, Public relations and mass media.

**Course outcome:**

At the end of the course the students will be able to:

CO1: Identify and respond to clients' advertising and marketing communications objectives by applying principles of marketing and communications.

CO2: Develop an advertising plan and present and defend it persuasively. Contribute to evaluating the effectiveness of advertising and marketing communications initiatives.

CO3: Understand the sales promotion and controlling campaign.

CO4: Understand the role of market development manager and public relation



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO5: Collaborate in the development of advertising and marketing communications material, in compliance with industry standards and business practices.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	M	—	L	M	H
CO2	L	M	—	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	H	H	L	M	H	H	—	M	L	M
CO5	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**Reference Books:**

1. JaishreeJethwaney, *Advertising Management*, OUP, New Delhi, 2012
2. Larry Percy and Richard R. Elliot, *Strategic Advertising Management*, OUP, New Delhi, 2012

**MBA (Elective-Marketing)**  
**International Marketing**  
**Subject Code: MBA164A**  
**Credit: (3)**

**Objectives**

The course aims at making students understand the concept and techniques of international marketing and train them to develop and implement plans and marketing strategies for entering into international markets and managing overseas operations.

**UNIT I**

International marketing-its scope and tasks- world economy prospects and Challenges; India's external trade. Analysis of export performance. Why all organizations cannot go global Shipping terms and international trade terms. Information needs of exports.

**UNIT II**

Costing and pricing in international trade. Advantages and disadvantages of globalization.

**UNIT III**

Strategic export planning. Handling an export transaction. Export marketing Checklist; Selection of Markets: Choosing Markets; Export pricing; Management of export logistics. Documentation for export; processing of an export trade. Sales forecasting in international trade, Identifying geographical territories for expansion. Cultural factors affecting business in global market.

**UNIT IV**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Export credit system pre shipment and post- shipment, finance, medium- and long-term credit financing; ECGC; Transportation and shipment of cargo; Marine insurance of cargo; procedure for claiming rebate of excise duty. Import replenishment licensing procedures.

**UNIT V**

Generalized scheme of preferences.Sourcing and Transfer pricing mechanism. WTO related issues and IPR related issues impacting global trade.

**Course Outcomes-**

By the end of this module the student should be able to:

CO1: Critically analyse concepts, models, theories and issues relevant to international marketing.

CO2: Analyze the influences on, and the decisions involved in, the development and implementation of international marketing strategy.

CO3: Apply relevant knowledge and understanding to the analysis and creative solution of problems in international marketing and be able to communicate this through the medium of a management report.

CO4: To understand how managers perform the functional tasks that constitute international marketing such as marketing intelligence and mix adapters.

CO5: To understand how companies adjust to their international strategies with respect to global environmental changes.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	M	—	L	M	H
CO2	L	M	H	M	L	M	M	M	—	M	M	H
CO3	L	H	M	H	L	M	H	M	—	M	L	H
CO4	L	M	L	H	H	M	H	H	—	M	L	M
CO5	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**Reference Books:**

- 1.RakeshM.Joshi,*InternationalMarketing*,OUP,New Delhi,2014
- 2.K.Lee and S.Carter,*Global Marketing Management*,OUP,New Delhi,2012

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

3. Justin Paul and Rajiv Aserkar, *Export Import Management*, OUP, New Delhi, 2013

**MBA (Elective-Marketing)**  
**Product Management and Brand Building**  
**Subject Code: MBA165A**

**Objectives:**

To understand the product management functions and its strategic role. To learn the issues involved in the product management function through the cases and project. To understand Brand development and its sustenance in competitive market.

**UNIT I**

Introduction to product management - what is product & product-service continuum, individual product decisions, and product attributes product and product lives, special issues in product management - product life cycle & strategy, product manager-brand manager product manager-functions and tasks-tools and techniques

**UNIT II**

New product development and launching. Challenge of change opportunity and risk-product innovation, modification, addition and elimination product proposals-sources, generation, processing and selection.

**UNIT III**

Introduction to brand management, value & significance of brand. and crafting of brand elements: brand name, symbol & slogan, brand strategic decision, brand extension Consumer brand knowledge. Managing brand architecture and brand portfolios

**UNIT IV**

Concept of brand equity & association - Meaning, Definition and elements of Brand equity, Creating and managing brand equity, corporate branding and tools for building brand equity. Measuring and leveraging brand equity.

**UNIT V**

Brand Association: Meaning, Definition and types of brand association, Process of selecting, creating and maintaining, association.

Brand strategy - brand rejuvenation, brand relations, brand proliferation, multi branding, global brand. Branding for services, retail, and hi-tech products.

**Reference Books:**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

1. Richard Elliot, *Strategic Brand Management*, OUP, New Delhi, 2007
2. Kirti Dutta, *Brand Management*, OUP, New Delhi, 2012

**Course outcomes:**

CO1: Understand the fundamental concepts of product and brand development and management. Gain the tools to develop products and to analyze their success.  
 CO2: Evaluate new product ideas and understand the development of a product over time.  
 CO3: Develop some sensitivity for the problem in strategic product management.  
 CO4: Implement profitable brand strategies by building, measuring and managing brand equity.  
 CO5: Develop a critical understanding of trends, development and challenges in brand management.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	L	—	M	M	H
CO2	L	M	M	M	L	M	M	M	—	M	M	H
CO3	M	H	L	H	L	M	H	M	—	M	L	H
CO4	L	M	L	H	H	M	H	H	—	M	L	M
CO5	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**MBA (Elective-Marketing)**  
**Consumer Behaviour and Market Research**  
**Subject Code: MBA163A**  
**Credit :(3)**

**Objectives:**

The subject explores the mysterious world of the consumer's psyche and guidelines to the students to understand what makes consumers to purchase a particular product or avail a particular service.

**UNIT I**

Identifying and classifying customers, buying behaviour, attitude of consumer, consumer perception.

**UNIT II**

Factors influencing buying behaviour; Reference groups, opinion leaders, social influences. Consumer behaviour process; Understanding consumer motivation, personality and self-concept, learning, memory.

**UNIT III**

Research concepts; exploratory, descriptive and conclusive research. The marketing decision making process and the need of different types of research. Types of marketing problems and

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

type of marketing research activity. Sources of data; use and appraisal of existing information.

**UNIT IV**

Information from respondents, sampling design, scaling techniques and questionnaire design, interviewing, mail surveys.

**UNIT V**

Information from experiment, experimental design for marketing, Motivational research, Advertising research, Analysis and reporting. Marketing Information Systems, Structure and design, its role in planning and control; the place of marketing research.

**Course outcome**

CO1: Analyse the nature and scope of consumer behaviour

CO2: Define, illustrate and critically analyses the main components of consumer behaviour.

CO3: Critically evaluate the existing theories of consumer behaviour and their contributions and limitations.

CO4: Assess the implications of consumer behaviour theories for business and wider society.

CO5: Critically examine alternative ways of thinking about consumers as individuals and within their families, groups and broader cultural context.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	H	L	L	L	L	M	—	M	M	H
CO2	L	M	M	M	L	M	M	M	—	M	H	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	M	H	L	M	H	H	—	M	L	M
CO5	L	M	L	H	L	L	H	L	—	M	L	M

**MBA (Elective-Marketing)**  
**Sales and Distribution Management**  
**Subject Code: MBA167A**  
**Credit: (3)**

**Objectives:**

The course aims to impart skills and knowledge needed to manage sales force and distribution function so as to gain competitive advantage. As a successful marketer, the sales and distribution function needs to be properly managed. This incorporates understanding of various concepts, which the course aims to provide to the student participants.

**UNIT I**

The Sales Management - Introduction to sales management and sales organization, Sales function & policies, Personal selling - nature, scope & objectives, Formulating Personal selling strategy.

**UNIT II**

Planning the Sales Effort - Sales planning and Budgeting, Estimating Market Potential and Sales forecasting, Setting the sales territory & quotas, Sales and cost Analysis.

**UNIT III**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Organizing and Directing the sales Force - Recurring and training sales personnel, Designing & compensating sales Personnel, Motivating and Leading the sales force, Evaluating sales force performance.

**UNIT IV**

Distribution Management - Managing marketing logistics & channels,

**UNIT V**

Channel Integration - VMS, HMS, Channel Management, and Marketing channel Policies & legal issue. Channel Institutions & control, Wholesaling &- Retailing, Channel Information systems, Managing & Evaluating Channel Performance Case & future trends in sales & distribution Management.

**Reference Books:**

1. Tapan K. Panda and Sunil Sachdev, *Sales and Distribution Management*, OUP, New Delhi, 2011
2. P. K. Mallik, *Sales Management*, OUP, New Delhi, 2011
3. Dinesh Kumar, *Marketing Channels*, OUP, New Delhi, 2012

**Course outcomes**

CO1: To introduce course participants to national and international sales and distribution practices

CO2: To expose course participants to the tools and strategies necessary for designing,

CO3: To motivate and evaluate & distribution management systems.

CO4: To sharpen the decision-making skills of future sales and distribution manager.

CO5: Demonstrate an understanding of logistics management and be able to take decisions related to logistics.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	M	—	L	M	H
CO2	L	M	M	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	L	H	L	M	H	H	—	M	L	H
CO5	L	M	H	H	L	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA (Elective-Marketing)**  
**Rural Marketing**  
**Subject Code: MBA166A**  
**Credit: (3)**

**Objectives**

To expose students to the reality of rural markets. To understand the problems, challenges in rural marketing. The objective of the course is to provide conceptual understanding on the Rural Marketing with special reference to Indian context and develop skills required for planning of Rural Products.

**UNIT I**

Rural Marketing: Characteristics and Dimensions of Rural Markets - Rural Market Profile - Rural Market in India - Size and Scope - Environment and Emerging Profile of Rural Markets in India - Constraints in Rural Marketing and strategy to overcome the constraints.

**UNIT II**

Rural Market Behaviour ~ Rural consumer dimensions - Rural Demand Dimension - Tapping the Rural Markets - Rural Market Segmentation - Basis and Strategies - Consumer Behaviour in Rural Markets - Approach to Rural Markets of India - Marketing Research.

**UNIT III**

Marketing Mix for Rural Marketing - Product Planning for Rural Products - Pricing Methods and Strategies for Products of Rural Markets Product Management in Rural Markets.

**UNIT IV**

Channels of Distribution: Distribution pattern and methods in rural markets - Special characteristics of rural channels - Channel management in rural markets - Managing physical distribution in rural markets - Storage, warehousing and transportation.

**UNIT V**

Marketing Communication in Rural Markets: Promotion as a component in marketing communication -Advertising and sales promotion for rural markets - Major challenges in Media planning - Sales force management in rural markets - Selecting the Media Mix - Evaluation of promotional activities.

**Course outcome:**

CO1: Gain insight into the socio-economic structure of rural India.

CO2: Understand the prospects and problems of rural development in India

CO3: Would understanding on the Rural Marketing with special reference to Indian context

CO4: Would develop skills required for planning of Rural Products.

CO5: Objective of this course is to develop understanding of issues in rural markets, to provide an overview of marketing environment, consumer behaviour.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

<b>CO1</b>	L	L	M	H	L	L	L	L	—	M	M	H
<b>CO2</b>	L	M	M	H	H	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	H	M	H	M	—	M	L	M
<b>CO4</b>	L	M	L	H	L	M	H	H	—	M	L	H
<b>CO5</b>	L	M	L	H	L	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**Reference Books:**

1. Krishnamacharyalu, *Rural Marketing*, Pearson, New Delhi, 2011
2. Pradeep Kashyap, *Rural Marketing*, Pearson, New Delhi, 2012

**MBA (Elective-Marketing)**  
**Retail management**  
**Subject Code: MBA461A**  
**Credit: (3)**

**Objectives:**

To introduce the student to the field of retailing management and enable them to understand the problems and issues faced by retailers and develop winning strategies for retailing business.

**UNIT I**

Introduction to Retailing: Introduction, Meaning of Retailing, Economic Significance of Retailing, Retailing Management Decision Process, Product Retailing vs. Service Retailing, Types of Retailers, Retailing Environment, Indian vs. Global Scenario

**UNIT II**

Store Location and Layout: Introduction, Types of Retail Stores Location, Factors Affecting Retail Location Decisions, Country/Region Analysis, Trade Area Analysis, Site Evaluation, Site Selection, Location Based Retail Strategies

**UNIT III**

Retail Marketing Strategies: Retail Merchandising: Introduction to Merchandising Management, Retail Merchandising Management Process, Retail Pricing- Introduction, Factors Influencing Pricing, Pricing Strategies, Retail Pricing- Introduction, Factors Influencing Pricing, Pricing Strategies, Integrated Marketing Communication in Retail- Introduction, Understanding Integrated Communication, Marketing



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**UNIT IV**

Customer Relationship Management in Retailing-Introduction, Benefits of Relationship Marketing, Management of Relationship, Principles of CRM, Customer Relationship Management Strategies, Components of CRM, Customer Service in Retailing, CRM and Loyalty Program

**UNIT V**

International Retailing- Introduction, Stages in Retail Global Evolution, Reasons for Going Global, Benefits of Going Global, Market Entry Methods

E-Tailing- Introduction, E-tailing, Role of Technology in Satisfying Market Demand, Technology in Retail Marketing Decisions, Structure and Developments in E-tailing, Factors Influences the Growth of E-Tailing, Advantages& Disadvantages of E-Tailing,

**Course outcomes**

CO1: The role and relevance of retail Management

CO2: Types and trends of retailing

CO3: The difference between the organized and unorganized retail sector

CO4: The role and importance of international retailing,Retail pricing strategies,Retail segmentation and relationship marketing

CO5: About Merchandise management,CRM Process in retailing and legal compliances.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	L	—	L	M	H
CO2	L	M	L	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	L	H	H	M	H	H	—	M	L	M
CO5	L	M	L	H	L	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**Reference Books:**

- 1.P.K.SinhaandD.P.Uniyal,*ManagingRetailing*,OUP,New Delhi,2012
- 2.Bajaj,TuliandSrivastava,*Retail Management*,OUP,New Delhi,2010

# Elective HR

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA III SEMESTER**  
**Performance Management and Retention Strategies**  
**Subject Code: MBA195A**  
**Credit: (3)**

**Objectives:**

Performance management is the most critical function and strong determinant of organizational excellence. This course is designed to develop appreciation and skills essential for designing and instituting effective performance management systems.

**UNIT I**

Performance Appraisal – A Conceptual Framework, Concept & Definitions of performance appraisal, Objectives of performance appraisal and Process of performance Appraisal

**UNIT II**

Concept of performance management, Process & elements Of performance management. Behavioural Performance Management - Learning Theories; Principles of Learning: Reinforcement and Punishment, Role of Organizational Reward Systems, Behavioural

**UNIT III**

Performance Management or OB Mod. Potential Appraisal & HRD - Meaning & objectives of Potential Appraisal, Potential Appraisal & Performance Appraisal, Concept of HRD; Objectives and challenges of HRD, D Mechanisms and HRD outcomes.

**UNIT IV**

Performance Planning & Measuring Performance - Meaning & need or Performance Planning, Planning Individual Performance, Principles of Measurement.; Classification of Performance Measures, Measurement issues; Approaches &: tools to measure organizational performance, Traditional and modern performance appraisal methods.

**UNIT V**

Competency Analysis and Competency Mapping - Meaning of competency, Competency Analysis, and Approaches to competency Analysis, Competency mapping Need development and assessment of competency models, Competency and performance, Tools to identify the competencies of the employees.

**Course outcome:**

CO1 : Design an organizations performance management process that is compliant with law and supports organizational mission and strategy.

CO2: Compare and contrast various organizational performance management programs and best practices and define attributes of effective performance management systems.

CO3: Employ job-related performance standards and performance indicators that reflect the employee's range of responsibilities.

CO4: Assess how increased employee involvement can contribute to effective performance and coach employees to identify career paths and resources available to support individual development.

CO5 : Identify and communicate appropriate actions with employees (e.g. training and

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

development, wage increase, promotion, bonus etc.) based on their performance strengths and weaknesses.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	M	—	M	M	H
CO2	L	M	M	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	M	H	L	M	H	H	—	M	L	M
CO5	L	M	L	H	L	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**Reference Books:**

- 1.A.S.Kohli and Tapomoy Deb, *Performance Appraisal*, OUP, New Delhi, 2008
- 2.Tanuja Agarwala, *Strategic Human Resource Management*, OUP, New Delhi, 2007

**MBA III SEMESTER**  
**Strategic Human Resource Management**  
**Subject Code: MBA197A**  
**Credit: (3)**

**Objectives**

The Primary concern to this course is to develop in depth understanding of the strategic role performed by HR in business organisation and to gain insight of the alignment between different HR systems and practices and organisation outcomes.

**UNIT I**

Introduction to SHRM: Definition, Need, Importance, and Steps, Human Resource Environment: Workforce Diversity, Demographic Changes, Temporary and Contract Labour, Global Environment, International Labour Standards, Changed Role of HR in Organizations

**UNIT II**

Recruitment & Retention Strategies: Online Recruitment, Outsourcing Recruitment, Head Hunting, Performance Management Strategies: Defining Key Result Areas, Seniority Vs. Merit-based Promotions, Pay for Performance, 360 Feedback, Executive Performance,

**UNIT III**

Compensation & Reward Strategies: Skill Based Pay, Broad banding, Variable Pay, Incentives and Benefits, Profit Sharing, ESOP, Executive Compensation, Training & Development

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Strategies: Cross-cultural Training, Multi-Skilling, Succession Planning, Learning Organizations and Organizational Learning

**UNIT IV**

Retirement & Retrenchment Strategies: Redundancy, Downsizing, HR Outsourcing, Employee Leasing, Separation Benefits e.g., VRS/CRS

**UNIT V**

Human Aspects of Strategies Implementation, Human Side of Mergers & acquisition, Leadership, Managing Conflict, Stress Management, Work-life Balance, Reengineering HR, Human Resource Development: Accounting and Audit, Scorecard and Report

**Recommended Books:**

1. Strategic Human Resource Management by Tanuja Agarwala, Oxford University Press
2. Personnel Management - Text & Cases, By C. B. Mamoria & V. S. P. Rao, Himalaya
3. Strategic Human Resource Management by Rajib Lochan Dhar, Excel Books
4. HRD Audit by TVR Rao, Response Books Publishers
5. Strategic Prospects for HRM by Shaun Tyson, Jaico Publishing House

**Course Outcome:**

CO1: Have a general knowledge of the key HRM concepts, process and practices

CO2: Have an appreciation of different theoretical perspectives and models used to understand HRM practice

CO3: Be able to analyse key issues and challenges related to the implementation of and outcomes associated with HR strategies within the organisation and the wider environment; and

CO4: Be familiar with key areas of interest to practitioners, policymakers and researchers.

CO5: Identify strategies for performance and development. Able to develop view point for performance from employer and employee both sides. To understand effectiveness and future of SHRM, Measure cost and benefit of HRM.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L		—	M	M	H
CO2	L	M	H	H	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	L	H	H	M	H	H	—	M	L	M
CO5	L	M	L	H	L	L	H	L	—	M	L	M

H = Highly Related; M = Medium L = Low

**Reference Books:**

1. Tanuja Agarwala, *Strategic Human resource Management*, OUP, New Delhi, 2007
2. Truss, Mankin, and Kelliger, *Strategic Human Resource Management*, OUP, New Delhi, 2014

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA III SEMESTER**  
**Consumer Behaviour and Market Research**  
**Subject Code: MBA163A**  
**Credit : (3)**

**Objectives**

The subject explores the mysterious world of the consumer's psyche and guidelines to the students to understand what makes consumers to purchase a particular product or avail a particular service.

**UNIT I**

Identifying and classifying customers, buying behaviour, attitude of consumer, consumer perception.

**UNIT II**

Factors influencing buying behaviour; Reference groups, opinion leaders, social influences. Consumer behaviour process; Understanding consumer motivation, personality and self-concept, learning, memory.

**UNIT III**

Research concepts; exploratory, descriptive and conclusive research. The marketing decision making process and the need of different types of research. Types of marketing problems and type of marketing research activity. Sources of data; use and appraisal of existing information.

**UNIT IV**

Information from respondents, sampling design, scaling techniques and questionnaire design, interviewing, mail surveys.

**UNIT V**

Information from experiment, experimental design for marketing, Motivational research, Advertising research, Analysis and reporting. Marketing Information Systems, Structure and design, its role in planning and control; the place of marketing research.

**Course outcomes:**

- CO1: Analyse the nature and scope of consumer behaviour.  
 CO2: Define, illustrate and critically analyse the main components of consumer behaviour.  
 CO3: Critically evaluate the existing theories of consumer behaviour and their contributions and limitations.  
 CO4: Assess the implications of consumer behaviour theories for business and wider society.  
 CO5: Critically examine alternative ways of thinking about consumers as individuals and within their families, groups and broader cultural context.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L	M	—	H	M	H
<b>CO2</b>	L	M	L	M	L	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	L	M	H	M	—	M	L	M
<b>CO4</b>	L	M	M	H	L	M	H	H	—	M	L	H

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO5	L	M	L	H	L	L	H	L	—	M	L	M
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H = Highly Related; M = Medium; L = Low

**Reference Books:**

1. Rajneesh Kumar, *Consumer Behaviour*, OUP, New Delhi, 2014
2. Nigel Bradley, *Marketing Research*, OUP, New Delhi, 2010
3. Sunanda Easwaran and Sharmila Singh, *Marketing Research*, OUP, New Delhi, 2006

**MBA (Elective-HR)**  
**Organizational Development and Management of Change**  
**Subject Code: MBA194A**  
**Credit: (3)**

**Objectives:**

This course is designed to provide I depth understanding of behavioural interventions and enable the students to apply this intervention for building individual, team, system, systems and process related competencies and helping organizational to achieve peak performance and become self-sustaining.

**UNIT I**

Process of Organization Development, Human process interventions, Techno-Structural Interventions, HRM interventions, Competitive and Collaborative Strategies, Organization Transformation.

**UNIT II**

Process of change and organization theory and practice

**UNIT III**

Elements of change. Achieving Systematic change. Domains of systematic change strategy, technology, structure and people. Planning for change.

**UNIT IV**

Change and the use of power. Nature and sources of power. Leadership and change- Transactional vs. Transformational change. Change cycle including participative and coerced change. Resistance to change, change through behaviour modification. Positive and negative reinforcement.

**UNIT V**

Training for change. Managing resistance. Implementing change. Adjustment to change and organising for growth. Prerequisites and consequence of change. The change Dynamics.

**Reference Books:**

1. D.K. Bhattacharyya, *Organisational Change and Development*, OUP, New Delhi, 2011
2. Piers Myers, Sally Hulks, and Liz wiggins, *Organisational Change*, OUP, New Delhi, 2012.

**Course Outcome:**

CO1: To understand the nature of change, the forces for change, resistance to change and approaches to managing organizational change

CO2: To understand the nature and concept of organizational transformation and transition

CO3: To gain an insight into the organizational development programmes and techniques, emerging OD approaches and techniques and its application in organizations

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO4: To provide conceptual and practice-based approach on the implications of change tailoring the specific needs of the organization through organizational development techniques.

CO5: To provide conceptual knowledge of organizational dynamics and consequence of change.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	H	H	L	L	M	—	H	M	M
CO2	L	M	M	H	H	M	M	M	—	M	M	M
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	M	H	H	M	H	H	—	H	L	M
CO5	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium L = Low

**MBA (Elective-HR)**  
**Sourcing, Training and Development**  
**Subject Code: MBA196A**  
**Credit: (3)**

**Objectives:**

The objective of this course is to provide an in-depth understanding to various stages in a training process and the catalytic role of training and development in the effective functioning of an organisation. The course also facilitates the participants to learn some of the tools and techniques of training process.

**UNIT I**

HRP concepts, importance, objective, type of HR plan, HRP approaches, Process, HR Forecasting: Concepts: Demand & Supply of manpower & methods of Forecasting.

**UNIT II**

Recruitment: Concept, Sources & Techniques, Selection: Concept & Process HRD, Concept system, HRD matrixes climate, elements, Interventions. Career planning: concept, objective, process, Career planning and Career development, Career planning Vs Succession planning., Career Anchors, Succession Planning: concept & Process, Management Development Program.

**UNIT III**

Job analysis: meaning and definition, job analysis process, techniques of job analysis, methods and practice of job analysis, competency-based approach. Job Analysis in Human Resource Planning, Recruitment and Selection.

**UNIT IV**

Learning: Principles of Learning, Theories of Learning, learning process; learning styles, Andragogy. Training – concept and rationale; training process of stakeholders in training programme; Organization and Management of training function; Training needs assessment-



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

organization analysis, operational analysis, person analysis; competency mapping. Designing the training programme: process of learning in training programme- attributed and factors influencing; training climate and pedagogy; developing training modules;

**UNIT V**

Training aids. Training methods and techniques, Trainers. Budgeting Of Training, Evaluation of training-need for evaluation, principles of evaluation, criteria and approaches; return on investment in training, process of calculating ROI in training; emerging trends in training and development; new perspectives on training –cross culture training, e-learning

**Course Outcomes:**

CO1: To learn the concept of Human Resource Planning, its objectives, different approaches to HRP and HRP process

CO2: To develop deep knowledge on the importance of job analysis, job description, job specification and job designing in Human Resources Management

CO3: To understand the issues relating to manpower sourcing in organizations

CO4: To gain knowledge on the legal aspects related to manpower sourcing

CO5: To understand training aids and evaluation.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	M	M	L	L	L	L	M	—	L	M	H
<b>CO2</b>	L	M	L	M	L	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	H	M	H	M	—	M	L	M
<b>CO4</b>	L	M	—	H	H	M	H	H	—	M	L	M
<b>CO5</b>	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**Reference Books:**

1. B. Janakiram, *Training and Development*, Wiley India, New Delhi, 2012
2. John Pulparambil, *Training and Development*, Patridge, 2012

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA (Elective-HR)**  
**Talent Management**  
**Subject Code: MBA371A**  
**Credit: (3)**

**Objectives**

This course is aimed at helping students gain an insight into the basic concepts and application of Talent Management in business and industry. It involves deliberations on the basic processes and tools of managing Talent in organizations.

**Unit I**

Introduction to Talent Management: Introduction, Talent Management – Overview, Talent Management – History, the Scope of Talent Management, Need of Talent Management, Key Processes of Talent Management, Talent vs knowledge people, Source of Talent Management, Consequences of Failure in Managing Talent, Tools for Managing Talent

**Unit II**

Talent Management System: Introduction, Talent Management System, Critical Success Factors to Create Talent Management System, Some other critical success factors of best practice Talent Management System, Factors of unique talent management approach, Key Elements of Talent Management System

**Unit III**

Life Cycle of Talent Management: Introduction, Linkage between Talent Management Process and Workforce, Importance of Talent Management Process, Important Steps to Assess Talent Management Process, Stages of Talent Management, Essentials of Talent Management Process, And Approaches to Talent Management: Talent Management Approaches, Developing a Talent Management Strategy, Mapping Business Strategies and Talent Management Strategies, Post Recession Challenges of Talent Management

**Unit IV**

Talent Planning: Talent Planning, Objectives of Talent Planning, Steps in Strategic Talent Planning, Succession Planning Program, Innovative talent planning, Current Industry Practices for Strategic Talent Planning, Ensuring Leadership, Role of HR in Talent Management: Introduction, Overview of Human Resource Management, and Role of HR in Talent Management, Role of the HR Manager.

**Unit V**

Contemporary Talent Management Issues, Challenges, Best Practices: Introduction, Organisational Issues, Talent Management Challenges, Best Practices of Talent Management, Talent Management in India, Role of Information Technology in effective Talent Management Systems: Introduction, Role of Information Technology in Talent Management Systems, Talent Management Information System, Creating Business Value through Information Technology, Five Steps to a Talent Management Information Strategy, HR Analytics for TM Processes, Design Development through Rapid Prototype.

**Course Outcome:**

CO1: Talent Management: Students will be able to understand different approaches of talent management.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO2: They will be able to identify talent and develop retention strategies.

CO3: It will develop understanding to evaluate the talent management in the organization.

CO4: Recognise the business case for talent management and succession planning, Identify the need to have talent management integrated into the strategy of their organisation in order to retain talent.

CO5: Recognise the key steps required to implement the Talent Management Continuum

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L	M	—	M	M	H
<b>CO2</b>	L	M	M	M	L	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	H	M	H	M	—	M	L	M
<b>CO4</b>	L	M	L	H	H	M	H	H	—	M	L	M
<b>CO5</b>	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**Reference Books:**

1. Talent Management Handbook, by Lance A. Berger and Dorothy R. Berger.
2. Reinventing Talent Management: How to Maximize Performance in the New Marketplace, by William A. Schiemann.
3. Talent Force: A New Manifesto for the Human Side of Business, by Rusty Reuff and Hank Stringer.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA (Elective – HR)**  
**INDUSTRIAL RELATION AND LABOR LAWS**  
**SUBJECT CODE: MBA193A**  
**CREDIT: (3)**

**Objectives:** To provide basic knowledge in industrial relations and labour laws and to enable the students understand the various provisions of Trade Union.

**UNIT I**

Industrial Relations: Definition, Importance & Scope. Trade Union-Growth, Objective, Function & Role in globalize Content. Governmental Measures – Ministry for labor, Commissioner of labour, Deputy Commissioner & labour Offices.

**UNIT II**

Industrial Disputes: Nature and causes of Industrial Dispute, Types of Conflict Resolution – Statutory & Non-Statutory Collective Bargaining – Meaning, Characteristics, Need, Importance, Process, Pre-requisites.

**UNIT III**

Workers Participation in Management: Concept & Pre-requisites. Forms & Levels of Participation. Benefit of workers participation in management. Industrial Relations: International Perspective. Industrial Health and Safety

**UNIT IV**

The Industrial Disputes Act, 1947: Definitions, Authorities under the Act, Power & Duties of Authorities. Strike & lockout, Lay-off and retrenchment. The Industrial Employment (Standing Orders) Act, 1946

**UNIT V**

The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013. Factories Act, 1948: Provisions regarding Safety, regarding Health, Welfare, Leave with Wages and Working hours of adults.

**Course Outcome:**

CO1: To familiarize students with the basic concepts of industrial relations, its philosophy, origin and development.

CO2: To develop knowledge on trade unions and its formation, structure, functions and legal framework.

CO3: To gain insight into the process of collective bargaining, its origin and development.

CO4: To gain understanding on industrial disputes, its causes, manifestation and effects.

CO5: To develop Understanding about harassment in workplace.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L	M	—	H	M	H
<b>CO2</b>	L	M	L	M	L	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	H	M	H	M	—	M	L	M
<b>CO4</b>	L	M	M	H	H	M	H	H	—	M	L	M
<b>CO5</b>	L	M	L	H	H	L	H	L	—	M	L	H

H = Highly Related; M = Medium; L = Low

**Recommended Books:**

1. Akhileshwar Pathak, *Legal Aspects of Business*, Tata McGraw-Hill, 2007
2. P. Saravanavel & S. Sumathi, *Business Law for Management*, Himalaya Publishing house, 2004.
3. P. Kasliwal, *Intellectual Property Rights*, CBC, First Edition, 2009.
4. Industrial Relations and Labour Laws Paperback – 1 July 2017  
by Piyali Ghosh (Author), Shafali Nandan (Author)

**MBA (Elective – HR)**  
**Compensation Management**  
**Subject Code: MBA192A**  
**Credit: (3)**

**Objectives:**

This course is designed to promote understanding in issues related to compensation in corporate sector and impart skills in designing, analysis and restructuring compensation management system, policies and strategies.

Gain knowledge of different components of compensation • Understand different monetary and non-monetary benefits of compensation • Identify international components of compensation • Understand various factors required to design compensation

**UNIT I**

Compensation – Definition – Compensation Responsibilities – Compensation System Design Issues – Compensation Philosophies – Compensation Approaches,

**UNIT II**

Job Evaluation, Grading and Compensation Structure:

Job Evaluation Introduction to Nature and Objectives of Job Evaluation; Introduction to Principles and Procedure of Job Evaluation Programs; Introduction to Basic Job Evaluation Methods;  
Introduction to Implementation of Evaluated Job;

**UNIT III**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Compensation Classification – Types – Incentives – Fringe Benefits – Strategic Compensation Planning – Determining Compensation – The wage Mix – Development of Base Pay Systems – The Wage Curve – Pay Grades – Salary Matrix – Compensation as a Retention Strategy.

**UNIT IV**

Theories of Wages – Wage Structure – Wage Fixation – Wage Payment – Salary Administration – Executive Compensation – Incentive Plans – Team Compensation – Gain Sharing Incentive Plan – Enterprise Incentive Plan – Profit Sharing Plan- ESOPs – Compensation Management in Multi-National organizations.

**UNIT V**

Calculation of Income Tax implications while calculating the income of an individual - Cost to the Company - Valuation of Perquisites - Taxability of various components of salary and wages; Fixation of Tax Liability - Tax deduction at source - Deductions and Tax Rebates to be considered while deciding tax deducted at source - Tax Deduction Certificates.

**Course outcomes-**

- CO1: To learn basic compensation concepts and the context of compensation practice
- CO2: To illustrate different ways to strengthen the pay-for-performance link.
- CO3: To learn the concepts of Payment and employee benefits issues for contingent workers.
- CO4: To understand the legally required employee benefits.
- CO5: To understand the tax liability and various components of salary and wages.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	L	—	L	M	M
CO2	L	M	—	M	L	H	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	—	H	H	M	H	H	—	M	L	M
CO5	L	M	L	H	H	L	H	L	—	M	L	H

H = Highly Related; M = Medium; L = Low

**Reference Books:**

1. D.K. Bhattacharyya, *Compensation Management*, OUP, New Delhi, 2014
2. Uday K. Halder and Juthika Sarkar, *Human Resources Management*, OUP, New Delhi, 2012.

# Elective –IT

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**Data Base Management System**  
**Subject Code- MBA224A**  
**Credit – (3)**

**Objectives:**

This course has been designed to introduce the participants with applications of systems designed to manage the data resources of organizations. It provides the participants an opportunity to study the hands-on implementation of a database in a corporate environment.

**UNIT I**

File System and Databases: Introducing the database - files and file systems - database systems - introduction to database models - data base models and internet.

**UNIT II**

The Relational Database Model: A Logical view of data - keys - integrity rules - relational database operators - relationships within the relational database - data redundancy indexes.

**UNIT III**

Structured query language: SELECT Statement - distinct clause - handling of null values - ORDER BY clause, WHERE clause - relational operators - logical operators (AND, OR, NOT), SQL Operators - (BETWEEN, AND, IN, LIKE) - numeric functions - string functions - date functions - conversion functions - GROUP BY clause - group functions - HAVING clause - joining tables - SET Operators (UNION, INTERSECTION, MINUS) - Sub queries.

**UNIT IV**

Object oriented databases: Object oriented concepts - features of an object-oriented DBMS - How object orientation affects database design - Advantages and disadvantages of OODBMS. Web based databases

**UNIT V**

Database security and administration: Database security - access control - GRANT, REVOKE - GRANT, REVOKE on views and integrity constraint - data as a corporate asset - the evolution of database administration function - The DBA's managerial role.

**Course outcome-**

CO1: To understand the nature of change, the forces for change, resistance to change and approaches to managing organizational change

CO2: To understand the nature and concept of organizational transformation and transition

CO3: To gain an insight into the organizational development programs and techniques, emerging OD approaches and techniques and its application in organizations



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO4: To provide conceptual and practice-based approach on the implications of change tailoring the specific needs of the organization through organizational development techniques

CO5: Understand the concept of transactions and serialize ability in database management system.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	L	—	M	M	H
CO2	L	M	M	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	M	H	H	M	H	H	—	M	L	M
CO5	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**Recommended Books**

- —Database System Concepts|| by Abraham Silberschatz, Henry Korth, and S. Sudarshan
- —Database Management Systems|| by Raghu Ramakrishnan
- —An Introduction to Database Systems|| by Bipin Desai
- —Principles of Database Systems|| by J. D. Ullman
- —Fundamentals of Database Systems|| by R. Elmasri and S. Navathe
- —Foundations of Databases|| by Serge Abiteboul, Richard Hull and Victor Vianu

**MBA (Elective – IT)**

**IT Strategy & E-Business**

**Subject Code- MBA228A**

**Credit – (3)**

**Objective:**

This course will provide the students with an analytical and technical framework to understand the emerging world of e-Business. E-Business poses both a challenge and an opportunity for managers.

**UNIT I**

Introduction, background and current status: digital economy, principles of e-business, e-business models.

**UNIT II**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

E-business frameworks: e-selling process, e-buying planning, e-procurement, convergence strategies, e-business design and e-markets: overview, steps in e-business design, reversing the value chain, knowledge building. E-market models, direct B2B markets, coalitions.

**UNIT III**

Integrating supply chain management process: definitions, components of e-supply chain, managing relations in e-supply chain.

**UNIT IV**

Integrating enterprise resource planning process: enterprise architecture planning, lead time reduction, improved supplier performance. Selling chain management process: definition, business and technology drivers, infrastructure, sales and distribution configuration.

**UNIT V**

E-CRM processes and their integration, e-banking, e-governance. E-Business strategy into action, Challenges, e-Transition and Summary. e-Security. Case and Problems

**Recommended Books**

- J Deitel, Deitel & Nieto Internet and World Web. How to Program
- Deitel, Deitel & Nieto e-Business and e-Commerce. How to Program
- E-Business and E-Commerce, 2/E, Dave Chaffey, Prentice Hall.

**Course Outcome:**

CO1: Understand the E-Commerce and E-business infrastructure and trends.

CO2: Analyze different types of portal technologies and deployment methodologies commonly used in the industry.

CO3: Analyze the effectiveness of network computing and cloud computing policies in a multi-location organization.

CO4: Analyze real business cases regarding their e-business strategies and transformation processes and choices.

CO5: Integrate theoretical frameworks with business strategies.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	L	—	M	M	H
CO2	L	M	L	H	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	L	H	L	M	H	H	—	M	L	M
CO5	L	M	L	H	H	L	H	L	—	M	L	H

H = Highly Related; M = Medium; L = Low

**MBA (Elective – IT)**  
**Strategic Management of Information Technology**  
**Subject Code- MBA229A**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**Credit – 3**

**Objective:** This course is aimed at developing an understanding of the use of Information Technology as a Strategic Tool for Business Management. The course focuses on the development of Information Technology Leadership.

**UNIT I**

Key Issues in Information system & Management, the Role of CEO. Analytical Framework for Strategic IT Initiatives.

**UNIT II**

Sustaining Competitive Advantage of use of IT & Management. I.T. & Intensive Strategic Growth

**UNIT III**

Creative Learning, Organizational Learning and Role of Information technology in Business Transformation

**UNIT IV**

Information Partnerships, Managing in the Market space- National Information Infrastructure and IT Policy at the National Level.

**UNIT V**

Planning for strategic IT resources. Managing the IT Function. Outsourcing IT Function  
.

**Recommended Books**

- Strategic Management in Information Technology, David B. Yoffie
- Executive Strategy: Strategic Management and Information Technology, Frederick Betz
  
- Management Strategies for Information Technology (Business Information Technology), Earl (Author)

**Course Outcome:**

CO1: Relate the basic concepts and technologies used in the field of management information systems;

CO2: Compare the processes of developing and implementing information systems.

CO3: Outline the role of the ethical, social, and security issues of information systems.

CO4: Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.

CO5: Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course	Program Outcomes
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**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	L	—	L	M	H
CO2	L	M	M	M	L	M	M	M	—	M	M	H
CO3	L	H	M	H	H	M	H	M	—	M	L	M
CO4	L	M	L	H	L	M	H	H	—	M	L	M
CO5	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**MBA (Elective – IT)**  
**Business Intelligence & Data mining**  
**Subject Code- MBA222A**  
**Credit-3**

**Objectives**

To appreciate e-Business as a significant business segment of the future. To develop capacity to initiate/lead an e-business venture/business segment, to understand the principles of BI and Analytics at conceptual level. To develop skills to design BI and Analytics projects

**UNIT I**

**Business Intelligence:** Definition and Examples in BI, Need, Features and use of BI, BI Components. Business Analytics – Introduction, Need, Components and Types

**UNIT II**

**Digital Data and Data warehouse:** Types of Digital Data – Definition, Sources and Characteristics of Structured, Semi-structured and Unstructured data. **Data Warehouse –** Definition, characteristics, framework

**UNIT III**

**Data Mining:** Concepts and applications, Data mining process. **Text & Web Analytics:** Text analytics and text mining overview, Text mining applications. Web mining overview, social media analytics, and Sentiment analysis overview

**UNIT IV**

**Big Data Analytics:** Definition and characteristics of Big data, Fundamentals of big data analytics

**UNIT V**

**Applications of BI in Business:** Sales and Marketing analytics, HR Analytics, Financial Analytics, Production & Operation Analytics. **Analytics in Industries:** Telecom, Retail, Healthcare, Financial Services

**Recommended Books**

- Business Intelligence: A Managerial Perspective on Analytics – Ramesh Sharda, Dursun Delen, Efraim Turban (Pearson)
- Fundamentals of Business Analytics – R.N. Prasad and Seema Acharya (Wiley)

**Course outcomes**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO1: To identify the major frameworks of computerized decision support: decision support systems (DSS),

CO2: To identify how data analytics and business intelligence works (BI).

CO3: To Explain the foundations, definitions, and capabilities of DSS, data analytics and BI.

CO4: To Identify principles of BI and Analytics at conceptual level.

CO5 :Develop skills to design BI and Analytics projects.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L	L	—	L	M	H
<b>CO2</b>	L	M	M	M	H	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	H	M	H	M	—	M	L	M
<b>CO4</b>	L	M	M	H	L	M	H	H	—	M	H	M
<b>CO5</b>	L	M	L	H	L	L	H	L	—	M	L	H

H = Highly Related; M = Medium; L = Low

# **Elective Production**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA (Elective – Production and Operation Management)**  
**Total Quality Management**  
**Subject Code- MBA441A**

**Credit - (3)**

**Objective:**

To introduce the students to the basic concepts of total quality management and how the focus of TQM has become so important for all companies in recent times.

**UNIT I**

Introduction: Concept of quality, Definition, Dimensions of quality, Evolution of TQM, Components of TQM, Developing quality Culture. Customer Focus and Satisfaction: Meeting Customer needs and Expectations, Translating customer needs into requirements (Kano Model) using customer complaints.

**UNIT II**

Philosophy of TQM: Philosophies of Deming, Crosby, Juran and Taguchi, PDCA Cycle, Costs of Quality, Measuring quality costs, Criteria for Malcolm Baldrige Quality Award.

**UNIT III**

Prerequisite for TQM: Quality Orientation, Leadership, Employee Involvement, Role of ISO9000 QMS , Organizing for quality.

**UNIT IV**

Quality by Design: Production and product development tools, Taguchi methods, Design of Experiments, Orthogonal Arrays. Benchmarking: Evolution, Process of benchmarking, Understanding current performance, Types of Benchmarking, issues in Benchmarking.

**UNIT V**

Tools of TQM: Management Tools, Design review, Pokayoke, Force field analysis, FMEA, FTA, 5S and 7M Principles.

**Course outcomes-**

CO1: Gaining knowledge about managing production processes. How to run operations effectively?

CO2: Better understanding of modern production techniques

CO3: Better understanding of quality management

CO4: Management skills needed for the effective operations management

CO5: Understand the importance of total quality management and management tools.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM-SPECIFIC OUTCOMES:**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L	L	—	M	M	H
<b>CO2</b>	L	M	M	M	L	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	H	M	H	M	—	M	L	M
<b>CO4</b>	L	M	L	H	L	M	H	H	—	M	M	H
<b>CO5</b>	L	M	L	H	H	L	H	L	—	M	L	H

H = Highly Related; M = Medium L = Low

**Recommend Books**

Dale H.Besterfield et al, Total Quality Management, Third edition, Pearson Education (First Indian Reprints 2004).

Shridhara Bhat K, Total Quality Management – Text and Cases, Himalaya Publishing House, First Edition 2014.

**MBA (Elective – Production and Operation Management)**  
**Purchasing & Materials Management**

**Subject Code: MBA438A**

**Credit :(3)**

**Objective**

This course will allow a student to understand basics and fundamentals of Materials Management, with primary focus on purchasing and material Management. At end of this course, students would be able to make decisions regarding practical aspects of Materials Management as practiced in

**UNIT I**

Introduction -Materials management – An overview – Introduction – ScopeObjective, Importance Integrated approach to Materials Management.

**UNIT II**

Material Planning – Introduction – Factors affecting material planning – Techniques of material planning - MRP

**UNIT III**

Purchasing, Procedure & Pricing Issues – Receipt – Storage - Issue

**UNIT IV**

Inventories – Definition-Classification of Inventories- Need for inventories – Merits & Demerits of Inventories

**UNIT V**



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Inventory control techniques and principles - classification, codification, standardization – ABC analysis –VED, GOLF, FSN - HML 6 6 Economic order quantity concept – Derivation of EOQ formula, modified EOQ

**Course outcomes**

CO1: Develop an ability to perform the role of a materials manager in an organization.

CO2: Shall be able to manage the activities of materials manager like purchasing, inventory analysis, storage, etc. in a scientific manner.

CO3: Shall be able to improve due date performance through use of MRP techniques with in capacity constraints.

CO4 : Shall be able to analyze the inventory situation of a company and suggest improvements.

CO5 : Understand the importance of inventory control, inventory ordering policies and select appropriate inventory model to solve inventory problems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L	M	—	M	M	H
<b>CO2</b>	L	M	L	M	L	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	L	M	H	M	—	M	L	M
<b>CO4</b>	L	M	L	H	L	M	H	H	—	M	L	M
<b>CO5</b>	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium; L = Low

**Recommended Books**

1. Arnold, Chapman: Introduction to Materials Management: Pearson, 5th edition, 2008
2. Gopalkrishnan & Sundarsan: Material Management: An Integrated Approach, Prentice Hall of India Private Limited, New Delhi, 2003
3. A. K. Dutta: Materials Management: Procedures, Text and Cases, Prentice Hall of India Private Limited, New Delhi, 2nd edition, 2004

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA (Elective – Production and Operation Management)**  
**Service Operations Management**  
**MBA439A Credit :(3 L)**

**Objectives:**

The objectives of this subject are to provide students with: An overview of Service and Operations Management as management functions in general. An understanding of the impact Operational Capability has on decision making and options in Business Strategy and the linkage to Operations Strategy.

**UNIT I**

Introduction- The Nature and Classification of Services. The Future of Services

**UNIT II**

Service Design and Operations Strategy, Service Quality: Five Gap Model. Kano's Model. Leveraging value over cost in service delivery

**UNIT III**

Linking the service model to the P&L. Testing and adapting a firm's service model. Compensation and performance reporting systems

**UNIT IV**

Measuring Service Productivity; Benchmarking productivity

**UNIT V**

Measuring Performance in Client Relations; Understanding Evolving Customer Needs and Relationship Building. Globalization of services

**COURSE OUTCOMES-**

CO1: An overview of Service and Operations Management as management function in general.

CO2: An understanding of the impact Operational Capability has on decision-making and options in Business Strategy and the linkage to Operations Strategy.

CO3: An understanding of the different types of operations process types on which operational capability can be based and the strategic implications of the process choice decision.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO4: An understanding of the relationship between Business Strategy, Operations Strategy, Process Type,

CO5: An understanding of Organisation and Control structures and the impacts these have on managerial decision-making and choices.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	L	—	L	M	H
CO2	L	M	—	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	H	M	H	M	—	M	L	M
CO4	L	M	—	H	H	M	H	H	—	M	L	M
CO5	L	M	L	H	H	L	H	L	—	M	M	H

H = Highly Related; M = Medium; L = Low

**MBA (Elective – Production and Operation Management)**  
**Product Planning & Control**  
**Subject Code: MBA437A**  
**Credit :(3)**

**Objective:**

To get acquainted with the basic aspects of Production Management. The course attempts to discuss various important planning, organizing and controlling aspects of Operations Management.

**UNIT I**

History and Overview of Production Management. Capacity Planning, Location Planning, Types of Production Processes. Layout Planning, Productivity Management, Deterministic and Probabilistic Inventory Management models, Purchasing and Warehousing. Methods Study, Motion Study and Work Measurement. Job Evaluation. Wage Incentive Schemes. Value

**UNIT II**

Production systems, type of production, Functions of production, planning and control, production procedure. Sales forecasting: Nature and uses of forecast sources of data Forecasting techniques:

**UNIT III**

Production order: Process charts, Production master programme breakdown production order and preparation of various cards like job card, materials requisition from inspection card etc.

**UNIT IV**

Production -Planning: for continuous, batch and job order production: Capacity planning, planning models-static and dynamic.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**UNIT V**

Scheduling: Forms of Schedules, Loading, and Scheduling, Basic scheduling problems: Flow production scheduling; job shop scheduling. Random order scheduling; product sequencing. Production control of processes and production activities.

**Course outcomes**

CO1: Recognize the objectives, functions, and applications of PPC and forecasting techniques.

CO2: Explain different Inventory control techniques.

CO3: Solve routing and scheduling problems.

CO4: Summarize various aggregate production planning techniques.

CO5: Describe way of integrating different departments to execute PPC functions.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L	M	—	L	M	H
<b>CO2</b>	L	H	—	H	L	M	H	M	—	M	M	H
<b>CO3</b>	L	H	L	H	H	M	H	M	—	H	L	M
<b>CO4</b>	L	M	—	H	H	M	H	H	—	M	L	M
<b>CO5</b>	L	M	L	H	H	L	H	L	H	M	L	M

H = Highly Related; M = Medium L = Low

**Recommended Books**

- Seetharama, Peter J., Dennis W, Production planning & inventory control by. –Pub. PHI
- Production and operation management- S N Chary- Tata Mc Graw hill
- Groover, M. P., Automation, Computer Integrated Manufacturing System,
- R. B Khanna, Production and operation management by–Pub. PHI
- Aswathappa&Bhat, Production and operation management- Pub. - HimaLaya pub. House

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA (Elective – Production and Operation Management)**  
**Logistics Management**  
**Subject Code- MBA434A**  
**Credit –(3)**

**Objective:**

To give students an understanding that the problems and issues within the respective fields of logistics are invariably complex, and require clear reasoning and analysis, in order to derive an appropriate course of action

**UNIT I**

Logistics Management- Introduction, Nature and Concepts, Evolution; Supply Chain Management, Logistical Mission and Objectives; Components and Functions of Logistics Management

**UNIT II**

Integrated Logistics Management; Key Distribution-Related issues and Challenges and Strategic Logistics Management; Total Cost Analysis and Trade-off.

**UNIT III**

Customer Service- Introduction, Nature, Concept and Components. Customer Service Cost, Strategic Customer Service Management and Measurement. Impediments to an effective Customer Service Strategy.

**UNIT IV**

Inventory Management- Introduction, Concept, types, Functions; Elements of Inventory Costs; Inventory Management under certainty, Managing Finished Products Inventory under Uncertainty, Strategic Inventory Management Tools and Techniques; Distribution Requirement Planning.

**UNIT V**

Transportation- Introduction, Functions; Elements of Transportation Cost, Modes of Transport, Multi-Model Transport, Containerization, Selection of Transportation Mode,

**Course outcomes :**

CO1:To describe the increasing significance of logistics and its impact on both costs and service in business and commerce.

CO2:To incorporate and learn the critical elements of logistics and supply-chain management processes based on the most relevant application in forward-thinking companies.

CO3:To develop criteria and standards to achieve improved business performance by integrating and optimizing the total logistics and supply-chain process.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO4: To describe the ways to shift the business culture from functional work to overall process-driven results.

CO5 :Introduce various Environmental , Ethical and Technological issues in Operations Management.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	H	H	L	L	L	—	L	M	H
CO2	L	M	—	M	H	M	M	M	—	M	M	H
CO3	L	H	M	H	L	M	H	M	—	M	L	M
CO4	L	M	—	H	L	M	H	H	—	M	L	M
CO5	L	M	L	H	L	L	H	H	—	H	L	M

H = Highly Related; M = Medium L = Low

**Recommended Books**

Khanna, K.K. Physical Distribution Management, Himalaya Publishing House, New Delhi.

Lambert, D. et. al.: Strategic Logistics Management, Tata McGraw Hill, New Delhi.

Ballu, Ronald H.; Business Logistics Management, Englewood Cliffs, New York, Prentice Hall Inc., 1999.

Martin, Christopher and Gordon Wills: Marketing Logistics and Distribution Management.

**MBA (Elective – Entrepreneurship & Family Business Management)**  
**Entrepreneurship Process & Behaviour**  
**Subject Code- MBA301A**  
**Credit –(3)**

**Objective:**

To give students an understanding that the problems and issues within the respective fields of innovation in entrepreneurship are invariably complex, and require clear reasoning and analysis, in order to derive an appropriate course of action.

**UNIT I**

Concept of Entrepreneurship: Nature & development of entrepreneurship, Role of Entrepreneurship in economic development, Entrepreneur Vs. intrapreneur: The entrepreneurial process, Intrapreneurship. The individual entrepreneur: Role models and support systems, Male Vs. Female entrepreneurs,, Entrepreneurs Vs. Inventors, International

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Vs. domestic entrepreneurship, entrepreneurial entry into international business, Barriers to international trade.

**UNIT II**

Creating & starting the venture: Sources of new ideas, Methods of creating new ideas, creative problem solving, and product planning & development process. Government Supports and schemes for entrepreneurs, Legal issues for Entrepreneur: Intellectual property, Legal issues in setting up an organization

Business Plan (Creating & starting the venture): Concept, scope and value, evaluation of the plan, causes of the failure of some BUSINESS PLANS.

**UNIT III**

Marketing Considerations: Industry analysis, Marketing research for a new venture, The marketing mix, Marketing plan, Contingency planning, Causes of failure of some marketing plans, Internet marketing, E-Commerce and planning the websites for new business

Organizational considerations: Legal forms of business, Tax attributes of forms of business, Legal formalities in starting a company, partnership firm and other forms of business

**UNIT IV**

Financial considerations: Operating and capital budgets, Performa income statements, Performa cash flow, Performa balance sheet, Break even analysis, Performa sources and application of funds, Sources of capital, Role of SBA in small business financing, Venture capital, Use of Ratio analysis in valuation of a company.

**UNIT V**

Strategic considerations: New entry, Risk reduction strategies, Growth strategies, Economic implications of growth, financial control.

Accessing Resources for growth from external sources: Franchising, joint ventures, Acquisitions, Mergers, Leveraged buyouts, Going Public: Timing & underwriter selection

**Course Outcomes:**

CO1: Describe entrepreneurship and identify the characteristics of successful entrepreneurs.

CO2: Explain the business planning process.

CO3: Describe how to create a strong ethical culture in an entrepreneurial venture.

CO4: Compare different strategies for sustained venture growth.

CO5: Analyze miscellaneous issues that are critical to venture success.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	H	L	L	M	—	M	M	H
CO2	L	M	—	M	H	M	M	M	—	M	M	H

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

<b>CO3</b>	L	H	L	H	L	M	H	M	—	M	L	M
<b>CO4</b>	L	M	—	H	L	M	H	H	—	M	L	M
<b>CO5</b>	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium L = Low

**Recommended Books:**

- Hisrich D Robert, Peters P Michael & Shepherd A Dean, —Entrepreneurship, 6th edition, Tata McGraw-Hill, New Delhi, 2008
- Zimmerer W. Thomas, Scarborough, —Essentials of entrepreneurship and small business management, 4th edition, Prentice Hall of India Pvt. Ltd, New Delhi
- Roy Rajeev, —Entrepreneurship, Oxford University Press, 2008
- Schemes for entrepreneurs on the website of Ministry of MSME

**MBA (Elective – Entrepreneurship & Family Business Management)**  
**Creativity & Innovation in Entrepreneurship**  
**Subject Code- MBA302A**  
**Credit –( 3)**

**Objective:**

To give students an understanding that the problems and issues within the respective fields of innovation in entrepreneurship are invariably complex, and require clear reasoning and analysis, in order to derive an appropriate course of action.

**Unit I**

Introduction to the process of innovation, Models of Innovation, factors facilitating innovation. Barriers to innovation.

The underpinning of profits: Assets, Competence of knowledge, Sources and Transfer of Innovation, Creating a culture of Innovation

**Unit II**

Recognizing the potential of Innovation, Reducing Uncertainty, Strategic Choice or environmental determinism, Strategies for sustaining profit.

Levels of Entrepreneurship in Organizations: Entrepreneurial Intensity. The Forms of Corporate Entrepreneurship, Training in Innovation

**Unit III**

Human Resources in the Entrepreneurial Organization: The Creative Individual

Human Resources and the Entrepreneurial Organization: The Organizational Perspective.

Corporate Strategy and Entrepreneurship.

Structuring the Company for Entrepreneurship. Developing an Entrepreneurial Culture

Constraints on Entrepreneurial Performance, Team building exercises

**Unit IV**

Financing Entrepreneurial Activity, Implementation of the decision to adopt.

Leading the Entrepreneurial Organization, Assessing Entrepreneurial Performance. Control and Entrepreneurial Activity



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**Unit V**

Globalization of Innovations, Innovation for emerging economies, Role of National Government in Innovation, Strategic Innovation Process.

Case studies on entrepreneurial organizations, innovative organisations, entrepreneurial culture, creativity innovation and development.

**Course Outcomes:**

Students will be able to:

CO1: Understand the concept of innovation, its components and its importance for the company and organizations in general.

CO2: Develop a practical framework for the design and implementation of a systematic innovation strategy.

CO3: Incorporate adequate tools for formulation of a business model and a business plan.

CO4: Connect the theoretical issues with the concrete reality through work on actual experiences of companies that have a culture in innovation and studying successful study cases.

CO5: develop their own business.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	H	L	L	—	—	—L	M	H
CO2	L	M	—	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	—	H	L	M	H	H	L	H	L	M
CO5	L	M	L	H	L	L	H	L	—	M	L	H

H = Highly Related; M = Medium, L = Low

**Recommended Books:**

- Corporate Entrepreneurship & Innovation, 2nd Edition by Michael H. Morris, Publishers Cengage India
- Steve Conway & Fred Steward, Managing & Shaping Innovation, Oxford University Press, 2012
- Handbook of Technology Management – Gaynor – Tata McGraw Hill
- Management of New Technologies for Global Competitiveness by Christian N Madu, Jaico Publishing House
- Management Of Technology Change – Rao A S – Global Business Press
- Entrepreneurship: Successfully Launching New Ventures 1/e – Barringer, Pearson India
- University Entrepreneurship and Technology Transfer: Process, Design, and Intellectual Property (Advances in the Study of Entrepreneurship, Innovation ... Innovation and Economic Growth) by Gary Libecap, Publisher: JAI Press (July 1, 2005), ISBN-10: 0762312300, ISBN-13: 978-0762312306

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MBA (Elective – Entrepreneurship & Family Business Management)**  
**Small Business Management**  
**Subject Code- MBA303A**  
**Credit –(3)**

**Objective:**

To give students an understanding that the problems and issues within the respective fields of innovation in entrepreneurship are invariably complex, and require clear reasoning and analysis, in order to derive an appropriate course of action.

**UNIT I**

Introduction: Definition, meaning, importance and relevance of Entrepreneurship, types & characteristics of entrepreneurship, identification and classification of business opportunities, barriers to entrepreneurship. environmental scanning through 7 Domains of market attractiveness & porter's 5-forces model

**UNIT II**

Needs, Tools and techniques for market assessment & survey, entrepreneurial motivations & environmental innovations & creativity.

**UNIT III**

Business plan writing, scope, types, sources and process of identifying target market, survey industry & competition analysis.

**UNIT IV**

Entrepreneurship development program: Objectives, Programs of EDP, Entrepreneurial development cycle, Relevance & Accruements of EDP, Role of Government in organizing EDPs, E-business & Networking.

**UNIT V**

Small business management: Starting up a new business venture, Source of Fund-Raising to start up a New Business Venture, Developing Marketing Strategies

**Course Outcomes:**

Students will be able to:

CO1: Understand the concept of innovation, its components and its importance for the company and organizations in general.

CO2: Develop a practical framework for the design and implementation of a systematic innovation strategy.

CO3: Incorporate adequate tools for formulation of a business model and a business plan.

CO4: Connect the theoretical issues with the concrete reality through work on actual experiences of companies that have a culture in innovation and studying successful study cases.

CO5: Develop their own business.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	H	H	L	L		—		M	H
CO2	H	M	-	M	L	M	M	M	—	M	M	H

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

<b>CO3</b>	H	H	L	H	H	M	H	M	—	M	L	H
<b>CO4</b>	L	M	-	H	L	M	H	H	-	M	L	M
<b>CO5</b>	M	M	L	H	L	L	H	L	—	M	L	H

H = Highly Related; M = Medium L = Low

**Recommended Books:**

1. Jain P.C handbook for New Entrepreneurs: Oxford University Press
2. Drucker Peter F: Innovation & Entrepreneur
3. Lalitha D Rani : Women Entrepreneur. APH Publishing Corporation

**MBA (Elective – Entrepreneurship & Family Business Management)**  
**Family Business Management**  
**Subject Code- MBA304A**  
**Credit –(3)**

**Objective:**

The course gives the knowledge relating to the concepts of family business environment its history in India and its challenges. The course also provides the knowledge relating to the ownership patterns and various challenges faced in family governance and the issues relating to successor development in terms of next generation attributes to be acquired by the successor of business concern. The information relating to the life cycle stages of business and various strategies to be followed by the owner in case of competing situation and also to mould the competencies into competitive advantages and to adapt the new changing culture and the change formulas to be applied and also to create new leaders.

**UNIT I**

Introduction: Family Business as a unique synthesis, Succession and Continuity: The three generation rule, Building Family business that last, The systems theory model of Family Business, Agency Theory of Family business, The stewardship perspective of family business, Competitive Challenges and Competitive advantages of family businesses, The role of Genograms and family messages to understand the family system. Family emotional intelligence, The ECI-U Model.

**UNIT II**

Ownership Challenges and family governance: Shareholder Priorities – Managers vs. Owners - Responsibilities of shareholders to the company - Effective Governance of the shareholder - firm relationship – Family Governance: Structure, Challenges to family governance, managing the challenges of succession. Enterprise Sustainability: Twelve elements of strategic –fit and its implications on family firms.

**UNIT III**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Successor Development: Characteristics of next-generation leaders - Next-generation attribute interests and abilities for responsible leadership.

Next-generation personalities-managing interdependence- CEO as an architect of succession and continuity - Types of CEO Spouse and the transfer of power.

**UNIT IV**

Strategic Planning and Transgenerational Entrepreneurship: Life cycle stages influencing family business strategy - Turning core competencies into competitive advantage. The unique vision of family-controlled businesses - Strategic regeneration- The Business Rejuvenation matrix - Intrapreneurship.

**UNIT V**

Future of Family Business: New Leaders of the Evolution - Three states of evolution- Continuity and culture - change the culture - The change formula - Organization Development approaches to change - Commitment planning - Organic competencies and business's future - Thriving through competition - Institutionalizing the change.

**COURSE OBJECTIVES:**

The students will try to learn:

CO1: The family business system in India.

CO2: Challenges and governance of family Business in India.

CO3: The qualities to be possessed by the successor of the organization and concentrating on the improvement of those qualities.

CO4: Business cycle stages and its influence on family business and tuning business according the changing environment.

CO5: The change strategies for changing the business according to the dynamic environment.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L		—		M	H
<b>CO2</b>	L	M	-	M	L	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	L	M	H	M	—	M	L	M
<b>CO4</b>	L	M	-	H	L	M	H	H	-	H	L	M
<b>CO5</b>	L	M	L	H	H	L	H	L	—	H	L	H

H = Highly Related; M = Medium L = Low

**Recommended Books:**

1. Keep Hunt, —The Family Business, Graphic Arts Books, April, 2021.
2. Josh Baron, Rob Lachenauer, —Harvard Business Review Family Business Handbook, Harvard Business Review Press, Jan, 2021.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

3. Thomas Zellweger, —Managing the family business, Edward Elgar Publishing Ltd, April, 2017.
4. Ernesto J. Poza, Mary S. Daughterty, Family Business, Cengage Learning, 3rd Edition, 2015.
5. Laura Hougaz, Entrepreneurs in Family Business Dynasties: Stories of Italian-Australian Family Businesses over 100 years, Springer, 7th Edition, 2015.
6. Frank Hoy, Pramodita Sharma, Entrepreneurial Family Firms, Prentice Hall, 4th Edition, 2010.
7. Sudipt Dutta, Family Business in India, Sage Publications, 5th Edition, 1997.

**MBA (Elective – Entrepreneurship & Family Business Management)**  
**Leading Change in Family Business**  
**Subject Code- MBA305A**  
**Credit - 3**

**Objective:**

The course is designed to provide students an understanding of change management in family business. The course is designed to provide students for defining the role and responsibility of members within a Family business. The course is designed to provide an understanding on how to drive change within Family business.

**UNIT I**

Introduction: Family business, readiness of family and family business. A strategic management model for the family and the family business, understanding the pattern of family business, family and board culture, growth of family business.

**UNIT II**

Need to Change: Describe the roles & responsibilities, culture, value towards sensing transformation in family business. Issues and challenges in family business. Best practices in family business. Managing the leading change in family business.

**UNIT III**

How to Drive to Change: Mindset, people, players, individual, team, group towards role and responsibilities. Decision making process in family business. The impact of culture on the family business, Stakeholders perceptions of culture and management practices in family and family business.

**UNIT IV**

Lead the Change: How family meetings lead to collective action. Communication skills and conflict resolutions; getting things straight, conflict management strategies used in successful family businesses.

**UNIT V**

Next generation family businesses: Leading a family business in a disruptive environment- Case Studies of Indian Family-owned Businesses.

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**Course outcome:**

The students will try to learn:

CO1: To develop an understanding of family business and entrepreneurship.

CO2: To learn issues and concepts of the family business.

CO3: To understand the need of change and cultural impact.

CO4: To establish an understanding in conflict management.

CO5: To learn about real Indian family-owned business.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	H	H	L	L		—		M	H
CO2	L	M	—	M	H	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	—	H	L	M	H	H	—	M	L	M
CO5	M	M	L	H	L	L	H	L	—	M	L	M

H = Highly Related; M = Medium L = Low

**Recommended Books:**

1. A Bakr Ibrahim & Willard H Ellis, (1994), Family Business Management: Concepts and Practices, Published by Kendall/hunt Publishing Company.
2. Butler, J.E,(2001), E – Commerce and Entrepreneurship, Information Age
3. Chell, E. Haworth, J .M & Brearley, S. S, (1991), The Entrepreneurial Personality: Concepts, Cases and Categories, Lomnon: Routledge

**MBA (Elective – Entrepreneurship & Family Business Management)**  
**Social Entrepreneurship**  
**Subject Code- MBA306A**  
**Credit - 3**

**Objective:**

To give students an understanding that the problems and issues within the respective fields of innovation in entrepreneurship are invariably complex, and require clear reasoning and analysis, in order to derive an appropriate course of action.

**UNIT I**

Introduction to Product Management - Introduction to product management - what is product & product-service continuum, individual product decisions, and product attributes product and product lives, special issues in product management - product life cycle & strategy, product differentiation, new product development

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Organization and Management of the Product Development Process: Idea Generation, Screening New Product Ideas, Concept Development and Testing, Business Analysis, Product Testing, Commercialization: Test Marketing and Launching the New Product, Controlling the Product Line: An Overview of the Deletion Decision

**UNIT II**

Trade Marks, and Intellectual Property Issues: - Designing Logo, trademark, symbols, registration of trademarks, patents, and intellectual property including GI

**UNIT III**

Brand Management and Crafting of Brand Elements - Introduction to brand management and crafting of brand elements. Brand elements - value & significance of brand, brand name, symbol & slogan, brand strategic decision, line expensing & brand extension. Consumer brand knowledge. Brand identity, personality and brand associations. Managing brand architecture and brand portfolios

**UNIT IV**

Brand Equity, Association and their Measurement - Concept of brand equity & association - brand loyalty, awareness, creating and managing brand equity, selecting, creating and maintaining, association. Corporate branding and tools for building brand equity. Leveraging brand equity. Measurement of brand equity.

**UNIT V**

Brand Strategy - Brand strategy - brand rejuvenation, brand relations, brand proliferation, multi branding, global brand. Branding for services, retail, and hi-tech products.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	L	L	L		—		M	H
<b>CO2</b>	L	M	-	M	L	M	M	M	—	M	M	H
<b>CO3</b>	L	H	L	H	L	M	H	M	—	M	L	M
<b>CO4</b>	L	M	-	H	L	M	H	H	-	M	L	M
<b>CO5</b>	L	M	L	H	L	L	H	L	—	M	L	M

H = Highly Related; M = Medium L = Low

**Recommended Books:**

- Strategic Brand Management – Kelvin Keller
- Brand Management – Majumdar
- Brand Management – Chunawala
- Strategic Brand Management - Jeolkeperor



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

**MBA (Elective – Entrepreneurship & Family Business Management)**  
**Financing New Business Ventures**  
**Subject Code- MBA307A**  
**Credit - 3**

**Objective:**

To give students an understanding that the problems and issues within the respective fields of innovation in entrepreneurship are invariably complex, and require clear reasoning and analysis, in order to derive an appropriate course of action.

**UNIT I**

Introduction to Business Plan; Sources of entrepreneurial Opportunities; Principles of entrepreneurial finance, Role of entrepreneurial finance, the successful venture cycle, Financing through the venture life cycle

**UNIT II**

Organizing and Operating the Venture: Organising and Financing a New Venture, Measuring Financial Performance, Evaluating Financial Performance

Planning for the Future: Financial planning, Types and cost of financial capital

Creating and Recognizing Venture value: venture worth, mechanics of valuation, calculating the cash flow for valuing venture equity, Equity Valuation.

**UNIT III**

Venture Capital Valuation Methods: Assets and Liability Valuation methods, earnings multipliers and discounted dividends.

Structuring Financing for the Growing venture: Common equity, preferred equity, Convertible Debt, warrants and options, Professional venture capital, other financing alternatives.

**UNIT IV**

Exit and Turnaround Strategies: Harvesting the Business venture Investment, Financial Distress: Turnaround opportunity or Liquidation.

**UNIT V**

Project Financing, Export Financing, Factoring, Forfaiting, Working Capital Financing

Private Equity, Angel Investors and Venture Capital Financing Institutions.

**Recommended Books:**

- Leach Chris. J & Melicher. W Ronald, Finance for Entrepreneurs, 4th edition, South- Western Cenagage Learning.
- Dollinger M.J., Entrepreneurship: strategies and resources. Prentice Hall, 2008.
- Ross, S.A., Westerfield, R.W., and Jaffe, J.F., Corporate finance. McGraw-Hill/Irwin, 2008



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA II Semester**

**HUMAN RESOURCE MANAGEMENT**  
**PAPER CODE: MBA 191A**  
**CREDITS: (3)**

**Objective:**

The objective of this course is to help the students to develop an understanding of the concept & techniques of essential functions of human resource management.

**UNIT I**

**Introduction to Human Resource Management** HRM – Nature and Scope of HRM, Using HR Analytics for recognizing changing trends in HRM - Strategic HRM, Managing Global Human Resources Role of HR in Internationalization of Business - Staffing Global Organizations - Implementing Global HR System

**UNIT II**

**Recruitment and Selection** HR forecasting, Recruitment and Selection, Human Resource Planning - Job Analysis – Job Evaluation - Recruiting Talent – Selecting Right Talent , Application Forms, Selection Test, Interviews, Evaluation, Placement, Induction, Man power Planning , methods

**UNIT III**

**Training and Development:** Training and development approaches , Training Budget, Training -ROI, Evaluation of Training and Management Development, Performance Management and Appraisal, Concept of Employee Growth, Managing Career Planning, Elements of a Career Planning Programme, Succession Planning.

**UNIT IV**

**Compensation** Concept of compensation, Elements of Compensation, Process of Determining Compensation , Managing Wages, Concept of Rewards and Incentives,

**UNIT V**

**Practical aspects of HRM** Preparing recruitment forms, Drafting offer letter, Appointment letters, Job Description and Specification Forms, Preparing Training & placement Doc, Performance Appraisal Forms; Human Resource Development: Accounting and Audit, Scorecard and Report

**Text/ Reference Books:**

1. De Cenzo, D.A. & Robbins ,S.P. (2006). *Fundamentals of Human Resource Management* (10th ed.). New York: John Wiley & Sons

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

2. Monappa&Saiyaddin. (2000). *Personnel Management*. New Delhi: Tata McGraw Hill
3. Rao, V.S.P (2007). *Human Resource Management- Text and Cases* (2nd ed.). New Delhi: Excel Books.

**Course outcome:**

At the end of this course the student will able to learn-

CO1: Demonstrate an understanding of key terms, theories/concepts and practices within the field of HRM;

CO2: Demonstrate competence in development and problem-solving in the area of HR Management; Provide innovative solutions to problems in the fields of HRM;

CO3: Work effectively with colleagues with diverse skills, experience levels and way of thinking and be able to identify and appreciate the significance of the ethical issues in HR

CO4: Be able to evaluate HRM related social, cultural, ethical and environmental responsibilities and issues in a global context.

CO5: Develop competency to recruit, train, and appraise the performance of employees and handle employee issues. To develop necessary skill set for application of various HR issues.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L		—	H	M	H
CO2	L	M	—	H	L	M	M	M	—	H	M	H
CO3	L	H	—	H	L	M	M	M	—	M	L	M
CO4	L	M	—	H	H	M	M	H	—	M	L	M
CO5	L	M	—	H	L	L	M	L	—	M	L	M

H = Highly Related; M = Medium, L = Low

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**  
**MBA III SEMESTER**  
**Performance Management and Retention Strategies**  
**Subject Code: MBA195A**  
**Credit: (3)**

**Objectives:**

Performance management is the most critical function and strong determinant of organizational excellence. This course is designed to develop appreciation and skills essential for designing and instituting effective performance management systems.

**UNIT I**

Concept of performance management, Process & elements of performance management, Scope and Significance – Advantages of Performance Management Communicating performance expectations; Disciplinary actions; Impact of Organizational structure and Operational Problems Performance management process

**UNIT II**

Performance Planning – Performance Appraisal -Performance Mentoring – Performance Management Strategic Planning. Performance Management and Employee Development: Performance Management Skills, Employee Assessment system, Role of HR Professionals in Performance management.

**UNIT III**

Performance Appraisal – A Conceptual Framework, Concept & Definitions of performance appraisal, Objectives of performance appraisal and Process of performance Appraisal; Evaluating employee performance

**UNIT IV**

Theoretical Framework of Performance Management: Goal Theory and its Application in Performance Management, Control Theory and its Application in Performance Management, Social Cognitive Theory and its Application in Performance Management, Organisational Justice Theory and its Application in Performance Management.

**UNIT V**

Competency Analysis and Competency Mapping - Meaning of competency, Competency Analysis and Approaches to competency Analysis, Competency mapping ; Need development and assessment of competency models, Competency and performance, Tools to identify the competencies of the employees.

**Course outcome**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO1: Design an organizations performance management process that is compliant with law and supports organizational mission and strategy.

CO2: Compare and contrast various organizational performance management programs and best practices and define attributes of effective performance management systems.

CO3: Employ job-related performance standards and performance indicators that reflect the employee's range of responsibilities.

CO4: Assess how increased employee involvement can contribute to effective performance and coach employees to identify career paths and resources available to support individual development.

CO5: To develop understanding about the competency analysis and tools.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L		—	L	M	H
CO2	L	M	-	H	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	-	M	H	M	H	H	-	M	L	M
CO5	L	M	L	M	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium, L = Low

**Reference Books:**

- 1.A.S. Kohli and Tapomoy Deb, *Performance Appraisal*, OUP, New Delhi, 2008
- 2.Tanuja Agarwala, *Strategic Human Resource Management*, OUP, New Delhi, 2007

**MBA III SEMESTER**  
**Strategic Human Resource Management**  
**Subject Code: MBA197A**  
**Credit: (3)**

**Objectives:**

The Primary concern to this course is to develop in depth understanding of the strategic role performed by HR in business organisation and to gain insight of the alignment between different HR systems and practices and organisation outcomes.

**UNIT I**

Introduction to SHRM: Definition, Need, Importance, and Steps, Human Resource Environment: Workforce Diversity, Demographic Changes, Organizational effectiveness, Changed Role of HR in Organizations

**UNIT II**

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

Recruitment & Retention Strategies: Online Recruitment, Outsourcing Recruitment, Head Hunting, Performance Management Strategies: Defining Key Result Areas, Seniority Vs. Merit-based Promotions, Pay for Performance, 3600 Feedback, Executive Performance

**UNIT III**

Compensation & Reward Strategies: Skill Based Pay, Broad banding, Variable Pay, Incentives and Benefits, Profit Sharing, ESOP, Executive Compensation, Training & Development Strategies: Cross-cultural Training, Multi-Skilling, Succession Planning, Learning Organizations and Organizational Learning

**UNIT IV**

Strategic management and strategy formulation; communicating strategy to staff, Competitive strategy, Competitive advantage, Competitive differentiators, Trends in HR mission and vision

**UNIT V**

Human Aspects of Strategies Implementation, Global HRM: Global and cultural effectiveness (SHRM competency), Linking HR strategy to organizational strategy; Managing workforce changes Mergers and acquisitions Outsourcing Rightsizing/downsizing

**Recommended Books:**

- 1.Strategic Human Resource Management by Tanuja Agarwala, Oxford University Press
- 2.Personnel Management - Text & Cases, By C. B. Mamoria & V. S. P. Rao, Himalaya
- 3.Strategic Human Resource Management by Rajib Lochan Dhar, Excel Books

**Course Outcomes:**

CO1:Have a general knowledge of the key HRM concepts, process and practices;

CO2:Have an appreciation of different theoretical perspectives and models used to understand HRM.

CO3: Be able to analyse key issues and challenges related to the implementation of and outcomes associated with HR strategies within the organization and the wider environment; and

CO4: Be familiar with key areas of interest to practitioners, policymakers and researchers.

CO5: To understand effectiveness and future of SHRM, Measure cost and benefit of HRM.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM-SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L		—		M	H
CO2	L	M	-	M	L	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M

**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

<b>CO4</b>	L	M	-	H	L	M	H	H	-	M	L	M
<b>CO5</b>	L	M	L	H	L	L	H	L	—	M	L	M

H = Highly Related; M = Medium L = Low

**Reference Books:**

1. Tanuja Agarwala, *Strategic Human resource Management*, OUP, New Delhi, 2007
2. Truss, Mankin, and Kelliger, *Strategic Human Resource Management*, OUP, New Delhi, 2014

**A (Elective-HR)**  
**Organizational Development and Management of Change**  
**Subject Code: MBA194A**  
**Credit: (3)**

**Objectives:**

This course is designed to provide I depth understanding of behavioural interventions and enable the students to apply these intervention for building individual, team, system, systems and process related competencies and helping organizational to achieve peak performance and become self sustaining.

**UNIT I**

Process of Organization Development, Human process interventions, Techno-structural Interventions, HRM interventions, Competitive and Collaborative Strategies, Organization Transformation.

**UNIT II**

Coaching Developing human resources, Equipping the organization for present and future talent needs, Improving organizational effectiveness, Ongoing performance and productivity initiatives, Organizational structure and job design, Outsourcing employee development Social networking strategies for developing an organizational behaviour model, Workplace culture and trust building

**UNIT III**

Elements of change Achieving Systematic change, Domains of systematic change-strategy, technology, structure and people, Planning for change, Process of change and organization theory and practice.

**UNIT IV**

Change and the use of power, Nature and sources of power, Leadership and change- Transactional vs. Transformational change, Change cycle including participative and coerced change, Resistance to change, change through behaviour modification, Positive and negative reinforcement.

**UNIT V**

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**Master of Business Administration**  
**MBA Scheme 2022-2024**

Training for change, managing resistance, implementing change, The change Dynamics: Leading, planning and implementing change, Stages of change management, Prerequisites and consequence of change.

**Reference Books:**

1. D.K.Bhattacharyya, *Organisational Change and Development*, OUP, New Delhi, 2011
2. Piers Myers, Sally Hulks, and Liz wiggins, *Organisational Change*, OUP, New Delhi, 2012.

**Course Outcome**

CO1: To understand the nature of change , the forces for change, resistance to change and approaches to managing organizational change

CO2: To understand the nature and concept of organizational transformation and transition

CO3: To gain an insight into the organizational development programmes and techniques, emerging OD approaches and techniques and its application in organizations

CO4: To provide conceptual and practice-based approach on the implications of change tailoring the specific needs of the organization through organizational development techniques

CO5: Gain knowledge of the conditions for optimal success of OD Understand planned change through models of change.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L	—	—	—	M	H
CO2	L	M	—	M	H	M	M	M	—	M	M	M
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	—	H	H	M	M	M	—	M	L	M
CO5	L	M	L	L	H	H	H	L	—	M	L	M

H = Highly Related; M = Medium L = Low

**MBA (Elective-HR)**  
**Sourcing, Training and Development**  
**Subject Code: MBA196A**  
**Credit: (3)**

**Objectives:**

The objective of this course is to provide an in-depth understanding to various stages in a training process and the catalytic role of training and development in the effective functioning of an organisation. The course also facilitates the participants to learn some of the tools and techniques of training process.

**UNIT I**

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**Master of Business Administration**  
**MBA Scheme 2022-2024**

Introduction to training and development, concept and rationale-training, Conducting training, Evaluating training, Calculating training return on investment (ROI), process of calculating ROI in training, Linking performance and career, Development needs to training

**UNIT II**

Assessment; design; development; implementation; evaluation; Conducting needs assessments and SWOT analysis, Linking organizational strategy with training and development strategies, Training as competitive advantage.

**UNIT III**

Job analysis: meaning and definition, job analysis process, techniques of job analysis, methods and practice of job analysis, competency based approach. Job Analysis in Human Resource Planning, Recruitment and Selection.

**UNIT IV**

Learning: Principles Of Learning, Theories of Learning, learning process; learning styles, Andragogy. Designing the training programme: process of learning in training programme-attributed and factors influencing; training climate and pedagogy; developing training modules.

**UNIT V**

Training aids. Training methods and techniques, Trainers Budgeting of Training, Evaluation of training-need for evaluation, principles of evaluation, criteria and approaches,; emerging trends in training and development; new perspectives on training –cross culture training.

**Course outcomes-**

CO1: To learn the concept of Human Resource Planning, its objectives, different approaches to HRP and HRP process

CO2: To develop deep knowledge on the importance of job analysis, job description, job specification and job designing in Human Resources Management

CO3: To understand the issues relating to manpower sourcing in organizations

CO4: To gain knowledge on the legal aspects related to manpower sourcing

CO5: To understand cross culture training and development.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L		—		M	H
CO2	L	M	-	M	L	M	M	M	—	M	M	H



**Jaipur School of Business**  
**Master of Business Administration**  
**MBA Scheme 2022-2024**

<b>CO3</b>	L	H	L	H	L	M	H	M	—	M	L	M
<b>CO4</b>	L	M	-	H	L	M	H	H	—	M	L	M
<b>CO5</b>	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium L = Low

**Reference Books:**

1. B.Janakiram, *Training and Development*, WileyIndia, New Delhi, 2012
2. John Pulparambil, *Training and Development*, Patridge, 2014

**MBA (Elective-HR)**  
**Knowledge Management**  
**Subject Code: MBA371A**  
**Credit: (3)**

**Objectives:**

This course is aimed at helping students gain an insight into the basic concepts and application of Talent Management in business and industry. It involves deliberations on the basic processes and tools of managing Talent in organizations.

**UNIT I**

Introduction to KM, History of KM, Importance of KM, Information Management to Knowledge Management, K M Cycle, Industrial Economy to Knowledge Economy

**UNIT II**

Mechanics of Knowledge Management–Tools and Technologies, Communities of Practice and Knowledge conversion, The knowledge Management Matrix.

**Unit III**

Social Nature of Knowledge, Social Network Analysis, Obstacles to knowledge sharing, Organizational learning & Social Capital. Knowledge Application – Individual level, Group level & Organization Level.

**UNIT IV**

KM Strategy, Knowledge audit, GAP Analysis, Road Map, KM Metrics, Balance Score Card. KM Tools – Knowledge Capture & Creation tools, Knowledge sharing & Dissemination Tools, Knowledge Acquisition & Application tools.

**UNIT V**

Km Team–Roles & Responsibilities, Political issues in KM, Ethics in KM, Strategies issues in Knowledge Management, Future of Knowledge Management.

**Course Outcomes:**

CO1: Knowledge Management: Students will be able to understand different approaches of knowledge management.

CO2: They will be able to identify knowledge and develop retention strategies.

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**Master of Business Administration**  
**MBA Scheme 2022-2024**

CO3: It will develop an understanding to evaluate the knowledge management in the organization

CO4: To gain knowledge about Contemporary Knowledge Management Issues, Challenges,

CO5: To understand the roles and responsibility of knowledge Management

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	L	L		—	M	M	H
CO2	L	M	-	M	H	M	M	M	—	M	M	H
CO3	L	H	L	H	H	M	H	M	—	M	L	M
CO4	L	M	-	H	H	M	H	H	-	M	L	M
CO5	L	M	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium L = Low

**Reference Books:**

1. *Talent Management Handbook*, by Lance A. Berger and Dorothy R. Berger.
2. *Reinventing Talent Management: How to Maximize Performance in the New Marketplace*, by William A. Schiemann.
3. *Talent Force: A New Manifesto for the Human Side of Business*, by Rusty Reuff and Hank Stringer.

**MBA (Elective – HR)**  
**INDUSTRIAL RELATION AND LABOR LAWS**  
**SUBJECT CODE: MBA193A**  
**CREDIT: (3)**

**Objectives:** To provide basic knowledge in industrial relations and labour laws and to enable the students understand the various provisions of Trade Union.

**UNIT I**

Industrial Relations: Definition, Importance & Scope. Industrial Disputes: Nature and causes of Industrial Dispute, Types of conflict Resolution – Statutory & Non Statutory Collective Bargaining – Meaning, Characteristics, Need, Importance, Process, Pre-requisites.

**UNIT II**

Workers Participation in Management: Concept & Pre-requisites. Forms & Levels of Participation. Benefit of workers participation in management. Industrial Relations: International Perspective. Industrial Health and Safety

**UNIT III**

The Factories Act, 1948: Provisions regarding Safety, regarding Health, Welfare, Leave with Wages and Working hours of adults. THE TRADE UNIONS ACT, 1926- Trade Union-Growth, Objective, Function & Role in globalize Content, Registered and recognized trade unions.

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**Master of Business Administration**  
**MBA Scheme 2022-2024**

**UNIT IV**

The Industrial Disputes Act, 1947: Definitions, Authorities under the Act , Power & Duties of Authorities. Strike & lockout, Lay-off and retrenchment,

**UNIT V**

The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013.

**Course Outcome :**

CO1: To familiarize students with the basic concepts of industrial relations, its philosophy, origin and development

CO2: To develop knowledge on trade unions and its formation, structure, functions and legal framework

CO3: To gain insight into the process of collective bargaining, its origin and development

CO4: To gain understanding on industrial disputes, its causes, manifestation and effects.

CO5: To develop understanding regarding redressal and prevention against harassment at workplace.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
 OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	M	H	L	L		—		M	H
CO2	L	M	-	M	H	M	M	M	—	M	M	H
CO3	L	H	L	H	L	M	H	M	—	M	L	M
CO4	L	M	-	H	L	M	H	H	—	M	L	M
CO5	L	L	L	H	H	L	H	L	—	M	L	M

H = Highly Related; M = Medium, L = Low

**Recommended Books:**

1. AkhileshwarPathak, *Legal Aspects of Business*, Tata McGraw-Hill, 2007
2. P. Saravanavel& S. Sumathi, *Business Law for Management*, Himalaya Publishing house, 2004.
3. P. Kasliwal, *Intellectual Property Rights*, CBC, First Edition, 2009.

**MBA (Elective – HR)**  
**Compensation Management**  
**Subject Code: MBA192A**  
**Credit: (3)**

**Objectives:**

This course is designed to promote understand in issues related to compensation in corporate sector and impart skills in designing, analysis and restructure compensation management system, policies and strategies.

Course outcomes-

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Gain knowledge of different components of compensation • Understand different monetary and non-monetary benefits of compensation • Identify international components of compensation • Understand various factors required to design compensation

**UNIT I**

Compensation – Definition – Compensation Responsibilities – Compensation System Design Issues – Compensation Philosophies – Compensation Approaches,

**UNIT II**

Job Evaluation, Grading and Compensation Structure: Role of job analysis/job design in compensation decisions, Job Evaluation Introduction to Nature and Objectives of Job Evaluation; Introduction to Principles and Procedure of Job Evaluation Programs; Introduction to Basic Job Evaluation Methods; Introduction to Implementation of Evaluated Job

**UNIT III**

Compensation Classification – Types – Incentives – Fringe Benefits – Strategic Compensation Planning – Determining Compensation – The wage Mix – Development of Base Pay Systems – The Wage Curve – Pay Grades – Salary Matrix – Compensation as a Retention Strategy.

**UNIT IV**

Theories of Wages – Wage Structure – Wage Fixation – Wage Payment – Salary Administration – Executive Compensation – Incentive Plans – Team Compensation – Gain Sharing Incentive Plan – Enterprise Incentive Plan – Profit Sharing Plan- ESOPs – Compensation Management in Multi-National organizations.

**UNIT V**

Managing employee benefits (Cost control, monitoring future obligations, action planning, strategic planning) Educational benefits Life insurance Employee assistance programs Family-friendly benefits Domestic partner benefits Outsourcing benefits administration.

**Course outcomes**

CO1: To learn basic compensation concepts and the context of compensation practice

CO2: To illustrate different ways to strengthen the pay-for-performance link.

CO3: To learn the concepts of Payment and employee benefits issues for contingent workers.

CO4: To understand the Legally required employee benefits.

CO5: To Learn the concept of wage structure .

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**MBA Scheme 2022-2024**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	L	L	M	L	H	L	L		M		M	H
<b>CO2</b>	M	M	L	M	L	H	M	M	—	M	M	L
<b>CO3</b>	L	L	L	L	H	H	H	M	—	M	L	M
<b>CO4</b>	L	M	—	H	H	M	H	H	—	M	L	M
<b>CO5</b>	L	M	L	H	H	M	H	L	—	L	L	M

H = Highly Related; M = Medium, L = Low

**Reference Books:**

- 1.D.K.Bhattacharyya,*Compensation Management*,OUP,New Delhi,2014
- 2.Uday K.Haldar and JuthikaSarkar,*Human Resources Management*,OUP,New Delhi,2012.

**MBA (Elective – HR)**  
**HR Analytics**  
**Subject Code: MBA190A**  
**Credit: (3)**

**UNIT I**

**HR Analytics in Perspective** Role of Analytics, Defining HR Analytics, HR Analytics: The Third Wave for HR value creation, HR Measurement journey in tune with HR maturity journey Understanding the organizational system (Lean) , Locating the HR challenge in the system , Valuing HR Analytics in the organizational system, Typical problems (working session)

**UNIT II**

**HRA Frameworks:** Current approaches to measuring HR and reporting value from HR contributions, Strategic HR Metrics versus Benchmarking, HR Scorecards & Workforce Scorecards and how they are different from HR Analytics, HR Maturity Framework: From level 1 to level 5, HR Analytics Frameworks: (a) LAMP framework; (b) HCM: 21 Framework and (c) Talent-ship Framework, 5 overarching components of an effective Analytics framework.

**UNIT III**

Basics of HR Analytics: Basics of HR Analytics, what is Analytics, Evolution, Analytical capabilities, Analytic value chain, Analytical Model, Typical application of HR analytics.

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**Master of Business Administration**  
**MBA Scheme 2022-2024**

Predictive Analytics: Steps involved in predictive analytics: Determine key performance indicator, analyze and report data, interpreting the results and predicting the future. Metrics and Regression analysis and Causation.

**UNIT IV**

**Insight into Data Driven HRA** Typical data sources, Typical questions faced (survey), Typical data issues, Connecting HR Analytics to business benefit (case studies), Techniques for establishing questions, Building support and interest, Obtaining data, Cleaning data (exercise), Supplementing data. **HR Scorecard:** Assessing HR Program, engagement and Turnover, Finding money in Analytics, Linking HR Data to operational performance, HR Data and stock performance. Creating HR Scorecard, develop an HR measurement system, guidelines for implementing a HR Scorecard.

**UNIT V**

**HR Metrics –** Defining metrics, Demographics, data sources and requirements, Types of data, tying data sets together, Difficulties in obtaining data, ethics of measurement and evaluation.

**HR Dashboards:** Statistical software used for HR analytics: MS-Excel, IBM- SPSS, IBMAMOS, SAS, and R programming and data visualization tools such as Tableau, Click view and Fusion Charts.

**Course Outcome:**

The students will be able to.

CO1: Have an understanding of How HR function adds value and demonstrates the value in business terms

CO2: Measure the value of Intangibles that HR helps builds for the organization given a particular business context to facilitate decision making.

CO3: Convert soft factors in a people management context into measurable variables across various domains.

CO4: Describe, conduct and analyze a study on employees or any other related to the HR context in an organization.

CO5: Understand the importance of HR Analytics ,Learn the metrics measured by HR analytics,Learn and effectively use the data to analyse trends.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM-SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

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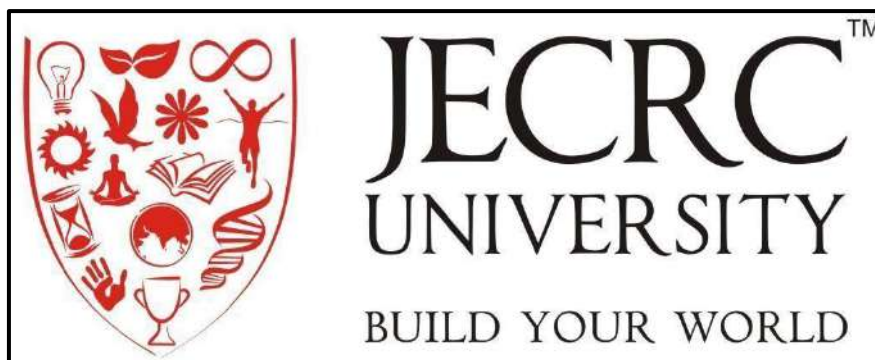
<b>CO1</b>	L	L	M	L	H	L	L	L	—		M	H
<b>CO2</b>	L	M	—	L	L	M	M	M	—	H	M	H
<b>CO3</b>	L	H	L	H	L	M	H	M	H	M	L	M
<b>CO4</b>	L	M	—	H	L	M	H	H	—	H	L	H
<b>CO5</b>	L	M	L	H	H	L	L	L	—	M	L	M

H = Highly Related; M = Medium L = Low

**TEXT/ REFERENCE BOOKS:**

- Moore, McCabe, Duckworth, and Alwan. The Practice of Business Statistics: Using Data for Decisions, Second Edition, New York: W.H.Freeman, 2008.
- Predictive analytics for Human Resources, Jac Fitz-enz, John R. Mattox, II, Wiley, 2014.
- Human Capital Analytics: Gene Pease Boyce Byerly, Jac Fitz-enz, Wiley, 2013.

Semester Scheme 2021 – 2023



**School of Business Studies**

**Master of Business Administration  
(Corporate Management)  
Semester Course**

**Course Structure & Syllabus**

**Batch (2021-2023)**

Semester Scheme 2021 – 2023

**Total Credits for the Batch 2021-2023 = 100 Credits**

A small rectangular box containing a handwritten signature in black ink, likely of the Dean.

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1. Minimum Credit required = Credits
2. Total Relaxation = 20 Credits
3. No relaxation in Core and Fundamental subjects.
4. Option can be availed in Specialization, Interdisciplinary and General Subjects.

### Summary Sheet

Terms (Semester Scheme)	Credits
<i>Semester 1</i>	29
<i>Semester 2</i>	26
<i>Semester 3</i>	30
<i>Semester 4</i>	15
<b>Total Credits</b>	<b>100</b>
<b>Minimum Credit Required</b>	

Type	Foundation	Core	Specialization	Interdisciplinary	General
<b>Total Credit</b>					

Abbreviation: F=Fundamental, G=General, C=Core, ID=Interdisciplinary, S=Specialization

### Semester I

S. No.	Sub Code	Sub Name	L	T	P	C	Type
1	MBC030	Basics of Communication for Managers	2	1	-	3	F
2	MBC031	Technology in Management	2	2	-	4	C
3	MBC032	Fundamentals and New Age Marketing	3	1	-	4	F



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4	MBC033	Organisational Behaviour	3	-	-	3	F
5	MBC034	Business Economics for Managers	3	1	-	4	F
6	MBC035	Financial Management	4	-	-	4	G
7	MBC037	Quantitative Techniques for Managers	3	1	-	4	G
8	MBC038	Business Awareness	3	-	-	3	ID
<b>TOTAL</b>			<b>23</b>	<b>6</b>		<b>29</b>	

## Semester II

S. No.	Sub Code	Sub Name	L	T	P	C	Type
1	MBC039	Professional Communication	2	1	-	3	F
2	MBC040	Market Analysis	2	1	-	3	C
3	MBC041	Introduction to Financial Products	3	-	-	3	F
4	MBC042	Operations Management	3	-	-	3	F
5	MBC043	New Age Business Models	4	-	-	4	F
6	MBC044	Human Resource Management	3	-	-	3	G
7	MBC045	Sales & Distribution Management	3	-	-	3	G
8	MBC046	Analytical Tools for Managers - I	4	-	-	4	ID
<b>TOTAL</b>			<b>24</b>	<b>2</b>		<b>26</b>	

## Semester III

S. No.	Sub Code	Sub Name	L	T	P	C	Type
<b>1</b>	MBC047	<b>Effective Communication</b>	<b>2</b>	<b>1</b>	<b>-</b>	<b>3</b>	<b>F</b>
2		Elective 1	2	1	-	3	S
3		Elective 2	2	1	-	3	S
4		Elective 3	2	1	-	3	S
5		Elective 4	2	1	-	3	S



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6		Elective 5	2	1	-	3	S
7		Elective 6	2	1	-	3	S
8	MBC024B	Analytical Tool for Managers - II	2	1	-	3	ID
9	MBC048	Summer Internship Project Report	-	-	6	6	C
<b>TOTAL</b>			<b>16</b>	<b>8</b>	<b>6</b>	<b>30</b>	

### Semester IV

S. No.	Sub Code	Sub Name	L	T	P	C	Type
1	MBC049	Transformational Communication	2	1	-	3	F
2		Elective 7	2	1	-	3	S
3		Elective 8	2	1	-	3	S
4	MBC050	Industry Research Report	-	-	6	6	F
5	MBC051	Business Law	3	-	-	3	G
<b>TOTAL</b>			<b>6</b>	<b>3</b>	<b>6</b>	<b>15</b>	

### Specialisation Elective Subjects

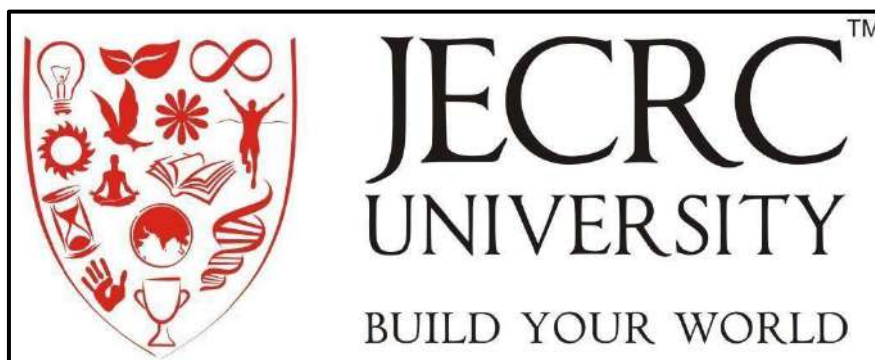
S. No.	Sub Code	Subject	L	T	P	C	Type
<b>Marketing Management</b>							
1	MBC052	Brand Management	2	1	-	3	S
2	MBC053	New Businesses in Emerging Market	2	1	-	3	S
3	MBC054	Marketing Analytics	2	1	-	3	S
4	MBC055	International Marketing	2	1	-	3	S
<b>Digital Marketing</b>							
1	MBC056	Website Planning, SEO& SEM	2	1	-	3	S
2	MBC057	Social Media Marketing	2	1	-	3	S
3	MBC058	Email Marketing - ORM, Email	2	1	-	3	S
4	MBC059	Marketing Data Tools and Techniques	2	1	-	3	S
<b>Finance</b>							
1	MBC060	Introduction to Financial Markets & Institutions	2	1	-	3	S
2	MBC061	Corporate Finance & Asset Management	2	1	-	3	S

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3	MBC062	Financial Planning & Wealth Management	2	1	-	3	S
4	MBC063	Financial Analysis	2	1	-	3	S
<b>Banking, Financial Services &amp; Insurance (BFSI)</b>							
1	MBC064	BFSI Products	2	1	-	3	S
2	MBC065	Introduction to Retail Banking	2	1	-	3	S
3	MBC066	Current Account & Savings Account (CASA)	2	1	-	3	S
4	MBC067	Insurance Management and Wealth Management	2	1	-	3	S
<b>Operations Management</b>							
1	MBC068	Advanced Operations Management	2	1	-	3	S
2	MBC069	Operations Research	2	1	-	3	S
3	MBC070	Quality Management Standards and Six Sigma	2	1	-	3	S
4	MBC071	Operations Analytics	2	1	-	3	S
<b>Logistics &amp; Supply Chain Management</b>							
1	MBC072	Logistics	2	1	-	3	S
2	MBC073	Supply Chain Management	2	1	-	3	S
3	MBC074	Inventory Management & Delivery Efficiency	2	1	-	3	S
4	MBC075	Technology in Logistics & Supply Chain	2	1	-	3	S
<b>IT, Analytics &amp; Research</b>							
1	MBC076	Data Analytics-I	2	1	-	3	S
2	MBC077	Data Analytics-II	2	1	-	3	S
3	MBC078	Business Research	2	1	-	3	S
4	MBC079	Strategic Technology Management	2	1	-	3	S
<b>Human Resource Management</b>							
1	MBC080	Human Resource Management	2	1	-	3	S
2	MBC081	Recruitment	2	1	-	3	S
3	MBC082	Employee Life Cycle & Organisational Development	2	1	-	3	S
4	MBC083	Compensation and Benefits	2	1	-	3	S
<b>Sales Management</b>							
1	MBC084	Sales Management	2	1	-	3	S
2	MBC085	Sales Processes	2	1	-	3	S
3	MBC086	Sales Systems	2	1	-	3	S
4	MBC087	Managerial Skills for Sales	2	1	-	3	S
<b>Retail Management</b>							
1	MBC088	Introduction To Retail Management	2	1	-	3	S
2	MBC089	Retail Planning & Branding	2	1	-	3	S
3	MBC090	Strategy & Finance in Retail	2	1	-	3	S
4	MBC091	Digital Commerce	2	1	-	3	S



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**Jaipur School of Business**

**Syllabi**

**Master of Business Administration**

**Academic Programme**

**Batch (2021-2023)**

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SEMESTER 1			
Sl. No	Subject Name & Title	Type	Credits
1	<i>Fundamentals and New Age Marketing</i>	Core	4
2	<i>Business Economics for Managers</i>	Core	4
3	<i>Financial Management</i>	Core	4
4	<i>Organizational Behaviour</i>	Core	3
5	<i>Quantitative Techniques and Analysis for Managers</i>	Core	4
6	<i>Business Awareness</i>	Core	3
7	<i>Technology in Management</i>	Core	3
8	<i>Basics of Communication for Managers</i>	Core	3



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**1. Fundamentals and New Age Marketing**

**Course Objectives:**

1. This course intends to provide an experienced-based approach to marketing theory and its practical application.
2. The course is designed to enable the students to learn the basic of marketing. Topics of the syllabus shall be addressed and discussed from an application oriented perspective.
3. To learn about marketing process for different types of products and services
4. To understand the tools used by marketing managers in decision situations
5. To understand the marketing environment

Ref No	Topic to Be Covered
<b>Unit-I: Introduction to Marketing Management</b>	
<b>1.1</b>	<ul style="list-style-type: none"> <li>● Introduction to marketing basic Concepts</li> <li>● Basic Marketing Model</li> <li>● Product Versus Service</li> <li>● Value Versus Cost</li> <li>● Understanding 4P's of Marketing</li> <li>● 4P's Versus SAVE</li> </ul>
<b>Unit-II: Value Proposition &amp; Price</b>	
<b>2.1</b>	<ul style="list-style-type: none"> <li>● Concept of Customer Delivered Value</li> <li>● Costs to Customer</li> <li>● Values derived by Customer</li> <li>● Net Customer Delivered Value</li> <li>● Correlation between Psychic Cost and Image Value</li> <li>● Customer Acquisition Cost</li> <li>● Customer Life Time Value</li> </ul>
<b>UNIT-III: Segmentation, Targeting &amp; Positioning</b>	
<b>3.1</b>	<ul style="list-style-type: none"> <li>● Market Segmentation;</li> <li>● Pattern Procedures;</li> <li>● Evaluation of the Market Segment;</li> <li>● Market Targeting;</li> <li>● Developing and Communicating a Positioning Strategy</li> </ul>
<b>UNIT-IV: Brand &amp; Consumer Behaviour</b>	
<b>4.1</b>	<ul style="list-style-type: none"> <li>● Understanding Brand</li> <li>● Myths about Branding</li> <li>● Brand Positioning &amp; Loyalty</li> <li>● Brand Extension, Co-Branding, Multi- brand</li> <li>● BCG Matrix</li> <li>● Understanding Consumer Behavior</li> <li>● Buyers Characteristics</li> <li>● Buyers Decision Process</li> </ul>
<b>UNIT-V: Marketing in 21st Century</b>	
<b>5.1</b>	<ul style="list-style-type: none"> <li>● Changing Trends in Marketing Mix</li> <li>● CRM</li> <li>● e-Marketing</li> <li>● B2B Marketing</li> <li>● Socially Responsible Marketing Market Segmentation</li> </ul>



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<b>UNIT-VI: Introduction to Digital Marketing</b>	
	<ul style="list-style-type: none"> <li>● Digital marketing and its importance</li> <li>● Difference between traditional and digital marketing</li> <li>● Recent trends and current scenario of the industry</li> <li>● Digital marketing has been a tool of success</li> <li>● How to use digital marketing to increase sales</li> <li>● Competitive analysis</li> <li>● Case studies on digital marketing strategies</li> <li>● Website Planning and Creation</li> <li>● Search Engine Marketing</li> <li>● Social Media Marketing</li> </ul>

**Course Outcome**

CO1. Students will demonstrate strong conceptual knowledge in the functional area of marketing management.

CO2. Students will demonstrate effective understanding of relevant functional areas of marketing management and its application.

CO3. Students will demonstrate analytical skills in identification and resolution of problems pertaining to marketing management.

CO4: Students integrate the knowledge of Marketing management concepts to take correct business decisions.

CO5.To understand the major types of consumer buying behavior, the stages in the buyer decision process and completely outline the components of the marketing mix; identify how the firms marketing strategy and marketing mix must evolve and adapt to match consumer behavior and perceptions of the product (e.g., classification of products and services, brand image, price and value), the stage in the product life cycle and the competitive environment; summarize the importance of measuring and managing return on marketing


	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CO1</b>	<b>3</b>		<b>1</b>			<b>1</b>
<b>CO2</b>	<b>1</b>	<b>2</b>				<b>1</b>
<b>CO3</b>		<b>3</b>				<b>2</b>
<b>CO4</b>		<b>2</b>			<b>2</b>	<b>3</b>
<b>CO5</b>	<b>3</b>		<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>

**Textbooks:**

1. Philip Kotler-Agrihotri : Principle of Marketing 17 e, Pearson Education
2. Rajan Saxena: Marketing Management, Tata McGraw Hill

**References**

1. Ramaswamy V.S. and Namakumari S - Marketing Management: Planning, Implementation and Control (Macmillian, 3rd Edition).
2. R Kumar & Goel-Marketing Management (UDH Publishers, edition 2013).
3. Tapan Panda : Marketing Management, (Excel Books)
4. Stanton William J - Fundamentals of Marketing (TATA Mc Graw Hill)





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Etzel M.J., Walker B.J. and Stanton William J - Marketing concept & Cases special Indian Edition (Tata Mc Graw Hill, 13th Edition).



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**2. Business Economics for Managers**

**Course Objectives:**

1. The Managerial Economics course aims to provide students with an exposure to the basic principles of microeconomics.
2. to enable them to understand the business scenario.
3. To equip students with the standard tools of microeconomic analysis including cost analysis.
4. To provide an understanding of opportunity cost, marginal concept.
5. To know about the managerial decision making process.

Ref. No	Topics to be Covered
<b>Unit-I: Introduction to Managerial Economics</b>	
1.1	<ul style="list-style-type: none"> <li>● Utility of Managerial Economics.</li> <li>● Equilibrium and Related Concepts.</li> <li>● Basic Principles of Economics.</li> <li>● Significance in Decision Making.</li> <li>● The Economic Problem: scarce resources, unlimited wants.</li> <li>● Rational-Maximizing and optimizing behavior.</li> <li>● Evolution of business economics.</li> <li>● Need of managers to know economics</li> </ul>
<b>Unit-II: Cost Benefit Analysis</b>	
2.1	<ul style="list-style-type: none"> <li>● Concept of Costs</li> <li>● Explicit &amp; Implicit cost</li> <li>● Concept of Benefits</li> <li>● Measurement concept</li> <li>● Completeness concept</li> <li>● Irrationality concept</li> <li>● Decision-Making Under Risk and Uncertainty.</li> </ul>
<b>Unit-III: Marginal Concepts and Applications</b>	
3.1	<ul style="list-style-type: none"> <li>● Marginal concepts</li> <li>● Marginal Principle</li> <li>● Incremental Principle</li> <li>● Contribution Analysis</li> <li>● The Time Perspective in business decision</li> <li>● Sunk Cost</li> </ul>
<b>Unit-IV: Opportunity Cost</b>	
4.1	<ul style="list-style-type: none"> <li>● Opportunity costs</li> <li>● Identification of different types of opportunity costs</li> <li>● Applications of opportunity costs in decision making</li> </ul>
<b>Unit-V: Production Possibility Curve (PPC)</b>	
5.1	<ul style="list-style-type: none"> <li>● Absolute Advantage</li> <li>● Comparative Advantage</li> <li>● Trade Advantage</li> </ul>

**Course Outcome**

- CO1. Students will demonstrate strong conceptual knowledge in the functional area of managerial economics
- CO2. To provide the basic business aptitude.
- CO3. To understand the basic techniques of economic analysis.
- CO4: To be aware about the decision making under risky situations.



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CO5. Provide knowledge about different types of cost, their calculation and analysis.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	M			L
CO2		M				
CO3	M	M				
CO4		H				H
CO5	M	H				

**Textbooks:**

1. Mehta, P.L. **Managerial Economics- Analysis, Problems, Cases**, Sultan Chand & Sons, New Delhi, Latest Edition. **(PL)**
2. Dwivedi, D.N. **Managerial Economics**, Vikas Publishing House Pvt. Ltd., New Delhi, Seventh Edition. **(DN)**

**References**

1. Sloman, J. **Economics for Business**, Pearson Education.
2. Dornbusch, R. Fischer, S. and Startz, R. **Macroeconomics**, Tata McGraw-Hill...
3. Gupta, G., S. **Managerial Economics**, Tata McGraw Hill.
4. Gupta, G., S. **Macroeconomics Theory and Applications**, Tata McGraw-Hill.
5. Manikiw, G. N. **Macroeconomics**, W.H. Freeman & Company.
6. Salvatore, D. **Managerial Economics in a Global Economy**, Thomson Southwestern.



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### **3. Financial Management**

**Course Objectives:**

1. This course in financial accounting gives students an overview of the accounting cycle.
2. Understanding for the preparation of financial statements.
3. To help the students to develop cognizance of the importance of accounting in organization financial statements
4. To enable students to describe how people analyse the corporate financial under different conditions and understand why people describe the financial statements in different manner.
5. To give an insight into Accounting Concepts and Principles to Prepare to have the foot hold in Accounts.

Ref .No	Topics to be Covered
<b>Unit-I: Concept, Purpose and Objectives of Accountancy</b>	
1.1	<ul style="list-style-type: none"> <li>● Cost concepts</li> <li>● Money measurement concept</li> <li>● Business entity concept</li> <li>● Realization concepts</li> <li>● Dual aspect concept</li> <li>● Historical record concept</li> <li>● Going concern concept</li> <li>● Matching Concept.</li> </ul>
<b>Unit-II: Introduction to Accounting Terminology &amp; Double entry system</b>	
2.1	<ul style="list-style-type: none"> <li>● Debit and Credit Concept</li> <li>● Principle of conservatism</li> <li>● Revenue recognition &amp; realization</li> <li>● Accrual &amp; cash basis</li> <li>● Record Keeping Basics- Recording, Classifying and Summarizing.</li> <li>● Account Categories- Personal accounts and Impersonal accounts</li> <li>● Preparing accounts: Single Journal Entries &amp; Compound journal entries</li> <li>● Ledger &amp; Posting</li> <li>● Preparation of Trial balance</li> <li>● Capital and Revenue</li> </ul>
<b>Unit-III: Preparation of Final accounts</b>	
3.1	<ul style="list-style-type: none"> <li>● Trading account</li> <li>● Profit and Loss account</li> <li>● Manufacturing Account</li> <li>● Balance Sheet and Adjustment Entries</li> <li>● Rectification of Errors</li> <li>● Preparation of financial statements with Adjustment</li> </ul>
<b>Unit-IV: Depreciation &amp; Inventory Valuation</b>	
4.1	<ul style="list-style-type: none"> <li>● Methods to compute depreciation</li> <li>● Apply depreciation to different businesses</li> <li>● Purpose and methods of inventory valuation</li> <li>● Cash Flow Statement, Fund Flow Statement</li> </ul>
<b>Unit-V: Analyzing and Interpreting Financial Statements</b>	
5.1	<ul style="list-style-type: none"> <li>● Meaning of financial statements and need of interpretation thereof</li> <li>● Meaning of Ratios and its relation to financial statement</li> <li>● Profitability Ratios</li> </ul>

<b>Unit-VI: Investment Decisions</b>
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**Master of Business Administration**  
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- Introduction to Corporate Finance
- Investment under risk & certainty
- Basic principles of capital budgeting
- Methods of Capital Budgeting
- ROI, PBP, NPV, IRR, PBPI
- Time Value of Money

**Course Outcome**

CO1. Demonstrate the applicability of the concept of Accounting to understand the managerial Decisions and financial statements

CO2. Preparing financial statements in accordance with appropriate standards

CO3. Prepare ledger accounts using double entry bookkeeping and record journal entries accordingly

CO4. Interpreting the business implications of financial statement information. Apply the Financial Statement Analysis associate with Financial Data in the organization.

CO5. Explain the purpose of double entry system to understanding the accounting system properly. Preparation of ratification errors.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	2	1			1
CO2		3	1			
CO3		3				
CO4	2	2			2	3
CO5	2	2			2	3

**Textbooks:**

1. Dhamija - Financial Accounting for managers: (Prentice Hall)
2. Banerjee-Financial Accounting(Excel Books)

**References**

1. Maheshwari S.N & Maheshwari S K – A Textbooks of Accounting for Management (Vikas)
2. Ambrish Gupta - Financial Accounting: A Managerial Perspective (Prentice Hall)
3. Narayanswami - Financial Accounting: A Managerial Perspective (PHI)
4. Mukherjee - Financial Accounting for Management (TMH)
5. Ramchandran & Kakani - Financial Accounting for Management (TMH)



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**4. ORGANIZATIONAL BEHAVIOUR**

**Course Objective**

1. To enable the students to understand the HR Management and system at various levels in general and in certain specific industries or organizations.
2. to study the behaviour of employees in an organization with a view to understand as to why and how do they behave
3. To develop relevant skills necessary for application in HR related issues
4. To Enable the students to integrate the understanding of various HR concepts along with the domain concept in order to take correct business decisions
5. Understanding and modulating behaviour of employees.

Ref No.	Topic to be Covered
<b>Unit-I: Introduction</b>	
1.1	<ul style="list-style-type: none"><li>● Business Organizations, their characteristics, nature etc.</li><li>● Role of Human Resource for effective organizations.</li><li>● What &amp; how business organizations are managed?</li><li>● Human Resource as an Asset or as Human Capital-a long journey from inception</li><li>● Scientific Management&amp; Classical Organizational theory.</li><li>● Behavioral School Concept of Management</li></ul>
<b>Unit-II: Elements of Human Behavior</b>	
2.1	<ul style="list-style-type: none"><li>● Concept&amp; perception of human behaviour.</li><li>● Importance &amp; foundation of organizational behavior.</li><li>● Personality, its constituents, types of personality &amp; development.</li><li>● Creating &amp; managing perception in organizations.</li><li>● Management of human behaviour.</li></ul>
<b>Unit-III: Human Resource</b>	
3.1	<ul style="list-style-type: none"><li>● What managers-leaders do?</li><li>● Nature and scope of HRM.</li><li>● Human resource planning.</li><li>● Analyzing work &amp; design job.</li><li>● Management functions-Planning, Organizing, Directing.</li><li>● Staffing, Coordinating, Controlling, Reporting &amp; budgeting.</li></ul>
<b>Unit-IV: Process of Management &amp; Recruitment Process</b>	
4.1	<ul style="list-style-type: none"><li>● What managers-leaders do?-2</li><li>● Conventional recruitment methods and processes.</li><li>● Open &amp; transparent communication system.</li><li>● Innovative recruitment.</li></ul>
<b>Unit-V: Process of Management and HR planning.</b>	
5.1	<ul style="list-style-type: none"><li>● Introducing perception and reality.</li><li>● Creating and developing perception.</li><li>● Human resource planning process...</li></ul>

**Course Outcome**

CO1: To develop the understanding of the concept of human resource management and to understand its relevance in organizations.



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Master of Business Administration  
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CO2: To develop necessary skill set for application of various HR issues.

CO3: To analyse the strategic issues and strategies required to select and develop manpower resources.

CO4: To integrate the knowledge of HR concepts to take correct business decisions.

CO5: To understand as to why and how they behave, the way they do, and to regulate/ manage their behaviour so that both employees & organization work in conjunction with each other towards its effectiveness.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2			2		2
CO2	3				2	2
CO3	1	3				3
CO4		1				3
CO5		2	2	2		3

**Textbooks:**

1. Koontz Harold & Wehrch Heinz-Essentials of management- TMH, 5th Edition.
2. Stoner, Freeman & Gilbert Jr- Management- PHI.

**References**

2. Fred Lufthansa- Organizational Behaviour- TMH, 12th edition.



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**5. Quantitative Techniques and Analysis for Managers**

**Course Objectives:**

1. The Business Statistics course will give a basic working knowledge in statistics.
2. This will work as a guideline for the students for basic management decisions.
3. To ensure students will understand basic statistics & its business application
4. To be able to analyse & interpret data for business decisions.
5. To impact the basis in Statistics to help students acquire new skills on the application of statistical tools and techniques in Business decision-making.

Ref No	Topics to Be Covered
<b>Unit I: Business Mathematics Fundamentals</b>	
	<ul style="list-style-type: none"> <li>• Percentage using mental Math</li> <li>• Conversions between decimals, fractions and percentages</li> <li>• Markup and Markdown</li> <li>• Growth quarter over quarter, year on year, semi annually</li> <li>• Discounts, Commissions, Arbitrage, Incentives</li> <li>• Currency Conversions</li> </ul>
<b>Unit II: Basic Interest Accounts</b>	
	<ul style="list-style-type: none"> <li>• Interest and interest rates.</li> <li>• Simple interest account.</li> <li>• Decursive and anticipative investment of money at interest.</li> <li>• Compound interest account.</li> <li>• Types of interest rates.</li> </ul>
<b>Unit-III Introduction to Statistics</b>	
	<ul style="list-style-type: none"> <li>• Why is Statistics required? With examples from industry</li> <li>• Basic statistics</li> <li>• Measure of central tendency: Mean, Mode ,Median</li> <li>• Measure of dispersion: Range, Quartile Deviation, Variance, Standard Deviation</li> <li>• Standard Deviation and Computation Frequency distribution and Graphical presentation of data(Histogram )</li> <li>• Stem and Leaf plot</li> <li>• Skewness, Moments and kurtosis</li> <li>• Building and analysing Data models</li> </ul>
<b>Unit IV. Distributions and Statistics</b>	
	<ul style="list-style-type: none"> <li>• Probability and probability Distribution</li> <li>• Uses of distributions in business analysis</li> <li>• Normal distributions (bell shaped curve)-</li> <li>• Example Business cases of various Distributions-</li> </ul>
<b>Unit-V Forecasting and Time Series Analysis</b>	
	<ul style="list-style-type: none"> <li>• Forecasting: Components of Time series,</li> <li>• smoothing methods,</li> <li>• Trend Projection,</li> <li>• Regression and correlation</li> </ul>
<b>Unit-VI Working with Spreadsheet</b>	





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**Master of Business Administration**  
**(Corporate Management)**

	<ul style="list-style-type: none"> <li>• Basic Statistics functions in Excel</li> <li>• Solving simple statistical problems through Excel</li> <li>• Introduction to Analysis ToolPak</li> <li>• Making histogram, frequency polygon</li> <li>• Basic Forecasting (Moving average, Linear Regression)</li> </ul>
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**Course Outcomes:**

CO1: To familiarizes the concept of statistics

CO2: To provide practical exposure on calculation of measures of average

CO3: To provide practical exposure on calculation through excel

CO4: To introduce the students about the concept of probability

CO5: To provide practical exposure on calculation of trend analysis

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3				
CO2			3		1	
CO3			1			
CO4		3		2		
CO5		3			3	2

**Textbooks:**

1. Taha & Hamdy, "Operations Research: An Introduction", Pearson Education.
2. Sharma J.K., "Operations Research: Problems & Solutions", Macmillan India Ltd.

**References**

1. Rajagopalan S. & Sattanathan, R. "Business Statistics & Operations Research", McGraw Hill Education.
2. Render, Barry, Stair, R.M., Hanna, M.E., & Badri, "Quantitative Analysis for Management", Pearson Education.
3. Vohra N.D., "Quantitative Techniques in Management", McGraw Hill Education.
4. Vishwanathan, P.K., "Business Statistics and Applied Orientation", Pearson Education.



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**6. Business Awareness**

**Course Objectives:**

1. In today's multifaceted environment, direct, comprehensible and coherent communication is necessary to drive success in the organization, hence business awareness session will provide students with the practical skills and knowledge necessary to express themselves clearly, with confidence and power, in a variety of speaking situations.
2. The student should be able to Gain the confidence
3. To express and summarize his/her thoughts publicly in a structured manner.
4. Knows about current changes in the market
5. To know about different business & social issues

Ref. No	Topics to be Covered
<b>Unit-I: Group Discussion</b>	
<b>1.1</b>	<ul style="list-style-type: none"> <li>● Introduction of Public speaking and its importance</li> <li>● Do's &amp; Don'ts of GD</li> <li>● Group Discussion on Current affairs</li> <li>● Group Presentation on social cause</li> </ul>
<b>Unit-II: Extempore &amp; Speech</b>	
<b>2.1</b>	<ul style="list-style-type: none"> <li>● Extempore Do's &amp; Don'ts</li> <li>● On the spot</li> </ul>
<b>Unit-III: Role Play &amp; Ad mania</b>	
<b>3.1</b>	<ul style="list-style-type: none"> <li>● Role Play on social cause</li> <li>● Ad making for a product- tagline&amp; pictorial presentation</li> </ul>
<b>Unit-IV: Topic Writing</b>	
<b>4.1</b>	<ul style="list-style-type: none"> <li>● Writing Skills</li> <li>● Presentation Skills</li> </ul>
<b>Unit-V: Debate</b>	
<b>5.1</b>	<ul style="list-style-type: none"> <li>● Debate on Current issue.</li> <li>● Debate on Social Issues</li> <li>● Debate on Business Issues</li> </ul>

**Course Outcome:**

CO1: Prepare students to communicate effectively.

CO2: Prepare students to synthesize, analyze, and integrate their knowledge of business disciplines to provide innovative and credible solutions to organizational problems and opportunities.

CO3: Prepare students to assess the impact of globalization on business.

CO4: Prepare students to analyze ethical implications of business decisions.

CO5: Prepare students to address current issues.

	PO1	PO2	PO3	PO4	PO5	PO6
<b>CO1</b>					<b>3</b>	



**School of Business Studies  
Master of Business Administration  
(Corporate Management)**

<b>C02</b>	<b>1</b>	<b>2</b>			<b>2</b>	<b>2</b>
<b>C03</b>			<b>3</b>			<b>2</b>
<b>C04</b>				<b>3</b>		<b>2</b>
<b>C05</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>

**Reference Material:**

1. Class Notes, Videos



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**Master of Business Administration**  
**(Corporate Management)**

**7. Technology in Management**

**Course Objectives:**

1. To enlighten the students to study the technical languages of computers which is related with business in the modernised world.
2. This course aims to provide students with an exposure to the basics of Google Drive
3. An exposure to Calendar, Gmail, Word Processor, and
4. Presentation Software with a special focus on business application.
5. To equip students with knowledge on basic software for business communication with in-hands training on office software's.

Ref. Points	Topics to be covered
<b>Unit 1:Introduction</b>	
1.1	<ul style="list-style-type: none"> <li>● Introduction to Computer, Monitor, CPU, Keyboard, Mouse, Laptop (only brief introduction to be given)</li> <li>● Software- File, folder, drive, Desktop</li> <li>● How to open file, folder (Folder ,Subfolder, Arrangement of file , Folders &amp; Data)</li> <li>● Save &amp; save as (In Word Processor)</li> </ul>
<b>Unit II :Internet &amp; Gmail</b>	
2.1	<ul style="list-style-type: none"> <li>● Introduction to internet</li> <li>● Search Engine (Google, Yahoo, Bing, AOL)</li> <li>● Introduction to email</li> <li>● Gmail – Sending emails, Labels – Uses of Labels, create new labels &amp; Edit</li> <li>● Accounts &amp; Import – Change Password, change password recovery option.</li> <li>● Introduction to Google drive</li> <li>● Google sheet,doc,slides</li> <li>● Google Form, Google calendar</li> </ul>
<b>Unit 3:Getting started with Office Software (Word Processor)</b>	
3.1	<ul style="list-style-type: none"> <li>● Introduction of Office Software</li> <li>● Uses of Office Software, file extension, opening new file</li> <li>● Interface of word processor</li> <li>● Text Editing and Formatting</li> <li>● Bullets &amp; Numbers</li> <li>● Inserting Header &amp; Footer, Page Number, Date &amp; Time</li> <li>● Hyperlink &amp; Bookmark</li> </ul>
<b>Unit 4: Word Graphics</b>	
4.1	<ul style="list-style-type: none"> <li>● Inserting Picture &amp; text formatting with picture (Text Position)</li> <li>● Text Box (Uses of Text Box)</li> <li>● SmartArt</li> <li>● Uses of all kind of Smart art (At least two example for each kind of smart art)</li> <li>● Understanding the difference of all kind of smart art.</li> <li>● Word art</li> <li>● Chart (Only Basic charts)</li> <li>● Design – Themes, Watermark, page color, Page border</li> </ul>
<b>Unit 5: Tables ,Equation Editor, Printing</b>	
5.1	<ul style="list-style-type: none"> <li>● Inserting table, drawing table, Table layout, Split cells, Split table, Insert Row &amp; Column, Function &amp; sort in table</li> <li>● Equation editor</li> <li>● Writing Equation &amp; Inserting Symbol</li> </ul>



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**Master of Business Administration**  
**(Corporate Management)**

	<ul style="list-style-type: none"> <li>● Printing a document, different options</li> <li>● Printing setting</li> <li>● Print preview</li> <li>● Basic Trouble shooting in printing.</li> </ul>
<b>Unit 6: Advance Feature of Ms Words</b>	
6.1	<ul style="list-style-type: none"> <li>● Table of Contents</li> <li>● Footnote &amp; Endnote</li> <li>● Creating Citations &amp; Bibliography</li> <li>● Cross Referencing</li> <li>● User filled Forms in Word</li> <li>● Mail merge (using at 10 contacts mail merge should be uses by students)</li> <li>● Use of templates and creating own templates.</li> <li>● Macro</li> </ul>

**Course Outcomes:**

CO1: To introduce the students about basics of MS-Office

CO2: To provide practical knowledge exposure to MS- Word

CO3: To provide practical knowledge exposure MS-Excel

CO4: To provide practical knowledge exposure MS- Power Point

CO5: Develop the competence of database management

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2				
CO2	3					
CO3	3	2				
CO4	3				2	1
CO5	3					

**Text Books:**

1. Surtis Frye, Joyce Cox, Steve Lambert, "Microsoft Office System "Step By Step.

2. Nance Muir, "Microsoft Office- Power Point 2010 Plain and Simple", Amazon.Com.

**Reference Material:**

1. Class Notes

2. E-Books Open Office



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**8. Basics of Communication for Managers**

**Course Objectives:**

1. The course aims to develop basic communication skills among students to face and resolve business situations.
2. The main objectives of the course are: Learn professional usage of English language.
3. Understand basics of English Develop fluency in spoken formats.
4. Be different, express yourself (through the work). Develop effective presentation skills – Audio/Video/Live Identify gaps in reading and writing effectively.
5. Develop basic reading and writing skills: expressing clearly, simply, and correctly.

Ref No.	Topic to be Covered
<b>Unit-I: Introduction.</b>	
1.1	<ul style="list-style-type: none"> <li>● English Language</li> <li>● Contextual English</li> <li>● Mispronounced Words</li> <li>● Similar Sounding Words</li> <li>● Elocution</li> </ul>
<b>Unit-II: Grammar</b>	
2.1	<ul style="list-style-type: none"> <li>● Capitalize the correct word</li> <li>● Redundancy</li> <li>● Make/Do</li> <li>● Make/Let</li> <li>● A/An/The</li> <li>● Has/have</li> <li>● Ungrammatical Sentences</li> </ul>
<b>Unit-III: Presentation Skills</b>	
3.1	<ul style="list-style-type: none"> <li>● Presentation Skills- Introduction and Delivery</li> <li>● Design</li> <li>● Audio Video Presentation-</li> <li>● Product Introduction</li> <li>● Podcast</li> <li>● Picture Presentation</li> </ul>
<b>Unit-IV: Story Telling</b>	
4.1	<ul style="list-style-type: none"> <li>● Story Telling</li> <li>● Comprehension</li> </ul>
<b>Unit-V: Interview Skills and Resume</b>	
5.1	<ul style="list-style-type: none"> <li>● Resume</li> <li>● Interview Skills</li> <li>● LinkedIn Profile</li> </ul>

**Course Outcome:**

CO1: To demonstrate his/her ability to write error free while making an optimum use of correct Business Vocabulary & Grammar.

CO2: To distinguish among various levels of organizational communication and communication barriers while developing an understanding of Communication as a process in an organization.

CO3: To draft effective business correspondence with brevity and clarity.



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**Master of Business Administration**  
**(Corporate Management)**

CO4: To stimulate their Critical thinking by designing and developing clean and lucid writing skills.

CO5: To demonstrate his verbal and non-verbal communication ability through presentations.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1					3	
CO2	2				3	1
CO3					3	1
CO4		2			3	
CO5	2				3	2

**Text Books:**

1. Mahadevan, Usha. Empower with English, Sun Beams - 1. Emerald Pub: Chennai.
2. Rao, Shoba B. Empower with English, Sun Beams - II. Emerald Pub: Chennai.

**References:**

**Be A Player, Not A Victim**

<https://www.youtube.com/watch?v=xXdN5kMioRQ&feature=youtu.be>

<https://www.youtube.com/watch?v=6OI7REyatq4>



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**School of Business Studies**  
**Master of Business Administration**  
**(Corporate Management)**

SEMESTER 2			
Sl. No	Subject Name & Title	Type	Credits
1	Market Analysis	Core	3
2	Sales & Distribution Management	Core	3
3	Introduction to Financial Products	Core	3
4	Human Resource Management	Core	3
5	Operations Management	Core	3
6	New Age Business Models	Foundation	4
7	Analytical Tools for Managers I	Foundation	4
8	Professional Communication	NTCC	3



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**Master of Business Administration**  
**(Corporate Management)**

**1. Market Analysis**

**Course Objectives:**

1. The basic objective of this course is to develop and understanding about the many aspects of consumer behaviour and its applications in marketing.
2. To understand consumer behaviour in an informed and systematic way.
3. To analyse personal, socio-cultural, and environmental dimensions that influence consumer decisions making.
4. To enable students in designing and evaluating the marketing strategies based on fundamentals of consumer buying behaviour.
5. To give the students a perspective to understand the application of market research in framing effective marketing strategies. Course Outcomes

Ref No.	Topic to be Covered
<b>Unit-I: Introduction to Consumer Behaviour</b>	
1.1	<ul style="list-style-type: none"> <li>• Nature, Scope and Application</li> <li>• Consumer Research</li> <li>• Market Segmentation.</li> </ul>
<b>Unit-II: The Consumer as an Individual</b>	
2.1	<ul style="list-style-type: none"> <li>• Consumer Need and Motivation</li> <li>• Learning and Involvement</li> <li>• Personality, Perception</li> <li>• Attitudes, Value, Lifestyle.</li> </ul>
<b>Unit-III: Group Dynamics and Reference Groups</b>	
3.1	<ul style="list-style-type: none"> <li>• Group Dynamics, Reference Group, The Family</li> <li>• Social Class, Culture, Subcultural and Cross-cultural Influences</li> <li>• Role of Communication</li> </ul>
<b>Unit-IV: Consumer Decision-making Process</b>	
4.1	<ul style="list-style-type: none"> <li>• :Models of Consumer Decision-making</li> <li>• The Purchase Process and Consumption Experience</li> <li>• Low Involvement Decision-making</li> <li>• Situational Influences.</li> <li>• <b>ARM and Consumer Behaviour</b></li> <li>• Word of Mouth, Communication</li> <li>• CRM, Consumer Protection</li> </ul>
<b>Unit-V Overview of Market Research</b>	
5.1	<ul style="list-style-type: none"> <li>• Introduction of Market Research;</li> <li>• Defining the Market Research Problem</li> <li>• Research Design and Formulation</li> <li>• Data understanding and Preparation</li> <li>• Primary &amp; secondary data</li> <li>• Measurement Scale</li> </ul>
<b>Unit-V Data Collection and Interpretation</b>	
6.1	<ul style="list-style-type: none"> <li>• The Sources &amp; Collection of Data</li> <li>• Data interpretation and presentation</li> <li>• Research Report (writing and Presentation)</li> </ul>

**Course Outcomes:**

CO1: Demonstrate how knowledge of consumer behaviour can be applied to marketing. CO2: Identify and explain factors which influence consumer behaviour.



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**School of Business Studies**  
**Master of Business Administration**  
**(Corporate Management)**

CO3: Relate internal dynamics such as personality, perception, learning motivation and attitude to the choices consumers make.

CO4: Use appropriate research approaches including sampling, data collection and questionnaire design for specific marketing situations.

CO5: In a team, work effectively to prepare a research report on consumer behaviour issues within a specific context.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1		2		
CO2		1	1			
CO3	2			3	3	
CO4		3			2	2
CO5	1				2	3

**Textbooks:**

1. Assael, H. Consumer Behaviour and marketing Action, Ohio, South Western.
2. Engle, J F etc. Consumer Behaviour, Chicago, Dryden Press, Electives (Mktg)

**References:**

1. Howard, John A etc. Consumer Behaviour in marketing Englewood Cliffs, New Jersey, Prentice Hall Inc.
2. Hawkins, D I etc. Consumer Behaviour Implications for Marketing Strategy. Texas, Business.
3. Mowen, John C. Consumer Behaviour , New York, MacMillan.
4. Schiffman, L G and Kanuk, L L Consumer Behaviour New Delhi, Prentice Hall of India



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Master of Business Administration  
(Corporate Management)**

**2. Sales & Distribution Management**

**Course Objective:**

1. The course aims to develop practical sales skills and concepts
2. Understand sales as a process
3. Develop the ethics for perseverance at the developed process
4. Develop practical and contemporary skill sets for real time work and be result oriented with an aim to derive continuous results from a process rather than a windfall gain
5. To focus on decision making aspects and implementation of decisions in sales and distribution management

Ref. No.	Topics to be Covered
<b>Unit-I: Introduction to Sales</b>	
1.1	<ul style="list-style-type: none"><li>● Introduction to Sales: Basic concept of sales, classifying sales roles</li><li>● Types of Sales Strategies</li><li>● Importance of Personal selling, trends in personal selling</li><li>● Difference between Personal and organizational customer and related change in approach of sales team</li></ul>
<b>Unit-II: Sales Process</b>	
2.1	<ul style="list-style-type: none"><li>● 7 step process from Prospecting to Follow up</li><li>● New contemporary digital process</li><li>● Funnel process</li><li>● Prospect/Lead generation</li><li>● “Ferris wheel” concept – importance and practical application</li><li>● Approach, Presentation and Demonstration</li><li>● Handling Objections</li><li>● Win (closing and follow up)</li><li>● Engagement</li></ul>
<b>Unit-III: Unique Selling Proposition</b>	
3.1	<ul style="list-style-type: none"><li>● Unique Selling Proposition</li><li>● Elevator pitch</li><li>● Complete sales pitch</li></ul>
<b>Unit-IV: Distribution Channel</b>	
4.1	<ul style="list-style-type: none"><li>● Distribution levels and channel</li><li>● 0 level direct to customer to multi-level manufacturer</li><li>● C&amp;F, wholesaler, semi wholesaler, retailer. Customer</li></ul>
<b>Unit-V: Types of Sales</b>	
5.1	<ul style="list-style-type: none"><li>● Bulk accounts and industrial sales</li><li>● Undercutting activity</li></ul>

**Course Outcomes:**

- CO1: Understand foundations in components of sales and channel management.  
CO2: To understand various types of sales & facts of the job of a sales manager.  
CO3: Know the importance of sales & channel management in the global economy  
CO4: Evaluate, classify, imagine and plan the successful sales & channel plan.  
CO5: Analyze the challenges and opportunities before the channel management and to develop the suitable plans.



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**Master of Business Administration**  
**(Corporate Management)**

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	3	1	2		
CO2	3		2			1
CO3	2		3			
CO4	1	3			2	2
CO5		3			2	2

**Textbooks:**

1. up your sales in a down Market, Ron Volper
1. The art of closing the Sale, Brian Tracy

**References**

1. Making Breakthrough Innovation, Porus Munshi (How 11 Indians pulled off the impossible)



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**3. Introduction to Financial Products**

**Course Objectives:**

1. The Corporate Finance course aims to provide students with an exposure to the basic principles of finance.
2. To enable them to understand the business scenario.
3. To equip students with the standard tools of capital budgeting,
4. To provide an understanding of return on investment and
5. The students should be able to understand the concept and applicability of Pay Back Period

Ref No.	Topic to be Covered
<b>Unit-I: Investment Decisions</b>	
1.1	<ul style="list-style-type: none"> <li>• Introduction to Corporate Finance</li> <li>• Investment under risk &amp; certainty</li> <li>• Where to use capital.</li> </ul>
<b>Unit-II: Capital Budgeting</b>	
2.1	<ul style="list-style-type: none"> <li>• Basic principles of capital budgeting</li> <li>• Methods of Capital Budgeting</li> <li>• Return on Investment</li> <li>• Payback period</li> <li>• Net discounted present value</li> <li>• Internal Rate of Return</li> <li>• Pay back profitability index</li> </ul>
<b>Unit-III: Time Value of Money</b>	
3.1	<ul style="list-style-type: none"> <li>• Present value &amp; future value</li> <li>• Making Investment decisions with NPV Rule</li> <li>• Capital Budgeting and Risk; Practical Problems in Capital Budgeting;</li> <li>• Organizing Capital Expenditure and Evaluating Performance</li> </ul>
<b>Unit-IV: Financing Decisions</b>	
4.1	<ul style="list-style-type: none"> <li>• Corporate Financing</li> <li>• Lessons of Market Efficiency</li> <li>• How much should be Firm Borrow?</li> <li>• Interactions of Investment and Financing Decisions</li> </ul>
<b>Unit-V: Short-term Financial Decisions</b>	
5.1	<ul style="list-style-type: none"> <li>• Short Term Financial Decisions; Credit Management; Cash Management</li> <li>• The Final Words: What we do and do not know about Finance.</li> </ul>

**Course Outcomes:**

CO1: Aiming to enable the students to get the Know-how of corporate finance in its wide aspects

CO2: To create an interest in investment habit keeping its wide scope

CO3: To introduce the concept of Capital Budgeting

CO4: To make them understand the cost of capital in wide aspects

CO5: Understand the importance of various decision making areas of financial management

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3		1			
CO2	2	1			1	
CO3	2	2			1	1



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**School of Business Studies**  
**Master of Business Administration**  
**(Corporate Management)**

<b>CO4</b>	<b>3</b>					<b>1</b>
<b>CO5</b>		<b>3</b>			<b>1</b>	<b>2</b>

**Textbooks:**

1. Prasanna, Dr Chandra: Financial Management Theory &Practice, Tata McGraw-Hill, Latest Edition. **(PL)**
2. Damodaran, Aswath : Corporate Finance Theory and Practice, John Wiley and sons(Latest Edition)

**References**

3. Lesman, S.: Corporate Financial Management – Strategies for Maximizing Shareholders Wealth, John Willey & Sons.
4. Pandey, I.M. - Financial Management (Vikas)
5. Ravi M. Kishore - Financial Management (Taxmann)
6. .Khan & Jain - Financial Management (TMH)



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**4. Human Resource Management**

**Course Objective:** This course aims to:

- Apprise the students about the concept, nature, and fundamentals of Human Resource Management
- Provide an overview of the roles and responsibilities of management
- Recognize the management principles and their application in real-world scenarios
- Analyse the fundamentals of organisational and Individual behaviour
- Identify and apply the nature and role of functions of management
- Identify and apply the need of human resource planning
- Apply the organisational behavioural concepts on transactions between Individual and Group Behaviour
- Develop the skills required for the application of fundamental techniques in day-to-day activities

**Course Learning Outcomes:** By the end of the course, the students will be able to:

- Understand the concept of HRM in relation to Industry
- Analyzing the roles and responsibilities of HR from general and recruitment perspective
- Recognize the driving forces for HRM
- Understand the need to acquire right number and quality of resources
- Appraise the behaviour and performance of Individual and teams
- Apply the theoretical knowledge of fundamentals and principles of HRM in the real-world scenarios
- Evaluate the skills required to perform a particular job role

Lecture No.	Topics to be covered
	<b>Unit 1</b>
	<b>Home Assignment – Pre-Read on Human Resource Management</b>
1	<b>Introduction to Human Resource Management</b> <ul style="list-style-type: none"><li>• Human Resource Management and Its Scope</li><li>• Role of HRM in an Organisation</li><li>• Hierarchical Structure</li><li>• Case Study</li></ul>
2	<b>Human Resource Function</b> <ul style="list-style-type: none"><li>• Key Roles and Responsibilities</li><li>• Challenges Faced by Human Resource Function</li><li>• Strategies to Connect Resources to the Organisational Goals</li></ul>



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Master of Business Administration  
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	<b>Case Study 1</b>
	<b>Unit 2</b>
3	<b>Introduction to HR Life Cycle</b> <ul style="list-style-type: none"> <li>• Stages of HR life Cycle</li> <li>• Role of each component in the Human Resource Management</li> <li>• Challenges and their wayouts</li> </ul> <b>Case Study 2,3</b>
4	<b>Human Resource Planning (Stage of HR life Cycle)</b> <ul style="list-style-type: none"> <li>• Identification of Job Opening, Head Counts in each department and their defined job roles</li> <li>• Developing the Recruitment Plan <ul style="list-style-type: none"> <li>○ Analyze the Need for Recruitment</li> <li>○ Plan a Recruitment Calendar</li> <li>○ Identify the Tools Required to Bring the Plan into Action</li> <li>○ Creating a Compelling Job Description</li> <li>○ Designing, Screening and Selection Process</li> <li>○ Make an Offer</li> <li>○ Define the Process after the Job is Accepted</li> <li>○ Optimize the Plan whenever Required</li> <li>○ Reports</li> </ul> </li> </ul> <b>Case Study 4</b>
5-6	<b>Employee Attraction (Stage of HR life Cycle)</b> <ul style="list-style-type: none"> <li>• Concept of Employee Attraction</li> <li>• Techniques of Attracting Suitable Employees</li> <li>• Role of Job Analysis in Attracting Employees</li> <li>• Job Description and Job Specification of Sample Jobs</li> <li>• Creating Job Description</li> <li>• Reports</li> </ul> Video - <a href="https://youtu.be/UjvLNyRqDQs">https://youtu.be/UjvLNyRqDQs</a> <b>Individual Assignment – 1</b> <b>Case Study 5</b>
7-8	<b>Employee Recruitment and Selection (Stage of HR life Cycle)</b> <ul style="list-style-type: none"> <li>• Sourcing &amp; Screening</li> <li>• Recruitment vs Selection</li> <li>• Categories of Selection Tests</li> <li>• Background Verification</li> </ul>






**School of Business Studies  
Master of Business Administration  
(Corporate Management)**

	<ul style="list-style-type: none"> <li>• Job Offer: Salary Distribution, Provident Fund, Salary Slips</li> <li>• Documentation</li> </ul> <b>Case Study – 6</b> <b>Role Play – 1</b>
9	<b>Onboarding Employees (Stage of HR Life Cycle)</b> <ul style="list-style-type: none"> <li>• Methods of Onboarding</li> <li>• Steps</li> <li>• Employee Readiness</li> <li>• Challenges Involved</li> <li>• Employee Handover: ID, Creation of ID in HRM, Mapping the New Joiner with the Reporting Manager</li> <li>• Reports</li> </ul> <b>Case Study – 7</b>
10-11	<b>Career Planning and Development (Stage of HR Life Cycle)</b> <ul style="list-style-type: none"> <li>• Performance Improvement</li> <li>• Performance Appraisal</li> <li>• Internal Job Posting (IJP)</li> <li>• Systematic Approach for Training</li> <li>• Various Methods of Management Development</li> <li>• Challenges</li> </ul> <b>Case Study – 8</b> <b>Group Assignment – 1 (Solution for Case Study 5)</b>
12	<b>Employee Retention (Stage of HR Life Cycle)</b> <ul style="list-style-type: none"> <li>• Analyze the Need of Retaining an Employee</li> <li>• Techniques to Retain Employees</li> <li>• Challenges Involved</li> </ul> <b>Case Study – 9</b>
13	<b>Employee Termination (Stage of HR Life Cycle)</b> <ul style="list-style-type: none"> <li>• Role and Responsibilities of HR in Employee Termination</li> <li>• Dealing with Challenges</li> </ul> <b>Case Study – 10</b>
	<b>Unit 3</b>
14	<b>Performance Management and Performance Appraisal</b>



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**Master of Business Administration**  
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	<ul style="list-style-type: none"> <li>• Difference between Performance Management and Performance Appraisal</li> <li>• Importance of Performance Appraisal</li> <li>• Appraisal Process and Methods</li> <li>• Pros and Cons of Performance Appraisal Methods</li> </ul> <p><b>Case Study – 11</b></p>
15	<p><b>Compensation Management</b></p> <ul style="list-style-type: none"> <li>• Introduction and Components of Compensation Management</li> <li>• Relationship of Compensation with Performance, Motivation, Engagement, and Turnover</li> <li>• Wage and Salary Evaluation</li> </ul>
16-18	<p><b>Understand MIS and Technologies in HRM</b></p> <ul style="list-style-type: none"> <li>• Role of MIS and HRIS in HRM</li> <li>• MIS and Cloud Computing</li> <li>• Handling MIS and Maintaining MIS Reports by HR</li> <li>• Types of HRIS Systems <ul style="list-style-type: none"> <li>○ Learning Management System (LMS)</li> <li>○ Applicant Tracking System (ATS)</li> <li>○ Employee Self Service Portal</li> <li>○ Payroll</li> <li>○ Attendance Management System</li> <li>○ Timesheet Management System</li> <li>○ Full &amp; Final Settlement</li> </ul> </li> <li>• Popular HR softwares in India</li> <li>• Tips for Successfull Application of MIS and HRIS in a Business</li> </ul>
	<b>Unit 4</b>
19-20	<p><b>Employee Relations</b></p> <ul style="list-style-type: none"> <li>• Need for Managing Employee Relationship</li> <li>• Managing Dynamics of Employee Relationship</li> <li>• Maintaining Positive Employee Relations</li> <li>• Causes of Poor Employee Relations</li> </ul> <p><b>Case Study – 12</b></p>
	<b>Home Assignment – Pre Read Employment Laws and Regulations of India</b>



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Master of Business Administration  
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	Reference: <a href="https://www.globallegalinsights.com/practice-areas/employment-and-labour-laws-and-regulations/">https://www.globallegalinsights.com/practice-areas/employment-and-labour-laws-and-regulations/</a>
21	<b>Employment laws in India</b> <ul style="list-style-type: none"> <li>• Different Labor Laws and Rights</li> <li>• Identify the Applicable Laws for Specific Situations</li> </ul> <b>Case Study – 13</b>
22	<b>Role of HR in Processing Complaints &amp; Addressing Grievances</b> <ul style="list-style-type: none"> <li>• Identification of Employee Grievances</li> <li>• Process Complaints against any sort of Employee Harassment</li> <li>• Process of Handling &amp; Resolving Employee Grievances and Complaints</li> </ul> <b>Case Study – 14</b>
23	<b>HR Employee Satisfaction Surveys</b> <ul style="list-style-type: none"> <li>• Identifying the Topics on which the Survey Needs to be Conducted</li> <li>• Sample of Employee Satisfaction Survey Questions</li> <li>• Measuring and Analyzing the Survey Results</li> </ul> <b>Case Study – 15</b>
24-25	<b>Role of HR During and After COVID</b> <ul style="list-style-type: none"> <li>• Virtual Onboarding</li> <li>• Conducting Virtual Recruitments</li> <li>• Motivational &amp; Employee Engagement Activities for Employees Working from Home</li> <li>• Training the Employees</li> <li>• Sensitize the Employees for Work Life Balance</li> <li>• Handling Challenging Situations in COVID as an HR Manager</li> </ul> <b>Case Study – 16</b>

**References/Links:**

Human Resource Management, 15e

By Gary Dessler, Biju Varrkey

[https://books.google.co.in/books?id=QDFpDwAAQBAJ&printsec=frontcover&source=gbs\\_ge\\_summary\\_r&cad=0#v=onepage&q&f=false](https://books.google.co.in/books?id=QDFpDwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false)

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<https://xceed365.com/blog/2018/11/30/a-guide-to-the-hr-lifecycle/>

## **5. OPERATIONS MANAGEMENT**

### **Course Objectives:**

1. The area of operations management explains how inputs are converted into outputs with the help of processing.
2. It gives universality of applications of issues, concepts and tools and techniques in manufacturing as well as service environments.
3. Today, every organization is facing fierce competition due to narrowing down the global distances and reason being one has to work as per global standards for competing in the market. Talk relevant to- cost, quality and speed along with other social and environmental issues is most relevant for overall effectiveness of operations in every organization.
4. The course addresses all the prominent issues starting from understanding of resources, their use in effective manner with the help of appropriate technologies in order to achieve highest levels of efficiency and responsiveness towards today's customer.
5. To understand the relationship between Operations and other business functions, such as Marketing, Finance, Accounting, and Human Resources

Ref Point	Topics to Be Covered
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Master of Business Administration  
(Corporate Management)**

<b>Unit I: Operations Management Overview</b>	
1.1	<ul style="list-style-type: none"> <li>● Introduction to Operations Management</li> <li>● Operations: The Transformation Model</li> <li>● Goods &amp; Services</li> <li>● Manufacturing and Services Operations</li> <li>● Systems View and Process View of Organizations</li> <li>● Operations Strategy: Competitive Dimensions Cost, Time, Quality, Flexibility Customer need &amp; satisfaction</li> <li>● Role of A operations Manager</li> </ul>
<b>Unit-II: Productivity &amp; Scheduling</b>	
2.1	<ul style="list-style-type: none"> <li>● Productivity for competitiveness</li> <li>● Employee Productivity</li> <li>● Work analysis &amp; Work Measurement</li> <li>● Time Study, Wage Incentive</li> <li>● Job Designing:KRA,KPI</li> <li>● Capacity planning :Output &amp; Input measures, Effective Capacity(Utilization)</li> <li>● Scheduling: Job Scheduling, Scheduling in services, Workforce Scheduling Gantt Charts and Sequencing</li> </ul>
<b>Unit -III: Budgeting and Resource Management</b>	
3.1	<ul style="list-style-type: none"> <li>● Budgeting and the management Process</li> <li>● Forecasting</li> <li>● Long and short range planning</li> <li>● Inventory Management</li> <li>● Elementary Inventory Models</li> <li>● Inventory Control</li> </ul>
<b>Unit –IV Operations Review</b>	
4.1	<ul style="list-style-type: none"> <li>● Network analysis</li> <li>● CPM/PERT Analysis</li> <li>● Gantt Chart for Control and monitoring</li> <li>● Project Completion</li> <li>● Pyramid Analysis</li> <li>● Attrition review</li> <li>● Using Data to Manage Operations</li> <li>● Business Process Reengineering and Kainzen Method</li> <li>● Continuous Improvement</li> </ul>
<b>Unit -V Make versus Buy</b>	



**School of Business Studies**  
**Master of Business Administration**  
**(Corporate Management)**

5.1	<ul style="list-style-type: none"> <li>● Introduction</li> <li>● Make versus Buy: The Strategic Approach</li> <li>● Identifying Core Processes</li> <li>● The Business Process Route</li> <li>● The Product Architecture Route</li> <li>● Markets versus Hierarchy</li> <li>● Economies of Scale</li> <li>● Agency Cost</li> <li>● Transaction Cost</li> <li>● Incomplete Contracts</li> <li>● Integrative Framework of Market versus Hierarchy</li> <li>● Impact of the Technology/Internet on Sourcing Strategy</li> </ul>
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**Course Outcomes:**

CO1: Identify the elements of operations management and various transformation processes to enhance productivity and competitiveness.

CO2: Analyse and evaluate various facility alternatives and their capacity decisions, develop a balanced line of production & scheduling and sequencing techniques in operation environments

CO3: Classify the relationship between Operations and other business functions, such as Marketing, Finance, Accounting, and Human Resources.

CO4: Plan and implement suitable materials handling principles and practices in the operations.

CO5: Plan and implement suitable quality control measures in Quality Circles to TQM

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3		2			1
CO2		3				2
CO3	3	1				2
CO4		2			1	2
CO5		2			2	3

**Text:**

1. Kanishka Bedi, Production and operations management, Oxford University Press, YMCA Library Bldg, Jai Singh Rd. New Delhi – 110001

**Reference:**

2. Richard B. Chase, Nicolas J. Aquilano and F. Robert Jacob Production and operations management (Manufacturing and Services) Irwin / McGraw – Hill, a division of McGraw – Hill, co.
3. Norman Gaither and Greg Frazier, Operations management. Thomson, South – Western
4. S. N. Chary, Production and operations management Tata McGraw – Hill publishing co. Ltd , 7 , West Patel Nagar New Delhi – 110008
5. B. Mahadeven, Operations management (Theory and Practice ) , Pearson Education , 482 , F.I.E. ,  
[www.pearsoned.co.in/bmahadevan](http://www.pearsoned.co.in/bmahadevan)



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**School of Business Studies**  
**Master of Business Administration**  
**(Corporate Management)**



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Master of Business Administration  
(Corporate Management)**

**6. New Age Business Models**

**Course Objectives:**

- To study the behaviour of employees in an organization with a view to understand as to why and how do they behave
- To regulate/manage the behaviour so that both employees & organization work in conjunction with each other towards its effectiveness
- To equip students with basic theoretical as well as practical input about important aspects of Human Resource Management
- To ensure collaboration within employees that will contribute towards building teamwork
- To equip the students to conduct the HR planning & Processes in the best effective manner

**Course Outcome**

CO1: To develop the understanding of the concept of human resource management and to understand its relevance in organizations.

CO2: To develop necessary skill set for application of various HR issues.

CO3: To analyse the strategic issues and strategies required to select and develop manpower resources.

CO4: To integrate the knowledge of HR concepts to take correct business decisions.

CO5: To understand as to why and how they behave, the way they do, and to regulate/ manage their behaviour so that both employees & organization work in conjunction with each other towards its effectiveness.

Ref No.	Topic to be Covered
<b>Unit-I: Introduction</b>	
1.1	<ul style="list-style-type: none"><li>● Business Organizations, their characteristics, nature etc.</li><li>● Role of Human Resource for effective organizations.</li><li>● What &amp; how business organizations are managed?</li><li>● Human Resource as an Asset or as Human Capital-a long journey from inception</li><li>● Scientific Management &amp; Classical Organizational theory.</li><li>● Behavioural School Concept of Management</li></ul>
<b>Unit-II: Elements of Human Behaviour</b>	
2.1	<ul style="list-style-type: none"><li>● Concept &amp; perception of human behaviour.</li><li>● Importance &amp; foundation of organizational behaviour.</li><li>● Personality, its constituents, types of personality &amp; development.</li><li>● Creating &amp; managing perception in organizations.</li><li>● Management of human behaviour.</li></ul>
<b>Unit-III: Human Resource</b>	
3.1	<ul style="list-style-type: none"><li>● What managers-leaders do?</li><li>● Nature and scope of HRM.</li><li>● Human resource planning.</li><li>● Analysing work &amp; design job.</li><li>● Management functions-Planning, Organizing, Directing.</li><li>● Staffing, Coordinating, Controlling, Reporting &amp; budgeting.</li></ul>





**School of Business Studies  
Master of Business Administration  
(Corporate Management)**

<b>Unit-IV: Process of Management &amp; Recruitment Process</b>	
4.1	<ul style="list-style-type: none"><li>● What do managers-leaders do?</li><li>● Conventional recruitment methods and processes.</li><li>● Open &amp; transparent communication system.</li><li>● Innovative recruitment.</li></ul>
<b>Unit-V: Process of Management and HR planning</b>	
5.1	<ul style="list-style-type: none"><li>● Introducing perception and reality.</li><li>● Creating and developing perception.</li><li>● Human resource planning process..</li></ul>

**Textbooks:**

1. Koontz Harold & Weihrch Heinz-Essentials of management- TMH, 5th Edition.
2. Stoner, Freeman & Gilbert Jr- Management- PHI.

**References**

1. Fred Lufthansa- Organizational Behaviour- TMH, 12th edition.
2. Stephen P Robbins-Organizational Behaviour-PHI
3. V S P Rao- Managing Organization- Excel Publication.
4. Human Resource Management by PRAVEEN DURAI.
5. Human Resource Management & Industrial Relations by P SUBBA RAO



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**School of Business Studies**  
**Master of Business Administration**  
**(Corporate Management)**

**7. ANALYTICAL TOOLS FOR MANAGERS I**

**Course Objectives:**

1. This course aims to provide students with an exposure to the advanced features in MS Excel
2. To equip students with knowledge on basic software for business communication with in-hands training.
3. To provide an understanding on how to analyse quantitative data using Microsoft excel.
4. To familiarize Students with basic to intermediate skills for using Excel in the classroom vis-à-vis Business Applications
5. To gain proficiency in creating solutions for Data Management and Reporting

Ref. Points	Topics to be covered
<b>Unit 1: Getting started with MS excel</b>	
1.1	<ul style="list-style-type: none"> <li>Excel interface (Title bar, Menu bar, Toolbar, Formula Bar, Calculation Bar)</li> <li>Understanding excel option for customization and add-ins</li> <li>Data Entry and editing, formatting of data</li> <li>Auto fill, Custom List</li> <li>Cell Referencing (Relative references, Absolute, Mixed referencing)</li> <li>Paste special, Paste Link</li> <li>Data Validation</li> <li>Customizing Excel Interface</li> </ul>
<b>Unit-II: Basic functions, Sort and Filter</b>	
2.1	<ul style="list-style-type: none"> <li>Mathematical function</li> <li>Statistical functions</li> <li>Logical functions</li> <li>Date &amp; Time Functions</li> <li>Test Functions</li> <li>Filters and sort ( Standard, Custom, Multiple)</li> <li>Advanced filter</li> </ul>
<b>Unit –III Charts &amp; Graphs</b>	
3.1	<ul style="list-style-type: none"> <li>Charts ( Bar chart, Stock chart, Area chart, Statistic Chart, Combo chart, Pie chart),</li> <li>User defined Charts :(Gantt Chart, Gauge Chart,RACI Matrix)</li> <li>Trend line analysis &amp; forecasting using Graphs(Line, scatter)</li> <li>Infographics using charts &amp; graphs</li> </ul>
<b>Unit-VI: Data Analysis using Lookup, Match, Index &amp; Pivot table</b>	
4.1	<ul style="list-style-type: none"> <li>VLOOKUP,HLOOKUP &amp; LOOKUP</li> <li>XLOOKUP</li> <li>Match ,Index &amp; Choose</li> <li>Introduction to Pivot table</li> <li>Filter, sort and group PivotTable data</li> <li>Uses of Pivot chart</li> <li>Organizing &amp; Presenting Data Interpretation using Pivot</li> <li>Dashboard</li> </ul>
<b>Unit -V: What if Analysis &amp; Conditional Formatting</b>	
5.1	<ul style="list-style-type: none"> <li>Scenario Managers</li> <li>Data tables</li> <li>Tables</li> <li>Goal seek</li> </ul>



**School of Business Studies**  
**Master of Business Administration**  
**(Corporate Management)**

	<ul style="list-style-type: none"> <li>Conditional formatting using default rules</li> <li>Conditional formatting by user defined rules</li> </ul>
<b>Unit -VII: Excel for Finance</b>	
6.1	<ul style="list-style-type: none"> <li>Basic Financial Function</li> <li>Loan calculation of different duration</li> <li>Capital budgeting</li> <li>Loan amortization</li> <li>Depreciation</li> </ul>
<b>Unit-VII :Views, Printing &amp; Security</b>	
	<ul style="list-style-type: none"> <li>Freeze Panes,</li> <li>Protect sheet</li> <li>Page Layout &amp; Views ( Margins, Break, Background, Landscape, Portrait, Theme colors, Theme effects, Fonts)</li> <li>Printing the sheet</li> <li>Password protection</li> </ul>

**Course Outcomes:**

CO1: Get familiarize with basic to intermediate skills for using Excel in the classroom vis-à-vis Business Applications

CO2: Create a workbook, enter data in a worksheet, format a worksheet, Format numbers in a worksheet, create an Excel table, and Filter data by using an AutoFilter, Sort data by using an AutoFilter

CO3: Apply conditional formatting, print a worksheet, Using Print Preview & Other Utilities

CO4: Use Formulas like VLookup, HLookup, Count, Sum, Subtotal, and Creating Formulas for Financial Applications, Create Charts and Graphics

CO5: Use Custom Number Formats and Data Tab and Data Validation, Use Pivot Tables for Data Analysis

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3					
CO2	3	2		2		1
CO3	3	2				
CO4	3	3				
CO5	3	3			1	

**Textbooks:**

1. Nancy Muir. **Teach Yourself VISUALLY Excel 2007**, Visual; 1 edition, ISBN-10: 0470045957
2. Stephen James Nelson, **Excel Data Analysis for Dummies** ,1st edition, ISBN-10: 047004599X



**School of Business Studies  
Master of Business Administration  
(Corporate Management)**

**1. PERSONAL BRANDING & MASTERING INTERVIEWS**

**Course Objectives:**

1. To understand that personal brand is central to professional success
2. This course provides the students with tools to turn their passions and knowledge into authentic thought leadership
3. Students will learn how to build and leverage their profile to amplify and support the growth of self and organization
4. Attract new business and further their career
5. To develop an orientation towards business etiquettes and the proper etiquette practices for different business scenarios

**Course Outcomes:**

CO1: Develop Recruitment advertisements; utilize profiling techniques by understanding personal brand.

CO2: Understand the leadership & develop the leadership skills

CO3: Design different interviewing method

CO4: Know how to consciously influence themselves and others so as to create productive behaviour's that lead to optimal personal impact

CO5: Adapt business etiquettes and the proper etiquette practices for different business scenarios.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3		1			1
CO2	2					3
CO3	2				3	2
CO4	2				2	2
CO5	2		2		1	2

**Reference Material:**

1. Class Notes, Videos
2. E-Material



**School of Business Studies  
Master of Business Administration  
(Corporate Management)**

**8. PROFESSIONAL COMMUNICATION**

**Course Objective:**

1. The course aims to develop interpersonal, business writing, persuasive writing and speaking, and networking and social media skills among students.
2. To develop Interpersonal Skills for business and personal interaction.
3. To understand and apply the basics of business writing. To learn persuasive writing and speaking.
4. To learn networking skills for business.
5. To learn social media skills for personal branding and growth of business.

Ref No	Topics to Be Covered
<b>Unit 1: Goal Setting</b>	
1.1	<ul style="list-style-type: none"> <li>Why do you need to raise your profile?</li> <li>What benefits can flow from this for you and /or your current business brand?</li> <li>Who is your audience?</li> <li>Set some achievable 12-month targets</li> <li>Understand your strengths, boundaries and natural limitations</li> </ul>
<b>Unit II: Resume Preparation</b>	
2.1	<ul style="list-style-type: none"> <li>Review some successful case studies</li> <li>Select the right photo</li> <li>Summaries your expertise in a compelling way Use your bio to build a bridge to the 'future you'</li> <li>Describe yourself using the language of impact and influence</li> <li>Identify where the long and short versions of your bio need to be used</li> </ul>
<b>Unit III: Set up your online channels</b>	
3.1	<ul style="list-style-type: none"> <li>An overview of key social channels and how and when to use each</li> <li>Upgrade your LinkedIn profile in class and learn future tips and tricks</li> <li>Set-up or upgrade your Twitter channel</li> <li>Set-up your Medium channel</li> <li>Create a plan for Facebook</li> <li>Plan a personal website (if appropriate)</li> </ul>
<b>Unit4: Mastering Interview</b>	
4.1	<ul style="list-style-type: none"> <li>Learn right body language,</li> <li>learn to handle FAQs the right way,</li> <li>Dress right,</li> <li>marketing your strengths,</li> <li>learn NLP techniques for confidence,</li> <li>speech control</li> <li>Learning to make a good impression</li> </ul>
<b>Unit V: Preparations for Interview</b>	
5.1	<ul style="list-style-type: none"> <li>Attitudes and perception building</li> <li>Body language activities &amp; Role Play</li> <li>Psychometric Analysis- identify SWOT</li> <li>Mock Interview Rounds</li> <li>Presentations –Video, audio.</li> <li>Newspaper reading</li> <li>Group Discussion</li> </ul>

**Course Outcomes:**

CO1: Explain Principles of effective Communication and Barriers of Communication.



**School of Business Studies**  
**Master of Business Administration**  
**(Corporate Management)**

CO2: Explain Cross Cultural Dimensions of Business Communication Technology and Communication, Ethical & Legal Issues in Business Communication.

CO3: Explain Principles of Nonverbal Communication.

CO4: Elaborate Principles of Effective Presentations, Principles governing the use of audio-visual media.

CO5: Give managerial speeches such as speech of introduction, speech of thanks, occasional speech, and theme speech and can give presentations.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2				3	
CO2	2		2		2	2
CO3	2				2	
CO4	2				2	2
CO5	3				3	3

**Text Books:**

1. Mishra. B, Sharma. S, Communication Skills for Engineers and Scientists. PHI Learning Pvt. Ltd. ISBN: 8120337190.
2. Chaturvedi P. D, Chaturvedi M. Business Communication: Concepts, Cases and Applications. Pearson Education India. ISBN: 8131718727.
3. Greenbaum. Sidney. College Grammar of English. Longman Publishers. ISBN: 9780582285972.

**Reference Books:**

1. Pal, Rajendra and Korlahalli, J.S. Essentials of Business Communication. Sultan Chand & Sons. ISBN: 9788180547294.
2. Kaul, Asha. Effective Business Communication. PHI Learning Pvt. Ltd. ISBN: 9788120338487.
3. Murphy, R. Essential English Grammar, CUP. ISBN: 8175960299.
4. C. Muralikrishna and S. Mishra, Communication Skills for Engineers, Pearson education. ISBN: 9788131733844.

**Online Dictionary:** <http://www.merriam-webster.com/>

**Online Dictionary:** <http://www.thefreedictionary.com/>



**School of Business Studies  
Master of Business Administration  
(Corporate Management)**

**SUMMER INTERNSHIP REPORT**

**Objective of the Subject:**

1. Internship work is the best way to practice what you have learnt.
2. The purpose of including an Internship project report in the Program is to provide you an opportunity to summarize your learning in a systematic manner.
3. It will enable you to apply your conceptual knowledge in a practical situation and to learn the art of presenting your experience/findings in a coherent report.
4. As managers, you are constantly seeking information to base your decision.
5. The objective is to equip the students with the knowledge of actual functioning of an organization and problems faced by them for exploring feasible solutions.

Ref No.	Topic to be Covered
<b>Unit 1: Introduction</b>	
1.1	<ul style="list-style-type: none"><li>● Summer Internship Report</li><li>● Drafting Guidelines</li><li>● Title Page</li><li>● Internship Completion Certificate</li><li>● Certificate</li><li>● Declaration</li><li>● Acknowledgement</li></ul>
<b>Unit 2: Theoretical Background</b>	
2.1	<ul style="list-style-type: none"><li>● Statement about the problem</li><li>● Objectives</li><li>● Scope of the Study</li><li>● Company Profile</li></ul>
<b>Unit 3: Research Design</b>	
3.1	<ul style="list-style-type: none"><li>● Research Design- Sample,</li><li>● Sampling Technique</li><li>● Sampling Area</li></ul>
<b>Unit 4: Analysis &amp; Findings</b>	
4.1	<ul style="list-style-type: none"><li>● Findings</li><li>● Analysis</li><li>● Recommendations and Conclusions</li></ul>
<b>Unit 5: Final Compilation and Conclusion</b>	
5.1	<ul style="list-style-type: none"><li>● Final Compilation -Guidelines</li><li>● Appendix</li><li>● List of References</li><li>● Bibliography</li><li>● Glossary (optional)</li></ul>

**Outcome**

CO1: During the training, the student is expected to learn about the organization and analyze and suggest solutions to a live problem.

CO2: During the course of training, the organization (where the student is undergoing training) will work on real time scenario

CO3: Will have the knowledge of actual functioning of an organization and problems faced by them for exploring feasible solutions.



**School of Business Studies**  
**Master of Business Administration**  
**(Corporate Management)**


CO4: Will learn how to conduct a research in real problem

CO5: Will learn how to write a professional report and present it.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3					
CO2	3					
CO3	3					
CO4		3				3
CO5					3	

**References**

1. Cooper and Schindler - Business Research Methods (Tata Mc Graw Hill)
2. C. Murthy- Research Methodology (Vrinda Publications)
3. Bhattacharyya-Research Methodology(Excel Books)
4. Panneer Selvam - Research Methodology (Prentice Hall of India)



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## SEMESTER- 3&4

SEMESTER 3 and 4			
No.	Subject Name & Title	Type	Credits
FINANCE			
1.	Introduction to Financial Markets & Institutions		
2.	Corporate Finance & Asset Management		
3.	Financial Planning & Wealth Management		
4.	Financial Analysis		
Banking, Financial Services and Insurance BFSI			
5.	BFSI Products		
6.	Introduction to Retail Banking		
7.	Current Account & Savings Account (CASA)		



**School of Business Studies  
Master of Business Administration  
(Corporate Management)**

8.	Insurance Management and Wealth Management		
<b>MARKETING</b>			
9.	Brand Management		
10.	New Businesses in Emerging Market		
11.	Marketing Analytics		
	International Marketing		
<b>DIGITAL MARKETING</b>			
	Website Planning, SEO and SEM		
14.	Social Media Marketing		
15.	Email Marketing - ORM , Email		
16.	Marketing Data Tools and Techniques		
<b>SALES MANAGEMENT</b>			
17.	Sales Management		
18.	Sales Processes		
19.	Sales Systems		
20.	Managerial Skills For Sales		



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JECRC University, Jaipur-303905

**School of Business Studies  
Master of Business Administration  
(Corporate Management)**

<b>OPERATIONS Management</b>			
<b>21.</b>	<b>Advanced Operations Management</b>		
<b>22.</b>	<b>Operations Research</b>		
<b>23.</b>	<b>Quality Management Standards and Six Sigma</b>		
<b>24.</b>	<b>Operations Analytics /Services Management in Key Sectors</b>		
<b>LOGISTICS AND SUPPLY CHAIN Management</b>			
<b>25.</b>	<b>LOGISTICS MANAGEMENT</b>		
<b>26.</b>	<b>Supply Chain Management</b>		
<b>27.</b>	<b>Inventory Management &amp; Delivery Efficiency</b>		
<b>28.</b>	<b>Technology in Logistics &amp; Supply Chain</b>		
<b>RETAIL MANAGEMENT</b>			
<b>29.</b>	<b>Introduction To Retail Management</b>		
<b>30.</b>	<b>Retail Planning &amp; Branding</b>		
<b>31.</b>	<b>Strategy &amp; Finance In Retail</b>		
<b>32.</b>	<b>Digital Commerce</b>		
<b>Human Resource Management</b>			



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JECRC University, Jaipur-303905

**School of Business Studies  
Master of Business Administration  
(Corporate Management)**

33.	Human Resource Management		
34.	Recruitment		
35.	Employee Life Cycle & Organisational Development		
	Compensation and Benefits		
IT, Analytics & Research			
36.	Data Analytics-I		
37.	Data Analytics-II		
38.	Business Research		
39.	Strategic Technology Management		
ABILITY ENHANCEMENT			
40.	Summer INTERNSHIP REPORT		
	BUSINESS ETHICS AND BUSINESS LAWS		

## FINANCE

### INTRODUCTION TO FINANCIAL MARKETS & INSTITUTIONS

**Course Objective:**



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**School of Business Studies**  
**Master of Business Administration**  
**(Corporate Management)**

1. This course will provide an understanding of the functions, and operations of the –financial markets and institutions operating in India.
2. It explains the role of –financial system on economic development.
3. The role of regulatory bodies, mechanism of commercial banking, operations of insurance companies and mutual funds are discussed elaborately.
4. Describes the working of Money, Debt and Equity Market.
5. Introduction to Various investments instruments.

<u>Ref No</u>	<b>Topics to be covered</b>
<b>Unit 1: Financial System of India: Functions and Structure</b>	
<u>1.1</u>	<ul style="list-style-type: none"> <li>● Introduction</li> <li>● Functions of Financial System</li> <li>● Structure of Indian Financial System</li> <li>● Role and Segments of Financial Markets</li> </ul>
<b>Unit II: Financial and Capital Market Intermediaries and Developments in Financial System</b>	
<u>2.1</u>	<ul style="list-style-type: none"> <li>● Financial Intermediaries and Its Role</li> <li>● Capital Market Intermediaries and Its Role</li> <li>● Developments in Financial System</li> </ul>
<b>Unit III: Indian Money Market</b>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

3.1	<ul style="list-style-type: none"> <li>• Features and Functions of Money Market</li> <li>• Money Market Instruments and Participants</li> <li>• Repo Market, CBLO and Issues in Money Market</li> </ul>
Unit4: Indian Debt Market	
4.1	<ul style="list-style-type: none"> <li>• <u>Debt Instruments and Government Debt Market</u></li> <li>• <u>Corporate Debt Market</u></li> <li>• <u>Primary Market</u></li> <li>• <u>Market Composition and Secondary Market</u></li> </ul>
<u>Unit V: Indian Equity Market</u>	
5.1	<ul style="list-style-type: none"> <li>• <u>Types of Shares</u></li> <li>• <u>Issue of Shares at Par, Discount and Premium</u></li> <li>• <u>Primary Market</u></li> <li>• <u>Initial Public Offering through Book Building Method</u></li> <li>• <u>Difference between Book Building and Normal Public Issue</u></li> </ul>

**Course Outcome:**

**CO1: Identify the functions of financial markets**



School of Business Studies  
Master of Business Administration  
(Corporate Management)

**CO2: Apply concepts relevant to financial markets and financial institutions, such as the flow of funds, levels of interest rates and interest rate differentials, to current events or topical issues.**

**CO3: Determine and analyze the appropriate measures of risk and return for various financial instruments. Understand the mechanics and regulation of financial securities exchanges and determine how the value of stocks, bonds, and securities are calculated.**

**CO4: Research and analyse specific problems or issues related to financial markets and institutions.**

**CO5: Explore the international integration of international financial markets and analyze the implications for financial managers.**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>					
<u>CO2</u>	<u>2</u>					
<u>CO3</u>	<u>2</u>	<u>2</u>		<u>1</u>		
<u>CO4</u>	<u>3</u>	<u>2</u>				
<u>CO5</u>	<u>2</u>		<u>3</u>			<u>3</u>

**Textbooks**

1. **Foundations of Financial Markets and Institutions, Frank J. Fabozzi, Franco P. Modigliani, and Frank J. Jones**
2. **An Introduction to Financial Markets and Institutions - Maureen Burton, Reynold F. Nesiba, Bruce Brown**

**Reference:**

1. **Financial Institutions & Markets, Bhole - 2016**Financial Modelling in practice: by Michael Rees



**CORPORATE FINANCE AND ASSET MANAGEMENT**

**Course Objective:**

1. The course introduced the concept and best practices of corporate finance and assets management.
2. Explain what Asset Management is and how it can contribute to the realization of the corporate strategy of your organization
3. Understand the content and value of ISO 55000, the international standard on Asset Management
4. Apply 'Good Asset Management Practice', starting with foundations and building up to best practices that will deliver maximum business benefits
5. To be able to understand basics of Money.

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Corporate Finance</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Time Value of Money</u></li><li>● <u>Interest Rates</u></li><li>● <u>Cost of Capital</u></li><li>● <u>CAPM</u></li></ul>
<u>Unit II: Principals of Asset Management</u>	





School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Asset Management as a Business Process</u></li><li>● <u>Asset Management Scope &amp; Definitions</u></li><li>● <u>Asset Management Conceptual Model</u></li><li>● <u>Asset Management Strategy &amp; Planning</u></li><li>● <u>Asset Management Roles - about roles, expectations and responsibilities</u></li><li>● <u>ISO 550000 – The International Standard on Asset Management</u></li></ul>
<u>Unit III: Assessing &amp; Managing Asset Management Risks</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Identification and Assessment of Risk</u></li><li>● <u>Risk in Asset Management</u></li><li>● <u>Significance of Risk</u></li><li>● <u>Stakeholder Risks</u></li><li>● <u>Risk on Asset Level</u></li></ul>
<u>Unit4: Asset Management Policy, Strategy and Planning</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>4.1</u>	<ul style="list-style-type: none"><li>● <u>Asset Management Policy</u></li><li>● <u>Developing (Strategic) Asset Management Plan(s)</u></li><li>● <u>Implementing (Strategic) Asset Management Plan(s)</u></li><li>● <u>Long Term Maintenance &amp; Investment Planning</u></li><li>● <u>Renewal, Disposal and Lifetime Extension</u></li><li>● <u>Sourcing &amp; Outsourcing</u></li></ul>
<u>Unit V: Financial &amp; Business Impact of Asset Management</u>	
<u>5.1</u>	<ul style="list-style-type: none"><li>● <u>Financial Management – Basics</u></li><li>● <u>Budgeting</u></li><li>● <u>Life Cycle Costing</u></li><li>● <u>The Business Case for Asset Management</u></li></ul>

**Course Outcome:**

- CO1: Explain and be able to communicate the nature of corporate finance in an academic or a business forum;**
- CO2: Distinguish different types of business structure, identify the major corporate financial decisions and corporate objective, and describe some important basic concepts**
- CO3: Be able to perform time-value calculations by using financial mathematics;**
- CO4: Explain how to value a firm and apply skills in evaluation debt and equity securities;**
- CO5: Explain the nature of interest rate risk and describe the theories that are used to explain the term structure of interest rates;**



School of Business Studies  
Master of Business Administration  
(Corporate Management)

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>1</u>				<u>3</u>	<u>2</u>
<u>CO2</u>	<u>3</u>	<u>1</u>			<u>2</u>	
<u>CO3</u>	<u>2</u>	<u>2</u>				
<u>CO4</u>		<u>3</u>	<u>1</u>	<u>2</u>		<u>3</u>
<u>CO5</u>	<u>3</u>	<u>3</u>				<u>2</u>

**Textbooks:**

1. Corporate Finance Jonathan Berk and Peter DeMarzo, 3rd ed., Pearson - Prentice Hall, 2014. (SBN-10: 0-13-342415-4; ISBN-13: 978-0-13- 342415-7)

**Reference:**

1. Brigham, E. F and Huston J. F. Fundamentals of Financial Management, Concise 7th edition, South Western, 2011.
2. Brealey, R., Myers, S., and Allen, F., Principles of Corporate Finance, McGraw-Hill, 10th edition, 2011

**FINANCIAL ANALYSIS**

**Course Objective:**

1. The fundamental theories and practices of valuation analysis, strategy analysis, prospective analysis,
2. DCF modeling, trading comparables and transaction comparables.
3. Project evaluation and costing
4. Modeling through Excel to create financial model.
5. The intensive instruction and training to successfully compete in rapidly developing global financial markets.



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Introduction to Financial analysis and modelling</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>What is financial modelling?</u></li><li>● <u>Application of Financial modelling</u></li><li>● <u>Roles in financial modelling</u></li><li>● <u>Tools in Financial modelling</u></li></ul>
<u>Unit II: Financial Statement Analysis</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to Financial Statement Analysis</u></li><li>● <u>Financial Reporting Mechanics,</u></li><li>● <u>Understanding Income Statement, Balance Sheet, Cash Flow Statement,</u></li><li>● <u>Inventories, Long Lived Assets,</u></li></ul>
<u>Unit III: Financial Ratios</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Ratio analysis of industries</u></li><li>● <u>Du point Analysis</u></li><li>● <u>Peer to peer analysis</u></li><li>● <u>Preparation of Financial Analysis report on an industry</u></li></ul>
<u>Unit4: Project Finance modelling</u>	
<u>4.1</u>	<ul style="list-style-type: none"><li>● <u>Project evaluation; stage of project; construction &amp; development phase; funding during investment phase</u></li><li>● <u>Costs during investment phase</u></li><li>● <u>Life of project</u></li></ul>
<u>Unit V: Financial Modelling and projections</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>5.1</u>	<ul style="list-style-type: none"> <li>• <u>Prepare an Income Statement, Balance sheet, Cash Flow Statement, Geographic Revenue Sheet, Segment Revenue Sheet, Cost Statement, Debt Sheet, Analyze Revenue Drivers</u></li> <li>• <u>Forecast Geographic &amp; Segment Revenues, Cost Statement, Debt, Income Statement, Balance Sheet, and Cash Flow Statement.</u></li> <li>• <u>Cash Flow Statement Projection, Valuation- Discounted Cash Flow Method (DCF), Valuation – Relative Valuation (Football Field Chart)</u></li> <li>• <u>Valuation – Assumptions for Valuation Model, Prepare Valuation Model, Prepare Presentation Sheet, Prepare Company Overview , Sector Overview</u></li> </ul>
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**Course Outcome:**

CO1: The programme is designed to offer students the intensive instruction and training needed to successfully compete in rapidly developing global financial markets.

CO2: Modelling through Excel will build enough confidence in the participants so that they are able to create their own financial model.

CO3: Able to prepare simple financial statements

CO4: Able to analyses company performance using basic ratios

CO5: Aware of costing and budgeting techniques to maintain efficiency and profitability

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>1</u>	<u>3</u>				<u>2</u>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>C02</u>		<u>3</u>			<u>2</u>	<u>2</u>
<u>C03</u>	<u>2</u>			<u>1</u>		<u>1</u>
<u>C04</u>	<u>1</u>	<u>3</u>			<u>1</u>	
<u>C05</u>		<u>3</u>			<u>2</u>	<u>3</u>

**Textbooks**

1. Financial Modelling (MIT Press), 3rd Ed. (ISBN-13: 978-0262027281)
2. Financial Modeling, 3rd Edition, by Simon Benninga (Acronym SB) MIT Press, 3rd Edition, 2008, ISBN: 978-0-262-02628-4.

**Reference:**

1. Special Edition Using Microsoft Excel 2000 by Blattner, Ulrich, Cook, and Dyck (QUE Macmillan). This is a very complete reference for using Excel.
2. Financial Modelling in practice: by Michael Rees

**FINANCIAL PLANNING & WEALTH MANAGEMENT**

**Course Objective:**

1. This module would serve as an introduction to Financial Planning and Wealth Management
2. Financial Planning process, client interactions, time value of money applications, personal financial statements, cash flow and debt management, asset acquisition, education planning.
3. Overview of risk management.
4. The unit would further focus on dynamics of Wealth Management Industry especially in the context of global space.
5. Investment planning and retirement planning, special circumstances, plan integration, ethics, and business aspects of Financial Planning.



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School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Ref No.</u>	<u>Topics to be Covered</u>
<u>Unit 1: Introduction to Financial Planning &amp; Wealth Management</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Concept of Financial Planning and Wealth Management</u></li><li>● <u>Financial Planning Process</u></li><li>● <u>Developing a Wealth Management Plan</u></li></ul>
<u>Unit 2: Personal Financial Statement Analysis</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Steps in Personal Money Management</u></li><li>● <u>Strategy for Cash Management</u></li><li>● <u>Aim of a Cash Flow Statement</u></li><li>● <u>Budgeting for Skilled Money Management</u></li></ul>
<u>Unit 3: Economic environment and indicators</u>	





School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>3.1</u>	<u>Inflation/ deflation</u>  <u>Interest rates/yield curves</u>  <u>Equity investment and real return</u>  <u>Government monetary and fiscal policy</u>  <u>The impact of business cycles</u>  <ul style="list-style-type: none"> <li>● <u>Key Indicators – lagging, concurrent and leading</u></li> </ul>
<u>Unit 4: Assessment of risk and client behaviour</u>	
<u>4.1</u>	<ul style="list-style-type: none"> <li>● <u>Client attitudes</u></li> <li>● <u>Client knowledge</u></li> <li>● <u>Client behaviour</u></li> <li>● <u>Health of client</u></li> <li>● <u>Occupation</u></li> <li>● <u>Hazardous activities</u></li> </ul>
<u>Unit 5: Ethical and professional considerations</u>	
<u>5.1</u>	<ul style="list-style-type: none"> <li>● <u>The Code of Ethics and Professional Responsibility</u></li> <li>● <u>Responsibilities to the public, clients and employers</u></li> <li>● <u>Client agreements and confidentiality clauses</u></li> </ul>

**Course Outcome:**

CO1: Understanding of where to implement the Financial Planning and Wealth Management process.

CO2: Understand the economic, social, political, and technological environment and be able to determine how Financial Plans should accommodate those environments.

CO3: Describe the process of creation of a Wealth Management Plan and understand the integral components of a Wealth Management Plan.



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School of Business Studies  
Master of Business Administration  
(Corporate Management)

**CO4: Describe the nature of the Client by performing a Risk Profiling Test and Develop understanding about the nature of information to be ascertained from the client**

**CO5: Understand basic investment topics (including investment types, risk and return, diversification, passive versus active management, Establish the relationship of Inflation and Risk viz. a viz. time value of money) and specific investment strategies.**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>	<u>2</u>			<u>1</u>	
<u>CO2</u>	<u>2</u>	<u>3</u>			<u>2</u>	<u>1</u>
<u>CO3</u>	<u>2</u>	<u>3</u>			<u>2</u>	
<u>CO4</u>	<u>2</u>	<u>3</u>				<u>1</u>
<u>CO5</u>	<u>3</u>					

1. Wealth Management, by Dun & Bradstreet – 2009

2. Wealth Management & Financial Planning: Concepts & Practices, Balaji Rao DG - 2015

**Reference**

1. Khan M.Y, Financial Services, Tata McGraw Hill

2. Investment Analysis and Portfolio Management, Prasanna Chandra - 2017

**Banking, Financial Services and Insurance (BFSI)**

**BFSI Products**



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## **Introduction to Retail Banking**

### **Course Objectives:**

1. Key concepts and issues in bank management
2. Introduction to Banking structure to students.
3. Debit products, loan products and ancillary services in banking.
4. Procedures documents requirement to do investments with banks
5. Different Transactions in Bank

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Introduction to banking and Banking Structure</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Evolution</u></li><li>● <u>Classification</u></li><li>● <u>RBI as a bank regulator</u></li></ul>
<u>Unit 2: Deposit products</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction</u></li><li>● <u>Demand Drafts</u></li><li>● <u>Customer Identification-KYC Guidelines, Procedure and requirements</u></li><li>● <u>Introduction to banking and Banking Structure</u></li></ul>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<b><u>Unit 3: Loan Products and Modes of Creating Charge on Secured Advances</u></b>	
<b><u>3.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Introduction to Credit Facility</u></b></li><li>● <b><u>Types of Loan Schemes</u></b></li><li>● <b><u>Eligibility and Documentation</u></b></li><li>● <b><u>RBI guidelines</u></b></li></ul>
<b><u>Unit 4: Ancillary Services in Banking</u></b>	
<b><u>4.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Channels of services</u></b></li></ul>
<b><u>Unit 5: Branch Banking</u></b>	
<b><u>5.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Transactions in a bank branch</u></b></li><li>● <b><u>Customer Service</u></b></li></ul>

**Course Outcome:**

**CO1: The students will understand key concepts and issues in bank management.**

**CO2: This course is designed to introduce Banking structure to students.**

**CO3: Students will understand about the debit products, loan products and ancillary services in banking.**

**CO4: Able to do banking transactions at bank branches.**

**CO5: Understanding about various banking products and procedures to invest.**



School of Business Studies  
Master of Business Administration  
(Corporate Management)

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>				<u>2</u>	<u>1</u>
<u>CO2</u>	<u>2</u>					
<u>CO3</u>	<u>3</u>			<u>1</u>		
<u>CO4</u>		<u>1</u>			<u>2</u>	<u>1</u>
<u>CO5</u>	<u>3</u>	<u>2</u>				<u>1</u>

**Textbooks:**

1. Commercial Bank Management, Kanhiyala Singh, Vinay Dutta
2. Bank Management & Financial Management, Peter S Rose, Sylvia C. Hudgins

**References:**

1. Srivastava, Divya Nigam, Management of Indian Financial Institutions, Himalaya Publishing House.
2. M. Y. Khan, Indian Financial System, Tata McGraw Hill.
3. Bharati Pathak, Indian Financial System,

**Current Account & Savings Account (CASA)**

**Course Objective:**

1. Understanding about the field of banking and insurance.
2. Introduction insurance products, capital market products
3. Marketing of BFSI products
4. Understanding of life insurance products
5. Types of Health insurance products



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Ref No.</u>	<u>Topics to be Covered</u>
<u>Unit 1: Life Insurance Products</u>	
<u>1.1</u>	● <u>Types of life insurance products</u>
<u>Unit 2: General Insurance products in life and business</u>	
<u>2.1</u>	● <u>Different classes of general insurance</u>
<u>Unit 3: Health Insurance, nature and products</u>	
<u>3.1</u>	● <u>Different Health insurance products</u>
<u>Unit 4: Capital Market products</u>	
<u>4.1</u>	● <u>Different capital market instruments and their utility</u>
<u>Unit 5: Marketing of BFSI products</u>	
<u>5.1</u>	● <u>Strategies of Marketing of BFSI products</u>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

**Course Outcome:**

- CO1:**     **Able to understand the field of banking and insurance.**  
**CO2:**     **Understanding of insurance products, capital market products**  
**CO3:**     **Able to understand market of BFSI products**  
**CO4:**     **Able to apply strategies of marketing of insurance products**  
**CO5:**     **Understanding of Health insurance products**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>			<u>2</u>		<u>2</u>
<u>CO2</u>	<u>2</u>				<u>2</u>	<u>2</u>
<u>CO3</u>	<u>3</u>					
<u>CO4</u>		<u>3</u>			<u>2</u>	
<u>CO5</u>	<u>1</u>	<u>3</u>		<u>1</u>		

- 1. Banking and Insurance: Principles and Practices, Neelam Gulati**
- 2. Elements of Banking and Insurance, Jyotsna Seth and Nishwan Bhatia**

**Reference**

- 1. Khan M.Y, Financial Services, Tata McGraw Hill**

**INSURANCE MANAGEMENT**

**Course Objective:**

- 1. Fundamentals and applications of both Life and Non-life insurance.**
- 2. Providing a thorough knowledge of Risk assessment and Insurance fundamentals.**



School of Business Studies  
Master of Business Administration  
(Corporate Management)

- 3. Facilitation to understand different type of insurance businesses and their features
- 4. Leading them to an in-depth understanding of the characteristics of Indian market
- 5. Making participants to understand the challenges and operational realities in social/economic/regulatory with specific reference to India

<u>Ref No.</u>	<u>Topics to be Covered</u>
<u>Unit 1: Insurance and Risk Analysis</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Meaning and objective of risk analysis</u></li><li>● <u>Risk control and risk financing</u></li><li>● <u>Basic characteristics of insurance – pooling of losses, risk transfer, indemnification</u></li><li>● <u>Requirements of insurable risks</u></li></ul>
<u>Unit 2: Fundamental Principles of Insurance</u>	





School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Principle of Indemnity</u></li><li>● <u>Insurable Interest</u></li><li>● <u>Utmost Good Faith</u></li><li>● <u>Principle of Subrogation</u></li><li>● <u>Contribution</u></li><li>● <u>Proximate Cause</u></li></ul>
<u>Unit 3: Life Insurance – Analysis of Life Cover, Strategies and Products</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Human life approach</u></li><li>● <u>Needs approach</u></li><li>● <u>Capital needs analysis approach</u></li><li>● <u>Life insurance policy Selection and analysis</u></li></ul>
<u>Unit 4: General Insurance - Property, Health and Liability Insurance</u>	
<u>4.1</u>	<ul style="list-style-type: none"><li>● <u>Personal Property &amp; Liability Insurance</u></li><li>● <u>Health and Personal Accident Insurance</u></li><li>● <u>Some Popular Terms used in Health Insurance Policies</u></li><li>● <u>Analysis and Selection of Insurance Products and Its Provider</u></li></ul>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Unit 5: Regulatory Framework of Insurance</u>	
<u>5.1</u>	<ul style="list-style-type: none"> <li>● <u>Regulation Relating Insurance</u></li> <li>● <u>Insurance Intermediaries</u></li> <li>● <u>Important Terms in Insurance Contract</u></li> <li>● <u>Insurance Mathematics</u></li> </ul>

**Course Outcome:**

**CO1: Describe History and overview of Insurance Sector in India**

**CO2: Identify Purpose and need of Insurance...**

**CO3: Elucidate the basic sections of Insurance Contracts, Understand additional Insurance Contract Provisions and appreciate the distinct legal characteristics of Insurance Contracts**

**CO4: Describe the Human Life Value Approach in detail**

**CO5: Understand the different types of Insurance Policies on the basis of various criteria**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>					
<u>CO2</u>		<u>3</u>			<u>1</u>	
<u>CO3</u>	<u>3</u>				<u>2</u>	
<u>CO4</u>		<u>3</u>	<u>1</u>		<u>2</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>CO5</u>	<u>3</u>					
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**Textbooks**

1. Banking and Insurance: Principles and Practices, Neelam Gulati
2. Elements of Banking and Insurance, Jyotsna Seth and Nishwan Bhatia

**Reference**

1. Khan M.Y, Financial Services, Tata McGraw Hill
2. Risk Management And Insurance: Perspectives In A Global Economy, Harold D. Skipper/w. Jean Kwon - 2008

## **Marketing Management**

### **BRAND MANAGEMENT**

**Course Objective:**

1. Understanding of Brand image and its Value
2. To understand concept of creating a Brand
3. Types of Brand
4. To understand practical aspect of BCG matrix
5. To know about Buying behaviour

<u>Ref No.</u>	<u>Topics to be Covered</u>
<u>Unit 1: Brand</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Understanding brand</u></li><li>● <u>Myths about Branding</u></li><li>● <u>Brand Positioning</u></li><li>● <u>Brand Loyalty</u></li><li>● <u>Brand Extension, Co-Branding, Multi-brand</u></li></ul>
<u>Unit 2: BCG Matrix</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Components of BCG Matrix</u></li><li>● <u>Quadrants of BCG Matrix</u></li><li>● <u>Applications of BCG Matrix</u></li></ul>
<u>Unit 3: Stimuli Response Model of Buying Behaviour</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Buyers Characteristics</u></li><li>● <u>Buyers Decision Process</u></li></ul>

**Course Outcome:**

CO1: Able to have practical approach towards understanding of Brand image and its Value

CO2: Concept clarity for creating a Brand

CO3: Will be able to comprehend different types of Brand

CO4: Apply and decipher practical aspect of BCG matrix

CO5: Understand and apply Model Buying behaviour



School of Business Studies  
Master of Business Administration  
(Corporate Management)

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>				<u>2</u>	
<u>CO2</u>	<u>3</u>				<u>2</u>	
<u>CO3</u>	<u>2</u>	<u>3</u>	<u>2</u>			
<u>CO4</u>		<u>1</u>				<u>3</u>
<u>CO5</u>		<u>2</u>	<u>2</u>			<u>3</u>

**Textbooks:**

1. Philip Kotler-Agrihotri: Principle of marketing 13 e, Pearson Education
2. Rajan Saxena: Marketing Management, Tata McGraw Hill


**References:**

1. U.C. Mathur, Product and Brand Management, Excel Books, New Delhi.
2. Harsh V. Verma, Brand Management, Excel Books, New Delhi.Tapan
3. K. Panda, Building Brands in the Indian Market, Excel Books, New Delhi.
4. Kapferer, Strategic Brand Management, Kogan Page, New Delh

**Creating and Managing New Businesses in Emerging Market**

**Course Objective:**

1. Classify the prevalent digital business models into various groups
2. Outline their benefits and limitations
3. Exposure to Real case scenarios
4. Understanding of Marketing strategy in Digital world
5. How to gain and attract customer online



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Introduction</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>What is a business model?</u></li><li>● <u>Digital as a Business Model</u></li><li>● <u>Digital Business Models in practice – Toothbrush Innovation</u></li></ul>
<u>Unit II: Case Studies of various Business Models</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Internet Companies using Digital Models</u></li><li>● <u>Amazon Business Model</u></li><li>● <u>OLX Business Model</u></li><li>● <u>Business Models of Apple and Google</u></li><li>● <u>Business Models of Xiaomi</u></li><li>● <u>Business Model of WeWork</u></li><li>● <u>Asymmetric business models – creating unfair advantage</u></li></ul>
<u>Unit III: Marketing Strategies of various Business Models</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>3.1</u>	<ul style="list-style-type: none"> <li>● <u>Marketing Strategy (MS) of Walmart</u></li> <li>● <u>MS – Xiaomi vs. One Plus</u></li> <li>● <u>MS – Amazon vs. Alibaba</u></li> <li>● <u>MS – OLX</u></li> <li>● <u>MS – Snapdeal</u></li> <li>● <u>Entry of Amazon in India</u></li> </ul>
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**Course Outcome:**

**CO1: The student will be able to understand the various business models used in the digital environment.**

**CO2: It will help the student differentiate between the seemingly same e-commerce websites**

**CO3: And understand how they gain and attract consumers**

**CO4: Comprehend strategies used by companies in real scenario**

**CO5: Case Studies help them to comprehend models used**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>			<u>2</u>		
<u>CO2</u>	<u>3</u>				<u>2</u>	
<u>CO3</u>		<u>3</u>	<u>1</u>		<u>2</u>	
<u>CO4</u>		<u>1</u>				<u>2</u>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>C05</u>		<u>2</u>	<u>2</u>		<u>2</u>	<u>3</u>
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1. Annabeth Aagaard - Digital Business Models Driving Transformation and Innovation, Palgrave Macmillan
2. Introduction to E Commerce & Social Commerce, Turban E , Whiteside J , King D, Outland J Springer

**References:**

1. E-Business and E-Commerce Management- Strategy, Implementation and Practice, Dave Chaffey, Pearson Education.
2. Electronic Commerce – A Managerial Perspective, Efraim Turban, David King, Dennis Viehland, Jae Lee, Pearson Education

## Marketing Analytics

**Course Objective:**

1. This course intends to provide an experienced-based approach in sizing the market and its practical applications.
2. To learn basics of market sizing
3. Different terms associated to market sizing, approaches
4. Calculating the market size.
5. An applications oriented perspective.

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Introduction to Market Sizing</u>	



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Faculty of Management  
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School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to Marketing Sizing, Important technologies</u></li><li>● <u>How we determine Market Sizing</u></li><li>● <u>Data Collection and its types</u></li><li>● <u>Importance, Impact, Role of Market Size</u></li></ul>
<u>Unit 2: Interlinked Concepts Affecting Market Sizing</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Market Penetration and its strategies</u></li><li>● <u>Market Share and its calculation</u></li><li>● <u>Market Potential and its Importance</u></li></ul>
<u>Unit 3: Final Outcomes by Approaches</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Approach of Market Sizing</u></li><li>● <u>Top Down Approach</u></li><li>● <u>Bottom-Up Approach</u></li><li>● <u>Competition Analysis Approach</u></li><li>● <u>Golden Rule of Market Sizing</u></li></ul>

Course Outcome:

CO1: Ability to comprehend sizing of the market and its practical applications.

CO2: Clarity of market sizing concept,



School of Business Studies  
Master of Business Administration  
(Corporate Management)

**CO3:** Knowledge about different terms associated to market sizing.

**CO4:** Ability to calculate the market size.

**CO5:** Will be able to practically apply Market sizing approaches

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>	<u>1</u>				<u>2</u>
<u>CO2</u>					<u>2</u>	<u>2</u>
<u>CO3</u>	<u>1</u>				<u>2</u>	<u>1</u>
<u>CO4</u>		<u>1</u>				
<u>CO5</u>		<u>2</u>	<u>2</u>	<u>2</u>		<u>1</u>

**Textbooks:**

1. Philip Kotler-Agrihotri: Principle of Marketing 13 e, Pearson Education
2. Rajan Saxena: Marketing Management, Tata McGraw Hill

**References:**

1. Ramaswamy V.S. and Namkumari S- marketing Management: Planning, Implementation and Control (Macmillian, 3<sup>rd</sup> Edition)
2. R Kumar& Goel- Marketing Management (UDH Publishers, edition 2013)
3. Tapan Panda: Marketing Management (ExcelBooks)
4. Stanton William J- Fundamentals of Marketing (TATA Mc Graw Hill)
5. Eztel M.J., Walker B.J. and Stanton William J- Marketing concepts & Cases special Indian edition (Tata McGraw Hill)

**International Marketing**



## Digital Marketing

### Website Planning, SEO and SEM

#### Course Objective:

1. Search Engine Optimization (SEO) theory and its practical application.
2. To explore the underlying theory and inner workings of search engines;
3. To Understand the role of social media, user data and links;
4. And to discover tools to track results and measure success.

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Introduction</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>World Wide Web</u></li><li>● <u>Introduction to SEO</u></li><li>● <u>How search engine works</u></li></ul>
<u>Unit 2</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>2.1</u>	<ul style="list-style-type: none"> <li>● <u>SEO Research and Analysis</u></li> <li>● <u>On Site and Off Site Optimization</u></li> <li>● <u>Content Optimization</u></li> <li>● <u>Google Analytics</u></li> </ul>
<u>Unit 3</u>	
<u>3.1</u>	<ul style="list-style-type: none"> <li>● <u>Website Analytics</u></li> <li>● <u>SEO Tools/Google Tools</u></li> <li>● <u>Demand of SEO in Market</u></li> </ul>

**Course Outcome:**

CO1: Proficient use of World wide web

CO2: Able to use SEO to track results and measure

CO3: Ability to use Google analytics to enhance online visibility

CO4: Efficient use of social media platforms to increase business

CO5: Applying concepts to increase digital presence

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>		<u>3</u>		<u>2</u>		
<u>CO2</u>	<u>3</u>	<u>2</u>		<u>3</u>	<u>2</u>	



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School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>CO3</u>	<u>1</u>	<u>3</u>		<u>2</u>		<u>1</u>
<u>CO4</u>		<u>2</u>		<u>2</u>		
<u>CO5</u>		<u>3</u>	<u>1</u>	<u>2</u>		<u>1</u>

1. Jacqui Carrel : Search Engine Optimisation
2. Aaron Matthew Wall : Search Engine Optimization

**References:**

3. Eric Enge, Stephan Spencer, and Jessie C. Stricchiola : The Art of SEO Mastering Search Engine Optimization, O'Reilly

**Email Marketing - ORM , Email**

**Course Objective:**

1. Understanding Digital Marketing from industry point of view.
2. Enabling students to relate all the digital marketing in and around them with the basic concepts.
3. Understand and plan content for online marketing;
4. Learn how to use social media to meet organisation's acquisition and brand objectives;
5. Learn to incorporate best social media practices into marketing campaign

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Introduction</u>	
<u>1.1</u>	<ul style="list-style-type: none"> <li>● <u>Overview</u></li> <li>● <u>Career in Digital Marketing</u></li> </ul>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<b><u>Unit 2: Email Marketing</u></b>	
<b><u>2.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Email Marketing-Introduction</u></b></li><li>● <b><u>Effective E-mail Campaigns</u></b></li><li>● <b><u>Mail Chimp</u></b></li></ul>
<b><u>Unit3: Social Media Marketing</u></b>	
<b><u>3.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Facebook</u></b></li><li>● <b><u>Instagram</u></b></li><li>● <b><u>Google Ads</u></b></li><li>● <b><u>YouTube</u></b></li><li>● <b><u>LinkedIn</u></b></li><li>● <b><u>Ad exchange: Taboola and InMobi</u></b></li><li>● <b><u>TikTok</u></b></li></ul>
<b><u>Unit 4: Affiliate Marketing</u></b>	
<b><u>4.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Affiliate Marketing-Introduction</u></b></li><li>● <b><u>Case Study</u></b></li></ul>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

**Course Outcome:**

- CO1: Explain the role of Facebook, Google Ad words, YouTube and Email in digital marketing.**  
**CO2: Make use of Facebook, Google Ad words, YouTube and Email for carrying out digital marketing of real life products.**  
**CO3: Illustrate the use of Facebook, Google Ad words, YouTube and Email in various contexts of Digital Marketing.**  
**CO4: Design digital media campaign using appropriate mix of Facebook, Google Ad words, YouTube and Email.**  
**CO5: Create appropriate content for Facebook, Google Ad words, Youtube and Email campaigns.**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>			<u>2</u>		<u>2</u>
<u>CO2</u>			<u>1</u>	<u>2</u>	<u>2</u>	<u>2</u>
<u>CO3</u>	<u>1</u>	<u>3</u>		<u>1</u>		
<u>CO4</u>		<u>1</u>		<u>2</u>		
<u>CO5</u>		<u>2</u>	<u>3</u>	<u>2</u>		

- 1. Fundamentals of Digital Marketing, Puneet Bhatia**
- 2. Dan Zarrella, The Social Media Marketing Book, O'Reilly Media; 1 edition, 2009**
- 3. Tim Kitchen, Tashmeem Mirza, Profitable Social Media Marketing: Growing your business using Facebook, Twitter, Google+, LinkedIn and more, Exposure Publishing; 1 edition, 2013**

**Reference**

- 1. Liana Li Evans, Social Media Marketing : Strategies for Engaging in Facebook, Twitter & Other Social Media, Que Press; First edition, 2010**
- 2. Barker, Social Media Marketing: A Strategic Approach, Cengage; 01 edition, 2013**



## Social Media Marketing

### Course Objective:

1. This course aims to give you a rapid orientation around the key elements of successful and compliant Social Media.
2. Its focus is on the marketing part of Social Media marketing rather than the different technologies,
3. Services, platforms and tools that are needed to execute Social Media
4. Understand and plan content for online marketing;
5. Learn how to use social media to meet organisation's acquisition and brand objectives;

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Introduction to Internet</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>What is internet</u></li><li>● <u>Introduction to Social Media</u></li></ul>
<u>Unit 2: Social Media Types and Tools</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Defining Social Media</u></li><li>● <u>Social Media Types, purpose, and tools</u></li><li>● <u>Social Media Strategy</u></li></ul>
<u>Unit 3: Online Advertising</u>	





School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>3.1</u>	<ul style="list-style-type: none"> <li>● <u>Introduction to Online Advertising</u></li> <li>● <u>Monitoring Online Advertising</u></li> <li>● <u>Social CRM</u></li> <li>● <u>Types of Social CRM</u></li> <li>● <u>Sentiment Analysis</u></li> </ul>
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**Course Outcome:**

**CO1: Ability to incorporate best social media practices into marketing campaign**

**CO2: Create professional social accounts and manage them proficiently to build brand**

**CO3: Apply strategies of be visible on digital platforms**

**CO4: Create content for online marketing**

**CO5: Analysing social sentiment and designing proper online advertisement**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>			<u>3</u>		<u>2</u>
<u>CO2</u>		<u>3</u>			<u>1</u>	<u>2</u>
<u>CO3</u>	<u>1</u>	<u>3</u>				
<u>CO4</u>		<u>1</u>				



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>C05</u>		<u>2</u>	<u>3</u>	<u>3</u>		<u>3</u>
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1. JAB JAB Right Hook by Gary Vanerchuk / Handbook of Social Media Management by Mike Friedrichsen / Social Media Marketing by Dave Evans

**References:**

1. The socialmediahat.com / marketingzen.com
2. [http://www.kiddycuts.com.au/wp-content/uploads/2016/09/Jab-Jab-Jab-Right-Hook\\_-How-Vaynerchuk-Gary.pdf](http://www.kiddycuts.com.au/wp-content/uploads/2016/09/Jab-Jab-Jab-Right-Hook_-How-Vaynerchuk-Gary.pdf)
3. <https://www.mayerbrown.com/files/Event/191afec0-ce49-4413-9119-66d8161c3a88/Presentation/EventAttachment/a9ff12da-a2e2-4500-85b6-df43bcfd119d/140310-SocialMedia-PresentationMaterials.PDF>

**Marketing Data Tools and Techniques**

**SALES MANAGEMENT**

**SALES MANAGEMENT**

**Course Objectives:**

1. This course aims to cover fundamentals of sales management, different types of sales, and different channels of sales.
2. Understand the strategic role and importance of sales in business
3. Understand customer behaviour and manage them
4. Understand the impact of online sales.
5. Understand how sales management fits into the changing environment

<u>Ref No</u>	<u>Topics to be covered</u>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Unit 1</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>What is Sales</u></li><li>● <u>Sales as a career</u></li><li>● <u>Interdependencies with other departments</u></li></ul>
<u>Unit 2</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>B2B Sales</u></li><li>● <u>B2C Sales</u></li><li>● <u>Inbound and Outbound</u></li></ul>
<u>Unit 3</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Sales Channels – Direct Sales</u></li><li>● <u>Sales Channels – Indirect Sales</u></li><li>● <u>Sales Channels – Online Sales</u></li></ul>
<u>Unit 4</u>	
<u>4.1</u>	<ul style="list-style-type: none"><li>● <u>KPIs in Sales</u></li><li>● <u>Managing Different Customers</u></li><li>● <u>Post COVID Adaptation</u></li></ul>

**Course Outcome:**

**CO1: Will understand sales and its significance to gain competitive advantages.**

**CO2: Will be able to understand and assess selling as a career choice**

**CO3: To be able to evaluate salespeople's performance**

**CO4: Will be able to apply different sales training methods and techniques**

**CO4: will be able to understand and apply the concept of customer relationship management**



School of Business Studies  
Master of Business Administration  
(Corporate Management)

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>		<u>1</u>	<u>1</u>		<u>2</u>
<u>CO2</u>	<u>3</u>		<u>2</u>			<u>3</u>
<u>CO3</u>		<u>3</u>			<u>2</u>	<u>2</u>
<u>CO4</u>		<u>3</u>			<u>2</u>	<u>2</u>
<u>CO5</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>

**Textbooks:**

1. Sales Management, Pradip Kumar Malik
2. Sales and Distribution Management, Krishna K. Havaladar

**References:**

1. <https://www.salesforcerearch.com/blog/7-different-types-of-sales-roles-explained/>
  2. <https://simplicable.com/new/marketing-channel>
- <https://www.pipedrive.com/en/blog/sales-management>

**SALES SYSTEMS**

**Course Objectives:**

1. This course aims at making the students more organized in their sales approach.
2. It will provide them insights into sales systems to manage contacts better.
3. Make tracking sales deals more efficient and save time.
4. This course will also cover the most commonly used sales systems in the industry .To give the students a head-start before joining their jobs.



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School of Business Studies  
Master of Business Administration  
(Corporate Management)

**5. Introduce students to various software tools for sales automation and Customer relationship management**

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to Sales Funnel</u></li><li>● <u>Steps Involved in Sales Funnel</u></li><li>● <u>Analytics derived from a Sales Funnel</u></li><li>● <u>Customer Handling</u></li><li>● <u>Customer Complaints</u></li><li>● <u>Scenarios of Complaint Handling in various Industries</u></li></ul>
<u>Unit 2</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to Software Systems</u></li><li>● <u>Sales Force</u></li><li>● <u>Lead Squared</u></li><li>● <u>Fresh Sales</u></li></ul>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Unit 3</u>	
<u>3.1</u>	<ul style="list-style-type: none"> <li>● <u>Introduction to other commonly used sales Management Software's</u></li> <li>● <u>Vymo</u></li> <li>● <u>Zendesk</u></li> <li>● <u>Maximiser CRM</u></li> <li>● <u>Identifying CRMs used in various industries</u></li> </ul>

**Course Outcome**

**CO1: Will be able to explain how sales management fits into the changing environment.**

**CO2: Will be able to describe customer relationship management.**

**CO3: Will be able to effectively organize a sales force.**

**CO4: Apply different sales training methods and techniques.**

**CO4: Will have the working knowledge of various Sales Management & CRM software's**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>	<u>2</u>				<u>3</u>
<u>CO2</u>		<u>2</u>	<u>2</u>	<u>1</u>	<u>3</u>	<u>1</u>
<u>CO3</u>		<u>2</u>			<u>2</u>	<u>3</u>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>CO4</u>	<u>3</u>					<u>2</u>
<u>CO5</u>		<u>3</u>				<u>1</u>

**Textbooks:**

1. The Sales Funnel Book, Nathan William

**References:**

1. <https://www.salesforce.com/in/>
2. <https://www.leadsq.com/>
3. <https://www.freshworks.com/>
4. <https://getvymo.com/>
5. <https://www.maximizer.com/>
6. <https://www.zendesk.com/sell/>

**SALES PROCESSES**

**Course Objectives:**

1. This course aims to provide students with an exposure to the sales process involved in any industry.
2. It will teach them how to convert leads into customers,
3. How to add structure and accountability to their sales.
4. The course also aims at introducing them to the sales funnel
5. How to maximize the number of end customers.

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to Sales Process</u></li><li>● <u>Customer Profiling and segmentation</u></li><li>● <u>Leads</u></li><li>● <u>Methods of Lead Generation</u></li></ul>
<u>Unit 2</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Lead Prospecting</u></li><li>● <u>Planning and Preparation</u></li><li>● <u>Preparation ahead of Sales Meeting</u></li><li>● <u>Initial Contacting</u></li><li>● <u>Probing</u></li><li>● <u>Rapport</u></li><li>● <u>Solutioning</u></li><li>● <u>Objection Handling</u></li></ul>
<u>Unit 3</u>	





School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>3.1</u>	<ul style="list-style-type: none"> <li>● <u>Closing the Sale</u></li> <li>● <u>After Sale Service</u></li> </ul>
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**Course Outcome:**

**CO1: Will be able to understand the sales process of any industry**

**CO2: Will be able to do customer profiling and segmentation as per the need of the organization.**

**CO3: Will be able to define and manage sales funnel, one of the most powerful concepts in business.**

**CO4: Will be able to generate qualified leads filter out low-potential leads and identify the prospects with biggest likelihood to purchase.**

**CO5: Will be able to ensure higher customer lifetime value through CRM and after sales service**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>		<u>1</u>	<u>1</u>		<u>2</u>
<u>CO2</u>		<u>3</u>				<u>1</u>
<u>CO3</u>	<u>2</u>	<u>3</u>	<u>1</u>		<u>3</u>	<u>1</u>
<u>CO4</u>		<u>3</u>				<u>3</u>
<u>CO5</u>		<u>2</u>				<u>2</u>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

**Textbooks:**

1. Mastering your Sales Process, David Masover
2. Lead Generate, Scott Groves

**References:**

1. <https://www.leadfeeder.com/blog/18-ways-to-generate-more-b2b-sales-leads/#gref>
2. [https://www.youtube.com/watch?v=WphIXqTp\\_es](https://www.youtube.com/watch?v=WphIXqTp_es)
3. <https://www.agilecrm.com/blog/6-chrome-extensions-easy-lead-generation/#:~:text=LeadFuze%20is%20a%20complete%20B2B,pages%20and%20set%20automated%20emails.>
4. <https://www.lusha.co/>

**MANAGERIAL SKILLS FOR SALES**

**Course Objectives:**

1. To make students good sales managers by imbibing in the students essential skills and competencies.
2. Effective management of a sales team within organizations
3. Understanding of various behaviour and processes.
4. Understand and develop the core skills to achieve breakthrough results
5. Understand the importance and develop soft skills to achieve breakthrough results

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Roles and Responsibilities of a Manager</u></li><li>● <u>Core Drivers of a good Manager</u></li><li>● <u>Trustworthiness and Ethical Selling</u></li><li>● <u>Sales Mindset</u></li><li>● <u>Ownership &amp; Accountability</u></li><li>● <u>Planning and Prioritization</u></li></ul>
<u>Unit 2</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>2.1</u>	<ul style="list-style-type: none"> <li>● <u>Team Handling</u></li> <li>● <u>Managing Attribute</u></li> <li>● <u>Coaching and Feedback</u></li> <li>● <u>Customer Acquisition Cost</u></li> <li>● <u>Cost controlling</u></li> </ul>
<u>Unit 3</u>	
<u>3.1</u>	<ul style="list-style-type: none"> <li>● <u>Sales Hiring</u></li> <li>● <u>Sales target</u></li> <li>● <u>Reports</u></li> <li>● <u>Presentation Skills</u></li> <li>● <u>Interview Skills</u></li> <li>● <u>Performance management</u></li> <li>● <u>Audits</u></li> </ul>

**Course Outcome:**

**CO1: Develop the concept of planning in sales, and able to define roles in terms of responsibility and accountability.**

**CO2: Will be able to practice and guide the ethical aspects in sales and its significance in sales effectiveness.**

**CO3. Will be able to effectively organize a sales force, develop motivation strategies for the sales force, and understand the characteristics of effective salespeople**

**CO4. Will be able to recruit and select salespeople, Evaluate salespeople's performance**

**CO5. Will develop the skills of report writing, interviewing and designing effective presentations and delivering it.**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>



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(Corporate Management)

<u>CO1</u>	<u>2</u>	<u>2</u>				<u>2</u>
<u>CO2</u>				<u>3</u>		<u>3</u>
<u>CO3</u>		<u>1</u>			<u>2</u>	<u>3</u>
<u>CO4</u>		<u>3</u>				<u>2</u>
<u>CO5</u>	<u>2</u>				<u>3</u>	<u>2</u>

**Textbooks:**

1. [Cracking the Sales Management Code: The Secrets to Measuring and Managing Sales Performance](#), Jason Jordon and Michelle Vazzana

**References:**

1. <https://www.youtube.com/watch?v=yd0n9dh0j0E>
2. <https://www.td.org/insights/how-to-turn-your-sales-teams-victim-mentality-into-a-growthmindset#gsc.tab=0>
3. <https://www.youtube.com/watch?v=Lj-KuRsSfa4>
4. <https://www.youtube.com/watch?v=5n4josMijng>



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**OPERATIONS MANAGEMENT**

**OPERATIONS RESEARCH**

**Course Objective:**

- 1. Developing an analytical thinking in decision making.**
- 2. Learning some of the basic (Optimization) programming techniques/ models commonly used in business decision-making.**
- 3. Enable to assess the models and using them appropriately.**
- 4. Enable to formulate the problem, obtain a solution and interpret important features of this solution in a business decision-taking context.**
- 5. Learn at least one of the computer software (TORA, LINDO, Management Scientist, Excel-Solver etc.) and demonstrate the advantages they possess for quantitative analyses.**

<b><u>Ref No</u></b>	<b><u>Topics to be covered</u></b>
<b><u>Unit 1: Linear Programming</u></b>	
<b><u>1.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Decision Theory</u></b></li><li>● <b><u>Basic Linear Programing</u></b></li><li>● <b><u>Graphical Method</u></b></li><li>● <b><u>Simplex Method</u></b></li><li>● <b><u>Excel Solver for LP models</u></b></li></ul>
<b><u>Unit 2: Transportation, Trans shipment and Assignment problems</u></b>	
<b><u>2.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Transportation</u></b></li><li>● <b><u>Trans-shipment &amp; Assignment problems</u></b></li><li>● <b><u>Excel Solver</u></b></li></ul>
<b><u>Unit 3: Network optimization</u></b>	



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Master of Business Administration  
(Corporate Management)

<u>3.1</u>	<ul style="list-style-type: none"> <li>• <u>MST</u></li> <li>• <u>Maximal flow problem</u></li> <li>• <u>Shortest path</u></li> </ul>
<u>Unit 4: Decision Trees, Analytic Hierarchy Process</u>	
<u>4.1</u>	<ul style="list-style-type: none"> <li>• <u>Construction of decision trees</u></li> <li>• <u>EMV Computations</u></li> <li>• <u>Relevance of AHP</u></li> </ul>
<u>Unit 5: Project Management</u>	
<u>5.1</u>	<ul style="list-style-type: none"> <li>• <u>Work Breakdown Structure</u></li> <li>• <u>PERT and CPM Networks</u></li> <li>• <u>Critical Path Computation</u></li> <li>• <u>Crashing</u></li> </ul>

Course Outcome:

CO1: To Develop analytical thinking in decision making and problem solving.

CO2: Learning basic programming techniques and models commonly used in business

Decision-making.

CO3: Usage of right models in real time situation.

CO4: Formulation of problem, solution and its interpretation.

CO5: To familiarize with commonly used soft wares such as TORA, LINDO, MS Project and Advanced Excel.

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>	<u>3</u>				<u>1</u>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>CO2</u>		<u>3</u>	<u>1</u>			<u>1</u>
<u>CO3</u>		<u>2</u>				<u>3</u>
<u>CO4</u>		<u>3</u>			<u>2</u>	<u>1</u>
<u>CO5</u>	<u>3</u>					<u>1</u>

**Textbooks:**

1. Stevenson, W. J & Ozgur, C, Introduction to Management Science with Spreadsheets, Tata McGraw Hill, Latest Edition

**References**

1. John A. Lawrence, Jr. and Barry A. Pasternack, Applied Management Science, 2nd Ed. John Wiley Publication, New Delhi
2. Anderson, Sweeney and Williams, Introduction to Management Science: Quantitative Approaches to Decision Making, Thomson Learning Publication.
3. Hamdy A. Taha, Operations Research: An Introduction, 8th Ed. Pearson Education, New Delhi.
4. Hillier Frederick S. and Gerald J. Lieberman, Introduction to Operations Research, Tata McGraw Hill, New Delhi.
5. Rardin Ronald L., Optimization in Operations Research, Prentice Hall, New Jersey.
6. Lapin Lawrence L., Quantitative Methods for Business Decisions, the Dryden Press, New York.

**ADVANCED OPERATIONS MANAGEMENT**



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Master of Business Administration  
(Corporate Management)

**Course Objective:**

- 1. Foundational course to give a good understanding of Operations Management concepts.**
- 2. Making strategic process choices and a basic understanding of location, layout, and capacity planning.**
- 3. Planning and Control of Operations – related topics like forecasting, Aggregate Production Planning, and Inventory Management.**
- 4. It covers some core concepts in operations management needed in both manufacturing and service sector**
- 5. The course addresses all the prominent issues starting from understanding of resources, their use in effective manner with the help of appropriate technologies in order to achieve highest levels of efficiency and responsiveness towards today's customer**

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<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Performance Dimensions and Trade offs</u></li><li>● <u>Similarities and Difference -Manufacturing and Serving Operations</u></li><li>● <u>Operations function</u></li><li>● <u>System Perspective</u></li><li>● <u>Operations as a set of decisions</u></li><li>● <u>Challenges and current priorities in OM</u></li></ul>
<u>Unit 2</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Process Strategy</u></li><li>● <u>Process structure in services, customer-contact matrix</u></li><li>● <u>Process structure in manufacturing</u></li><li>● <u>Production and Inventory Strategies</u></li><li>● <u>Other Dimensions of process analysis</u></li></ul>





School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Unit 3</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Globalization of Operations</u></li><li>● <u>Factors affecting location decisions</u></li><li>● <u>Location Planning methods</u></li><li>● <u>Issues in Location planning</u></li><li>● <u>Plan Layout</u></li><li>● <u>Layout Planning</u></li><li>● <u>Implications of layout planning</u></li><li>● <u>Types of layout</u></li></ul>
<u>Unit 4</u>	
<u>4.1</u>	<ul style="list-style-type: none"><li>● <u>Need for Capacity Planning</u></li><li>● <u>Economies of Scale</u></li><li>● <u>Capacity build up modes</u></li><li>● <u>Capacity Measurement</u></li></ul>
<u>Unit 5</u>	
<u>5.1</u>	<ul style="list-style-type: none"><li>● <u>Single period Inventory Models</u></li><li>● <u>Multi-period Inventory Models: Fixed time-period Inventory models</u></li><li>● <u>Multi-period Inventory Models: Fixed order quantity inventory models</u></li></ul>
<u>Unit 6</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<b><u>6.1</u></b>	<ul style="list-style-type: none"> <li>● <u>Supply Chain Basics-Classification</u></li> <li>● <u>Push and Pull Systems</u></li> <li>● <u>Relationship with MPS and MRP</u></li> <li>● <u>Value added and non-value added activities</u></li> <li>● <u>Inventory Costing Methods</u></li> <li>● <u>JIT and Kanban systems</u></li> <li>● <u>Purchasing metrics; wrap up</u></li> </ul>
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**Course Objective**

**CO1: Describe broad understanding and role of OM in modern contest**

**CO2: Understand issues which affect the provision of service and manufacturing a product.**

**CO3: State a detailed understanding of various tools, techniques and methods in common use for operational effectiveness and excellence.**

**CO4: Use simple techniques for location decisions, capacity planning and control, inventory management and quality management.**

**CO5: Use combinations of interpretation and analytical skills which can be applied in a verity of operations**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>		<u>1</u>			<u>1</u>
<u>CO2</u>	<u>2</u>		<u>1</u>	<u>2</u>	<u>2</u>	<u>1</u>
<u>CO3</u>		<u>3</u>				<u>2</u>
<u>CO4</u>		<u>3</u>		<u>1</u>	<u>2</u>	<u>2</u>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>CO5</u>	<u>2</u>	<u>2</u>		<u>1</u>	<u>2</u>	<u>3</u>
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**Textbooks:**

1. Operations Management, William J. Stevenson
2. Operations Management, Nigel Slack, Alislair Brandon-Jones, Robert Johnson

**References**


1. Kanishka Bedi, Production and operations management, Oxford University Press, YMCA Library Bldg, Jai Singh Rd. New Delhi – 110001  
[www.oup.com](http://www.oup.com)
2. Richard B. Chase, Nicolas J. Aquilano and F. Robert Jacob Production and operations management (Manufacturing and Services) Irwin / McGraw – Hill, a division of McGraw – Hill, co.  
[www.mhhe.com](http://www.mhhe.com)
3. Norman Gaither and Greg Frazier, Operations management. Thomson, South – Western  
<http://gaither.swcollege.com>
4. S. N. Chary, Production and operations management Tata McGraw – Hill publishing co. Ltd , 7, West Patel Nagar New Delhi – 110008  
[www.tatamcgrawhill.com](http://www.tatamcgrawhill.com)
5. B. Mahadeven, Operations management (Theory and Practice ) , Pearson Education , 482 , F.I.E. ,  
[www.pearsoned.co.in/bmahadevan](http://www.pearsoned.co.in/bmahadevan)

**Quality Management Standards and Six Sigma**

**Course Objective:**

1. To understand execution of the operations to plan and achieving the desired objectives
2. Understanding of the operations, process and look at what does it take to execute the established processes to perfection?
3. Understand effective management of resources,
4. Understand importance of Priority, Tasks and Expectations to achieve excellence in operations.
5. Learn tools and technologies which can be used to achieve operational excellence

<u>Ref No</u>	<u>Topics to be covered</u>



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School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Unit 1</u>	
<u>1.1</u>	<ul style="list-style-type: none"> <li>● <u>Introduction: Setting the Context and Motivation</u></li> <li>● <u>Introduction to Operational Discipline</u></li> </ul>
<u>Unit 2</u>	
<u>2.1</u>	<ul style="list-style-type: none"> <li>● <u>Measurement of effective operations</u></li> <li>● <u>Parameters: Resource Utilization, Timely delivery, Quality</u></li> <li>● <u>Quality Management: Impact on Business</u></li> <li>● <u>Methods to measure, control and improve</u></li> <li>● <u>Waste Management: Impact on Business</u></li> <li>● <u>Introduction to Kiazen: Identify waste</u></li> <li>● <u>Continue on Kiazen: Identify incremental changes</u></li> <li>● <u>Make Changes Sustainable</u></li> </ul>
<u>Unit 3</u>	
<u>3.1</u>	<ul style="list-style-type: none"> <li>● <u>Theory of Constraints</u></li> <li>● <u>Understanding constraints in process chain and manage to improve the throughput (productivity)</u></li> <li>● <u>Task Management: Getting things done</u></li> <li>● <u>Introduce the need and high-level methodology</u></li> <li>● <u>Personnel Management: Continue on GTD</u></li> <li>● <u>Delegation, Collaboration</u></li> <li>● <u>Look at the 14 principles of management derived from TPS</u></li> </ul>

Course Outcome:

CO1: Will be able to execute plans to achieve desired objective.

CO2: Explain the different meanings of the quality concept and its influence

CO3: Describe, distinguish and use the several techniques and waste management tools



School of Business Studies  
Master of Business Administration  
(Corporate Management)

**CO4: Will be able to identify constraints in process chain and manage to improve the productivity**

**CO5: Will be able delegate responsibilities and collaborate with team.**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>	<u>1</u>				<u>2</u>
<u>CO2</u>	<u>3</u>	<u>1</u>	<u>1</u>		<u>2</u>	<u>2</u>
<u>CO3</u>	<u>2</u>	<u>2</u>		<u>2</u>		<u>2</u>
<u>CO4</u>		<u>3</u>				<u>2</u>
<u>CO5</u>	<u>1</u>	<u>2</u>			<u>3</u>	<u>3</u>

1. The Goal: A process of ongoing improvement, Eliyahu M. Goldratt
2. The Toyota Way: 14 Management Principles, Jeffrey K. Liker
3. Getting Things Done: The art of stress free productivity, David Allen

## **LOGISTICS & SUPPLY CHAIN MANAGEMENT**

### **LOGISTICS**

**Course Objective:**

1. Develop knowledge about the interconnectedness of business units and organizations (via the flow of products, money, and information) within the supply chain.
2. Develop knowledge about key elements of logistics processes, such as logistics planning and strategy, customer service, procurement, transport, inventory, warehousing, and handling.



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Master of Business Administration  
(Corporate Management)

3. Enhance analytical skills and capability to synthesize information from several perspectives.
4. Enhance communication, reflection and teamwork skills.
5. Use computing software to solve various logistics decision-making problems, including inventory policies and vehicle routing.

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Basics of Logistics management</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to physical distribution</u></li><li>● <u>Logistics management</u></li><li>● <u>Logistics Management and its elements</u></li><li>● <u>Modern Concepts in Logistics</u></li><li>● <u>Role of logistics in strategy</u></li><li>● <u>Inbound and outbound supply chain management</u></li><li>● <u>Container – types</u></li><li>● <u>Different types of cargo</u></li><li>● <u>Packaging and Material Handling</u></li></ul>
<u>Unit 2: Basics of Multinational Transport</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to Multimodal Transport</u></li><li>● <u>Carriage by Air</u></li><li>● <u>Carriage by Sea</u></li><li>● <u>Carriage by Road</u></li><li>● <u>Carriage by Rail</u></li><li>● <u>Types of Vessels</u></li><li>● <u>Operators (Vessel and other)</u></li><li>● <u>Freight Forwarders and NVOCC</u></li><li>● <u>Outsourcing of Logistics Services</u></li><li>● <u>Overview of MMTG Act (1993)</u></li><li>● <u>Shipping Intermediaries and Formalities</u></li></ul>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<b><u>Unit 3: Commercial Geography</u></b>	
<b><u>3.1</u></b>	<ul style="list-style-type: none"><li>● <u>Definition, Nature and Scope of Commercial Geography</u></li><li>● <u>Role of Industries in Economic Development.</u></li><li>● <u>Factors of Industrial Location</u></li><li>● <u>Weber's theory of Industrial Location</u></li><li>● <u>Major Industrial Regions of India</u></li><li>● <u>Need and importance of transportation in Commercial Development.</u></li><li>● <u>Geographical factors affecting International Trade</u></li><li>● <u>Major logistics routes in India</u></li><li>● <u>Major trade routes in world</u></li><li>● <u>International logistics and economic development</u></li><li>● <u>Role of intermediaries in international trade</u></li></ul>
<b><u>Unit 4: Trends in Logistics</u></b>	
<b><u>4.1</u></b>	<ul style="list-style-type: none"><li>● <u>Introduction – recent developments in logistics</u></li><li>● <u>Transport and mobility technologies</u></li><li>● <u>Green logistics</u></li><li>● <u>Reverse Logistics</u></li><li>● <u>Cold chain logistics</u></li><li>● <u>Block chain and big data analytics in logistics</u></li><li>● <u>3 D printing and wearable devices in logistics</u></li><li>● <u>Transport Services, Costing and Performance</u></li><li>● <u>Administration and Control and use of IT</u></li></ul>

**Course Outcome**

**CO1: Analyze how logistical decisions (e.g., facilities, inventory, and transportation) impact the performance of the firm as well as the entire supply chain.**

**CO2. Analyze the strengths and weaknesses of various transportation modes and perform cost analysis.**



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Master of Business Administration  
(Corporate Management)

**CO3. Develop the strategies that can be taken to find the best paths to route vehicles to deliver and collect goods at multiple stops.**

**CO4. Develop the strategies that can be taken to manage inventories, including deciding the timing and quantity for replenishments without hurting the level of product availability.**

**CO5 Interact with team members to achieve group objectives**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>	<u>2</u>				
<u>CO2</u>	<u>2</u>	<u>2</u>				
<u>CO3</u>	<u>1</u>	<u>3</u>				
<u>CO4</u>	<u>1</u>	<u>2</u>		<u>1</u>		
<u>CO5</u>	<u>1</u>				<u>3</u>	<u>3</u>

**Textbooks:**

1. The Handbook of Logistics and Distribution Management: Understanding the Supply Chain (5th Edition): Alan Rushton, Phil Croucher, Peter Baker
2. Introduction to Logistics Systems Management (2nd Edition): Gianpaolo Ghiani, Gilbert Laporte, Roberto Musmanno
3. Lean Supply Chain and Logistics Management (1st Edition): Paul Myerson
4. Warehouse Management: A Complete Guide to Improving Efficiency and Minimizing Costs in the Modern Warehouse (2nd Edition): Gwynne Richards
5. The Handbook of Logistics and Distribution Management: Understanding the Supply Chain (5th Edition): Alan Rushton, Phil Croucher, Peter Baker





## SUPPLY CHAIN MANAGEMENT

### Course Objective:


1. The course intends to cover the fundamental aspects of Supply Chain Management for providing an insight to the student for designing and implementing effective supply chains.
2. The course discusses the tools and techniques of supply chain management and illustrates their applicability in cases.
3. The course will equip the participants with necessary skills to manage complex supply chains by leveraging on information technology.
4. This course is intended to provide an understanding of the components and processes of supply chain and logistics management as well as the performance drivers of supply chain.
5. It is also intended to help the students to learn about logistics, transportation, warehousing and outsourcing decisions.

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Introduction to SCM</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>History</u></li><li>● <u>Development Chain</u></li><li>● <u>Global Optimization</u></li></ul>
<u>Unit 2: The Value of Information</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Information sharing and Incentive</u></li><li>● <u>Forecast</u></li><li>● <u>Bullwhip effect</u></li><li>● <u>Information and supply chain trade-off</u></li></ul>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u><b>Unit 3: Network Planning and Design</b></u>	
<u><b>3.1</b></u>	<ul style="list-style-type: none"><li>● <u>Network Design</u></li><li>● <u>Inventory position and logistic Coordination</u></li><li>● <u>Warehouse Management</u></li><li>● <u>Supply Chain Integration</u></li></ul>
<u><b>Unit 4: Strategic Alliances, Procurement and Outsourcing Strategies</b></u>	
<u><b>4.1</b></u>	<ul style="list-style-type: none"><li>● <u>3PL</u></li><li>● <u>Retailer Supplier relationship</u></li><li>● <u>Outsourcing</u></li><li>● <u>Measuring performance of SCM</u></li></ul>
<u><b>Unit 5: Customer Value</b></u>	
<u><b>5.1</b></u>	<ul style="list-style-type: none"><li>● <u>Value Dimensions</u></li><li>● <u>Value Measures</u></li></ul>
<u><b>Unit 6: Issues in Supply Chain Management</b></u>	
<u><b>6.1</b></u>	<ul style="list-style-type: none"><li>● <u>Local Issues in Supply Chain Management</u></li><li>● <u>Supply chain and disaster management</u></li></ul>
<u><b>Unit 7: Supply chain in various sectors</b></u>	



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Master of Business Administration  
(Corporate Management)

<u>7.1</u>	<ul style="list-style-type: none"> <li>• <u>Supply chain in E-commerce and Retail</u></li> <li>• <u>Supply chain in service industry</u></li> </ul>
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**Course Outcome**

**CO 1: Apply the basic framework of Supply Chain Management**

**CO 2: Knowledge about distribution, warehousing and its roles in strategic planning with supply chain**

**CO 3: Competency to analyze and use inventory management methodologies and evaluate and select transportation modes**

**CO 4: Assess the strategic role and impact of IT on supply chain integration**

**CO 5: Knowledge about the latest trends in SCM and logistics**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>		<u>2</u>			
<u>CO2</u>	<u>2</u>	<u>2</u>	<u>1</u>			<u>1</u>
<u>CO3</u>		<u>3</u>	<u>1</u>			
<u>CO4</u>		<u>3</u>			<u>2</u>	<u>2</u>
<u>CO5</u>			<u>3</u>			

**Textbooks:**

- 1. Managing Supply Chain Operations (Lei Lei, Leonardo DeCandia, Rosa Oppenheim, and Yao Zhao)**
- 2. Single Point of Failure: The 10 Essential Laws of Supply Chain Risk Management (Gary S. Lynch)**



### Reference Books

1. S.N.Chary, "Theory and Problems in Production & Operations Management", Tata McGraw Hill, 1995.
2. KanishkaBedi, "Production and Operations management", Oxford university press, 2nd Edition 2007.
3. Elwood S.Buffa, and RakeshK.Sarin, "Modern Production / Operations Management", 8th Ed. John Wiley and Sons, 2000...
4. Melynk, Denzler, "Operations management – A value driven approach" Irwin Mcgrawhill.
5. Norman Gaither, G. Frazier, "Operations Management" Thomson learning 9th edition IE, 2007
6. K.C.Jain& L.N. Aggarwal, "Production Planning Control and Industrial Management", Khanna Publishers, 1990.

### INVENTORY MANAGEMENT & DELIVERY EFFICIENCY

#### Course Objectives:

1. To introduce students to the concept of Delivery efficiency and how to improve the existing performance significantly just by upgrading slight changes.
2. Lean strategy formulation for delivery efficiency.
3. To understand the dynamic nature of delivery and to cope with it.
4. To understand the value chain concept and its influence I n network designing
5. To prioritize customer expectations in delivery

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Introduction</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to Delivery Efficiency</u></li><li>● <u>Hurdles</u></li><li>● <u>How to deliver efficiently and happily</u></li><li>● <u>How to identify the shortcomings</u></li><li>● <u>Plugging the loopholes</u></li><li>● <u>Effectiveness vs. Efficiency</u></li><li>● <u>Operation Discipline</u></li><li>● <u>Stress Management</u></li><li>● <u>Resource Management</u></li></ul>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Unit 2: Strategy Formulation</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Strategy for Strategy</u></li><li>● <u>Mapping a Strategy</u></li></ul>
<u>Unit 3: Efficiency vs. Effectiveness</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Active Components of Dynamic Capabilities</u></li><li>● <u>Effect of Dynamic Capabilities on Operating Routines</u></li><li>● <u>Efficiency and Effectiveness</u></li></ul>
<u>Unit 4: Workplace Improvement</u>	
<u>4.1</u>	<ul style="list-style-type: none"><li>● <u>PPROF 20 keys Strategy</u></li><li>● <u>PPROF Scope</u></li><li>● <u>Sale Boost using PPROF</u></li><li>● <u>Strategic Goals and Tactical Goals</u></li><li>● <u>20 Keys Relation Diagram</u></li><li>● <u>20 Keys Insight</u></li></ul>
<u>Unit 5: Value Creating Networks for Customer Satisfaction</u>	
<u>5.1</u>	<ul style="list-style-type: none"><li>● <u>Value Creating Networks</u></li><li>● <u>Value Chains/ Network analysis</u></li></ul>
<u>Unit 6: Achieving Client Satisfaction</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>6.1</u>	<ul style="list-style-type: none"> <li>● <u>Factors for measuring client/ Customer Satisfaction</u></li> <li>● <u>Establishing a priority list that identifies the most and least</u></li> <li>● <u>Satisfactory service that clients receive from consulting firms</u></li> <li>● <u>Derive strategies for consultants to achieve client satisfaction</u></li> </ul>
<u>Unit 7: Achieving Delivery Efficiency via Emotional labour</u>	
<u>7.1</u>	<ul style="list-style-type: none"> <li>● <u>Emotional Labour</u></li> <li>● <u>Positive and negative outcomes and How to control emotional labour</u></li> </ul>

**Course Outcome:**

**CO1: Will be able to differentiate between strategic and tactical roles in operations. To be able to improve productivity and efficiency of workplace**

**CO2: Will be able to formulate delivery plan to increase efficiency and effectiveness in delivery**

**CO3: Identify the value chain of an organization and to be able to analyse & improve the efficiency of delivery network.**

**CO4: Will be able to control the aspect of emotional labour and achieve positive outcome.**

**CO5: Will be able to measure the customer expectation and able to prioritize in accordance.**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>	<u>2</u>				<u>1</u>
<u>CO2</u>		<u>3</u>	<u>1</u>			<u>1</u>
<u>CO3</u>	<u>2</u>	<u>3</u>	<u>1</u>			



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>CO4</u>				<u>3</u>		<u>2</u>
<u>CO5</u>		<u>2</u>			<u>3</u>	<u>2</u>

**Textbooks:**

1. Efficient Logistics and Supply Chain Management, Sisco Mbindi

**Technology in Logistics & Supply Chain**

**RETAIL MANAGEMENT**

**Introduction To Retail Management**

**Course Objective:**

1. Understand the concepts and components of modern retail in India, know the recent trends in retailing in India Possess the knowledge of various retail formats.
2. To identify the rising intricacies and complexities of retailing with awareness, exposure widening choice and shifting tastes among consumers with introduction of new merchandises.
3. This course focuses on the learning and implementation the best combination of merchandise management, retailing actions to carry out at a store strategy in its target markets.
4. The course seeks to develop the students' skills in applying the analytic perspectives, decision tools, and concepts to decisions involving merchandising, space management.
5. The course gives an insight into the technological usages and their impact in the business



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: An Overview of Retailing Environment</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction</u></li><li>● <u>Evolution</u></li><li>● <u>Formats of Retailing</u></li><li>● <u>Retail market in India</u></li><li>● <u>New Trends</u></li></ul>
<u>Unit 2: Retailing Planning and Development</u>	
<u>2.2</u>	<ul style="list-style-type: none"><li>● <u>Retail Strategy</u></li><li>● <u>Market Segmentation</u></li><li>● <u>Store Operating Parameters</u></li><li>● <u>CRM</u></li><li>● <u>HR in Retail</u></li></ul>
<u>Unit 3: Basics of Merchandise Management</u>	





School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction</u></li><li>● <u>Product Mix and Merchandise Mix</u></li><li>● <u>Role of a Merchandiser</u></li><li>● <u>Types of Merchandise</u></li><li>● <u>Markup- Markdown</u></li></ul>
<u>Unit 4: Merchandise Management Operational Aspects</u>	
<u>4.1</u>	<ul style="list-style-type: none"><li>● <u>Merchandise Planning</u></li><li>● <u>Methods of Merchandise Procurement</u></li><li>● <u>Private Label</u></li><li>● <u>Private Label vs National Brand</u></li><li>● <u>Category Management</u></li></ul>
<u>Unit 5: Technology used in Retail</u>	
<u>5.1</u>	<ul style="list-style-type: none"><li>● <u>Emerging Retail Technologies</u></li><li>● <u>Importance of IT management in Supply Chain</u></li><li>● <u>ERP Systems</u></li></ul>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

**Course Outcomes:**

**CO1: CO1: Understand the fundamentals retailing**

**CO2: CO2: Recognize and understand the operations-oriented policies, methods, and procedures used by successful retailers**

**CO3: CO3: To know consumer motivations, shopping behaviors, and decision processes for evaluating retail offering and purchasing merchandise and services.**

**CO4: CO4: How retailer's use technologies, communicate with their customers; and tactics (pricing, merchandise assortment, store management, customer service) for extracting profit from a retail offering.**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>	<u>3</u>			<u>3</u>	<u>3</u>
<u>CO2</u>	<u>3</u>	<u>2</u>			<u>2</u>	<u>1</u>
<u>CO3</u>			<u>3</u>		<u>3</u>	<u>3</u>
<u>CO4</u>			<u>2</u>		<u>3</u>	<u>2</u>

**Textbooks:**

- 1. Swapna Pradhan, Retailing Management: Text and Cases, McGraw Hill Education; Fifth edition [www.tatamcgrawhill.com](http://www.tatamcgrawhill.com)**
- 2. Michael Levy, Barton Weitz, Ajay Pandit Retailing Management McGraw Hill Education; 8 edition. [www.tatamcgrawhill.com](http://www.tatamcgrawhill.com)**
- 3. Seshanna Sudarshan Retail Management, Tata McGraw-Hill Education India , [www.tatamcgrawhill.com](http://www.tatamcgrawhill.com)**



School of Business Studies  
Master of Business Administration  
(Corporate Management)

4. Barry Berman, Ritu Shrivastava, Joel R. Evans, Retail Management, Pearson  
[www.pearsoned.co.in](http://www.pearsoned.co.in)

**References:**

1. Retailer, Quarterly.
2. Journal of retailing, peer reviewed journal.
3. <https://www.indianretailer.com/magazine>

**Retail Planning & Branding**

**Course Objectives:**

1. Explain Visual merchandising which deals with the art and science of tastefully displaying the merchandise to the customers in order to enhance store ambience and at the same time
2. Aiding the customer in all stages of the purchase cycle
3. The second part of the course deals with the important topic of Retail branding. Understanding the concept of banding relevance of retail branding in the current competition, and how to maintain the brand over a period of time.
4. The last session helps to identify the rising intricacies and complexities of retailing store operations with awareness, exposure to modern retail store operation and as the modules proceed further the student will.
5. Understand the different operational and functional activities centred in the store operation.

<u>Ref No.</u>	<u>Topics to be Covered</u>
<u>Unit 1: An Overview of Retailing Environment</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to Visual Management</u></li><li>● <u>Planning for visual creativity</u></li><li>● <u>Store Exterior and Interior</u></li><li>● <u>Store Layout and Planning</u></li></ul>
<u>Unit 2: Retailing Planning and Development</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Display Basics</u></li><li>● <u>Planogram</u></li><li>● <u>Signage's</u></li><li>● <u>Types of Display</u></li><li>● <u>Experimental Retailing</u></li></ul>
<u>Unit 3: Basics of Retail Branding</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction of retail branding</u></li><li>● <u>Importance and Scope</u></li><li>● <u>Branding Challenges and Opportunities</u></li><li>● <u>Brand Equity</u></li></ul>



<b><u>Unit 4: Brand Positioning and Brand Elements</u></b>	
<b><u>4.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Brand Positioning in Retail: Meaning, Importance, Basis</u></b></li><li>● <b><u>Private Label in Retail: Importance, Growth and Strategies</u></b></li><li>● <b><u>Types of Brand Elements</u></b></li><li>● <b><u>Managing Brand Over Time</u></b></li></ul>
<b><u>Unit 5: Introduction to store operation &amp; Mall management</u></b>	
<b><u>5.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Overview of store operation</u></b></li><li>● <b><u>Store opening and closing and introductions to SOPs</u></b></li><li>● <b><u>Functional &amp; operational areas of the store</u></b></li></ul>

**Course Outcomes:**


**CO1: Understand the Retail branding.**

**CO2: Relevance of branding in the current retail trend.**

**CO3: Recognize and understand the operations- the different types of display and its usages**

**CO4: To know consumer shopping behaviors, and decision processes attractive visual merchandising.**

**CO5: Provide the students with the understanding of the concepts and the components of Retail Store Operation and as the modules proceed further the student will understand the different activities centred in the store operation.**



School of Business Studies  
Master of Business Administration  
(Corporate Management)


	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>	<u>2</u>	<u>2</u>		<u>1</u>	<u>2</u>
<u>CO2</u>	<u>3</u>	<u>3</u>			<u>2</u>	<u>2</u>
<u>CO3</u>	<u>3</u>	<u>3</u>			<u>2</u>	<u>2</u>
<u>CO4</u>	<u>3</u>	<u>3</u>	<u>3</u>		<u>3</u>	<u>2</u>
<u>CO5</u>	<u>3</u>	<u>2</u>			<u>1</u>	<u>2</u>

**Textbooks:**

1. Swapna Pradhan, Retailing Management: Text and Cases, McGraw Hill Education; Fifth edition  
www.tatamcgrawhill.com
2. Michael Levy, Barton Weitz, Ajay Pandit Retailing Management McGraw Hill Education; 8 edition.  
www.tatamcgrawhill.com
3. Seshanna Sudarshan Retail Management, Tata McGraw-Hill Education India , www.tatamcgrawhill.com
4. Barry Berman, Ritu Shrivastava, Joel R. Evans, Retail Management, Pearson www.pearsoned.co.in

**Reference:**

1. Retailer, Quarterly.
2. Journal of retailing, peer reviewed journal.
3. <https://www.indianretailer.com/magazine>



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**Strategy & Finance In Retail**

**Course Objectives:**

1. Pricing strategies course aims to provide students with an exposure to the basic principles of pricing strategy to enable them to understand the business scenario. To equip students with the standard tools of pricing strategies
2. To provide an understanding of different pricing strategies and their Impact on producers and consumer
3. The students should be able to understand the impact of pricing decision on business

<u>Ref No.</u>	<u>Topics to be Covered</u>
<u>Unit 1</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Pricing strategies</u></li><li>● <u>Price determination-Meaning and Importance</u></li></ul>
<u>Unit 2</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Types of Pricing strategies</u></li><li>● <u>Full Cost Pricing</u></li><li>● <u>Cost Plus Pricing</u></li><li>● <u>Marginal Cost Pricing</u></li><li>● <u>Rate of Return</u></li><li>● <u>Program Pricing</u></li></ul>
<u>Unit 3</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Competition oriented pricing</u></li><li>● <u>Price Skimming</u></li><li>● <u>Penetration Pricing</u></li><li>● <u>Discrimination Pricing</u></li><li>● <u>Misc Printing Strategies</u></li><li>● <u>Product Life Cycle &amp; Pricing Startegies</u></li></ul>

**Course Outcomes:**

**CO1: Describe pricing strategies, and how to determine pricing**

**CO2: Understanding of different types of pricing**

**CO3: Understanding of Product life cycle**

**CO4: Elucidate types of pricing**





School of Business Studies  
Master of Business Administration  
(Corporate Management)

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>	<u>3</u>			<u>3</u>	<u>3</u>
<u>CO2</u>	<u>3</u>	<u>2</u>			<u>2</u>	<u>1</u>
<u>CO3</u>			<u>3</u>		<u>3</u>	<u>3</u>
<u>CO4</u>			<u>2</u>		<u>3</u>	<u>2</u>

**Textbooks:**

1. Mehta, P.L. Managerial Economics- Analysis, Problems, Cases, SultanChand & Sons, New Delhi, Latest edition
2. Diwedi, D.N. Managerial Economics, Vikas Publishing House Private Limited, New Delhi, Seventh Edition

**References:**

1. Sloman, J. Economics for Business, Pearson Education, 2006
2. Dornbusch, R. Fischer, S and Startz, R. Macroeconomics, Tata Mc Graw Hill, 2001
3. Gupta, G. S, Managerial Economics, Tata Mac Graw Hill 1992
4. Gupta, G. S, Macroeconomics Theory and Applications, Tata Mac Graw Hill 2001
5. Maikiw, G.N. Macroeconomics, W.H. Freeman & Company 2000
6. Salvatore, D. Managerial Economics in a Global Economy, Thomson Southwestern 2001



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**Digital Commerce**

**HUMAN RESOURCE MANAGEMENT**

**HUMAN RESOURCE MANAGEMENT**

**Course Objective:**

1. Develop the knowledge, skills and concepts needed to resolve actual human resource management problems or issues.
2. Manage the employment relationship, which is a shared responsibility between employers, management, human resources specialists, and employees.
3. Identify the human resources needs of an organization or department.
4. Evaluate the procedures and practices used for recruiting and selecting suitable employees. Assess training requirements and design a successful orientation and training program.
5. Discuss workplace health and safety programs and the roles of the employer and the employee in enforcing health and safety policies and procedures.

<u>Ref No.</u>	<u>Topics to be Covered</u>
<u>Unit1: What is Human Resource Management</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>What is Human Resource</u></li><li>● <u>Major area in HR</u></li><li>● <u>Role of HRM in organizations</u></li></ul>
<u>Unit 2: Human Resource Management-Roles and Responsibilities</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Hiring</u></li><li>● <u>Attraction and Selling</u></li><li>● <u>Employment/ Employee testing</u></li><li>● <u>Compensations and Benefits</u></li><li>● <u>Growth plan and Training and Development</u></li><li>● <u>Ensuring HR Policies</u></li><li>● <u>Compliance Management</u></li></ul>
<u>Unit 3: Human Resource Management Profiles</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Organization Structures</u></li><li>● <u>HR Jobs in the Industry</u></li></ul>
<u>Unit 4: Human Resources Management in different Sector</u>	
<u>4.1</u>	<ul style="list-style-type: none"><li>● <u>Current job in HR</u></li><li>● <u>Future in HR- Pre and Post Covid</u></li><li>● <u>Legal issues in HRM</u></li><li>● <u>What does the HR Profile Demand</u></li></ul>
<u>Unit 5: Business Ethics and Human Resource Management</u>	
<u>5.1</u>	<ul style="list-style-type: none"><li>● <u>Business Ethics</u></li><li>● <u>Basic Workplace Ethics for an Organization</u></li><li>● <u>Role of HR in Business Ethics</u></li></ul>
<u>Unit 6: HR Metrics</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

	<ul style="list-style-type: none"> <li>• <u>Key HR Metrics and how they help in HR Function</u></li> </ul>
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**Course Outcome:**

- CO1:** Describe the role of Human Resource Function in an Organization.  
**CO2:** Enumerate the emerging trends and practices in HRM  
**CO3:** Illustrate the different methods of HR Acquisition and retention.  
**CO4:** Demonstrate the use of different appraisal and training methods in an Organization.  
**CO5:** Analyse competencies required for present and potential future job roles at various levels  
and across variety of organizations

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>			<u>2</u>		<u>2</u>
<u>CO2</u>	<u>3</u>	<u>3</u>		<u>1</u>		<u>2</u>
<u>CO3</u>	<u>1</u>	<u>3</u>			<u>1</u>	
<u>CO4</u>		<u>1</u>				<u>3</u>
<u>CO5</u>		<u>2</u>	<u>2</u>	<u>2</u>		

1. Human Resource Management, Gary Dessler
2. Human Resource Management, S.S. Khemka

**Reference**

1. Human Capital Measurement: An Introduction, K Sangeetha ICFAI University
2. .Competency Study: Mapping the Future, Paul R Bernthal, ASTD Press
3. Human resource Management, K Ashwathappa



## RECRUITMENT

### Course Objectives:

1. Understand the concept of Recruitment and Selection.
2. Explore ways of Recruitment and Selection methods and processes.
3. Understand new trends of Recruitment and Selection.
4. To provide students an understanding of recruitment and selection methods and processes.
5. Explore the concept of Orientation and Induction. To provide a platform to the students to be able to screen a CV.

<u>Ref No.</u>	<u>Topics to be Covered</u>
<u>Unit 1: What is Recruitment &amp; Selection?</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction</u></li><li>● <u>Objectives</u></li><li>● <u>Scope</u></li><li>● <u>Introduction &amp; Relevance of Recruitment</u></li></ul>
<u>Unit 2: Job Analysis</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to Job Analysis</u></li><li>● <u>Concept and Specifications</u></li><li>● <u>Description</u></li><li>● <u>Process and Methods</u></li><li>● <u>Diversity in Role</u></li></ul>
<u>Unit 3: Recruitment and its types</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>3.1</u>	<ul style="list-style-type: none"> <li>● <u>Source or type of Recruitment</u></li> <li>● <u>Techniques of Recruitment</u></li> </ul>
<u>Unit 4: Selection</u>	
<u>4.1</u>	<ul style="list-style-type: none"> <li>● <u>Selection</u></li> <li>● <u>Conducting Interviews</u></li> <li>● <u>Induction and Onboarding</u></li> <li>● <u>HR Metrics</u></li> </ul>

**Course Outcome:**

- CO1: Explain various models of competency development
- CO2: Develop a customized competency model in accordance with the corporate requirements.
- CO3: Define the key terms related to performance management and competency development.
- CO4: Develop Job Specifications and Job descriptions in a variety of context
- CO5: Interpret the sample job descriptions and job specifications for contemporary entry level roles in real world organizations

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>	<u>1</u>				<u>2</u>
<u>CO2</u>		<u>2</u>			<u>2</u>	<u>2</u>
<u>CO3</u>	<u>2</u>	<u>3</u>				<u>3</u>
<u>CO4</u>		<u>1</u>			<u>3</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>C05</u>		<u>2</u>	<u>2</u>	<u>2</u>		<u>3</u>
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**Textbook**

1. Harper's Rules: A Recruiter's Guide to Finding a Dream Job and the Right Relationship by Danny Cahill
2. Full Stack Recruiter: The Modern Recruiter's Guide by Jan Tegze

**References:**

1. <https://www.youtube.com/watch?v=M0zyf05Gllg> (conducting interviews)

**EMPLOYEE LIFE CYCLE AND ORGANIZATIONAL DEVELOPMENT**

**Course objectives:**

1. Articulate different HR expertise areas throughout the employee lifecycle.
2. Understand different stages from Hire to Exit.
3. Recognize the roles and responsibilities of HR in employee lifecycle.
4. Imbibe the skillset required to handle change management within organization and strategies growth path for employee.
5. Acknowledge the importance of HR policies and understand different situations where they are applied.

<u>Ref No.</u>	<u>Topics to be Covered</u>
<u>Unit 1: What is Employee Lifecycle</u>	
<u>1.1</u>	<ul style="list-style-type: none"> <li><u>Overview of Employee life cycle and what does each stage mean</u></li> </ul>
<u>Unit 2: Talent Acquisition</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>2.1</u>	<ul style="list-style-type: none"> <li>• <u>What is Talent Acquisition?</u></li> <li>• <u>The Recruitment funnel</u></li> <li>• <u>Effective ways for recruitment</u></li> <li>• <u>Difference between staffing and recruitment, Acquisition and recruitment</u></li> <li>• <u>Effective talent Acquisition Strategies</u></li> <li>• <u>Challenges faced</u></li> </ul>
<u>Unit 3: On Boarding and Talent Assimilation</u>	
<u>3.1</u>	<ul style="list-style-type: none"> <li>• <u>Documentation</u></li> <li>• <u>Verification</u></li> <li>• <u>Overview of Onboarding</u></li> </ul>
<u>Unit 4: Employee Engagement</u>	
<u>4.1</u>	<ul style="list-style-type: none"> <li>• <u>Employee Engagement</u></li> <li>• <u>HR strategies for employee engagement</u></li> </ul>
<u>Unit 5: Organizational Development and Change Management</u>	
<u>5.1</u>	<ul style="list-style-type: none"> <li>• <u>Organizational Development and Performance Management</u></li> <li>• <u>Worker behavior and Motivation</u></li> <li>• <u>Conflict Resolution</u></li> </ul>
<u>Unit 6: Human Resources Management Policies</u>	





School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>6.1</u>	<ul style="list-style-type: none"> <li>● <u>HR policies</u></li> <li>● <u>Types of HR Policies</u></li> <li>● <u>Framing and Formulating HR Policies</u></li> <li>● <u>Benefits and Limitation of HR Policies</u></li> <li>● <u>How to make HR Policies more effective</u></li> </ul>
<u>Unit 7: Employee Grievances</u>	
<u>7.1</u>	<ul style="list-style-type: none"> <li>● <u>What is Grievance?</u></li> <li>● <u>How to handle employee grievances</u></li> </ul>
<u>Unit 8: Project Management and Planning</u>	
<u>8.1</u>	<ul style="list-style-type: none"> <li>● <u>Project Acquisition</u></li> </ul>
<u>Unit 9: Exit Process</u>	
<u>9.1</u>	<ul style="list-style-type: none"> <li>● <u>Acceptance of Resignation</u></li> <li>● <u>Create Self Evaluation</u></li> <li>● <u>Initiate Separation</u></li> <li>● <u>Handover process</u></li> <li>● <u>Documentation</u></li> <li>● <u>Assets Management</u></li> <li>● <u>Full and Final</u></li> <li>● <u>Exit Form</u></li> </ul>

**Course Outcome:**

**CO1:**      Able to process Recruitment and employment correspondence letters

**CO2:**      Develop the logical thinking, communication skills and other prerequisite for successful business negotiations and handling organizational conflict. Map a career progression path for employees



School of Business Studies  
Master of Business Administration  
(Corporate Management)

**CO3: Successfully manage employee grievances**

**CO4: Create documentation and process of Exit formalities for employees**

**CO5: Support to employee retention and procedures**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>			<u>2</u>		<u>2</u>
<u>CO2</u>	<u>3</u>				<u>2</u>	<u>2</u>
<u>CO3</u>	<u>1</u>	<u>3</u>				<u>3</u>
<u>CO4</u>	<u>2</u>				<u>3</u>	
<u>CO5</u>		<u>2</u>	<u>1</u>	<u>2</u>		<u>3</u>

**1. From Hire to Fire & Everything In Between, Natasha Hawker**

**2. 9 Elements That Support the Employee Lifecycle, William A, Howatt**

**Reference**

- 1. Human Resource and Personnel Management, K Aswathappa, Tata McGraw Hill**
- 2. Effective Recruitment and Selection Practices, Alan Nankervis, Robert Compton, Bill Morrissey.**

**COMPENSATION AND BENEFITS**

**Course Objective:**

- 1. Understand different Compensation and benefits in an organization.**
- 2. Implement the Pay Structure.**
- 3. Ability to understand the types of individual incentive plans.**
- 4. Understanding the various benefit plans.**



School of Business Studies  
Master of Business Administration  
(Corporate Management)

**5. Recognize different labour laws and their implementation in an organization setup.**

<u>Ref No.</u>	<u>Topics to be Covered</u>
<b><u>Unit 1: Compensation and Benefits</u></b>	
<b><u>1.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>What are Compensation and Benefits?</u></b></li><li>● <b><u>Types of Compensations</u></b></li><li>● <b><u>Incentives and Rewards</u></b></li><li>● <b><u>Why are compensation and benefits important?</u></b></li><li>● <b><u>Calculate compensation and benefits</u></b></li></ul>
<b><u>Unit 2: Payroll</u></b>	
<b><u>2.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Payroll</u></b></li><li>● <b><u>Salary Processing</u></b></li><li>● <b><u>Paying Employees</u></b></li><li>● <b><u>Deductions</u></b></li><li>● <b><u>Invoicing Basics</u></b></li></ul>
<b><u>Unit 3: Labour Law</u></b>	
<b><u>3.1</u></b>	<ul style="list-style-type: none"><li>● <b><u>Legal provisions governing them</u></b></li><li>● <b><u>Healthy, safety and welfare measures</u></b></li><li>● <b><u>Maintaining Industrial relationships</u></b></li><li>● <b><u>Code of Conduct and Discipline</u></b></li></ul>
<b><u>Unit 4: Statutory Compliances</u></b>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>4.1</u>	<ul style="list-style-type: none"> <li>● <u>Introduction to Statutory Compliance</u></li> <li>● <u>Its presence in different organizations</u></li> <li>● <u>Advantages and Risks</u></li> <li>● <u>Statutory compliances in Indian Payroll Management Systems</u></li> </ul>
<u>Unit 5: Leave Management System</u>	
<u>5.1</u>	<ul style="list-style-type: none"> <li>● <u>Employee absenteeism and workforce productivity</u></li> <li>● <u>Types of employee paid leave</u></li> <li>● <u>Concept of manday, working days and compensation</u></li> </ul>

**Course Outcome:**

- CO1:**      Outline the compensation strategies of an organization  
**CO2:**      Create and develop proper salary slips and various invoices  
**CO3:**      Design a Leave management system and attendance trackers  
**CO4:**      Identify the applicability of various legislations to variety of real world organizations.  
**CO5:**      Demonstrate an understanding of legislations relating to working environment.

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>					<u>2</u>
<u>CO2</u>	<u>1</u>	<u>3</u>				
<u>CO3</u>	<u>1</u>	<u>3</u>				
<u>CO4</u>		<u>1</u>		<u>2</u>	<u>3</u>	<u>3</u>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>C05</u>		<u>2</u>	<u>2</u>	<u>2</u>		
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**Textbooks:**

1. Compensation and Benefit Design, Bhasker D. Biswas
2. Strategic Compensation: A Human Resource Management approach - Joseph J. Martocchio
3. Compensation Management in a knowledge-based world – Richard I. Henderson

**References:**

1. Introduction of Labour and Industrial Laws, Avatar Singh
2. Managing Workplace Conflicts, Subbulakshmi,V., Hyderabad : ICFAI University Press

## **IT, ANALYTICS & RESEARCH**

### **DATA ANALYTICS - I**

**Course Objectives:**

1. The course is designed to provide orientation to handling data and Business Analytics' tools that can be used for fact-based decision-making.
2. Understanding the Role of Business Analyst, Data Science and Statistics in business.
3. Understanding the basic concept of data visualization
4. Learn basics of query language and acquire programming skills and spreadsheet applications required for data science.
5. To understand the application of data analysis. Understanding the basic concept of Data Science Life Cycle.

<u>Ref No.</u>	<u>Topics to be Covered</u>
<u>Unit 1</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Excel basics</u></li><li>● <u>Functions</u></li><li>● <u>Descriptive Statistics</u></li><li>● <u>Financial Functions</u></li><li>● <u>What If Analysis</u></li><li>● <u>Pivot Tables and Charts</u></li></ul>
<u>Unit 2</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Tableau Basics</u></li><li>● <u>Worksheets</u></li><li>● <u>Visualization</u></li><li>● <u>Calculations, Filters, Show Me Dashboard &amp; Story</u></li></ul>
<u>Unit 3</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>DDL</u></li><li>● <u>Constraints</u></li></ul>
<u>Unit 4</u>	
<u>4.1</u>	<ul style="list-style-type: none"><li>● <u>Python Basics Using Jupyter</u></li></ul>
<u>Unit 5</u>	
<u>5.1</u>	<ul style="list-style-type: none"><li>● <u>Business Decisions under constraints</u></li><li>● <u>Communicating Actionable Insights: Using Excel Dashboards?</u></li><li><u>Pricing Analytics</u></li></ul>



School of Business Studies  
Master of Business Administration  
(Corporate Management)

**Course Outcome**

**CO1: At the end of the course, the participants will be able to understand the role of business analytics within an organization.**

**CO2: Understand the application of business analysis in different domain**

**CO3: Analyse data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.**

**CO4. Use decision-making tools/Operations Research techniques.**

**CO5: Manage business processes using analytical and management tools.**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>	<u>3</u>	<u>1</u>			
<u>CO2</u>	<u>3</u>					
<u>CO3</u>		<u>3</u>				
<u>CO4</u>		<u>3</u>				<u>2</u>
<u>CO5</u>		<u>3</u>				<u>2</u>

**Textbooks:**

1. Data Science for Business, Tom Fawcett

**References**

1. Essentials of Business Analytics: An Introduction to the methodology and its application, Bhimasankaram Pochiraju, SridharSeshadri, Springer



2. Introduction to Machine Learning with Python: A Guide for Data Scientists 1st Edition, by  
Andreas C. Müller, Sarah Guido, O'Reilly

3. Introduction to Data Science, Laura Igual Santi Seguí, Springer

Reference Book:

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson  
Education India

2. An Introduction to Business Analytics, Ger Koole, Lulu.com, 2019

## DATA ANALYTICS - II

## BUSINESS RESEARCH

Course Objective:

The course introduced the concept and best practices of Business Research

- Explain the use and industries of Market Research
- When and how to use a primary market research – Creating and Analysing Surveys
- Secondary Market Research Methodologies and various commonly used tools

<u>Ref No</u>	<u>Topics to be covered</u>





School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>Unit 1: Introduction</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Introduction to Market Research</u></li><li>● <u>Research Characteristics</u></li><li>● <u>Types of Market Research</u></li><li>● <u>Market Research – Value and Cost of Information</u></li><li>● <u>Marketing Research in the 21st Century – India</u></li></ul>
<u>Unit 2: Primary Market Research</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>● <u>Planning the Research Process</u></li><li>● <u>Formulation of Problem</u></li><li>● <u>Research Methods</u></li><li>● <u>Data Collection Methods</u></li><li>● <u>Designing a Questionnaire</u></li><li>● <u>Data Collection and Importance of Scaling</u></li></ul>
<u>Unit 3: Collating Analysis</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>● <u>Consolidating Results and Interpretations</u></li><li>● <u>Collating Analysis</u></li><li>● <u>Using Survey Tools like SurveyMonkey</u></li><li>● <u>ZohoSurvey</u></li><li>● <u>Survey Gizmo</u></li></ul>
<u>Unit4: Secondary Market Research</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<b><u>4.1</u></b>	<ul style="list-style-type: none"> <li>● <u>What is Secondary Market Research &amp; where is it used</u></li> <li>● <u>Using Google to find relevant News, Evaluating Press releases of a company</u></li> <li>● <u>Google search tips and tricks</u></li> <li>● <u>Using IMF, WorldBank websites for latest statistics</u></li> <li>● <u>Commonly used databases: Picking the right news from Factiva</u></li> <li>● <u>Commonly used databases: Picking the right reports and news from Thomson Reuters</u></li> <li>● <u>Understanding and picking items from Research Reports</u></li> <li>● <u>Thomson One</u></li> <li>● <u>Commonly used databases: Picking the right news from Bloomberg</u></li> <li>● <u>Commonly used database: Moneycontrol</u></li> </ul>
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**Course Outcome:**

**CO1: Understand the significance of Marketing Research and understand its role in the field of Marketing.**

**CO2: The student will be able to identify a Marketing Research problem from the current business environment and develop certain hypotheses for the research.**

**CO3: The student will be able to independently design a marketing research program.**

**CO4: The student will be able to conduct the required research using various data collection techniques.**

**CO5: The student will be able to utilize the data to prepare a report, outlining the findings of the research**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>	<u>2</u>	<u>1</u>			
<u>CO2</u>	<u>3</u>	<u>3</u>	<u>1</u>		<u>1</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>CO3</u>		<u>3</u>				
<u>CO4</u>		<u>3</u>				
<u>CO5</u>		<u>2</u>			<u>3</u>	<u>2</u>

**Textbooks:**

1. Basic Marketing Research: Volume 1 – Handbook for Research Professionals – Scott M Smith, Gerald S Albaum
2. <http://www.bancroftinfo.com/bi11/wp-content/uploads/2014/01/AzTechCouncilTucson.pdf>

**Strategic Technology Management**

**Course Objective:**

1. The objective of this course is to expose the students to the managerial issues relating to information systems
2. Help them identify and evaluate various options in this regard
3. Students should have gained an appreciation for the opportunities and challenges presented by organizations' use of IT and of the strategies, tactics, processes and decisions involved in deployment of IT.
4. Will understand the role of IT and its applicability beyond IT
5. The course aims to ensure that students have an appreciation of management issues and the role played by IT in the overall strategy of the business.

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Business Driven MIS</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>1.1</u>	<ul style="list-style-type: none"> <li>● <u>Data vs. Information vs. Intelligence vs. Knowledge</u></li> <li>● <u>Types of Analytics with Examples</u></li> <li>● <u>Systems and System thinking approach to MIS</u></li> <li>● <u>IS and its components</u></li> <li>● <u>Sociotechnical view of IS</u></li> <li>● <u>MIS and organizational change</u></li> </ul>
<u>1.2</u>	<ul style="list-style-type: none"> <li>● <u>Business decisions and relevance of MIS</u></li> <li>● <u>Using MIS to make business decisions</u></li> <li>● <u>MIS system types</u></li> <li>● <u>Interaction between the various system types</u></li> <li>● <u>Uses of AI in Decision Making</u></li> </ul>
<u>1.3</u>	<ul style="list-style-type: none"> <li>● <u>Finding Electronic Business Value</u></li> <li>● <u>Electronic Business vs. Electronic Commerce</u></li> <li>● <u>Business model and its components</u></li> <li>● <u>Electronic commerce business models and its elements</u></li> <li>● <u>Business models in context of B2B</u></li> <li>● <u>Business models in context of B2C</u></li> </ul>
<u>Unit 2: Enterprise MIS</u>	
<u>2.1</u>	<ul style="list-style-type: none"> <li>● <u>Technology Strategy – Case study of Alibaba</u></li> <li>● <u>Technology Strategy - Case study of Hardwarezone</u></li> <li>● <u>Theories underpinning web-based businesses</u></li> <li>● <u>Transaction Cost Theory</u></li> <li>● <u>Channel Conflict Theory</u></li> </ul>
<u>Unit 3: Technical Foundations of MIS</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<b><u>3.1</u></b>	<ul style="list-style-type: none"> <li>● <u>P2P Architecture</u></li> <li>● <u>Skype and P2P</u></li> <li>● <u>Challenges of P2P Architecture</u></li> <li>● <u>Wikipedia and Co-creation</u></li> </ul>
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**Course Outcome**

**CO1: Will have Knowledge of MIS, and its applications**

**CO2: Will be able to apply MIS knowledge to the selection and design of systems appropriate to management requirements.**

**CO3: Will be aware how MIS may contribute to the strategic management of an organisation.**

**CO4: Will have the knowledge of the management of IT and how the contribution of IT might be maximised.**

**CO5: Will be able to explore the issues surrounding the management of IT development projects and the provision of an IT infrastructure to an organization.**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>		<u>2</u>			
<u>CO2</u>		<u>3</u>	<u>1</u>			<u>1</u>
<u>CO3</u>	<u>2</u>	<u>2</u>	<u>1</u>		<u>1</u>	
<u>CO4</u>	<u>3</u>				<u>1</u>	<u>2</u>
<u>CO5</u>	<u>2</u>	<u>2</u>			<u>2</u>	<u>2</u>

**Textbooks:**



Dean  
Faculty of Management  
JECRC University, Jaipur-303905

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Master of Business Administration  
(Corporate Management)

1. Laudon, Kenneth C and Laudon, Jane Price, Management Information Systems, Pearson India.

**References**

2. Paige Baltzan (2019), Business Driven Information Systems, 6th Edition, McGraw Hill
3. MIS by WS Javadekar Tata McGraw Hill
4. Information Systems for Managers by Ashok Arora / Akshaya Bhatia – Excel Publishers
5. Sadagopan, S., “Management Information Systems”, 2003, PHI.
6. Jaiswal & Mittal, MIS.
7. E-Commerce – Cutting Edge of Business – Kamlesh K Bajaj, Debjani Nag – Tata McGraw Hill, 1/e, 2003,

**SUMMER INTERNSHIP REPORT**

**Objective of the Subject:**

1. Internship work is the best way to practice what you have learnt.
2. The purpose of including Internship project report in the Program is to provide you an opportunity to summarize your learning in a systematic manner.
3. It will enable you to apply your conceptual knowledge in a practical situation and to learn the art of presenting your experience/findings in a coherent report.
4. As managers, you are constantly seeking information to base your decision.
5. The objective is to equip the students with the knowledge of actual functioning of an organization and problems faced by them for exploring feasible solutions.

<u>Ref No.</u>	<u>Topic to be Covered</u>
<u>Unit 1: Introduction</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>● <u>Summer Internship Report</u></li><li>● <u>Drafting Guidelines</u></li><li>● <u>Title Page</u></li><li>● <u>Internship Completion Certificate</u></li><li>● <u>Certificate</u></li><li>● <u>Declaration</u></li><li>● <u>Acknowledgement</u></li></ul>
<u>Unit 2: Theoretical Background</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>2.1</u>	<ul style="list-style-type: none"> <li>● <u>Statement about the problem</u></li> <li>● <u>Objectives</u></li> <li>● <u>Scope of the Study</u></li> <li>● <u>Company Profile</u></li> </ul>
<u>Unit 3: Research Design</u>	
<u>3.1</u>	<ul style="list-style-type: none"> <li>● <u>Research Design- Sample,</u></li> <li>● <u>Sampling Technique</u></li> <li>● <u>Sampling Area</u></li> </ul>
<u>Unit 4: Analysis &amp; Findings</u>	
<u>4.1</u>	<ul style="list-style-type: none"> <li>● <u>Findings</u></li> <li>● <u>Analysis</u></li> <li>● <u>Recommendations and Conclusions</u></li> </ul>
<u>Unit 5: Final Compilation and Conclusion</u>	
<u>5.1</u>	<ul style="list-style-type: none"> <li>● <u>Final Compilation -Guidelines</u></li> <li>● <u>Appendix</u></li> <li>● <u>List of References</u></li> <li>● <u>Bibliography</u></li> <li>● <u>Glossary (optional)</u></li> </ul>

**Outcome**

**CO1: During the training, the student is expected to learn about the organization and analyze and suggest solutions to a live problem.**

**CO2: During the course of training, the organization (where the student is undergoing training) will work on real time scenario**

**CO3: Will have the knowledge of actual functioning of an organization and problems faced by them for exploring feasible solutions.**

**CO4: Will learn how to conduct a research in real problem**

**CO5: Will learn how to write a professional report and present it.**



School of Business Studies  
Master of Business Administration  
(Corporate Management)

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>					
<u>CO2</u>	<u>3</u>					
<u>CO3</u>	<u>3</u>					
<u>CO4</u>		<u>3</u>				<u>3</u>
<u>CO5</u>					<u>3</u>	

### References

1. Cooper and Schindler - Business Research Methods (Tata Mc Graw Hill)
2. C. Murthy- Research Methodology (Vrinda Publications)
3. Bhattacharyya-Research Methodology(Excel Books)
4. Panneer Selvam - Research Methodology (Prentice Hall of India)

### BUSINESS ETHICS & BUSINESS LAW

#### Course Objective:

1. The present course aims at familiarizing the participants with various legal aspects of business.
2. It aims at providing a rich fund of contemporary knowledge, time tested principles, basic concepts, emerging ideas, evolving theories, latest technique.
3. Ever changing procedures & practices in the field of Law in a comprehensive way.





School of Business Studies  
Master of Business Administration  
(Corporate Management)

4. This course also introduces Business ethics as the modern managerial approach to ethical questions in business environment.
5. Understanding of main theoretical concepts, but also developing skills of identification, analysis, and permission of ethical dilemmas on a workplace and managing ethics in organizations

<u>Ref No</u>	<u>Topics to be covered</u>
<u>Unit 1: Acts related to contract &amp; Partnership</u>	
<u>1.1</u>	<ul style="list-style-type: none"> <li>● <u>The Indian Contract Act, 1872</u></li> <li>● <u>Special contract</u></li> <li>● <u>The Indian Partnership Act, 1932</u></li> <li>● <u>Limited Liability Partnership Act, 2000</u></li> </ul>
<u>Unit 2: Acts related to Company, Goods &amp; Consumers</u>	
<u>2.1</u>	<ul style="list-style-type: none"> <li>● <u>The Sale of Goods Act, 1930</u></li> <li>● <u>The Negotiable Instrument Act, 1881</u></li> <li>● <u>The Companies Act, 1956</u></li> <li>● <u>The Consumer Protection Act, 1986</u></li> </ul>
<u>Unit 3: Acts related to IT &amp; Information</u>	
<u>3.1</u>	<ul style="list-style-type: none"> <li>● <u>The Information Technology Act, 2000</u></li> <li>● <u>The Right to Information Act, 2005</u></li> </ul>
<u>Unit4: Universal Ethics</u>	



School of Business Studies  
Master of Business Administration  
(Corporate Management)

<u>4.1</u>	<ul style="list-style-type: none"> <li>• <u>Nature and Essence of Ethics</u></li> <li>• <u>Business Ethics Concepts</u></li> <li>• <u>Professional ethics</u></li> </ul>
<u>Unit 5: Applied Ethics</u>	
<u>5.1</u>	<ul style="list-style-type: none"> <li>• <u>Organizational moral standards and the ethical dilemmas of decision-making</u></li> <li>• <u>Managing ethics in organization</u></li> <li>• <u>Anti-corruption behavior</u></li> <li>• <u>Socially responsible leadership and CSR' role in corporate governance</u></li> </ul>

**Course Outcome:**

- CO1:** Students become more effective decision makers by examining the meaning and role of ethics in the business environment,
- CO2:** Application of concepts and frameworks for moral reasoning to complex business issues
- CO3:** Designing guidelines for CSR and Ethical conduct within organization
- CO4:** Illustrate the use of the Acts in common business situations
- CO5:** Outline the various facets of basic case laws of each Act from a legal and managerial perspective.

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>2</u>			<u>2</u>		<u>2</u>
<u>CO2</u>	<u>3</u>				<u>2</u>	<u>2</u>
<u>CO3</u>	<u>1</u>					



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<u>CO4</u>		<u>1</u>		<u>3</u>		
<u>CO5</u>		<u>2</u>	<u>2</u>	<u>2</u>		

**Textbooks**

1. Kuchhal M.C. - Business Law (Vikas Publication, 4 th Edition)
2. Farnando,Muraleedharan & Sateesh Business Ethics : An Indian Perspective | Third Edition | By Pearson

**References**

1. Gulshan S.S. - Business Law Including Company Law (Excel Books)
2. Avtar Singh - Principles of Mercantile Law (Eastern Book Company, 7 th Edition).
3. N.D Kapoor & Rajni Abbi-General Laws & Procedures (Sultan Chand & Sons)
4. Durga Das Basu- Constitution of India (Prentice Hall of India) 6. Relevant Acts
5. Zabihollah Rezaee,

**NEGOTIATION SKILLS**

**Course Objective:**

1. Define the stages and elements of the negotiation process
2. Develop the skills and techniques of a successful negotiator
3. Identify optimal win-win solutions in negotiations and make profitable deals
4. Differentiate negotiation styles and mental models, analyse their own and their
5. partner's behaviour in negotiations
6. Learn to counter manipulation and psychological press in negotiations

<u>Ref No</u>	<u>Topics to be covered</u>



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<u>Unit 1: Introduction to Negotiation skills</u>	
<u>1.1</u>	<ul style="list-style-type: none"><li>• <u>What are Negotiation skills?</u></li><li>• <u>Negotiations in everyday life</u></li></ul>
<u>Unit II: Negotiation Process</u>	
<u>2.1</u>	<ul style="list-style-type: none"><li>• <u>Learning about catalysts and barriers of successful collaboration</u></li><li>• <u>Designing a negotiation plan</u></li><li>• <u>Creating a negotiation team</u></li></ul>
<u>Unit III: Negotiation in Sales</u>	
<u>3.1</u>	<ul style="list-style-type: none"><li>• <u>Positional bargaining</u></li><li>• <u>Principled negotiations</u></li><li>• <u>Mixed negotiating</u></li></ul>
<u>Unit4: Negotiation in Finance</u>	



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<u>4.1</u>	<ul style="list-style-type: none"> <li>● <u>Implementation and compliance</u></li> <li>● <u>Post-negotiation assessment and evaluation</u></li> </ul>
<u>Unit V: Negotiable in HR</u>	
<u>5.1</u>	<ul style="list-style-type: none"> <li>● <u>Compensation Pack</u></li> <li>● <u>HR Policies</u></li> <li>● <u>HR Software</u></li> <li>● <u>HR Payroll vendor</u></li> </ul>

**Course Outcome:**

**CO1: Describe the actions taken on different stages of negotiations.**

**CO2: Explain the importance of pre-negotiation and post-negotiation phases.**

**CO3: List the roles and functions in negotiation teams; demonstrate the skills of organizing and managing negotiation teams.**

**CO4: Formulate and apply the instruments of negotiation strategy and tactics.**

**CO5: Identify the zone of possible agreement (ZOPA) in negotiations.**

	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>
<u>CO1</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>3</u>	<u>2</u>
<u>CO2</u>	<u>2</u>	<u>2</u>	<u>1</u>		<u>3</u>	<u>2</u>



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<u>C03</u>		<u>2</u>				
<u>C04</u>		<u>3</u>			<u>3</u>	<u>1</u>
<u>C05</u>	<u>2</u>	<u>3</u>			<u>3</u>	

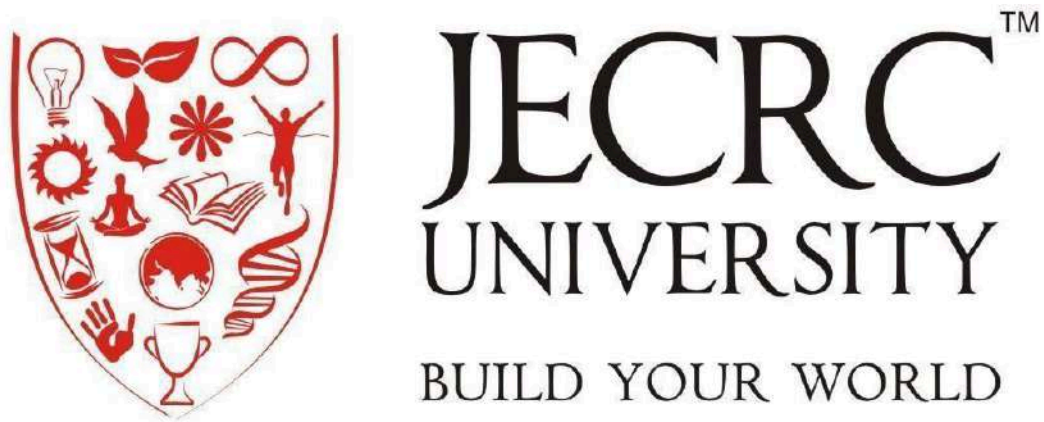
**Textbooks:**

1. Beyond Winning Negotiating to Create Value in Deals and Disputes by Robert Mnookin
2. Negotiating Rationally by Max H. Bazerman and Margaret A. Neale

**References:**

1. Berghoff, E. A. et al. (2007). The International Negotiations Handbook. Success through Preparation, Strategy, and Planning. PILPG and Baker & McKenzie. Online access: [http://www.bakermckenzie.com/files/Uploads/Documents/Supporting%20Your%20Business/Featured%20Services/bk\\_internationalnegotiationshandbook\\_12.pdf](http://www.bakermckenzie.com/files/Uploads/Documents/Supporting%20Your%20Business/Featured%20Services/bk_internationalnegotiationshandbook_12.pdf)
2. Jensen, K. (2013). The Trust Factor: Negotiating in SMARTnership. Palgrave Macmillan. Online access: <http://proxylibrary.hse.ru:2099/toc.aspx?bookid=89465>





**Jaipur School of Business**

**Course Structure**

**Bachelor of Business Administration**

**Academic Programmes**

**Batch (2022-2025)**

A handwritten signature in blue ink, appearing to be 'S. J.', is shown on a light-colored background.

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**Total Credits for the Batch 2022-2024 = 132 Credits**

- 1. Total credits required = 132**
- 2. No relaxation in Core and Fundamental subjects.**
- 3. Option can be availed in Specialization, Interdisciplinary and General Subjects.**

**Summary Sheet**

<b>Semester</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>6<sup>th</sup></b>	<b>Total</b>	<b>Min. credit required for degree</b>
<b>Credit</b>	20	18	26	20	26	22	132	

<b>Type</b>	<b>Fundamental</b>	<b>Core</b>	<b>Specialization</b>	<b>Interdisciplinary</b>	<b>General</b>
<b>Total Credit</b>	34	10	52	18	18

Abbreviation: F=Fundamental, G=General, C=Core, ID=Interdisciplinary, S=Specialization



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## Semester I

S. No.	Sub Code	Sub Name	L	T	P	C	Type
1	BBA501A	Fundamentals of Statistics	3	-	-	3	F
2	BBA502A	Organizational Behavior	2	-	-	2	C
3	BBA503A	Introduction to Marketing	3	-	-	3	F
4	BBA504A	Business History	2	-	-	2	F
5	BBA505A	Businesses across Cultures	2	-	-	2	F
6	BBA506A	Principles of Economics	2	-	-	2	G
7	BBA507A	Writing & Communication 1	2	-	-	2	G
8	BBA508A	Growth Mindset	2	-	-	2	ID
9	BBA509A	Thought   Clarity, Choice and Conviction	2	-	-	2	ID
<b>TOTAL</b>			<b>20</b>	<b>-</b>	<b>-</b>	<b>20</b>	

## Semester II

S. No.	Sub Code	Sub Name	L	T	P	C	Type
1	BBA510A	Introduction to Accounting	2	-	-	2	F
2	BBA511A	Financial Management	2	-	-	2	C
3	BBA512A	Operations and Production Management	2	-	-	2	F
4	BBA513A	Politics & Society	2	-	-	2	F
5	BBA514A	Consumer Behavior	2	-	-	2	F
6	BBA515A	Technology in Management	2	-	-	2	G
7	BBA516A	Writing & Communication 2	2	-	-	2	G
8	BBA517A	Critical Thinking & Logic	2	-	-	2	ID
9	BBA518A	Everydayness   Banks, RTOs and Courts	2	-	-	2	ID
<b>TOTAL</b>			<b>18</b>	<b>-</b>	<b>-</b>	<b>18</b>	



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### Semester III

S. No.	Sub Code	Sub Name	L	T	P	C	Type
1	BBA519A	Business Analytics	2	-	-	2	F
2	BBA520A	Human Resource Management	2	-	-	2	C
3		Elective 1	3	-	-	3	S
4	BBA521A	E-Commerce	2	-	-	2	F
		Elective 2	3	-	-	3	S
6	BBA522A	Writing & Communication 3	2	-	-	2	G
7	BBA523A	Problem Solving	2	-	-	2	G
8	BBA524A	Expression   Dance, Music and Theatre	2	-	-	2	ID
9	BBA525A	E-Commerce (Lab)	2	-	-	2	G
10	BBA526A	Summer Internship	6	-	-	6	S
<b>TOTAL</b>			<b>26</b>	<b>-</b>	<b>-</b>	<b>26</b>	

### Semester IV

S. No.	Sub Code	Sub Name	L	T	P	C	Type
1	BBA527A	Corporate Governance & Ethics	2	-	-	2	F
2	BBA528A	Statistics II	2	-	-	2	C
3		Elective 3	3	-	-	3	S
4	BBA529A	Environment and Businesses	2	-	-	2	F
5	BBA530A	SME Management	2	-	-	2	F
6		Elective 4	3	-	-	3	S
7	BBA531A	Negotiation	2	-	-	2	G
8	BBA532A	Situational Awareness	2	-	-	2	ID
9	BBA533A	Imagination   Drawing and Fiction	2	-	-	2	ID
<b>TOTAL</b>			<b>20</b>	<b>-</b>	<b>-</b>	<b>20</b>	



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### Semester V

S. No.	Sub Code	Sub Name	L	T	P	C	Type
1	BBA534A	Research Methods	2	-	-	2	F
2	BBA535A	Design Thinking	2	-	-	2	C
3		Elective 5	3	-	-	3	S
4	BBA536A	Basics of Programming	2	-	-	2	F
5	BBA537A	Public policy and Businesses	2	-	-	2	F
6		Elective 6	3	-	-	3	S
7	BBA538A	Summarizing and Narrative Building	2	-	-	2	G
8	BBA539A	Strategy and Decision Making	2	-	-	2	ID
9	BBA540A	Creativity   Visual Thinking and Cartography	2	-	-	2	ID
10	BBA541A	Summer Internship	6	-	-	6	S
<b>TOTAL</b>			<b>26</b>	<b>-</b>	<b>-</b>	<b>26</b>	

### Semester VI

S. No.	Sub Code	Sub Name	L	T	P	C	Type
1	BBA542A	Entrepreneurship	2	-	-	2	S
2	BBA543A	Internship	20	-	-	20	S
<b>TOTAL</b>			<b>22</b>	<b>-</b>	<b>-</b>	<b>22</b>	



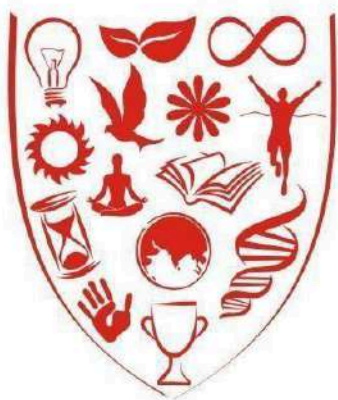
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## Specialisation Elective Subjects

S. No.	Sub Code	Subject	L	T	P	C	Type
<b>Marketing Management</b>							
1	BBA544A	Integrated Marketing Communications	3	-	-	3	S
2	BBA545A	Sales and Distribution Management	3	-	-	3	S
3	BBA546A	Events, PR and Corporate Communications	3	-	-	3	S
4	BBA547A	Advertising	3	-	-	3	S
<b>Digital Marketing</b>							
1	BBA548A	Digital Visualization and Expression	3	-	-	3	S
2	BBA549A	Digital Mediums for Business	3	-	-	3	S
3	BBA550A	Web Optimization	3	-	-	3	S
4	BBA551A	SEO	3	-	-	3	S
<b>Finance</b>							
1	BBA552A	Financial Derivatives and Risk Management	3	-	-	3	S
2	BBA553A	Securities Analysis and Portfolio Management	3	-	-	3	S
3	BBA554A	Banking and Insurance	3	-	-	3	S
4	BBA555A	Financial Markets and Institutions	3	-	-	3	S
<b>Operations Management</b>							
1	BBA556A	Customer Relationship Management	3	-	-	3	S
2	BBA557A	Project Management	3	-	-	3	S
3	BBA558A	Manufacturing, Inventory and Supply Chain Design	3	-	-	3	S
4	BBA559A	Operations Management Analytics	3	-	-	3	S
<b>Business Analytics</b>							
1	BBA560A	Fintech and Financial Services Analytics	3	-	-	3	S
2	BBA561A	Predictive Analytics for Business	3	-	-	3	S
3	BBA562A	Simulation	3	-	-	3	S
4	BBA563A	Understanding Big Data & Cloud Computing	3	-	-	3	S
<b>Tourism &amp; Hospitality Management</b>							
1	BBA564A	International Hospitality Operations	3	-	-	3	S
2	BBA565A	Cultural Tourism and Hospitality Management	3	-	-	3	S
3	BBA566A	Critical Issues in Tourism and Hospitality	3	-	-	3	S
4	BBA567A	Hospitality & Sustainable Development	3	-	-	3	S
<b>Human Resource Management</b>							
1	BBA568A	Employment laws and industrial relations	3	-	-	3	S
2	BBA569A	Performance and compensation management	3	-	-	3	S
3	BBA570A	Talent Management	3	-	-	3	S
4	BBA571A	Learning and Development	3	-	-	3	S
<b>Retail Management</b>							
1	BBA572A	Retail Environment Analysis	3	-	-	3	S

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2	BBA573A	Multi-channel Retailing	3	-	-	3	S
3	BBA574A	Strategic Retail Planning and Management	3	-	-	3	S
4	BBA575A	Merchandise Management	3	-	-	3	S



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**Syllabi**

**Bachelor of Business Administration**

**Academic Programme**

**Batch (2022-2025)**

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## **BBA SYLLABUS**

### **Course: Fundamentals of Statistics**

#### **Semester 1**

**Credit: 4**

##### **Unit 1:**

Overview - Statistics in daily life, Brief history and everydayness of statistics, Introduction to statistics and its applications, Overview of statistics, key terms, and definitions, what is data, scales of measurement, Visualization of data, Histograms, stem and leaf plots, box and, whisker plots Basics of Data Visualization in Excel, Plotting various types of graphs in Excel

##### **Unit 2**

Measures of central tendency - Mean, median, mode, need for central tendency, limitations of central tendency. Measures of dispersion, absolute and relative, range, mean deviation, standard deviation, Dispersions Significance, kurtosis, skewness, Type I and Type II errors.

##### **Unit 3:**

Sampling and Distribution - Probability, Meaning, significance in daily lives, needs, basic calculations, Probability (contd.). Conditional probability, Bayes theorem, Discrete Probability Distributions, Binomial and Poisson distribution, Continuous Probability Distributions  
Meaning, significance, characteristics of exponential and normal distribution, central limit theorem. Sampling - Sampling theory, statistical inference, standard error. Sampling II estimates, expectation, sampling distribution. sampling III

##### **Unit 4:**

Confidence Intervals and Hypothesis Testing Confidence Interval Estimation, Estimation of the population mean, confidence intervals, introduction to hypothesis testing  
Hypothesis Testing, Process of hypothesis testing, significance levels. Types of tests - z test, t-test, ANOVA Non-parametric tests. Non-parametric tests, Kolmogorov-Smirnov test, Wilcoxon signed-rank test.

##### **Unit 5:**



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Correlation-Introduction to correlations, key terms, definitions, meaning, significance, types of correlation. Correlation analysis. Methods of studying simple correlations, scatter diagrams, Pearson's coefficient of correlation, Spearman's correlation coefficient  
Causation v Correlations, Difference between correlation and causation

### Primary Resources

1	Fundamental Statistics
2	Gupta S.P. (2017): Statistical Methods, Sultan Chand & Sons, 45h Revised Edition
3	Levin, R. and Rubin, D. (2017). Statistics for Management. 8th ed. New Delhi: Pearson.
4	Business Statistics in Practice using Data, Modeling, and Analytics by Bowerman, O'Connell & Murphree
5	Eugene Don, Joel Lerner, Basic Business Mathematics, Tata McGraw Hill Publication.

### Course: Organizational Behavior

#### Semester 1

Credit: 4

#### Unit 1:

Introduction- Introduction to Org Behavior, Overview of OB, key terms, and definitions  
Evolution of Org Behavior, Chronological explanation of the evolution of OB since its inception., Key Constraints of Org Behavior, Challenges faced by managers, Limitations of OB Theory

The contributions of behavioral sciences to Org Behavior, The intersection of behavioral sciences and business, Applications of Org Behavior. Practical applications of OB. Personality- Introduction to Personality, Defining personality, history of personality. Personality Theories, Trait, type, and mixed approaches to personality. Measuring Personality, MBTI, design, administration, scoring, interpretation.

#### Unit 2:

Attitudes- Overview of Attitudes, Definition, key terms, related constructs, characteristics of attitudes. Criticality of Attitudes- Attitude formation, attitude change, attitudes in the workplace, measuring attitudes. Motivation - Motivation. Key terms, types of motivation, expression of motivation, theories of motivation. Motivation (contd.) Using rewards, incentives to motivate employees

#### Unit 3:

Emotions- Overview of Emotions, Key terms, related constructs, stress in the workplace (GAS Model), stress management, introduction to emotional intelligence, Emotional Intelligence in the workplace, Theories of EI in the workplace. Group Dynamics, Group Characteristics



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Key terms, key processes - group formation, group cohesiveness, and related characteristics of groups. Group Processes. Understanding groups and related processes - social loafing, groupthink, free riding . Work Teams

Understanding teams, types, levels, what makes a good team player, team effectiveness

#### **Unit 4:**

Organizational Culture- Introduction to organizational culture, Defining culture, dimensions, levels and types, related constructs, Importance of Org Culture, Impact of OC on the individual, culture shift/change in the workplace. Organizational Structure- Introduction to organizational structure and design. Common organizational structures and designs, types

Structure's impact. Departmentalization, organizational life cycle, the impact of structure and design on employees.

#### **Unit 5:**

Organizational Change- Overview of organizational change, Key terms, definitions, related constructs, change, and the change process, Organizational change and associated impact

Types of change, the influence of change, change and the individual, responding to change

Power & Politics, Power structures, Key terms, hierarchy, politics in the workplace, leadership, and power, Understanding Leadership

Approaches to leadership, leadership theories, managers vs leaders, Leadership styles, types of leadership. Interpersonal Business Communication. Fundamentals of Communication

Key terms, psychological contract, trust-building, Conflict

Identifying conflict, types of conflicts, cooperation vs conflict, managing conflicts, Negotiations

Bargaining strategies, types of negotiations, differences in the effectiveness of negotiating, tactics

#### **Primary Resources**

1	Organizational Behavior by Robbins, Judge, and Vohra, 18th Edition (2018)
2	Essentials of Organizational Behavior   Fourteenth Edition   By Pearson. Robbins & Judge (2019)

### **Course: Introduction to Marketing**

**Semester 1**

**Credit: 4**

#### **Unit 1:**

Introduction - Marketing is everywhere, Why is marketing so central to everything, Evolution of Marketing, Definition, evolution, core concepts, Application of Marketing, Marketing vs selling,



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roles of marketing managers, Marketing Environment: Global, Types of environments - internal, external, Marketing Environment: India. Relationships, demography, culture  
Cultural differences in marketing - Culture and marketing, global marketing and the influence of cultures, sensitivity, challenges

#### **Unit 2:**

Market STP-Market Segmentation, Meaning, benefits, Market Segmentation (contd.) Bases for the consumer market and industrial market segmentation. Targeting, Market targeting Product Positioning, Product positioning, Branding, Basics of branding and how organizations achieve it Marketing as a Strategy, Large scale insights on marketing as a strategic tool, Marketing strategies. Successful strategies, scope, limitations.

#### **Unit 3:**

Marketing Research- Introduction to Market Research, Nature and scope, Key Processes, Marketing research process, Questionnaire Design, Questionnaire construction, pre-testing Methods of Data Collection, Types of methods, process. Data collection (contd.) Strategies, Tools, Software's. Thick Data. Why do organizations need more than just big data Marketing Principles: Product. Product (concept, basic product, expected product, augmented product, potential product), product life cycle.

#### **Unit 4:**

Price Marketing Principles: Price, Price (meaning, pricing objectives, strategies - skimming, penetration, psychological), Marketing Principles: Place, Place (importance of distribution, channels of distribution - manufacturer, wholesaler, retailer, carrying and forwarding, factors influencing distribution channels, Marketing Principles: Promotion  
Promotion (Advertising, Sales, Publicity, Public Relations, Direct Marketing), people, processes.

#### **Unit 5:**

Trends in Marketing- Introduction to Digital Marketing, Digital marketing - meaning, importance,  
Green Marketing, Meaning, importance, IT & Marketing, Virtual marketing, e-buying behavior Marketing in Pandemic, Covid-19 and its impact on the pandemic, Mapping Marketing Strategy Visual designs for marketing strategy, Customer Experience, What really makes customers buy a product, New Products, Commercializing the Innovation

#### **Primary Resources**

1	Principles of Marketing - Philip Kotler, Gary Armstrong, Prafulla Agnihotri (2018)	(essential)
2	Fundamentals of Marketing - Paul Baines, Sophie Whitehouse, Sara Rosengren, Paolo Antonetti (2021)	(recommended)



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**Course: Businesses Across Cultures**

**Semester 1**

**Credit: 4**

**Unit 1:**

Introduction- Culture, Definition, associated terms, significance, Dimensions and determinants of culture

**Unit 2:**

Culture & Organizations- Cultural dilemmas, Cross-cultural dilemmas, cultural nuances, Culture and management. Impact of culture on management. Managing across cultures. Organizational structure, cultures. Sensitivity, ethical considerations. Leadership, Impact of culture on leadership

**Unit 3:**

Practical Applications Cross-cultural dilemma management. How to identify underlying assumptions, underlying methods of persuasion implied in arguments. Negotiating across cultures

**Unit 4**

Working in international teams, Culturally diverse teams, effective communication with others  
Cross-cultural communication

**Unit 5:**

Presenting internationally, effective speaking and listening, Relationship building  
Rapport formation, trust-building, and navigating barriers to effective cross-cultural functioning,  
Global business etiquette

**Primary Resources**

1	When cultures collide: Leading across cultures by Richard Lewis (2018)
2	Cross-cultural management: A Transactional Approach by Taran Patel (2013)

**Course: Business History**

**Semester 1**

**Credit: 4**

**Unit 1:**



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General Introduction to Business History- Why study business history. Why should managers study history: both of their own company, and the overall climate in the region they operate in.

### **Unit 2**

Brief History of Management, Large scale insights on managerial history. Private Limited Company. The emergence and rise of limited liability  
History of concepts - History of decision-making, history of companies

### **Unit 3:**

Pre-Independence India- East India Company, History of the Business of East India Company  
Indian Cities and their rise, Transformation of cities, Old Companies in India, Companies with roots in British India, Managing Agencies, Managing Agencies of British India, and roots of Indian conglomerates

### **Unit 4**

Swadeshi Movement- The rise of Indian entrepreneurs, Indian Business and economy  
Tracing the first and second world war and associated impact on Indian business

### **Unit 5:**

Post-independence India- License Raj and Indian businesses, Planning and License Raj, 1991 and its Impact on Businesses, Understanding the liberalization and policy changes and the impact on India's businesses, Indian Economy post-independence, Bird's eye view on the reflection of post-independent India's history.

### **Primary Resources**

1	Marwaris: From Jagat Sheths to Birlas
2	Roy, Tirthankar (2018). A Business History of India

### **Course: Writing and Communication 1**

#### **Semester 1**

**Credit: 4**

### **Unit 1:**

Introduction to communication- Why is it important, Need for developing good communication and writing techniques, Introduction to Channels, Various communication media, text, WhatsApp, email, Slack, etc. Reading long-form articles. Reading and analyzing why some articles (from say, Caravan, New Yorker, Harvard Business Review) captured us Writing Purpose, perspectives, and types of writing.

### **Unit 2:**

Practicing writing- Converting a thought into a written idea, Choosing a topic, critical reading, and writing



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### Unit 3

Cover Letter- Practicing how to write a good cover letter, Concise Email writing  
Practicing how to write a precise email,

### Unit 4

Argumentative writing- Arguments vs. non-arguments, framing arguments, different purposes  
Business Plan Writing Basics. Practicing how to write a B-Plan.

### Unit 5

Preparing your CV- Professionalizing a resume/CV, Report writing, Understanding of various components of the report, Presentation skills, Understanding of various components of a presentation

### Primary Resources

1	Sanjay Kumar, Pushp Lata (2015). Communication Skills
2	Kate Turabian (2019) Student's Guide to Writing College Papers, Fifth Edition (Chicago GDES Writing Editing & Publishing CGWEP (CHUP))

### Course: Growth Mindset

#### Semester 1

#### Credit: 2

### Unit 1:

The Mindset For Learning- Introduction To Growth Mindset, Introduction to the concepts of Growth and Fixed Mindsets and the impact each of the mindsets has on an individual's actions and thoughts. Moving To A Growth Mindset, Read a case study about Sachin Tendulkar's first test match to understand how using a Growth Mindset can help in overcoming challenges

Overcoming Obstacles- Introduction to the concept of Power of Yet that will help make the shift from a Fixed Mindset to a Growth Mindset by adopting a more positive outlook. Read a case study on Helen Keller and identify key takeaways about having a Growth Mindset.

Learning From Failure. Understand the link between having a Growth Mindset and achieving success by overcoming failure through the examples of famous leaders. Mentorship And Feedback, Understand the significance of having a mentor and identify a mentor for yourself through an activity. Learn how to give and receive constructive feedback by using a Growth Mindset.

### Unit 2:



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Kolb's Cycle Of Experiential Learning- Kolb's Experiential Learning Theory, Introduction to Kolb's Cycle of Experiential Learning as a tool to maximize learning from a past experience. Using Kolb's Experiential Cycle, Apply Kolb's Learning Theory by breaking it down into the 4 stages and creating a reflective journal entry.

**Unit 3:**

Gibbs Reflective Cycle- Gibbs Reflective Cycle Theory Applying The Reflective Cycle  
Learn about Gibbs' Reflective Cycle Theory and each of its stages Apply Gibbs' Reflective Cycle to an experience.

**Unit 4:**

Leading With A Growth Mindset, A Growth Mindset For Leadership  
Understand the meaning of leadership and the Growth Mindset qualities a leader possesses.  
Read case studies about leaders from two major companies, Telenor and Microsoft, to understand how these organizations ensure a Growth Mindset culture.

**Unit 5:**

Synthesizing Our Learning- Applying The Concepts, Revisit all the concepts covered in the previous modules and to provide more application. Also, create a reflective journal entry using Kolb's or Gibbs' cycle. Group Project, Create a reflective journal entry and a presentation using either Kolb's or Gibbs cycle. Also, identify learning style through a self-assessment.  
Creating Your Leadership Legacy, Develop a leadership legacy by thinking about the skills and core values you want to be remembered by. SMART Goals  
Understanding the meaning and relevance of creating SMART Goals and identifying strategies for overcoming challenges.

**Primary Resource:**

1. **The Growth Mindset: A Guide to Professional and Personal Growth Mindset - Updated Edition: Changing The Way You Think To Fulfill Your Potential-Dr. Carol S Dweck.**

## **SEMESTER 2**

**Course: Introduction to Accounting**

**Semester 2**

**Credit: 4**



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**Unit 1:**

Introduction-Financial Accounting, Definition, scope, objectives, Evolution of accounting  
 History and nature, Users of accounting information, Who uses accounting information and why  
 Accounting Principles, Generally accepted accounting principles (GAAP), conventions  
 Assets & Liability Management, Assets, liabilities, revenues, expenses  
 Expenditure, Capital, revenue expenditure, nature of accounts

**Unit 2:**

Financial Statements- Rules & Regulations, Rules for debit and credit, journal entries for GST accounting, users of statements, Limitations, What are the shortcomings of financial accounting  
 Accounts, Trading account, profit and loss account, Balance and cash flow statement  
 Balance and cash flow statement for the sole proprietor

**Unit 3:**

Accounting Principles and Standard- Joint-stock company, Financial statements of a joint-stock company (Companies act, 2013), Corporate annual general report, Contents, regulations, and expectations from the annual report, Accounting Conventions, General accounting conventions  
 Accounting Standards, Definition, scope, Significance of accounting standards, Meaning and need for Indian accounting standards to converge with IFRS

**Unit 4:**

Journal and Subsidiary Books, Accounting Process, Types of account, rules of accounts  
 Accounting Process (contd.) Preparation for journal, Journal Entries, Simple and combined journal entries, Subsidiary Books, Purchase, sales, purchase return, sales return, cash book

**Unit 5:**

Ledger Posting and Trial Balance- Ledgers, Meaning, utility, significance, Ledger Account Format, Journal Entries to Ledger Account, Balancing ledger account, Preparation of trial balance  
 Depreciation- Introduction, Meaning, causes, Methods, Written down value, the straight-line method Factors - Factors affecting depreciation. Final Accounts - Trading & Profit and Loss Account

Balance Sheet of sole proprietorPrimary Resources:

1	Hanif & Mukherjee, Financial Accounting 1, Tata McGraw Hill
2	Pengage management books - set of 4

## Course: Financial Management

### Semester 2

### Credit: 4

**Unit 1:**

Introduction- Finance, Definition, evolution, core concepts, scope, Financial Management, Meaning, scope, objectives, Financial Management (contd.)Profit vs wealth maximization, finance function, the role of finance manager. Time Value of Money. role of the time value of money in finance, present, future values, cash flow, annuities, perpetuities, Long-term financial decisions profit vs wealth maximization, finance function, the role of



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finance manager Long-term investment decisions, Capital budgeting, techniques (NPV, IRR), selecting the right technique

#### **Unit 2:**

Financial Markets- What are financial markets? Meaning, function, scope, the Indian market

Types of markets, Money market, capital market, forex market, debt market

Financial Instruments, Call money market, T Bills, commercial bills, commercial papers, certificate of deposits

Government securities Government securities, sovereign gold bonds

Stock Market Trading. Eligibility, Demat account, trading mechanism, settlement, major stock exchange - NSE, BSE, indices

#### **Unit 3:**

Banking Operations- Banks, Kinds of banking companies, commercial, private sector, public sector, development, investment banks, Banking, Licensing of banks in India, RTGS, NEFT, IMPS, core functions, RBI. Financial Intermediaries- Non-banking financial companies, types, functions, provident funds, pension funds. AssetsLand, property, mutual funds, insurance.

#### **Unit 4:**

Capital Budgeting- Introducing capital budgeting, Definition, nature, scope, techniques of evaluation, Rates of return, accounting rate of return, internal rate of return, Budgeting techniques, NPV, IRR, PI, ARR, PBP - meaning, function

Capital Structure- Introduction, Capital and financial structure, meaning, scope, factors determining capital structure, Approaches, NI & NDI approach in determining capital structure, traditional method, and M and M method. Leverage. Leverage meaning, scope, and significance of leverage analysis. Cost of Capital. Meaning, scope, measurement of cost of debt, cost of preference share capital, equity share capital, retained earnings, and weighted average

Dividends- Meaning, factors affecting dividend decision

#### **Unit 5:**

Working capital management- Cash management, Objectives, speeding up cash flows, slowing cash disbursement, Capital management, Determinants, operating cycle, estimation of working capital, Financing working capital, reserves, surplus, bonus shares, and retained earnings

Personal Finance, Financial goal-setting, Short term and long term financial goals

Personal Budgeting, Setting limits, effective allocation of funds, saving schemes

Tax Planning- Nature, scope, functions, Wealth Protection and Management, Estate planning, succession planning.

#### **Primary Resources:**

1	Financial Management (12th Edition) Pearson by IM Pandey
2	Financial Management: Theory and Practice (10th Edition) McGraw Hill by Prasanna Chandra

### **Course: Operations and Production Management**

#### **Semester 2**

#### **Credit: 4**

#### **Unit 1:**

Introduction- Operations Management, Definition, need, scope, Operations Managers

Roles, responsibilities, key decisions, Business & Operations Management, functional areas of organizations, operations management, and the linkage, Operation Strategies

Meaning, relevance, strategy formulation, Operation Strategies (contd.) The link between operations and organizational strategy, productivity, and associated factors. Maintenance Management. Need, relevance, equipment life cycle, measuring maintenance performance.



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**Unit 2:**

Capacity Planning- Introduction, Meaning, benefits, measuring capacity, determinants, considerations for capacity alternatives, Approaches to capacity planning, Steps used to resolve constraint issues, description of approaches, Decision-Making, Steps in the decision process, techniques to apply to decision making, decision tree

**Unit 3:**

Process Selection & Layout Decision- Introduction, What is process selection, characteristics influencing alternative processes (volume and variety), importance. Process types- Types of processes, factors influencing process selection, Layout Decision, layout planning, meaning, relevance, benefits, types of layouts, Layout Decision (contd.) Reasons for redesign, product layouts, and process layouts.

**Unit 4:**

Supply Chain Management- Introduction, Nature, scope, key aspects, current trends, Challenges, Complexities regarding global supply chains, ethical issues in supply chain management. Application, Concerns for small business owners, managing supply chain issues, Logistics, Supplier management, logistics of supply chain management including RFID Procurement. Purchasing interface, purchasing cycle, ethical considerations, decision making (centralized and decentralized) Inventory Management and Warehousing- Inventory Management, Definition, Types, main functions, costs related to inventory management, Approaches. ABC approach, EOQ model, economic production quantity model. Warehousing

**Unit 5:**

Forecasting- Introduction, Meaning, relevance, types - qualitative and quantitative Process, Forecasting process, what makes a good forecast, Techniques, Techniques of forecasting - average, weighted-average, exponential smoothing, linear trend, trend-adjusted exponential smoothing forecast. Aggregate Planning & Scheduling, Introduction Meaning, relevance, benefits, strategies of aggregate planning, Methods Methods of aggregate planning - level, chase and mixed plan, Scheduling Operation scheduling, short term vs long term, job sequencing, Master Scheduling Process, importance, inputs outputs, and MRP processing. Introduction Key terms, services, importance, determinants, need, costs, Methods TQM, Six sigma model, various quality tools, Analysis Control charts, control tables, quality control in finance, Elementary Queuing Theory

**Primary Resources:**

1	Mahadevan, B (2015). Operations Management: Theory & Practice, 3rd ed., Pearson
2	Operations Management (12th Edition) McGraw Hill by William J Stevenson

**Course: Politics & Society**  
**Semester 2**  
**Credit: 2**

**Unit 1:**

Politics - Introduction, Definitions, nature, scope, Indian and Western Political Thought, Fundamentals of political philosophy - India and western tradition, Global Politics



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## Unit 2

Globalization. Impact of globalization on politics and inter-state relations, Comparative Politics, Comparison of systems, tools to compare. Democratic Principles- Definition, evolution, contemporary political institutions and principles

## Unit 3:

Socio-Political Issues- Socio-political Movements in India, Features, evolution, collective action, Social Development, What constitutes development? Role of development in influencing policy, Caste, community, and politics, Relations, interrelations, intergroup conflict and the role of politics, Religion and politics. Critical debates in politics

## Unit 4:

Society- Social Theory, Nature, scope, functionalism, evolutionism, Social Theory (contd.) Structural functionalism, structuralism, post-structuralism.

## Unit 5:

The State, Law, and Society- Interrelations, power, corruption

Primary Resources:

1	Indian Politics and Society since independence by Bidyut Chakrabarty (2008)
2	Society & Politics in India: Understanding Political Sociology by Shefali Roy (2014)

## Course: Consumer Behavior

Semester 2

Credit: 2

## Unit 1:

Introducing to Consumer Behavior- Introduction, Definition, scope, significance, Marketing and STPs, Segmentation, targeting, positioning; how to select target market. Marketing and STPs (contd.) Bases of segmentation eg. Demographic, product benefits, product usage.

## Unit 2:

Consumer Attitudes- Motivation, Motives, needs, goals; types of motivation, Perception  
Consumer perception of a product, managing perceptions,

## Unit 3

Learning- How do consumers learn about the market? Methods of learning about the market, Attitudes  
Attitude formation, intensity, factors influencing attitudes, Attitude change, Can attitudes change? Strategies to drive attitude change.

## Unit 4:



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Factors- Cultures and subcultures, Importance of understanding cultural divisions and differences. Decision Making, Decision-making models, consumption behavior

**Unit 5:**

Reference Groups, Socioeconomic status, social divisions to better understand the market and its needs, Ethical considerations

Consumer culture, considering the impact of marketing techniques on consumers

**Primary Resources:**

1	Consumer Behavior (Twelfth Edition), Pearson by Kumar Leon G., Schiffman; Joe, Wisenblit, S. Ramesh (2018)
2	Consumer Behavior - A Digital Native, First Edition, Pearson by Varsha Jain, Jagdish Sheth, et al. (2019)

**Course: Technology in Management**  
**Semester 2**  
**Credit: 2**

**Unit 1:**

MIS- Also called MIS, A break up of all three concepts; function and characteristics; What is MIS?; Components; Data Processing, Data resourcing. Intro to BIS; Latest trends of DBMS-data warehousing, Data mining, Web Mining, and OLAP. MIS and Internet, going digital; Types of firms; characteristic of digital innovation; case studies; digital transformation; Importance; stakeholder; Case studies

**Unit 2:**

Implementing information systems- planning; challenges and stages in implementation; Success and failure stories; discussing the success and failure factors; Evaluation of MIS; Controlling management; management support and commitment

**Unit 3:**

Business applications of MIS- Marketing, ERP and CRM are used in each field. How does it help? Case studies, HRM, Finance, Operations and Production

**Unit 4:**

M-commerce, How have mobile digital platforms emerged? components, growth, effects and, changing roles due to the pandemic; Paytm/Fintech/ MakeMyTrip.

**Unit 5:**



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Emerging technologies in Business, Connecting clouds, An introduction of connecting clouds and examples/case studies. Ethics in IT- What are the ethical and social issues? legal system issues, privacy issues, and ethical issues; IPR, Liability and Accountability. Artificial Intelligence and Machine Learning. Simulation

Primary Resources:

1. Surtis Frye, Joyce Cox, Steve Lambert, "Microsoft Office System "Step By Step.
2. Nance Muir, "Microsoft Office- PowerPoint 2010 Plain and Simple", Amazon.Com.

**Program: Bachelors in Business Administration (B.B.A.)**

Course: Writings and Communications 2

**Semester 2**

**Credit: 2**

Course Manuals:

**Unit 1:**

Basics of business communication- Business words, Keywords, meaning, formal vs informal, Letters or inquiry How to write emails/letters of inquiry, Replying to inquiries, Drafting responses to inquiries, Order placement and fulfillment, How to order, communicate fulfilled orders.

**Unit 2:**

Critical Communication, Communicating with other stakeholders, Writing to legal agencies, government, and other stakeholders

Critical situation analysis, Analyzing diverse business situations and written etiquette.

**Unit 3:**

Reports & Presentations- Report writing and structuring, Basics of report writing, structuring, Report writing and structuring

Detailed understanding of various components of the report, Presentation skills, Conceptualization, design and finished presentations, oral communication.

**Unit 4:**

CV, Cover Letters, and SOPs- CV Design, Efficient and impactful CV designs, Cover letter and SOP drafting, Writing personal history statements, statements of purpose, and cover letters.

**Unit 5:**

Miscellaneous Communication- Writing for nominations, How to nominate individuals for selection, Social media etiquette, Corporate social media and efficient handling.

Primary Resources:

1	Lesikar Raymond, Marie Flatley, Kathryn Rentz, and Neerja Pande; Business Communication; Eleventh Edition; Tata McGraw Hill Education Private Limited.
2	Shirley Taylor, Communication for Business, Pearson Education, New Delhi



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**Program: Bachelors in Business Administration (B.B.A.)**

Course: Critical Thinking & Logic

**Semester 2**

**Credit: 2**

**Unit 1:**

Introducing critical thinking- What is critical thinking? Definition, associated terms, purpose, Introduction to Logic, Understanding mathematical logic and causality

**Unit 2:**

Arguments- Identifying arguments, Characteristics of arguments, argumentative writing, Strategies, Identifying reasons, conclusions, arguments applying critical thinking, Argument vs. non-argument, Differences, what is common, Analytical vs. descriptive writing, Types of writing, purpose, application, Consistency and clarity, Checking arguments for clarity, internal and logical consistency, order. Types of reasons

**Unit 3:**

Factors -Assumptions and persuasion, How to identify underlying assumptions, underlying methods of persuasion implied in arguments, Cognitive biases, Influencing individual judgment and decision-making, Flawed arguments, Difference between cause and effect

**Unit 4:**

Sources of evidence- Authenticity, relevance, validity, reliability, plagiarism- Note making, Selective reading and strategies for ensuring the accuracy of notes.

**Unit 5:**

Presentations.

Primary Resources:

1	Cottrell, S. (2017). Critical thinking skills (3rd ed.). London, UK: Palgrave Macmillan UK.
2	Van Den Brink-Budgen (2010). Critical Thinking for Students 4th Edition: Learn the Skills for Analyzing, Evaluating, and Producing Arguments

**Program: Bachelors in Business Administration (B.B.A.)**



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Course: Everydayness|Banks, RTOs, and Courts

**Semester 2**

**Credit: 2**

**Unit 1:**

Introduction to practices- Banks and Court of Law, Learning the entire process of opening a bank account; benefits; How to file an FIR/Court case?, RTO and Development Authority/ Tehsildar, How to get a driver's license? How to get land?, Right to information, What is the 'right' kind of question?,

**Unit 2**

Tax Filing, Overview+activity to see what the website entails, Bank, Going to the bank, Putting the theory into practice will also consist of documenting the hardships/challenges and learnings from the entire process. They are required to get a slip showing that they have successfully opened a bank account. Presentation, presentations of their documented visit

**Unit 3**

RTO Getting a driver's license, Putting the theory into practice will also consist of documenting the hardships/challenges and learnings from the entire process. They are required to get a slip showing that they have applied for a driver's license, Presentation, presentations of their documented visit

**Unit 4**

Development Authority/ Tehsildar- Development Authority/ Tehsildar- Putting the theory into practice will also consist of documenting the hardships/challenges and learnings from the entire process. They are required to get a slip showing that they have understood how to get land Presentation presentations of their documented visit

**Unit 5**

Right to Information- Filing for RTI, Putting the theory into practice will also consist of documenting the hardships/challenges and learnings from the entire process. They are required to get an acknowledgment slip to show success in their task, Presentation. presentations of their documented visit; this presentation will also entail the idea of whether the individuals are asking the right questions or not and what is considered right

Primary Resources: An Introduction to Banking, 2nd Edition by Moorad Choudhry, Steen Blaafalk

## **SEMESTER - 3**

**Course: Business Analytics**

**Semester 3**

**Credit: 4**



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### **Unit 1:**

Introduction- Overview of Business Analytics

### **Unit 2:**

Excel - Working with data, Data organization, management, and sorting, Pivot tables, Statistical Analysis, Using formulas for statistical analysis, Statistical Analysis, Using formulas for statistical analysis, Visualizations, Making visualizations:graphs, correlation, line charts, bar graphs, histograms, Macros, Datasets- keep getting difficult (progressing)

### **Unit 3:**

Powerpoint presentation- Basics, working with slides, texts, and objects, More objects, More Objects continue, customizations and transitions, Exercise

### **Unit 4:**

Power BI- Building a report, Data imports; Visualization; Manipulation of data; Interactive reports , Publish, Interactive reports; Dashboard basics- compiling, sharing report, Exercises, lecture, discussion, and activity, Exercise

### **Unit 5:**

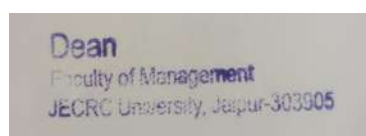
Tableau- Building a report, Data imports; Visualization; Manipulation of data; Interactive reports, Exercises, lecture, discussion, and activity

Publish, Interactive reports; Dashboard basics- compiling, sharing report, Exercises, lecture, discussion, and activity, Exercise. Presentation Presentation

Primary Resources : Business Analytics | Third Edition| By Pearson

**Course: Human Resource Management**  
**Semester 3**  
**Credit: 4**

### **Unit 1:**



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Introduction- How did HRM evolve? Definition and core concepts; Concepts and models of HRM; the Changing role of HRM due to Covid 19. How does the HRM function? Managerial and Operative responsibilities. HR structure and strategic HRM. Perspective to HRM; features; employment planning. Case study.

## **Unit 2:**

HRP, employments, Human resource planning- an overview, How would you define HRP? Objectives; HRP process and barriers, Forecasting. Overview; action plan wrt shortage, Job analysis, definition, objectives, and importance, Talent acquisition/ Head Hunting, How has HRM evolved into talent acquisition? What is headhunting? What is talent acquisition?

## **Unit 3:**

Staffing- Recruitment, Selection & Firing, Recruitment, Sources- internal and external; How to recruit someone? difference between recruitment and selection; what are the factors that influence recruitment? Selection, Interview technique; How is someone selected (stages)?; Types of tests taken while selecting?; Separation- Placement, Induction program, Firing, How do people get fired?; Consequences of getting fired; Case study

## **Unit 4:**

Train and Learn to develop- Training process, Who; why and hows of training?; why is training important?; on-job training and off-job training; soft skills, Career management, Definition, Methods, and challenges; Taking initiative at a job? How to do it? What are the stages?; Models for career management; Stages in Career Planning, Development in career, How can one develop in their career?; specific skill deficiencies; anticipated skillset. Case study

## **Unit 5:**

Evaluate Performance and compensation- Performance Appraisal, Overview; Methods and process of PA; Methods of PA; Stages, Compensation, bases for compensation, job evaluation, and compensation/evaluation systems, Incentives, Overview; managing employee benefits scope. Case study. Ethics in HRM- Workplace issues- Bullying, sexual harassment, and diversity, #Metoo. How did the #metoo movement change the role of HR, Grievance handling system, Trade unionizing collective bargaining; grievance handling, Labor law, Labor laws related to social security measures. Case study Emerging global trends and what is in store for the future? COVID 19 & its impact part 1. How has covid 19 changed the role of HRM; Was it good or bad? COVID 19 & its impact part 2 Virtual HRM; Issues to deal with; covid 19 and its impact. Workers and Trends. Gig workers; work from home; innovation in HRM; 21st century and HRM. International HRM. Overview. Case study.

Primary Resource: Human Resource Management, 15e By Gary Dessler, Biju Varrkey



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**Course: E-commerce (Theory)**  
**Semester 3**  
**Credit: 2**

**Unit 1:**

Introduction- Overview, The advent of E-commerce; Covid 19; Evolution, benefits, origin, Models based on Nature of Transactions, Manufacturing model and advertising model, Value chain model and Brokerage model

**Unit 2:**

Selling online- Sources of Revenue, How does customer service function in an online space?; Identify other sources of revenue, including online auctions, revenue sharing, and affiliate marketing. Define B2B e-commerce, strategic sourcing, outsourcing, and offshoring. Supply Chain Management. Logistics and supply chain management; show how data and goods can move between businesses.

**Unit 3:**

Digital Marketing in E-commerce, Promotional strategies, Recall the goals of product promotion, marketing mix, and ad campaigns, The role of Social media in E-Commerce. Instagram and Facebook and their impact on e-commerce and tell how these channels are incorporated into a marketing campaign.

**Unit 4:**

Payment systems- Payment methods and the advent of digital currency, Electronic fund transfer-define. How are cheques processed? differentiate between payment methods and types of credit; identify payment processing service providers; What is digital currency? PC Banking, Credit Cards, Debit Cards, Smart Cards, e-Cheques/ Internet Cheques, Micro Payments, e-Cash

**Unit 5:**

Ethics, Security, and Laws. How to keep everything secure? Information security- importance and components; Internal and external threats that negatively impact sellers and consumers. Security protocols- benefits, tools, and applications How to protect private information? Protecting private information; Primary consumer rights online sellers must protect. Are there any legal obligations? Intellectual property rights- for the individual and businesses; What are the items that cannot be sold to the consumer (list)? Are there any legal obligations towards the consumer? Consumer rights and private information- laws and ethical obligations; How do you sell and market products to children?- Laws.



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Primary Resource:

The complete e-commerce book-Janice Reynolds

Building a StoryBrand: Clarify Your Message So Customers Will Listen

**Course: E-commerce (Practice)**

**Semester 3**

**Credit: 2**

### **Unit 1:**

Let's build a website- Overview: what is the role of technology in E-Commerce, An overview of the internet, basic network architecture, and the layered model, Internet architecture, intranets, and extranets The making of world wide web, web system architecture, ISP, URLs and HTTP, cookies Building your website, Choosing an ISP, registering a domain name; How do you market on the internet? (web promotions), What is the E-cycle of internet marketing? mobile agents, tracking customers, customer service, CRM and e-value, Web Page design using HTML and CSS, Overview of HTML, the basic structure of an HTML document; Basic text formatting, links, images, tables, frames, form, and introduction to CSS, Google sites. How to make a website on google?

### **Unit 2:**

Case study- International, Amazon and Alibaba- Case study, India, Moglix and OLX, Nykaa and Flipkart

### **Unit 3:**

Social media and small businesses- Setting up a small business on Instagram, Help students set up a business on Instagram of any kind, side by side educate them on the different kinds of algorithms that exist, Marketing tools on other Social media platforms, Facebook and smaller spaces will be covered

### **Unit 4:**

How is E-commerce consumer-oriented? What are the different steps being taken to make E-commerce more consumer-oriented? E-mall, direct selling by manufacturer, e-broker, and e-services like web-enabling services. Information selling on the web, entertainment services, and auction-services.

### **Unit 5**



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Presentations

Primary Resource:

The complete e-commerce book-Janice Reynolds

Building a StoryBrand: Clarify Your Message So Customers Will Listen

**Course: Writing & Communication 3**  
**Semester 3**  
**Credit: 2**

**Unit 1:**

Editing & Proofreading - Introduction to editing & proofreading, The importance of editing and proofreading one's writing- the first draft is never the best, it has to be reworked to make it impactful, Practice editing: flow, structure, and content,

**Unit 2**

Practice looking at one's writing critically using the cover letter written in semester 1 or the report written in semester 2. Check if the main point is coming across, if the flow is good, if the details are necessary. Ask yourself: how can the piece of writing be improved? Practice proofreading: spelling & grammatical errors

**Unit 3:**

Tools and techniques for proofreading one's work to spot and correct errors- Accuracy & Fact-checking, How to take information from reliable sources. Fake news/facts. The importance of accuracy in reports and presentations, How to fact-check information. Prepare Fact-checking final draft Group or pair activity in which students use the tools learned in the previous classes to edit, proofread and fact-check each other's writing (reports)

**Unit 4:**

Thinking Visually- A picture is worth a thousand words, Introduces the importance of visuals- images, graphs and video- in impactful communication, Create your own infographic part 1 Ideate & research the content to create your own infographic (individual/in pairs/in groups. Create your own infographic part 2. Use a free tool like Canva to select a template, place content onto the infographic, use design elements (color, font, placement) to make it impactful

**Unit 5:**



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Storytelling - The power of a good story, The importance of stories in communication, why they are impactful, some examples, Using stories to sell (advertisements), Analysis of famous advertisements and how they used stories and emotions to sell the product or service, Create your own advertisement part 1. Take your favorite product or service. Imagine it has made huge losses and is about to close. You need to help boost sales by making an advertisement to convince your classmates to use the product or service. How will you use a personal story, emotions and a catchy slogan to convince your classmates to use the product or service? Create your own advertisement part 2. Present your advertisement to the class or in groups. Conclusion. Discussion

Primary Resources:

1	Writing that Works, Book by Joel Raphaelson and Kenneth Roman
2	E-Writing: 21st-Century Tools for Effective Communication by Dianna Booher

**Course: Problem Solving**  
**Semester 3**  
**Credit: 4**

**Unit 1:**

Introduction to problem Solving- IDEAL problem solving, What is problem solving, Why is it Important. IDEAL problem solving model. Thinking like a problem solver. Activity: The 6 thinking hats, the method helps individuals as well as teams to think about a problem or a topic from different perspectives. Problem solving in the Industry. Case Studies: Problem solving experiences shared by industry professionals

**Unit 2:**

Barriers to Problem Solving- Introduction to Bias, Activity: 9 dot problem, Introduction to bias: Misdiagnosis, Communication barriers, Solution Bias, Lack of Empathy, Causes of problem solving barriers, Perspective, emotional, environment, cultural factors and, functional fixedness, mental sets. Case Study: The Cost of Poor Communication

**Unit 3:**

Problem Solving - Process, Identifying Problems, Causes of the problems (Difference in opinions, goals, interpretation, attitude towards solving a problem), Types of problems ( between teammates and two teams, within an organization and a team) Solving problems - Steps, Problem solving steps ( identify, evaluate, managing , taking decision, resolving the issue/problem) Activity: Define the six step problem solving model in your own words and give example Solving problems - Strategies Problem solving strategies (competitive , accommodating, compromising, collaborative. Solving problems- Industries. Case Studies: How companies use strategies and steps to solve problems. Short assessment



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#### **Unit 4:**

Problem Solving- Tool, Identifying problems- Tools Strategies for identifying the root cause- 5 Why analysis, Fishbone diagram, Analyzing problems- Tools Analyzing the problem using SWOT Analysis

#### **Unit 5:**

case studies- 1. OYO, 2. Kingfisher airlines, SCAMPER for problem solving, Create a new product and assess its relevance using SCAMPER method, Problem Solving and Decision Making, Self-assessment to find your decision making style, Case study: read and articulate problems faced by an organization. Problem solving for managers, Examples of problem-solving skills for managers, Case Study: Fix the process, not the problem. Approaching problems in the right way. Effective approaches to problem solving. The STARRS Method for articulating problem solving experiences during interviews

Primary Resources:

Problem Solving 101: A Simple Book for Smart People by Ken Watanabe

Problem Solving by Richard Rusczyk and Sandor Lehocz

### **Course: Expressions|Dance, Music, and Theater Semester 3 Credit: 4**

#### **Unit 1:**

Theater- Contemporary theater, Open-ended discussions on theater that are screened. The class will start with a 10 minute Kahoot game of students rating actors from the theater and Bollywood industry. The course will cover various forms of theater that are currently relevant. The discussion of each form will be facilitated through videos. The videos covered will be at the discretion of the faculty (whatever they deem as meaningful). The idea is to show performances that would shake the realities of the students and make them want to think about what they liked or disliked. The preferred outcome of this class is to have students break down and articulate their own opinions on works of art. Voice, Speech, and Diction. It will incorporate techniques that focus on speech clarity, enunciation, voice and tone modulation, and other such things that are linked to verbal cues.

#### **Unit 2:**



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Slam poetry - This will be a video-led discussion. This Unit/ Module will focus on Hindi and English slam poetry. There will be different videos shown which will be followed by group discussions concerning their likes and dislikes. The students will also be taught the techniques that incorporate slam poetry, making them practice a few skills focusing on enunciation and voice clarity.

### **Unit 3:**

Indian Cinema - This Unit/ Module incorporates the journey of Indian Cinema mainly tackling what is considered 'popular' currently. It will show the advent from Ramayana and Mahabharata (scenes) to the current films that are gaining momentum such as Shershaah, Kabir Singh, Raazi, and so on. Further, this Unit/ Module will compare the journey of cinema with the journey of advertisements and the roles celebrities/plotlines play in influencing the growth of the product. The aim of this class is for the students to discern their likes and dislikes. It is also for them to understand the factors that go into making a successful ad.

### **Unit 4:**

Music - Indian Music, Both classes will start with a 10 minute Kahoot game of students rating songs. This Unit/ Module will cover the structure of Indian music from the start and where it lies presently. Most forms that are covered will be followed by video-led examples. Post which, students will discuss their reflections on the song. Singing. This Unit/ Module will mainly consist of riyaz. There will be a practice of sa re ga ma, followed by different variations of the octave. Finally ending the class by learning a song. Karaoke. Connecting the music. Passages from books and videos with no sound will be shown and the students will be asked to think on spot and connect it to some song that could potentially play in the background. Music Videos - In this class, students will be required to take a video of their entire week of whatever they have been doing. The students will sit through class and collate all the videos in the first half adding the appropriate song for the week. The second half of the class will be a presentation class. During the presentation, the students will highlight the reason behind adding the song.

### **Unit 5:**

Dance - Forms of Dance , Incorporating a 10 minute Kahoot session of yes and no, where students share whether they liked the dance sequence in the movie or not. This class will focus on the different forms of dance that exist in India and a few internationally. The kind of influence international dances have had in India. Each form of dance will be followed by a video-led discussion. These discussions are mainly self-reflections designed for the student to annotate their thoughts and critique the dances. Movement - Guest-led lectures will focus on the students moving their bodies and learning basic dance moves. This Unit/ Module aims to help the students appreciate the art form through its application. Movement-focused workshops will also help the students be more comfortable with their body posture, nonverbal cues, and their bodily conduct. Moreover, dancing as a form of art also reduces stress levels and makes individuals more flexible in their thinking.



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Primary Resources : “Marmalade Me” by Jill Johnston.

**Course: Corporate Governance and Ethics**  
**Semester 4**  
**Credit: 4**

**Unit 1:**

Conceptual Framework Of Corporate Governance - Overview: Corporate Governance, Meaning; theories and models of Corporate Governance, Overview: Ethics, various approaches, to business ethics; ethical theory, Ethics and Corporate governance, ethical governance; code of ethics; Key managerial Personnel (KMP), Corporate boards, Corporate boards and Powers, responsibilities disqualifications.

**Unit 2:**

Corporate Governance framework in India - Corporate Governance in India, regulatory framework of Corporate governance in India; Corporate governance in PSUs and banks.

**Unit 3:**

International Perspective on Corporate Governance, Corporate Governance in the international setting, Legislative framework of corporate governance in United Kingdom; general understanding for the foreign setting, Legislative framework of corporate governance in USA,, Australia, china, Legislative framework of corporate governance in china, South Africa; OECD Principles of Corporate Governance 1999

**Unit 4:**

Major Corporate Governance failures, International setting, Bank of credit and commerce International (UK), World.com (USA); common governance problems noticed in various corporate failures, National setting, Satyam computer, services ltd; Sahara (India); Kingfisher ltd (India); common governance problems noticed in various corporate failures

**Unit 5:**

Whistle –blowing and corporate Governance, What is whistle-blowing. The concept of whistle-blowing; types of whistle-blowers, Policy and India, whistle –blower policy; developments in India. Corporate Social responsibility (CSR). What is CSR? Meaning; CSR – an overlapping concept; corporate sustainability reporting. CSR and CG Relationship relation between CSR and Corporate governance; Initiatives in India. Ethics and business. When do you get unethical in business? Some unethical issues; benefits from managing ethics at the workplace, ethical. organizations. Finance and Ethics Overview of finance ethics; Agents,



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fiduciaries and professionals; conflict of interest. Ethics in investing. Mutual funds; relationship investing; socially responsible investing and microfinance. Enron: Case study. Highlighting ethics in investing ethics and IT Accountability and liability issues, internet challenges to privacy, IPR, Copyrights and Patents. Case study - 2G Corruption/ Coal scam, Naresh Goyal (Jet), Nirav Modi, Dhirubhai Ambani, How to do it right in business? Theranos/WE works, Whistle blowing Facebook Vs govt., Lobbying, #metoo movement. Sexual Harassment at the workplace, Why do bad men win at work? Confidence Vs Competence. Presentation Primary Resources

The Power of Ethics: How to Make Good Choices in a Complicated World by Susan Liautaud

## **Course: Statistics 2**

**Semester 4**

**Credit: 4**

### **Unit 1:**

What do you think about data?- An introduction, Thinking Clearly in a Data-Driven Age An understanding of what is in store for this class; How is thinking and data complementary to each other, not substituting?

### **Unit 2:**

Establishing a common language - Correlation: What Is It and What Is It Good For? What is correlation?; Benefits of correlation; Measurement of correlation; Linearity, Measurement of correlation; Linearity; Exercise.Causation: What Is It and What Is It Good For? Definition; benefits; Causal inference and its problems; Conceptual issues; Exercises. Correlation Requires Variation, What is a dependent variable; selecting a dependent variable; How is the world organized to select a dependent variable?

### **Unit 3**

Basics of regression - Functions, philosophy and idea behind regressions, Regression analysis, Linear regression examples, Regression analysis, Interpretation of regression analysis with examples, ANOVA

Type 1,2 and 3 Exercises Reversion to the mean, an overview; the placebo effect; cosmic habituation

### **Unit 4:**

Is the relationship causal? Why Correlation Doesn't Impose Causation? how to diminish the bias and noise?; how to think clearly of potential outcomes? What are the different sources of bias? Confounders and reverse causality. Mechanisms vs Confounders Controlling for Confounders. How to control bias? Regressions role Randomized Experiments randomisation, causal



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inference; estimation and inference in experiments; problems that arise with experiments; Natural experiments. Exercises, Regression Discontinuity Designs, implementation; continuity at threshold; non compliance.

### **Unit 5:**

From information to Decision - Turn Statistics into Substance, Visual presentation of data; how to illustrate statistical inferences

Measure Your Mission, On the Limits of Quantification, Decisions when evidence is limited; quantification and values.

### **Primary Resources**

<b>1</b>	<b>Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis by Ethan Bueno de Mesquita, Anthony Fowler</b>
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### **Course: Environment and Businesses**

**Semester 4**

**Credit: 2**

### **Unit 1:**

Introduction- Conceptual categories, Understanding sustainability, understanding Energy, Ecology and Biodiversity, Problems in ecology and biodiversity in general, Identifying our environment, Sensitizing towards the environment: trees, plants, and birds that surround us but we do not even identify them.

### **Unit 2:**

Impact and responsibilities of businesses on/for environment, Need for studying this subject, Why should businesses care about sustainability, Stakeholders v shareholders, The nature of businesses has changed. They now have huge impacts on people who are otherwise unconnected. The economy of Waste production. Env. impact of Fast Fashion, Internet Services

### **Unit 3:**

Law, Culture and Businesses- Legal Background, Various laws on the environment in India, Courts and environment, MC Mehta PILs and Godavarman PILs,

### **Unit 4:**

Why businesses must respect cultures, Case study: Vedanta Mining of Niyamgiri hills, International legal framework, Understanding Kyoto, COP, international treaties, and



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commitments, Corporate Social Responsibility, What is the Indian law on CSR, and how have companies used it in environmental space

## **Unit 5:**

Presentations

**Course: SME Management**  
**Semester 4**  
**Credit: 2**

## **Unit 1:**

Setting up a small business, What is MSMF? Setting up a new venture or starting the business through franchising,

Factors influencing SME Location strategy, Preliminary Registration with State Directorate of Industries- To be explained through case studies, for each; Covid 19

## **Unit 2:**

Assessment of different forms of business organizations, Sole proprietorship, Partnership, and LLP, Major differentiating aspects- case studies, Joint-stock company and HUF

## **Unit 3:**

Policy Initiative and Laws for MSMEs, Policies and initiative, ASPIRE; MSME Development Act (2005 and 2006); Emerging trends and institution support, World Trade Organization, IPR, INSME, Barcoding, Indian Laws, Role of Business in the modern Indian Economy SMEs in India,

## **Unit 4:**

Entrepreneurship - What is entrepreneurial thinking? Mindset; recognition and skills and attributes, Women entrepreneurship, Women entrepreneurship in India: a case study of creative bee of Smita Desai, Rural entrepreneurship, User innovation and entrepreneurship: case studies from rural India.

## **Unit 5:**

Institutions for support- Financial Support; the role of institutional aids in entrepreneurship development; agencies for policy formulation and implementation- what is their role? Benefits of long-term and short-term financial support. What are the sources? DST, SIDCO, NSIC, IRI, NIDC, SIDBI, SISI, SIPCOT, Entrepreneurial guidance bureaus; objectives of DIC, SISI, and EDII

Enterprising - GAME: Global alliance on mass enterprising. How does the government promote entrepreneurial setups? Government schemes for MSME. Subsidies Support on ISO Certification



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& skills upgrade. Does the state government support industrial infrastructure? GST and its exemption

Primary Resources : The Management of Small and Medium Enterprises

Edited By Matthias Fink, Sascha Kraus

Copyright Year 2009

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**Course: Negotiations**  
**Semester 4**  
**Credit: 2**

**Unit 1:**

Understanding negotiation- Introduction. What is negotiation? The topic will be introduced through an activity to help overcome assumptions towards negotiation. Followed by brainstorming the need to negotiate. Identifying the characteristics of a confident negotiator and role of negotiation in career and business management. Types of Negotiation . Students will brainstorm and share the differences between negotiation and other social interactions followed by. Activity to determine ‘What kind of a negotiator am I?’

**Unit 2:**

Types of Negotiation - Difference between bargaining and negotiating, 4 negotiation scenarios: win-win, win-lose, lose-win, lose-lose, Role-playing/case studies of the different Negotiation styles and identifying the correct scenario, Elements of Negotiation, A brief overview of the steps needed to follow when negotiating- 5 stages of negotiation, Principled negotiation

**Unit 3:**

Preparing Barriers to Negotiations, How to handle negotiations emotionally, How to express your disagreement while maintaining the relationship- case studies

**Unit 4:**

How to prepare for Negotiations, Skills for Successful Negotiating: Negotiation Types: Distributive v/s Integrative negotiations.



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## **Unit 5:**

Executing negotiations, Negotiation Strategies, Strategies- Evade, Comply, Assist, Settle, CNS, Negotiation, Styles, Case studies on: Distributive, Integrative, Multiparty, Team, Positional negotiation, BATNA, BATNA: Best Alternative to a Negotiated Agreement, Activity: The two-dollar game. Persuasion. Common Persuasion techniques: 'foot-in-the-door-technique', 'door-in-the-face' technique. Persuasive words. Activity: First Out of the Circle Loses. Negotiation tactics. The 8 hardball tactics in business negotiation. Negotiation Scenarios. Workshop of various negotiation scenarios that help to identify the best strategies for each of them.

Primary Resources : The Management of Small and Medium Enterprises

Edited By Matthias Fink, Sascha Kraus

Copyright Year 2009

**Course: Situational Awareness**

**Semester 4**

**Credit: 2**

Course Manuals:

## **Unit 1:**

Acing Job Milestones, Negotiating A Job Offer, Students will learn how to negotiate a job offer to get a Win-Win outcome, which is a mutually acceptable outcome that makes them and their employer happy. They will learn how preparation, flexibility and patience can help them negotiate better job offers. Asking For A Promotion Or Raise. Students will learn how to gather and use data when asking their manager or boss for a promotion or raise. They will also practice using different scripts with different strategies for asking for a promotion or raise. Losing Your Job Students will learn how to deal with losing their job by managing negative emotions, staying focused and optimistic, and avoiding harmful behaviors.

## **Unit 2:**

Getting Along With Others, Networking, Students will learn how to prepare an elevator pitch to introduce themselves to peers as well as industry seniors when networking. Finding A Mentor. Students will learn how having a mentor can help them grow in their careers. They will learn how to follow up with an industry senior after making an elevator pitch at a networking event. They will also learn how to build trust using the Trust Equation. Healthy Competition. Students will role-play situations to learn how to build healthy competition by collaborating with peers,



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being a team player and communicating assertively. Handling Disagreements. Students will role-play situations to learn how to handle disagreements at the workplace with empathy and express themselves following professional codes of conduct.

### **Unit 3:**

Working Efficiently With Others, Assigning Work To Others, Students will learn about effective delegation. They will learn how to use a tool to choose the right person for a task, how to give clear instructions, and how to stay accountable after delegating the work. Giving Feedback Students will learn how to use two tools to structure their feedback to others. They will also learn about the importance of keeping criticism of others' work constructive, and strategies for communicating it effectively. Accepting Feedback Positively Students will learn how to be open-minded and positive when getting feedback from others. They will learn how to listen carefully, put their feelings into words, and ask clarifying questions to understand the feedback better.

Engaging The Audience Students will learn how to read nonverbal cues to identify when their audience gets bored or disinterested. They will learn to use tools like storytelling and audience interaction to keep their audience

### **Unit 4:**

Standing Up For Yourself, Dealing With Harassment, Students will learn about the different forms of harassment in the workplace as well as tools they can use to deal with them. They will learn about their rights as employees and about laws about workplace bullying and harassment. Apologizing For Inappropriate Behavior. Students will learn how to craft a genuine apology to take accountability, express regret and focus on the well-being of the person who has been harmed. They will also learn through case studies of business leaders and companies that apologized for different things.

### **Unit 5:**

Project

**Primary Resources :** Situational Awareness A Clear and Concise Reference by Gerardus Blokdyk

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**Program: Bachelors in Business Administration (B.B.A.)**

Course: Imagination|Drawing and Fiction

**Semester 4**

**Credit: 2**

**Unit 1:**

ART- Modern Art, Students will be shown important modern art pieces and will be asked to criticize them. They will be asked to talk about what they enjoyed in the piece and whether they think the public liked the same things too, Drawing, This will be a drawing class. Students will be asked to draw a product and then a few students will be asked to sell their product, Photography. Students will be shown photographs and will be asked whether they liked it or not and to give reasonings for their opinion. The students will be asked to build a concept around each photograph. Click a picture. In the first 45 minutes of the class, students will be asked to go and take pictures of anything and then they will have to build a concept around the pictures they have taken

**Unit 2:**

Excursion- National Art Museum/virtual museum, Is this art or not? Students will be shown various stereotypical art pieces and will be asked to define whether it is art or not, Craft, The students will make something out of craft material

**Unit 3:**

Fiction - Story week, The students will be asked to read passages from stories and discuss whether they liked it or not and their reasons for holding such opinions, Writing a small story, Students will be given a topic. each student will be given a different one and they will have to make a 5 line story out of it. Write an ad. Students will be given a product. Each student will be given a different one and they will have to make a storyline for an ad to sell it

**Unit 4:**

Poem week, Students will participate in slam poetry, Selling a product, students will be given a product and they will have to sell it, the person they are selling to will keep changing. Excursion: Ghalib Museum

**Unit 5:**

Storytelling - each student will pick out a story and they will have to recite it in class in a monolog manner, Precis writing. Students will be given a 5500-word essay and will be asked to summarize it into 100 words.



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Primary Resources : Perspective made easy, by Ernest Norling

## **Semester 5**

**Course: Research Methods**

**Semester 5**

**Credit: 4**

### **Unit 1:**

Introduction- Writing a business research paper, Can a business paper be convincing and compelling? If yes. Then what makes it compelling? Writing an award-winning article

### **Unit 2:**

Data collection- Types of data, Introduction to Primary & Secondary data; Methods of primary data collection, Methods of secondary data collection; Advantages & disadvantages of data collection.

### **Unit 3:**

Theory and Hypothesis in Management Research, Integration of theory in research. How do you make out what is theory and what is not? How does a theory get incorporated into a research paper? Why should you incorporate? How is it beneficial? how is it not? How do you test theory?

How do we test our theories? How do we match our questions, theories, and methods?

### **Unit 4:**

Writing and ethics, Writing well, What constitutes good writing? Navigating the publishing process; Maintaining high ethical standards

Ethics. Can you just copy secondary data, research papers? If not, then why? How do you cite? What is plagiarism? What is not?

Collecting and handling data and research methods- Archival Research, Methods to handle big data

Laboratory Experiments, When are laboratory experiments necessary or sufficient for publishing in top-tier management journals? What are common errors in designing lab experiments? What are laboratory experiments most useful for? Field Experiments Quasi-Experiments-overview

Levels of Analysis, What are the levels of analysis? How do level issues influence theory, construct definitions, measurement, samples, and analyses? What are key steps in the analysis of multilevel data?

### **Unit 5:**



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Sampling and Probability - Sampling Technique, Population, Sampling Frame, Sample, Bias; Statistical Terms in Sampling: statistic, parameter, Sampling Distribution; Sampling & non-sampling errors

Probability and Non-Probability Sampling, Simple Random Sampling; Stratified Random Sampling; Cluster Random Sampling; Systematic Random Sampling, Multi-stage Sampling; Convenience Sampling; Judgment Sampling, Judgment Sampling; Quota Sampling; Snowball Sampling, methods of collecting data, Measurement & Scaling Technique, Scales of Measurement: Nominal, Ordinal, Interval, Ratio; General Issues in scaling; Likert Scaling, Questionnaire Designing, Types of questions; Question Content, Wording & Placement; Response Format; Criterion for a good questionnaire, Make a questionnaire and disseminate it- Google forms or KOBO, Analysis & Report Writing., Data Preparation & Report Writing. Data Aggregation; Data Accuracy; Data structure; Data transformation; Types of Research output; Key Elements of Report Writing.

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**Primary resources :** Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th Edition, by John W. Creswell (Author)

**Course: Design Thinking**  
**Semester 5**  
**Credit: 4**

**Unit 1:**

Introduction - What is design thinking? An overview of what to expect with this subject, Does design thinking matter? Where all have design thinking been used- A bunch of case studies.

**Unit 2:**

Design Research, What is design research? How do you research? Has field research changed due to covid 19? Ethnography- in pandemic and non-pandemic times. What does design research depend on? Integrating empathy during the onset of the research process Empathy activity: A case study Personas

**Unit 3:**

Defining a problem and generating ideas, Does research depend on a problem? How do you define problems during design research? Framing a problem. Generating ideas Synthesizing ideas and making them make sense! Worst ideas- Activity.

**Unit 4:**

Team building and initiating a project process, Understanding research, Team division and understanding each other and the project Communication of ideas, How do you communicate



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ideas? Defining a problem, Defining a problem and idea-generating period, Ideation, Ideation-case study, Stakeholders, Who are the stakeholders? Creating a stakeholder map on the basis of hypothetical case studies.

### **Unit 5:**

Prototyping and testing- What is prototyping? How do you prototype your idea? What is frog design? Discussion of project Testing your prototype Is your prototype working? How to test prototypes? What is a focus group? Activity to initiate prototype testing Development of prototypes. Buffer period meant for the development of prototype working and testing through their own experimental process. Does my idea work?- DO worksheet. Testing and reviewing, Testing process, Do final testing of the prototype to see its working, Feedback, Review the project final fixes. Storyboarding and communicating, Storyboarding, Learning the storyboarding process, Making a storyboard process- through video or ppt, Finish storyboarding, Communicating. How to communicate ideas to the bigger public?

**Primary Resources :** Change by design by Tim Brown

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## **Course: Basics of Programming**

### **Semester 5**

**Credit: 2**

### **Unit 1:**

Introduction to Data science - How to use R? What is it? Why should one study it? What is the process? What is data?; Why is R beneficial? How is R integrated into this.

### **Unit 2:**

R and R studio - A general understanding of R and R studio, Installing R and R studio; What is R? What is R studio? How are they used together? R packages R project. How to create a project? benefits

### **Unit 3:**

Overview of the R Language, How to improve data? data cleaning and data mining, Using data from external files, Reading and writing data to external files, Creating and storing R workspaces; Basic exploratory graphics, Mathematical operations, Multiple data sources, discussing problems with multiple data sourcing; How to merge data sources using R.

### **Unit 4:**

Graphics in R, Plotting, basic potting on the pie chart and line chart; Manipulating and saving, Customization of graphs and saving plots.

### **Unit 5:**

Presentations



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Primary Resources : The Self-Taught Programmer: The Definitive Guide to Programming Professionally by Cory Althoff

**Course: Business and Public Policy**

**Semester 5**

**Credit: 2**

**Unit 1:**

Introduction- Rise of public policy in businesses, Why must businesses understand policymaking?

**Unit 2:**

Frameworks of Policy Change, Kingdon's framework, John Kingdon's multiple streams frameworks, Punctuated equilibrium framework

Baumgartner and Jones framework of punctuated equilibrium.

**Unit 3:**

Public policy and business interaction, Rent-Seeking, What is rent-seeking and why is it important for business students to understand it

Public Procurement, How govt purchases from private parties and what are its problems, Lobbying, Amazon case study, Lobbying

Facebook case study, Consultants in policymaking. Understanding the phenomenon of the rising of consultants in policymaking: government work being done by consultants in India

**Unit 4:**

Understanding some policy frameworks- IT Rules 2021, Understanding a policy document and its implication, NEP 2020, Understanding a policy document and its implication, Insolvency Code, Case study (Essar bankruptcy and Insolvency Code)

**Unit 5:**

Informality in bureaucracy - Bureaucrats and businesses, Reliance's failed takeover of L&T, Informal relations in business and govt., Independent directors

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Primary Resources:

All topics in this course can be done from the Core-Economy Web-based resource, the e-book is here.	<a href="#">Textbook</a>
(This book called Core-Econ, is one of the most brilliant, updated, and contextual understanding of economics.)	



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**Course: Summarizing and Narrative Building**  
**Semester 5**  
**Credit: 2**

**Unit 1:**

Introduction - What is a summary? The introductory class will define what summarizing encompasses and talk about the steps required to create an effective summary. What is narrative building? The class will begin with the video followed by a discussion about what stood out to them.

Deciding when to summarize or build a narrative. Students will explore different situations and assess whether their idea should be summarized or presented as a narrative.

**Unit 2:**

How to be concise, Summarizing your story, Students will think of a memorable trip that they have taken and write two summaries targeting a different audience for each - one for their peers and one for a travel blog, Selling your product, Students will create a product and write down the idea behind it, its need/relevance in the market and the target audience. This will be followed by role play wherein they will summarize the aforementioned points for their peers. This can be done as a Just A Minute activity to ensure brevity

Writing an executive summary. Students will read a short report and write an executive summary for the same. Summarizing through infographics. Students will read an article, then summarize and present the content using infographics. The template will be shared with them.

**Unit 3:**

The art of storytelling, Building a strategic narrative, Students will explore the importance of creating a compelling story in order to sell their product/service (R2). They will then build a strategic narrative for the product created in the previous

**Unit 4 .**

Power of Humor in Storytelling- This topic will introduce humor as a storytelling tool. Students will learn how to create engaging and relatable narratives using different forms of humor such as self-deprecation, improvisational, observational and topical. Narrative building in advertisements: deconstructing a commercial, Through advertisements, students will explore the components required to convey a complex idea in a compelling and convincing manner. In small groups, students will create a commercial and enact a commercial for the product designed earlier. They can create a jingle/tag line as well.



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**Unit 5:**  
Project.

**Primary Resources :** The Power of Storytelling: The Art of Influential Communication by Ty Bennett

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**Course: Strategy and Decision Making**  
**Semester 5**  
**Credit: 2**

**Unit 1:**

Understanding Strategy- Strategy- Definition and Features, The Importance of Strategy, Strategic Thinking Competencies, Strategic Thinking Enablers. Strategic thinking. Activity: Reflecting on the environment; to understand the importance of reflective thinking, systems thinking as a fundamental skill for strategic thinking and skill building. Elements of Strategy  
The main elements of strategic thinking (Jean Liedtka). The GOST Framework- a distinct classification of all the interchangeable terms used while planning for strategy.

**Unit 2:**

Strategic planning- Strategic Process I, (Vision and Mission Statements), Vision and Mission statements(the dream, what and why) - The VMOSA Strategic Analysis Framework- Process of envisioning, Characteristics of Mission statements, Identifying various vision and mission statements of at least 4 large companies. SWOT Analysis  
Basic elements of the SWOT analysis- Internal/External strategies(SO, WO, ST, WT). Case study: Mc Donald's SWOT analysis

**Unit 3:**

Strategic Process II- (Objectives, Strategies, Action Plans), How much of what will be accomplished and by when; Setting Objectives- behavioral, community and process level, Setting strategies and action plans, Measuring Performance, Balanced scorecard and perspectives for measuring performance. Strategic Process III  
Class assignment: identifying all the components of Strategic planning for 2 major companies

**Unit 4:**



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Decision Making- Types of decisions in management, Strategic, tactical, operational, Decision making frameworks

What are decision making frameworks? Process of developing decision making frameworks

#### **Unit 5:**

Decision making tools, Decision trees, Decision Matrix, Introduction to AHP- Conditions Decision Makers face- Types of decisions made in business - prog/non prog, strategic, tactical, operational

Working with Risk, SWOT

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Primary Resources : The Decision Book – 50 Models for Strategic Thinking by Mikael Krogeru

### **Course: Creativity | Visual Thinking and Cartography** **Semester 5** **Credit: 2**

#### **Unit 1:**

Visual Thinking Fundamentals- Introduction to Visual thinking, Visual thinking and importance, Visual thinking for critical thinking, Activity: Interpreting images creatively, Thinking Maps, The Brain-Based Foundations for Thinking Maps, Connect to the Eight Core Cognitive Processes

Visual Thinking Strategies, Using concept maps 1

#### **Unit 2:**

Activity: Circle Map for defining in context / brainstorming, Activity: Tree Map for categorizing, Using concept maps 2, Activity: Flow Map for sequencing. Activity: Multi-Flow Map for Cause / Effect. Applying Visual Thinking. Using Visual Thinking Strategies in organizations

Applying Visual Thinking, Activity: Examine own self-understanding, choose images that represented the current selves and the future selves in the academic, physical and social domains

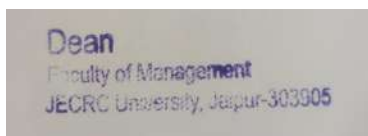
#### **Unit 3:**

Visual Story-telling- Understanding metaphors in story-telling- I, What are metaphors, Using metaphors in story-telling, 8 metaphors of organization. Understanding metaphors in story-telling- II

#### **Unit 4:**

Activity: Narrate your career vision and story using metaphors- Digital Story- telling, Introduction to Digital Storytelling, Phases of storytelling

Six steps of digital story-telling, Using digital resources for story-telling.



**Unit 5:**

Introduction to storyboarding- Locating resources for story boarding, Applying digital story-telling, Picture Your Career: Visualize & Plan Your Career Path

## **SEMESTER 6**

**Course: Entrepreneurship**

**Semester 6**

**Credit: 4**

**Unit 1:**

Overview of entrepreneurship- Introduction, Entrepreneurship: Meaning, Nature & Scope, Entrepreneur vs. Manager, Entrepreneur vs. Entrepreneur, Concepts, Characteristics and qualities of a successful entrepreneur. Application. Case study. Entrepreneurship And Society. What is Consumer Behavior? The Entrepreneurial decision process. Role of Entrepreneurship in Economic Development. Theories of Entrepreneurship  
Ethics and Social responsibility of Entrepreneurs. Opportunities for Entrepreneurs in India and abroad. Woman as Entrepreneurship.

**Unit 2:**

Starting a new Venture- Creating And Starting The Venture, New Venture Development: Meaning and Stages, Sources of new Ideas  
Methods of generating ideas, Creating problem solving, Product planning and development process, Application, Quiz. Business Plan  
Nature and scope of Business plan, Writing Business Plan, Marketing plan, financial plan and the organizational plan, Launching formalities.  
Application. Activity for the student related to starting a new business.

**Unit 3:**

Finance and Entrepreneurship- Financing And Managing New Ventures, Sources of Financing Entrepreneurship.  
Record keeping Advantages Disadvantages, Limitations, Motivating and Leading Teams, Video - Followed by trainer debrief  
Marketing Control. Sales Control. E-commerce and Entrepreneurship, Application, Activity  
New Venture Expansion Strategies And Issues, Features and evaluation of joint ventures, Acquisitions, Merges ,Public issues, rights issues, bonus issues, Stock splits, Application, Activity. Quiz.

**Unit 4:**

Industrial And Organizational Support To Entrepreneurship, Evaluation Of Role, Evaluation of Role of Government. Role of Non Government Agencies in Promoting Entrepreneurship in



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India, Industrial Supports, Role of Directorate of Industries, District Industries, Centers (DICs), Industrial Development Corporation (IDC), State Financial corporation (SFCs), Commercial banks Small Scale Industries Development Corporations (SSIDCs), Khadi and village Industries Commission (KVIC), National Small Industries Corporation (NSIC), Small Industries Development Bank of India (SIDBI)

### **Unit 5:**

Entrepreneurship In India- Entrepreneurial Strategies, Entrepreneurial Strategies and Business Plan, What makes a business successful?

Future Of Entrepreneurship, Future of Entrepreneurship in general, Future of Entrepreneurship in India

### **Primary Resources:**

1	Ten types of innovation: the discipline of building breakthroughs by Larry Keeley
2	Harvard Business Review Entrepreneur's Handbook: Everything You Need to Launch and Grow



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**Program: Bachelors in Business Administration (B.B.A.)**  
**Course: Digital Marketing (Workshops)**  
**Semester 6**  
**Credit: 2**

Workshop Description:

Workshop Level Outcomes:

Workshop Manual:

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**Program: Bachelors in Business Administration (B.B.A.)**  
**Course: Businesses in Small Towns and Rural India (Workshops)**  
**Semester 6**  
**credit: 2**

**Unit 1:**

Bottom of Pyramid- Inclusive Capitalism and Four Consumer Tiers Understanding Prahalad's rationale; What is inclusive capitalism? What is the bigger idea of investing in the rural class? What should MNCs be doing? Why is it necessary for MNCs to appreciate the market value of tier 4? Assumptions

The Invisible Opportunity and Tier 4 Pioneers.

**Unit 2:**

The scope of innovations in Tier 4; Case study discussions; HLL V/S Nirma to underline how tier 4 is a profitable market and the scope of innovation; Creating Buying Power. Even if the government is making changes through subsidies, how is that the rural population is more likely to use their old methods?; Examples of various MNCs that have used their policies to benefit the masses;

**Unit 3**

Shaping Aspirations and improving access- Information about SELF; How has the distribution systems catered to the needs of poor rural customers?

Tailoring Local Solutions

**Unit 4**

How can MNCs narrow the gap between the poor and rich? How should MNCs or entrepreneurs enter local spaces? What is AMUL doing?

Putting It All Together- Why MNCs? How should they function? How can they get support? How should research be integrated into this? How to increase employability? Is it important? A Common Cause- A conclusion of why it is important to cater to the bottom of the pyramid.



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## Unit 5

### Presentations

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#### Primary Resources:

1	The fortune at the bottom of the Pyramid by C.K. Prahalad and Stewart L. Hart- <a href="#">P</a>
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**Program: Bachelors in Business Administration (B.B.A.)**  
**Course: Networking and Partnership- Digital/offline (Workshops)**  
**Semester 6**  
**Credit: 2**

#### Unit 1:

What is networking? Understanding yourself, Practice a pitch. Identify sellable qualities through a personality test. In the last half an hour students will pitch whatever they could identify as their selling quality as though they are meeting a friend or going for an interview.

#### Unit 2:

Barriers to Networking- I find it hard to talk, Thinking about the kind of preparation one can do before an event to be better prepared. Identifying the thinking process that can be an obstacle.

#### Unit 3:

Social skills, At an event, How do you impact the room? What are the social skills to remember while talking to someone? The setting of this class will be shifted into a professional party

#### Unit 4:

Self Assessment techniques- Evaluation techniques, After a party, how would you evaluate yourself? Where did you go wrong? how to fix it?

#### Unit 5:

Maintaining Partnerships, How to stay friends? How to maintain a contact? Online Communication- Communication during Covid 19

How to be professional? Working on an elevator pitch. Selling an item. This class will be taught in a way that the student should feel they have come for an interview. Influencing How to be an influencer?



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Instagram, LinkedIn and Twitter. Branding cycle; How would you brand yourself? Exercise- closely looking at classmates and celebrities and branding them; a week prior to this students will be asked to document their lives on Instagram, each of them has to share their experience

Primary Resources : “Superconnector,” Scott Gerber and Ryan Paugh

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**Program: Bachelors in Business Administration (B.B.A.)**  
**Course: Balance | Work-Life Balance (workshops)**  
**Semester 6**  
**Credit: 2**

**Unit 1:**

Balance- Why is it important? Discussion upon the personal meaning and benefits of achieving balance, signs and effects of unbalanced life.

Followed by a self-assessment to approx. assess the time spent on every life role presently and reflect upon what changes need to be made in life to spend time in a way that brings greater satisfaction.

**Unit 2:**

Meaning of Being Productive- Case studies to help understand the types and styles of being productive (Pareto's 80/20 Principle), Tools to measure individual productivity . Understanding what turbocharges productivity. Work life balance strategy worksheet. Change management Kinds of changes(work for home and office etc). Setting up the workspace, The decision to Change specific Behaviors And Attitudes. Establishing and maintaining boundaries

**Unit 3**

Time management- Self-Assessment of tasks, time and purpose , Aligning your goals with life's purpose (smart goals), Prioritizing Your Goals daily Detecting Time Wasters of life, Stress management, Breaking the negative stress cycle. Managing stress at work, Leaving stress at where it belongs Stress and the ways to cope with it. The art of Delegation

**Unit 4 :**

Technology management, Turning off from technology      Dealing with constant distractions, Mobile apps to help with tracking work life balance

**Unit 5:**



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Leisure Management- Importance of Taking ME time. Handling Burnout: Physical and Mental. Self management Learning to say NO. Exercise for the body and mind. Scheduling, planning and sticking to the day's plan.

Primary Resources :

The Work-Life Balance Myth

Rethinking Your Optimal Balance for Success by David J. McNeff

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**School of Management**

**Syllabi and Course Structure**

**Master of Business Administration  
Digital & Strategic Marketing(CIM)**

**Academic Programmes**


**Batch (2022-2024)**

**Total Credits for the Batch 2022-2024= 104 Credits**

- 1. Minimum Credit required = 104**
- 2. Total Relaxation = \*10% relaxation for Mooc, NPTEL & Swayam courses**
- 3. No relaxation in Core and Fundamental subjects**
- 4. Option can be availed in Specialization, Interdisciplinary and General subjects.**

**Summary Sheet**

Semester	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	Total	Min. Credit req. for degree
Credit	28	28	28	20	104	*10% relaxation for Mooc, NPTEL & Swayam courses

  
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Type	Foundation	Core	Specialization	Interdisciplinary
Total Credit	28	36	32	08


**Semester I**

FIRST SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
MBA017A	Principles of Economics & Markets	4	-	-	4	F
MBA018A	Managerial Effectiveness & Ethics	4	-	-	4	F
MBA019A	Accounting & Finance	4	-	-	4	C
MBA020A	Organizational Behaviour & Human Resources Management	4	-	-	4	F
MBA021A	Quantitative Techniques & Analytics	4	-	-	4	ID
MBA022A	Information Technology for Management	4	-	-	4	F
MBA023A	Entrepreneurship	4	-	-	4	F
	<b>TOTAL</b>	<b>28</b>			<b>28</b>	

**Semester II**

SECOND SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
MBA028A	Corporate & Business Law	4	-	-	4	ID
MBA029A	Marketing & Digital Strategy (CIM)	4		-	4	C
MBA025A	Innovation in Marketing (CIM)	4		-	4	S
MBA027A	Managing Finance In A Digital World	4		-	4	F
MBA026A	Digital Optimisation (CIM)	4		-	4	S
MBA030A	Digital Customer Experience (CIM)	4		-	4	S
MBA031A	Resource Management (CIM)	4		-	4	S
	<b>TOTAL</b>	<b>28</b>			<b>28</b>	

**Semester III**

  
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THIRD SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
MBA032A	Analytics for Finance	4	-	-	4	F
MBA033A	Marketing Management & Research	4	-	-	4	C
MBA034A	Financial Markets	4	-	-	4	C
MBA035A	Managing Brands (CIM)	4		-	4	S
MBA036A	Global Marketing Decisions (CIM)	4		-	4	S
MBA037A	Corporate Digital Communications (CIM)	4		-	4	S
MBA038A	Creating Entrepreneurial Change (CIM)	4		-	4	S
	<b>TOTAL</b>	<b>28</b>			<b>28</b>	

#### Semester IV

FOURTH SEMESTER						Type
MBA100A	Dissertation	-	-	40	20	C
	<b>TOTAL</b>		-	40	20	

#### **Program Educational Objective (PEO)- MBA - Digital & Strategic Marketing(CIM)**

- I Demonstrate cognitive knowledge about the skills needed in online marketing campaigns, as well as in identifying, assessing and selecting digital market opportunities.
- II Gaining a understanding about emerging digital marketing trends and critically assess the use of digital marketing tools.
- III Develop the skills to build an actionable digital marketing strategy that aligns with your business goals.
- IV Critically appraise strategic options available to a growing organisation.
- V Evaluate the importance of corporate reputation to a growing organization.

#### **Program Outcome (PO) )- MBA - Digital & Strategic Marketing(CIM)**

**PO 1:** Demonstrate the understanding of important marketing concepts, role and function of marketing within organisations

**PO 2:** Demonstrate the skill to develop effective strategic marketing plans including digital strategy.

**PO 3:** Understand the key factors to develop innovations and develop a plan for communication of innovation


**PO 4:** Understand and apply the knowledge of digital measures used in analysis of digital marketing performance

**PO 5:** Understand the legal compliance involved in digital technology

**PO 6:** Learn techniques to manage the marketing budget and evaluate how to optimize the resource mix

**PO 7:** Apply the brand strategy, brand management and brand metric concepts for continuous improvement

**PO 8:** Develop effective global marketing strategies and determine the method of entering a market.

  
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**PO 9:** Highlight the importance of digital innovations in building corporate reputation and brand equity

**PO 10:** Develop ideas and strategies to use innovations at the right time to gain strategic and competitive advantage

**PO 11:** Understand the barriers to change and develop a suitable strategy to manage change

**PO 12:** Understand the various communication and digital platforms contributing towards a better stakeholder's management

**PO 8:** Analyse the process through which trading takes place and the role of clearing, settlement, lending, and custody process

**PO 9:** Determination of prices and values for bonds and equities.

**PO 10:** Analysis, interpretation and comparison of company information and financial statements in order to determine the prospects of a single company and investment class, as well as the relative prospects of different companies and investment classes.

**PO 11:** Evaluation, recommendation, and use of liquidity, bond, equity, and property based investments for wealth management and private client purposes.

**PO 12:** Analysis and comparison of market structure, trading venues, and financial indexes

### Semester I


FIRST SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
MBA017A	Principles of Economics & Market	4	-	-	4	C
MBA018A	Managerial Effectiveness & Ethics	4	-	-	4	C
MBA019A	Accounting & Finance	4	-	-	4	F
MBA020A	Organizational Behaviour & Human Resources Management	3	1	-	4	F
MBA021A	Quantitative Techniques & Analytics	3	1	-	4	G
MBA022A	Information Technology for Management	3	-	2	4	F
MBA023A	Entrepreneurship	3	1	-	4	ID
	<b>TOTAL</b>	<b>24</b>	<b>3</b>	<b>2</b>	<b>28</b>	

#### **Program Outcomes:**

PO1: To provide students with comprehensive management knowledge that can help them to be a business leader and manager

PO2: To required conceptual, analytical, technical, entrepreneurial and human relation skills to be an effective management professional and ethical and responsible citizen.

PO3: Ability to integrate business knowledge and management techniques and aid planning and control in a changing business environment.



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PO4: Display leadership competencies in implementing, coordinating and inspiring subordinates to manage change.

PO5: Naturalization with social responsibility issues that manager must address, including business ethics, cultural diversity, environmental concerns and sustainable development.

PO6: Demonstrate analytical skills applying business analysis, data management and diagnostic problem-solving skills in order to support management decision-making.

PO7: Apply the entrepreneurial, analytical, managerial skills for effective business management.

## **Principles of Economics and Markets**

**SUBJECT CODE: MBA017A**

**CREDITS: 4**

### **Course Objective**

The objective of the course is, the fundamentals of economics and with relationship with business, to know and learn about the demand and Supply Analysis, to learn about the macroeconomic policies and financial investment markets.

### **Unit 1: The Economic Way of Thinking**

Introduction to economics: concept of scarcity- trade-offs, opportunity cost, basic economic problems, microeconomics and macroeconomics, managerial economics-meaning and nature. Business Cycle: Business Cycle- Features, Phases, Causes and Measures for Controlling Business Cycles. Concept of Inflation, Deflation, FDI, National Income- Concepts and Measurements.

Sectoral Composition: Contribution of Agriculture, industry and services sector towards economic development, Government Initiatives to boost up each sector

### **Unit 2: Demand & Supply Analysis and Estimation**

Demand Analysis- meaning of demand, determinants of demand, demand equation, Law of Demand, elasticity of demand, types of elasticity (numerical), measurement of elasticity, Demand forecasting-meaning, types and measurement, supply- meaning, determinants, Law of Supply, market equilibrium.

### **Unit 3: Production Analysis and Market Competition**


Production-meaning, production function, laws of production-law of variable proportions and laws of returns to scale, isoquants, economies of scale; Cost analysis- Meaning of cost, Cost concepts, (problems), cost function- SR & LR, LAC curve; Breakeven analysis- BEP (numerical), Cost & Economies of scale.

Types of markets: perfect competition, monopoly, monopolistic competition and oligopoly; profit-maximization-alternative forms of organization; marginal revenue, marginal cost, and profit maximization, profit maximization by a competitive firm: short-run profit maximization by a competitive firm and long-run profit maximization. Oligopoly Market: Oligopoly-price searchers-meaning, cartels, conditions for cartel success; advanced pricing- extensions of oligopolistic pricing: limit entry pricing, price rigidity and kinked demand; price leadership, volume pricing.

### **Unit 4: Indian Economy**

Introduction: Characteristics of Indian economy as developing economy, Economic growth vs Economic development, causes and solutions for economic development, Measurement of Development- Human Development Index (HDI) and other measurements.

Policy and Economic Reforms : Economic Policies- New Economic Policy (LPG); monetary policy, fiscal policy; Industrial Policy, Foreign Trade Policy, FDI, Economic reforms -



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current economic reforms (SAP-Structural Adjustment Programs), privatization, disinvestment, Demonetization, GST.

Economic Planning: Need for Finance Commission, Role and functions of Finance commission of India, need for and importance of NITI Aayog, Functions of NITI Aayog.

### Unit 5: Financial System

Overview: Overview of the Financial System, Financial Institutions, Financial Markets, Financial Instruments and Services, Role of financial Intermediaries, Source of Funds, Application of Funds, Role of Financial Regulatory and Promotional Institutions like RBI, SEBI, IRDA, PFRDA.

Financial Markets:

Monetary policy-Tools, Goals and Targets, structure of interest rates – Nominal and real interest rate, Money Market- instruments, utility, eligibility: Call, Notice & Term Money Market, Commercial Bills, Commercial Paper, Certificate of Deposits, T-Bills issue & yield-computation, Repo, market for financial Guarantees, Discount market, Government (Gilt-edged) Securities Market & design, Banking institutes, Insurance companies

Equities Market-Primary Markets –SEBI norms (ICDR regulations), exit routes, introduction to public issues, types of issues, appointing Merchant Bankers & other intermediaries, Filing DRHP & types of prospectuses, book building mechanism, types of investors, ASBA, Secondary Markets-Purpose & procedures for listing (post-IPO); SEBI framework, role of stock exchanges-NSE, BSE, role of secondary market intermediaries, Depositories, Overview of Bond market and recent developments, Financial Services:

Various Savings plans, Non-Bank Financial intermediaries -Leasing, Hire purchase, Credit rating, Factoring, Forfaiting, Non-Bank Statutory Financial Organizations. Technology in Financial Services: Digital currencies, Emerging technologies, FinTech operational, technology, and regulatory risks, Block chain, Cryptocurrency and Bitcoins, Cyber-security law in India, Big data and Chat bots, Role of Artificial Intelligence.

### Course Outcomes

CO1: Identify the relationship between economic theories and business decisions.

CO2: Evaluate business decisions based on Demand and Supply concepts.

CO3: Assess market competition and structure for different products.

CO4: Interpret various macroeconomic policies for better understanding of the economy.

CO5: Apply financial market norms towards investment decisions.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

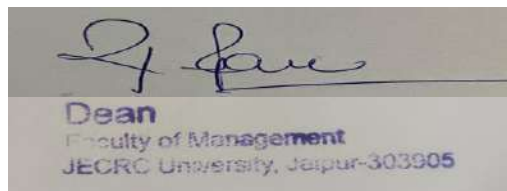
Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2		1				
CO2		2				2	
CO3							2
CO4				2			
CO5					2		

H = Highly Related; M = Medium L = Low

### Textbooks

- Ahuja, H.L. *Advanced Economic Theory(Micro Economics)*, S.Chand&Co, New Delhi

### References:





- Browning Edgar K. &Jacquel Line M. Browning, *Micro Economics and application*, Kalyani publishers, New Delhi.
- Gould John P. and Edward P.Lazear,*Micro Economic Theory*, All India Traveller Book-seller, New Delhi.
- Koutsoviannis*Modern Micro Economics*, Macmillan Press Limited, New Delhi.
- Dewett. K.K.*Micro Economics*, S.Chand&Co, New Delhi
- Price,M.C, *Welfare Economics*,Macmillian, London.
- Lipsey& Chrystal, *Economics*, IndianEdition, Oxford University Press.
- Dominick Salvatore, *Micro Economics Theory and Application*, OxfordUniversity Press.

### **Managerial Effectiveness and Ethics**

**SUBJECT CODE: MBA018A**

**CREDITS: 4**

#### **Course Objective**

The Objective of the Course is, to understand the competencies and skillsets, to know and learn about the effective reading, writing, speaking, listening and presentation skills and to learn the leadership skills for organizational building to create strong teams.

#### **Unit 1: Communication and Presentation Skills**

Effective Communication: Introduction, importance of communication, process of communication, types of communication, principles of effective communication, technology and business communication, addressing the barriers to communication.Oral and Non-verbal Communication, business etiquette.

Listening & Reading Skills, Written Communication: Written communication: memos, proposals, letter writing, circulars, notices, agenda and minutes of the meetings, report writing. CV and resume writing, Email writing and etiquette.

Presentation Skills: Learn to design effective & engaging presentations; Master powerful & effective verbal & non-verbal communication techniques; Gain insight into effective techniques for calming nerves; Create compelling PowerPoint presentations; Use videos and audio to enhance the experience

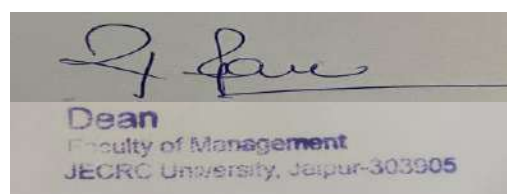
#### **Unit 2: Assertiveness and Emotional Intelligence**

Increase self-awareness; Deal more confidently and professionally with conflict and anger; make, refuse and accept requests more effectively; Handle inter-personal issues more confidently and effectively; three main categories of behavior within the assertiveness model: passive, aggressive and assertive, give and receive feedback more effectively.

Emotional Intelligence: Elements of Emotional Intelligence – Self Awareness, Managing Self, Motivation, Empathy, Social Skills; Review of your interpersonal skills, how to adapt and manage particular situations, use your emotions to your advantage, build stronger relationships, how to empathize with others, how to manage your stress levels, how to overcome challenging situations

#### **Unit 3:Leadership Skills for Effectiveness**

Understand the leadership skills necessary for effective managers; meaning of organization culture; building an organization culture; meaning of networking; building networking across



various business functions, similarities and differences between leadership and management, Key managerial skills- Motivating others, delegating effectively, giving feedback.

Leadership Challenges: Understand leadership theories, leadership challenges and strategies, negotiation: meaning, importance, mapping leadership styles, expanding professional and personal networks.

#### **Unit 4: Team Building and Conflict Resolution**

Meaning of team building; explain the main features and roles of a team; Tuckman's stages of team development: forming, storming, norming, performing and adjourning, recognizing behaviors at every stage, team building through management games, how to handle a team, characteristics of high performing team, leadership resourcing and developing a team, why teams fail, work teams – cross functional team, virtual team, self-managed team.

Conflict Resolution: Gain a thorough understanding of the sources, causes and types of conflict; master all six phases of the conflict resolution process; understand the five main approaches to conflict resolution; apply conflict resolution approaches; use parts of the conflict resolution process to recognize and prevent conflict before it escalates; develop communication tools such as agreement frames and open questions.

#### **Unit 5: Role of Ethos in Management**

History and relevance; meaning, principles practiced by Indian companies; role of Indian ethos in managerial practices; Indian heritage in business management, production and consumption; work ethos and values for Indian managers; ethics v/s ethos; Indian management v/s western management.

Ethos and Work Culture: Meaning, features, values for Indian, relevance of value based management in global change; impact of values on stakeholders: employees, customers, government, competitors and society; values for managers, trans-cultural human values in management and management education; secular v/s spiritual values in management; stress management through meditation and yoga; leadership changing scenario from Karta in a joint family to managers today; contemporary approaches to leadership; Karma, Laws of Karma.

Business Ethics in Management: Definition and nature of business ethics; need and benefit; ethical values; myths and ambiguity; ethical principles in business; theories of Ethics, Absolution vs Relativism, Theological approach, Deontological Approach, Kohlberg's 6 stages of moral development; Ethical dilemma, characteristics; ethical decision making, reasoning, and resolution process; ethical culture in organizations; developing codes of ethics and conduct; ethical value-based leadership; understanding ethics in the context of Indian business; ethical dilemma in areas of Finance, HRM, Marketing and International Business

#### **Course Outcomes**

CO1: Explain the competencies and skillsets needed for an effective manager.


CO2: Demonstrate effective reading, writing, speaking, listening and presentation skills to communicate effectively with the audience in business situations.

CO3: Analyze and integrate leadership skills for organizational building.

CO4: Create strong teams with the necessary skills to achieve results.

CO5: Assess contribution of Indian culture and ethos to service, leadership, and management.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**



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<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2			2				
CO3		2		2			
CO4					2		
CO5						2	2

H = Highly Related; M = Medium L = Low

### **Text & References:**

- Fernando, *Corporate Governance: Principal Policies & Practices*, Pearson Education, New Delhi.
- Fernando, *Business Ethics and Corporate Governance*, Pearson, New Delhi.
- Business Benchmark (Upper-Intermediate) (2nd Edition) Guy Brook- Hart, Cambridge University Press, New Delhi.
- Successful Meetings (1st Edition) John Hughes and Andrew Mallett, Oxford University Press.
- Successful Presentations (1st Edition) John Hughes and Andrew Mallett, Oxford University Press

### **Accounting and Finance** **SUBJECT CODE: MBA019A** **CREDITS: 4**

### **Course Objective**

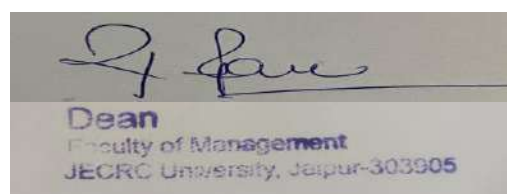
The Objective of the Course is, to understand the basics of Cost and Financing Accounting, to know and learn about the labour costs and overheads and to understand the double entry system and to understand the concept of cost methods and planning control.

### **Unit 1: Basics of Cost and Financial Accounting**

Sources of data (internal & external) –concept of cost – cost classification based on nature of expenses, function, variability – cost behaviour with use of graphs – concept of cost objects, cost units & cost centres- Data analysis and statistical techniques.

Define financial accounting – purposes of financial statements for the users – main elements of financial reports – conceptual framework – definitions of asset, liability, equity, income & expenses-prudence.

Concepts of relevance, faithful presentation, materiality, substance over form, going concern, business entity, accruals, consistency, comparability, verifiability, understandability and timeliness



## **Unit 2: Accounting for costs – Materials, labour and overheads**

Accounting for material costs – ordering, receiving & issuing material – methods of valuing purchases and issues (FIFO & Weighted Average methods only) – EOQ – inventory levels –

Accounting for labour – direct & indirect cost of labour – remuneration methods (individual & group) – labour turnover – overtime & idle time – labour efficiency, capacity & volume ratios

Accounting for overheads – allocation of overheads to production & nonproduction departments – apportion service overheads to production departments – production overhead absorption rates – entries for accounting of material, labour & overhead costs

## **Unit 3: Accounting records, double entry accounting systems and Recording transactions:**

Main data sources for accounting – different business documents such as sales order, purchase order, goods received note, quotation, goods despatched note, invoice, credit & debit notes, receipt, remittance advice, cash vouchers – understand the double entry accounting & duality concept – types of transactions such as sales, purchases, payments & receipts.

Recording into journals – ledger accounts – balancing of ledger accounts – accounting for discounts, sales tax – recording cash transactions – accounting & valuation of inventories – accruals & prepayments – tangible & non-tangible assets – depreciation & amortisation accounting – receivables & payables – provisions & contingencies – errors & rectification – bank reconciliation statements

## **Unit 4 - Trial balance, financial statements:**

Statements of profit or loss and other comprehensive income, cash flow statements, balance sheet – events after reporting period – interpretation of financial statements – use of basic ratios related to profitability, liquidity, and activity and resource utilisation – Describe the principle of the equity method of accounting for Associate entities.

## **Unit 5: Methods and techniques of costing for different industries and planning and control**

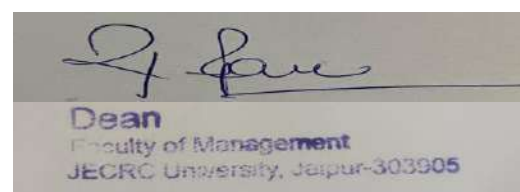
### ***Costing methods for different industries***

Understanding of applying job & batch costing, Process costing (including joint products & by-products, equivalent production), service costing – understand the differences between absorption & marginal costing

### ***Costing techniques for planning and control***

Understand the use of budgets and standard costs for planning & control – flexible budgets – reconciliation budgeted profits with actuals – meaning & calculation of standard costs – computation of simple variances v/s budgets & standards.

### **Course outcomes:**



CO 1: Understanding the basics of cost and financial accounting and the related concepts, principles, and terminologies.

CO 2: Understanding the application of costing for various cost components.

CO 3: Understanding the accounting records maintenance rules and systems and record keeping aspects.

CO 4: Use of costing techniques under different types of industries for different circumstances and evaluating the costing techniques facilitating planning and control of activities that drive the performance of an organization.

CO 5: Understand the importance of preparation of trial balance and the different types of financial statements prepared for disclosure and further analytical purposes

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2					
CO2			2				
CO3				2			
CO4				2	2		
CO5						2	2

H = Highly Related; M = Medium L = Low

#### **Textbooks & References:**

1. An introduction by Eddie McLaney & Peter Attrill, Pearson publication.
2. Advanced accountancy by S. P Jain & Narang K L.
3. Accounting: All In one for Dummies by Wiley.

### **Organizational Behaviour and Human Resources Management**

**SUBJECT CODE: MBA020A**

**CREDITS: 4**

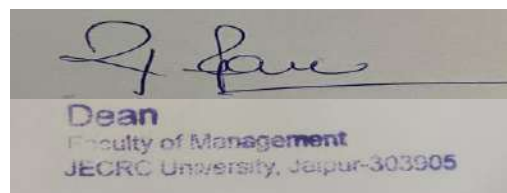
#### **Course Objective**

The Objective of the course is, to equip students to analyse the organizational culture and conflict management and to impart the knowledge of leadership and motivational theories and to enable the students to evaluate the strategic human resource management and industrial relations emerging trends in IHRM.

#### **Unit 1: Organizational Behavior**

Introduction to Organizational Behavior, Meaning and Importance of OB, Historical developments, the importance of Interpersonal skills, Contributing Disciplines to OB, OB model, Challenges and Opportunities for OB, Workforce Diversity, Dynamics of diversity. Application of OB in organizations, OB in Global Context

Individual behavior: The basis for understanding Work Behavior. Factors responsible for Individual differences at workplace Attitudes- Meaning, components, Values- Meaning, Types of values, the importance of values in organization. Attitude, components, Factors affecting attitude formation, Ways to change employee attitude, Types of job-related attitudes, Job Satisfaction. Personality, Theories of personality, Personality traits that influence Work Behavior. Groups- Defining and classifying groups, need for group formation, Tuckman's



stages of group development, Group properties – Norm, Status, Size, Composition, Cohesiveness, Group decision making Techniques, Cost of working in groups, Teams v/s Groups, Importance of teams in contemporary workplace

## **Unit 2: Motivation and Leadership**

Motivation and Group dynamics: Theories of motivation - Content Theories - Need Hierarchy Theory, Hygiene Motivation Theory, Existence Relatedness Growth (ERG) Theory, Theory X-Y, Three needs theory. Process Theories- Equity Theory, Expectancy Theory, Application of motivation concepts at workplace settings – Discussion.

Leadership: Meaning and importance, Leader v/s Manager, Traits of a leader\*

Trait Approach to leadership – Traits of a leader, are leaders born or made? Behavioral Approach, Ohio and Michigan studies, Managerial Grid; Situational Approach - Fiedler's Contingency model, Hersey Blanchard situational leadership theory, Path Goal Theory, Contemporary leadership theories - Transactional, Transformational, Charismatic, Visionary Leadership. Leadership challenges in current context.

Power and Politics; Managing Conflict: Power – Meaning, Bases of power, Dependence – The key to power, consequences of power, Power tactics, Political tactics for increasing power base, Organizational Politics, Causes and consequences, Impact of power and politics in organizations. Meaning and importance of conflict in organizations, Views of conflict, functional and dysfunctional conflict, Conflict process and conflict handling styles, functional and dysfunctional conflicts, Conflict process.

## **Unit 3: Organizational Structure and Culture**

Organizations and Organization Theory: Introduction to organizations, importance, evolution of organization theory and design, dimensions of organizational design, characteristics and design, and organizational configuration, Mintzberg's Organizational types, contemporary design Ideas.

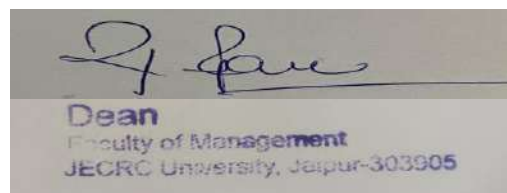
Strategy, Organization Design and Effectiveness: The role of strategic direction in organization design, organizational purpose, strategic intent, operative goals, importance; SWOT framework for selecting strategy; Porter's competitive forces and strategies; strategies and organization design; other factors affecting organization design; The Balanced Scorecard Approach to Effectiveness; identifying company strategies and effectiveness criteria.

Organization Structure: Organization structure; information-sharing perspective on structure vertical information sharing, horizontal information sharing; organization design alternatives, reporting relationships; departmental grouping options, functional, divisional, geographic, and matrix structure, conditions for the matrix, horizontal structure characteristics; virtual networks and outsourcing; external and internal factors impacting organization structure, hybrid structure, applications of structural design, structural alignment, symptoms of structural deficiency, Organization design essentials.

Organizational Culture: Meaning, definition of organization culture, and importance of organizational culture; uniform cultures; strong vs weak cultures, creating and sustaining culture, creating an ethical and positive organizational culture; Internal and external conflict management, progressive corporate culture that enables Innovation and change.

## **Unit 4: Human Resource Management and Industrial Relations**

Introduction to HRM, and Manpower Planning: Introduction to Human Resource Management, Evolution of HRM, Importance, HRM functions, Forces changing HRM, Human Resource Planning - Meaning, Process, HRP Models, Human Resource Forecasting methods, Challenges and relationship with other Human resource functions, Job analysis, Job Description, Job evaluation, Features of the competitive business environment (Globalization, Technology, E-





commerce, Demographic changes, Diversity), Global Human Resource Planning, Quality of work life. Cultural awareness – Iceberg Model of Culture. Business trends in HR.

International HRM and Emerging Horizons of HRM: Concept, importance, an model of International HRM; Challenges of International HR Managers; Global HR practices; E-HRM; HRIS (Human Resource Information System); Measuring intellectual capital; Impact of HRM practices on organizational performance; contemporary issues in Human Resource Management.

Basics of Industrial Relations and HR Analytics: Basics of Industrial Relations – meaning and importance, trade unions, workers participation in management, collective bargaining, HR Analytics – Introduction, Evolution, Steps in HRA, Applications of HRA, how analytics helps in negotiation and bargaining.

### **Unit 5: Talent Management**

Recruitment and Selection: Recruitment - meaning and process, Purpose of Recruitment, Types of Recruitment - Internal - Job postings, Employee Referral Programs, Temporary worker pools and External recruitment – Virtual Job Fairs, Executive Search Firms, Employment agencies, Recruitment advertising. Factors affecting Recruitment, Recent Trends in Recruitment. Human Capital Management – Meaning and definition, ROI of HCM – Human capital ROI, Training Investment Value, Turnover Rates, Selection- meaning, selection procedure, Types of tests used in Selection, Consequences of selection decisions, Interview and Types of interviews. Placement and Induction.

Talent Management: Training- meaning, need and importance of training, Distinction between training and development, methods of training – On the Job & Off the Job, process of training, recent developments in training, Succession Planning, Strategies for Accelerating Development for succession, Performance appraisal, meaning, importance, various performance appraisal methods, Drawbacks of Performance Management System, challenges and limitations. HR Metrics – Meaning, Key HR metrics, 5 W's of measuring ROI (Who, When, What, Where, Why), ROI of L&D..

Employee Rewards: Employee Rewards -meaning, concepts and definitions, Objectives of giving compensation to employees, Components of remuneration, types of employee benefits, financial and non-financial benefits, factors affecting wage and salary, salary components, salary structure, employee welfare, safety issues in organizations, work life balance and factors attributing to increased awareness for work life balance, Work Life Balance Intervention.

### **Course Outcomes**

CO1: Identify the challenges and opportunities in applying organizational behavior and develop understanding of self and others' behavior in organizations.


CO2: Describe the implications of motivational theories and the influence of different leadership styles on employees.

CO3: Develop an understanding of the principles and theory of organization; examine the reciprocal relationship between the organizational structure, strategies, and systems and the factors that impact organizational structures and design.

CO4: Comprehend the basic principles of strategic human resource management, and practices of talent acquisition and its management.

CO5: Develop the components of employee rewards and analyze the changing scenario of industrial relations and emerging trends in International Human Resource Management.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**



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<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2						2
CO2		2					
CO3					2		
CO4			2			2	
CO5				2			

H = Highly Related; M = Medium L = Low

### Textbooks

- Stephen Robins, *Organisational Behaviour* PHI

### References:

- K. Ashwathappa, *Organisational Behaviour*, Tata McGr
- Keith Davis, *Organisational Behaviour*, Tata Mc Graw-Hill
- Keith Davis, *Human Behaviour at Work*, Tata McGraw-Hill
- Greenberg, J. & Baron, R.A., *Behaviour in Organizations*, Pearson Education, 2005.
- John W. Newstrom and Keith Davis, *Organizational Behaviour: Human Behaviour at Work*, Tata McGraw Hill, New Delhi, 1993.
- Luthans, F., *Organizational Behaviour*, McGraw – Hill International Edition 2005.
- R. D. Agarwal, *Organisation and Management*, Tata McGraw Hill, New Delhi, 1995.
- Robbins, S.P., *Organizational Behaviour*, (11th Edn.), Prentice Hall India, 2005.
- Schermerhorn, J.R. Jr.; Hunt, J.G. & Osborn, R.N., *Managing Organizational Behaviour*, John Wiley & Sons, 1985.
- Srivastava, S., *Organizational Behaviour*, Galgotia Publications, 2000.

## HUMAN RESOURCE MANAGEMENT

### Text:

Garry Dessler, *Human Resource Management*, Pearson Publications

### References:

1. Edward, B Flippo, *Personnel Management*, Mc Graw hill International Ed.
2. Dale Yoder, *Personnel Management and Industrial Relation*,
3. Monappa& Sayiaddin, *Personnel Management*, Vikas Publishing Company
4. Desimone; *Human Resource Development*, Thomson Learning
5. VSP Rao, *Human Resource Management*, Excel Publications
6. K Aswathappa; *Human Resource and Personnel Management*; McGraw- Hill Companies
7. Bohlander; *Managing Human Resources*; Thomson Learning. Ed. 13 2004

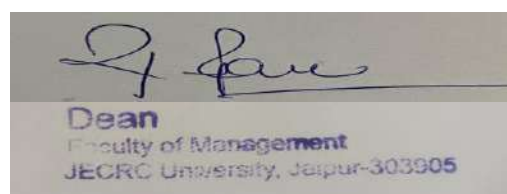
### Quantitative Techniques and Analytics

SUBJECT CODE: MBA021A

CREDITS: 4

### Course Objective:

The objective of this course is, to understand basic mathematical tools and techniques for solving complex business problems and explain the role of descriptive statistics and associate





the different aspects of probability, probability distributions and decision theory with business problems and hence solve them for better decisions and to describe various operation research techniques to get optimum solutions in business problems .

### **Unit 1: Descriptive Statistics**

Introduction to statistics and analytics, need for analytics, data types and scales, sources of data, types of classification of data. Frequency distribution grouped and ungrouped, frequency distribution, continuous distribution-diagrammatic and graphic representation: line diagram, bar diagram, rectangle diagram and pie diagram, Graphs- Histogram, frequency polygon, cumulative frequency curves, tabulation-one way and two way table. Various measures of central tendency, concepts and applications of Mean, Median, Mode, Geometric Mean and Harmonic Mean. Measure of Variation. Different measures of dispersion, significance of dispersion, requisites of a good measure of variation. Range, Inter-Quartile Distance, Standard Deviation, mean deviation, quartile deviation, Coefficient of variation

### **Unit 2: Introduction to Probability and Sampling**

Basic Concepts, relevance to management decisions, rules of probability, relevance of permutation and combinations to probability, theoretical Probability Distributions: Binomial, Poisson and normal Distributions

Sampling and Sampling Distributions, Population and Samples, Types of Sampling: Simple Random, Stratified, Systematic and Cluster Sampling, Sampling Distributions, Standard Errors, Sampling from Normal Populations, Central Limit Theorem

### **Unit 3: Hypothesis testing and Regression Analysis**

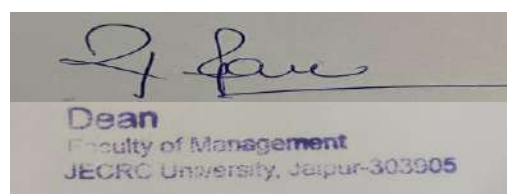
Correlation analysis: significance of measuring correlation, correlation and causation. Karl Pearson's coefficient of correlations, rank correlation. Regression analysis: need for regression, types of regression models, simple linear regression, concepts of multiple regression. Hypothesis Testing-Basic Concepts, One Tailed and Two Tailed Tests, Type I and Type II Errors, One Sample Tests, Hypothesis Testing of Means when Population Standard Derivation is Known and when Unknown, Hypothesis Testing of Proportions for Large Samples, Two Sample Tests for Equality of Means for Large and small Samples, Equality of Means for Dependent Samples, Difference between Proportions for Large Samples. Concepts and applications, Chi-square as a test of (a) independence (b) goodness of fit. Analysis of variance (ANOVA) - one way and two-way classifications

### **Unit 4: Operations Research**

Introduction to Operations Research, Application of LPP in Management, Advantages of LPP, Problem Formulation, Graphical Solution Procedure, Special Cases, Sensitivity Analysis. Transportation Problem: General Structure, Various methods for finding initial solution, Optimal Solution: Modified Distribution method; Variations: Unbalanced Transportation Problem, maximization case. Assignment Problem: General Structure, Finding Optimal Solution, Maximization problem, Restrictions on Assignments, Alternate Optimal solutions. Terminology; Networking Concepts; Rules for drawing network diagram; CPM Computations: CPM Terminology, Finding critical path – Different Floats; PERT Computations: Computation of earliest and latest allowable times, Probability of meeting the scheduled dates; Concept of Project Crashing, Time-Cost Tradeoff

### **Unit 5: Information Systems and Project Scheduling**

Overview, introduction to computers– Hardware, Software, impact of IS in business, digital divide, concept of systems, components of IS. MS Word - Introduction, Insert Menu options, Formatting, Tables and borders, Image handling, Insert Function, Hyperlink, , Track changes, Formatting & editing restrictions, Mail merge, Macro, Tables, Print ,Document Protection,



Bibliography, Citation. MS PowerPoint -Exploring the PowerPoint Window, Slide layouts, Formatting, Design template, Outline and slide sorter views, Speakers notes, Header & footer, Master Slide, Insert Function, Slide transition, Animation, Action Buttons, Custom Show, Set up Show, Keyboard tips during slide show. MS Excel-

Introduction, Custom fill, protection, Mathematical operations, Range, Formulas, linking worksheets - workbooks, short cut methods, Tables and Graphs, Data Functions in MS Excel - Functions in excel (Mathematical, Text, Date/time, Financial, Statistical, Logical functions, VLOOKUP and HLOOKUP, Situation Analysis (Scenario), Creation of Trial balance, P&L Accounts and Balance sheets. Terminology; Networking Concepts; Rules for drawing network diagram; CPM Computations: CPM Terminology, Finding critical path – Different Floats; PERT Computations: Computation of earliest and latest allowable times, Probability of meeting the scheduled dates; Concept of Project Crashing, Time-Cost Tradeoff

### Course Outcomes

CO1: Employ descriptive statistical techniques in managerial decision making.

CO2: implement and employ the use of probabilistic and sampling techniques with regards to problem solving.

CO3: Understand, classify and conceptualize various methods of hypothesis testing and regression modelling.

CO4: Describe and implement operation research techniques to make better business decisions.

CO5: Understand the concepts of managerial project scheduling and learn the usability of Microsoft Office suite effectively.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

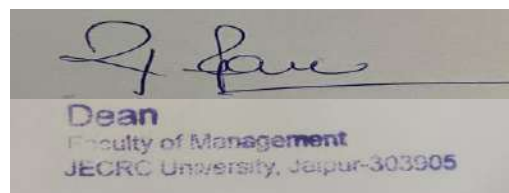
<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2						
CO2			2				
CO3							
CO4		2		2	2		
CO5						2	2

H = Highly Related; M = Medium L = Low

### Textbooks & References

- Anderson D.R; Sweeny D.J, Williams T.A, *Statistics for Business and Economics*, Cengage learning, 2002.
- Kazinier L.J., & Pohl N.F., *Basic Statistics for Business and Economics*, New York: McGraw Hill, 2004.
- Levin Richard I. & Rubin David S., *Statistics for Management*, Pearson Education India, 1998.
- Stephen .K.C., *Applied Business Statistics: Text, Problems and Cases*. New York: Harper and Row, 2002.
- Sharma, J.K., *Business Statistics*, Pearson Education India, 2007.

### Information System for Managers



**SUBJECT CODE: MBA022A****CREDITS: 4****Course Objective**

The objective of the course is, to understand how information systems support business strategy, processes and how to analyse the framework of MIS (Management Information System) and how to access the business information systems and application of information system in a ERP.

**Unit 1: Introduction**

Management Information System Basics, Framework of MIS, Information Needs and its Economics, Systems Approach, Objectives of MIS, Advantages and Disadvantages of Information Systems, Approaches of MIS Development, Constraints in Developing MIS, Limitations of MIS, Computer Based Information Systems.

**Unit 2: Information Systems for Decision Making**

Introduction, Transaction Processing System, Decision Making in MIS, Intelligence Support Systems, Decision Support System, Executive Information System, AI and Expert System, Office Automation System, Computer Hardware and Software for Information Systems, Data Communications and Client Server Computing.

**Unit 3: Decision Support Systems**

Definition, Evolution of DSS, Objectives of DSS, Classification of DSS, Characteristics and Components of DSS, Functions of a DSS, Development of DSS, Group DSS, Relationship between MIS and DSS, DSS Measures of Success in Organizations, Applications of DSS, Future Developments in DSS.

**Unit 4: Information Systems in Business**

Office Information Systems, Types of Office Automation Systems, Manufacturing Information System, Marketing Information System, Quality Information System, Financial and Accounting Information System, Research and Development Information System, Human Resource Information System, Cross Functional Information System.

**Unit 5 :Applications of Information Systems**

Strategic Management Information System, Information Resources Management, Enterprise Resource Planning, Role of IT in Enterprise Modeling, ERP Selection and Applications, ERP Implementation, Applications of IT in Business, E-Commerce, E-Business, Information and Internet Security, E-Governance.

**Course Outcomes**

CO 1: Develop an understanding of Management Information Systems, their advantages and functionality.

CO 2: Identify and conceptualize diverse Information Systems for Decision Making processes.


CO 3: Learn how to use Decision Support Systems in business scenarios and demonstrate their usefulness.

CO 4: Assess different types of Business Information Systems by identifying, classifying, and categorizing them.

CO 5: Explain and assess different uses of Information Systems in a business setting.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7



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CO1			2				
CO2		2					
CO3					2		
CO4				2		2	2
CO5	2						

H = Highly Related; M = Medium L = Low

### Textbooks & References

1. Norton P, *Introduction to Computers*, Tata McGraw-Hill, 2010.
2. Potter T, *Introduction to Computers*, John Wiley & Sons (Asia) Pvt Ltd, 2010.
3. Morley D & Parker CS, *Understanding Computers – Today and Tomorrow*, Thompson Press, 2009.
4. Jawadekar, WS, *Management Information System*, Tata Mc Graw Hill, 2009
5. Mclead R & Schell G, *Management Information Systems*; Pearson Prentice Hall, 2009.
6. O'Brein, JA, *Introduction to Information Systems*; Tata Mc Graw Hill, 2009.

## Entrepreneurship SUBJECT CODE: MBA023A CREDITS: 4

### Course Objective:

The objective of the Course is, to expose the students to the entrepreneurial cultural and industrial growth and understand the scope of an entrepreneurship and to know the importance of business plan and major elements of business plan.

### Unit 1: Introduction to Entrepreneurship

Introduction, importance of entrepreneurship, definitions of entrepreneurship, history and evolution of entrepreneurship, types of entrepreneurs, myths of entrepreneurship, women entrepreneurship in India. Qualities of successful entrepreneurs, motives and drives to take up entrepreneurship, careers in entrepreneurship, behavioral traits of entrepreneurs, entrepreneurial decision process

**Learning Outcome:** To understand the framework of entrepreneurial competence.

### Unit 2: Stages in entrepreneurship development

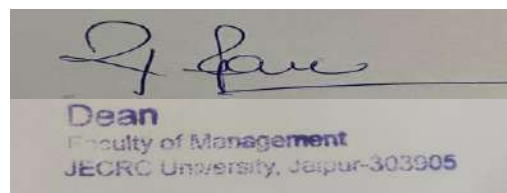
Opportunity Recognition, Identify problems and unmet needs, develop solutions to address problems, identify market gaps, sensing market opportunities, evaluation of opportunities. Sources of ideas, idea generation methods, brainstorming, secondary research, creativity and innovation, idea vs. opportunity matching, selection of ideas, ideas to market place, idea testing with potential customers

### Unit 3: Internal Environment Analysis

Identify the available resources, develop a unique selling proposition, identify strengths and weaknesses, assess the availability and advantage of resources, and assess the capability to attract investments. Elements of external environment, PEST to PESTEL to STEEPLE, identifying opportunities and threats in the external environment, matching internal environment factors to the external environment factors, political environment and government policies. Understand the existing competition both domestic and international, industry analysis using the tool Michael Porter's five forces, studying the competitor strategies

### Unit 4: Business Plan

Meaning of Business Plan, Entrepreneurial Process, Importance of Business Plan, Components of Business Plan, Reasons for Failure of Business Plan, Business Model Canvas, Value Proposition, Criteria for selection of Product/Service. Market Analysis, Market Research,



Feasibility Report, Market Segmentation, Developing the Product Mix, Developing the Marketing Mix, 4Ps and the 7Ps. Breakeven Analysis, Pro Forma Profit & Loss Statements, Pro Forma Balance Sheets, Cash flow and Funds Flow Statements. Incubation Centers, Approaching the Investors, Elevator Pitch, Seed capital, Angel Investors, Angel Networks, Venture Capitalists, Private Equity, LBO, Equity vs Debt Funding, Internal vs External Funds. Selection of Technology, Decision on Types of Processes, Plant Layout, Selection of Machinery, Capacity Planning, Quality Parameters, Make or Buy Decisions. Forms of Organization, Proprietorship, Partnership, LLP, Public Limited, Legal Issues, Organization Design, Organization Structure

### Unit 5: Institutions that Support Entrepreneurship

Role of SMEs in India, Classification of MSMEs, Government Support to SMEs, Problems for Indian SMEs, Sickness in SMEs, Causes of Sickness, Remedial Measure. SIDBI, KVIC, NIESBUD, IDBI, NSIC, NEN, AWAKE, CEDOK

### Course Outcomes

CO1: Define the concepts and explain the models of entrepreneurship.

CO2: Recognize the various stages in entrepreneurship development.

CO3: Articulate the characteristics required to become successful entrepreneurs. Identify and appraise strategies for growth of new ventures.

CO4: Create alternative Business Plans, appraise them and conclude on the most suitable Business Plan. Also prioritize on the next best alternatives.

CO5: Understand the institutional support.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2						
CO2		2	2				
CO3					2		
CO4				2		3	
CO5							2

H =

Highly

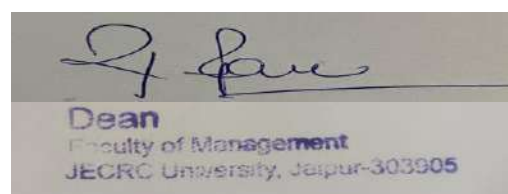
Related; M = Medium L = Low

### Text & References

1. Alexis Leon , *Enterprise Resource Planning*
2. Vinod K. Garg and N. K. Venkitakrishnan, *Enterprise Resource Planning, Concepts and Practice*

### References:

1. Amrit Tiwana, *Knowledge Management Toolkit*
2. Ganesh Natarajan and Sandhya Shekhar, *Knowledge Management, Enabling Business Growth*
3. Sunil Chopra and Peter Meindl, *Supply Chain Management, Strategy, Planning, and Operations*
4. Kristin Anderson and Carol Kerr, *Customer Relationship Management*
5. James G. Barnes, *Secrets of Customer Relationship Management*



## Semester II

SECOND SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
MBA028A	Corporate & Business Law	4	-	-	4	ID
MBA029A	Marketing & Digital Strategy (CIM)	4		-	4	C
MBA025A	Innovation in Marketing (CIM)	4		-	4	S
MBA027A	Managing Finance In A Digital World	4		-	4	F
MBA026A	Digital Optimisation (CIM)	4		-	4	S
MBA030A	Digital Customer Experience (CIM)	4		-	4	S
MBA031A	Resource Management (CIM)	4		-	4	S
	TOTAL	28			28	

### MARKETING AND DIGITAL STRATEGY

Subject Code: MBA029A

Credits: 4


#### Course Objective:

- 1) To understand micro and macro environment analysis and the required inputs for strategic decision.
- 2) The learners will be able to understand how businesses achieve competitive advantage
- 3) To make learners understand about the resource requirement for delivering the strategic marketing plan including digital strategy.
- 4) To make learners understand about the strategic approach to marketing planning.
- 5) To make learners understand the risk assessment procedure of organisation.

#### COURSE DESIGN

##### Unit-1 (Environment Analysis, Resources and Competences, Marketing Analysis Techniques)

PESTEL, Porter's five forces, SWOT analysis, types of market orientation, organisation's culture using cultural web model, leadership style and management style, Differentiate about core and threshold competences and resources, Explain about long termism and ethics in marketing, Identify ways to achieve competitive advantage, Analysis of online and offline activity, Understanding the current skill requirement and challenges faced by the organisation in gathering the data and analysing it, Determine the barriers to competitive advantage, Compare and contrast between conventional and disruptive marketing models, Explain the concepts of having social presence.( 12 hours )



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## ***Unit 2 (Environmental Audit, Market Analysis, Digital Marketing)***

Concepts of AAA Bottom line audit , Social and Environmental Footprints , Difference between social and environmental Audit, ISO 140001 , Research Methodologies for Online and Offline Marketing Audits , Evaluate the changes in market conditions and demand , Guerrilla marketing , online and offline marketing environment. impact of digital market environment and its capabilities and limitations, concept of MIS, Identify and recommend about the risk and barriers and ways to overcome it in market planning.(10 hours)

## **Unit 3 (Goals, Strategic Marketing Plan, Market Strategic Decisions)**

Explain the relationship between objectives, mission, and vision statement of an organization. Explain about the elements of marketing objectives, digital strategy models such as Monday, Hive, clickup etc , nine key elements of brand strategy. how to develop strategic marketing plans with reference to strategic marketing framework. Construct profit and sales projections. Explain the concept of one-to-one marketing. Evaluate the suitability, feasibility and acceptability of strategic marketing decisions. Discuss different groups of stakeholders and their expectations using Mendelow's matrix.

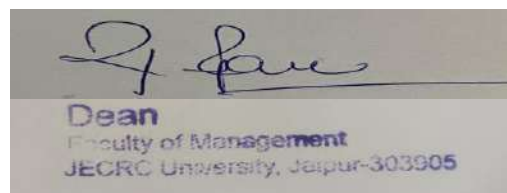
Explain market intelligence and organizational dynamics Calculate the return on investment and interpret. (12 hours)

## **Unit 4 – (7Ps, Implementation of Marketing Strategy)**

How to develop a successful marketing mix strategy and understand the marketing mix models developed by Mc Carthy 4 P's and the later extension into 7p's Compare and contrast between traditional and digital marketing communication Identify the four steps involved in digital marketing strategy framework and steps to develop the action plan for traditional and digital marketing strategies. Understand the regulatory and legal factors. Explain the resource and competence requirements for implementation of strategy. Define the scope of other alternatives like outsourcing, franchising and other agencies. Explain the concept of CSF. (12 hours)

## **Unit 5-(RISK, FINANCIAL AND NON FINANCIAL INDICATORS, POST-IMPLEMENTATION)**

Explain risk, how to assess the risk faced by an organisation and ways adopted to mitigate with it. Explain the response of organisational risk towards risk. Explain the social and ethical aspects



of risk assessment process. Calculate and interpret ratio analysis. Determine the KPI's for CSF's and evaluate. Explain steps involved in project planning. Identify and explain other technical aspects of measuring and monitoring system of implementation. Define strategic gap and ways to reduce it. Explain methods involved in analyzing the post-implantation stage and how to deal with it. Identify different methods of collecting data.(12 hours)

## **COURSE OUTCOMES**

- 1) Ability to apply knowledge for financial and Non-Financial Indicators
- 2) Know about the Marketing Strategy in digital marketing
- 3) Identify the Goals and Objectives of Companies and implementing the strategies according to that.
- 4) Knowing the Risk factors in business and market.
- 5) Knowing the difference between Micro and Macro Environment.

### **Innovation in Marketing**

**Subject Code: MBA025A**

**Credits: 4**

### **Course Objective:**

- 1) Creates understanding to develop innovation to deal with challenges.
- 2) Understand the key factors to develop innovation in marketing function.
- 3) Ability to use internal and external marketing.
- 4) Ability to understand the case related to innovation of marketing.
- 5) Develop plan for communication of innovation.

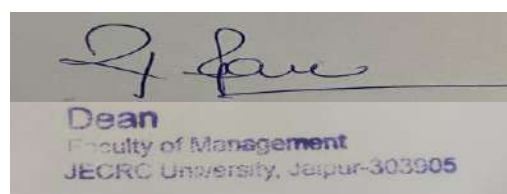
## **COURSE DESIGN**

### **Unit-1 (BUSINESS OPPORTUNITIES & CHALLENGES, STUDY OF INNOVATION, IMPLEMENTING INNOVATION)**

Evaluating Environmental scanning, trends, discovery theory, Disruptive innovation and digital disruption, Emerging economies and innovations, Competitive advantage – new competitive approaches

Evaluate Intuitive, 'gut feel', insights, Discovery-driven planning, Traditional business plans, Developing business models, Internal and external approaches, Business process re-engineering

Identification of challenges like External environmental factors, Competition, Leadership buys, Budget/Capital requirements, Resistance to change (20 Hours)





## **Unit 2 (TYPES OF INNOVATION, INNOVATIVE ORGANISATION, FACTORS DEVELOPING INNOVATIVE APPROACHES)**

Discuss the salient features of most innovative organization such as Vision and styles of leadership, Organizational structures, Key individuals, and team working, Creative climate/culture, External focus – market orientation, boundary spanning and networks

- Invention, creativity and innovation
- Disruptive and sustaining innovations
- Product, process and platform innovation
- Open and closed approaches to innovation
- Radical and incremental forms of innovation
- Market pull vs. technology push
- Business model innovation
- Discuss and evaluate Cross-functional and self-managing teams, Role of Learning, training and development in building innovation, Information sharing, Support of innovative business models, use of Adaptive/flexible approaches, Use of appropriate market research techniques and sources of information and Use of innovation networks (25 HOURS)

## **Unit 3 (CUSTOMER RELATIONSHIP, OPTIONS FOR INNOVATION, SERVICE DEVELOPMENT)**

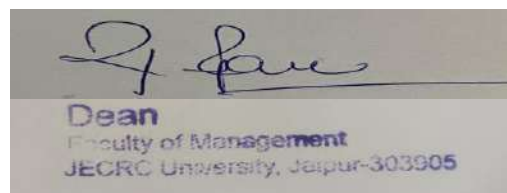
Study various innovative approaches such as Generating ideas, Screening, Business analysis, Development of a small-scale trial, Testing techniques, Commercial launch, Effective exit routes for unsuccessful ventures to enhance the service development

Discuss the methods to build better customer relationship ideagoras, crowdsourcing, online forums and other open platforms, conducting user trials, involving leading practitioners, supplier engagement, round table conferences.

Product/service/process/programme Business model Out-sourced vs internally implemented Adaptable/flexible/agile Benchmarking Collaborative/partnerships Assessing acceptability, feasibility or suitability ( 25hours)

## **Unit 4 – (INNOVATION PROPOSAL, BUSINESS CASE FOR CHANGE, LAUNCH OF INNOVATIVE APPROACHES)**

Assessing the risks and benefits of an innovation proposal Discuss the risks and benefits of the proposal - Strategic/operational/tactical, Financial, Reputational, Competition Understand the Factors driving change and the Scope of change required, evaluating the need for change and commitment from stakeholder groups, Structure the business case and Project proposal Understand the Background of the business plan, choosing right research techniques, Selection of relevant sources of information. Setting the objective and creating a strategy and tactics, action and evaluating measurement criteria. (25 hours)



***Unit 5- (MEASURING SUCCESS, SUPPORT CHOSEN INNOVATION, CULTURAL CHANGE AND INNOVATION OPTIONS)***

Discuss the impact of Current organisational culture, Levels of trust and openness, Space and support for ideas, Attitudes to risk taking, Degrees of freedom to experiment, Fit with business strategy, Strategies for culture change, Development of a culture for managing risk

- Internal communication plans
- External communication plans
- Target audiences
- Key messages
- Implementation
- Evaluation and measurement criteria
- Agency relationships

Discuss and evaluate - Soft and hard measures of success, Achievement of objectives, ROI, Metric dashboards, Latest trends in metrics and their impact. (25 hours)

**COURSE OUTCOMES-**

- 1)** Knowing about the strengths and weaknesses of organisation.
- 2)** Ability to cope up with the challenges of innovation.
- 3)** Knowing the qualities of innovative organisation.
- 4)** Understanding different factors that support innovation.
- 5)** Understanding Innovation in Customer Relationship.

**Digital Optimization**  
**Subject Code: MBA026A**  
**Credits: 4**

**Course Objective:**

CO1: Analyzing the factors that affect the digital environment of the organization

CO2: Creating knowledge and skill to optimise digital marketing performance.

CO3: Learning digital metrics and analytics

CO4: Knowledge of digital measures to analyse optimization.

CO5: Digital marketing innovation.

**COURSE DESIGN**

**Unit-1 (DIGITAL MICRO& MACRO ENVIRONMENT, DIGITAL ECOSYSTEM, AUDIT FINDINGS)**

Evaluate digital analysis tools and frameworks, understand the Digital culture framework such as Readiness, Essentials, Performance, Evaluate the impact and influence on key drivers within the digital environment, inside the organisation, within market sector and among the stakeholders.

Study the new trends in the business models and its impact on the organisation. Discuss the changes taking place in the Email, Websites, Online PR, Search Engine Optimisation, Blogs, Social networks, Online advertising, digital products/services, pricing models, distribution Understand the changes and emerging trends in digital platform. Evaluate the digital tools frameworks to evaluate the analysis. Discuss effective techniques of digital market research, Identification of reliable resources of data, Justification of findings through evidence (30 Hours)

**Unit 2 (DIGITAL ENVIRONMENT, INNOVATION, IMPACT OF INNOVATION)**

Discuss the opportunities and threats within the wider digital environment, elaborate the changes required to be adopted by the organisation, evaluate the business process re-engineering requirements. Evaluate the impact of wider digital environment on marketing activities, customer experience and ethical issues. Discuss the digital marketing evolution, role of AI, IOT, connected home, smart cities and crowd sourcing. Discuss the changes in the consumer behavior due to the innovation in the digital marketing. ( 25 HOURS)

**Unit 3 (CONVERSION RATES, CONVERTING CHANNELS, DIGITAL PERFORMANCE INDICATORS)**

Evaluate the role CRO audit, Online and offline integration, Visuals, copywriting, content Design and UX, online psychology on the conversion ratio Discuss the converting channels such as measuring A/B testing, Implementation and reporting, Return on marketing spend. Discuss on the measures to improve the conversion ratio. Discuss the digital performance indicators – evaluate the difference between analytics and insights, how to use vanity metrics and discuss the technique measuring return on investment. Elaborate the techniques of creating digital goals and objectives. ( 25hours)

#### **Unit 4 – (OPTIMIZATION OF DIGITAL MARKETING, USE OF DATA, ASSESS DIGITAL MATRIX)**

Discuss the methods of getting integration and improvement of digital marketing activities such as Testing, Different options and Gaining customer feedback Understand the Marketing automation and establishing trigger points for actions, study multi-touch attribution modelling and customer touchpoints. Elaborate the Application of data in improvement planning, evaluate Data versus Key Performance Indicators (KPIs), Use of Landing pages (25hours)

#### **Unit 5- (MEASURING DIGITAL INTEGRATION, MAXIMISING DIGITAL OPTIMISATION, TECHNICAL IMPLEMENTATION OF MONITORING SYSTEM)**

Relevant digital measurement tools, services and methods, Value of measuring digital integration Integration of digital measurement in organisations, Stages involved in maximising digital optimization Use findings to make improvements to marketing plans in the future. (20 hours)

#### **COURSE OUTCOMES-**

- 1) Understanding Digital metrics and analytics
- 2) Use of digital optimization
- 3) Assess the Digital Performance indicators
- 4) Analysing Audit Findings.
- 5) Knowing about the weaknesses to improvise marketing plans in future

**Digital Customer Experience**

**Subject Code: MBA030A**

**Credits:4**

#### **Course Objective:**

CO1: Develop skills to take strategic decisions.

CO2: Understand the digital customer and take decisions accordingly.

CO3: Management of digital channel selection

CO4: Understand the legal compliance involved in digital technology

CO5: Learning how to improve the digital experience of customers.

#### **COURSE DESIGN**

##### **Unit-1 (CHANNEL GOALS, CHANNEL SELECTION, DIGITAL CUSTOMER PERSONA)**

Explain the framework for setting business objective, define the purpose and mission, Setting goals for different channels, methods of customer acquisition, efforts to be taken for customer retention, Customer conversion, gathering and understanding customer experience, Efforts to attain organisation growth

Identification of qualities of an appropriate channel for the set objective, factors contributing to the success of the channel, Common mistakes – cautions to take, Types of channel, identification of target audience, Channel planning, selection of persons to handle the channel, risk involved in relation to channel usage.

Evaluate the various sources of customer data, identify online research sources, collection of customer behaviour, identifying current and changing consumer behaviour, importance of abandoned cart items, searching and browsing history, Technique of identifying consumer personas. (30 Hours)

## **Unit 2 (CUSTOMER AWARENESS, CUSTOMER EXPERIENCE MANAGEMENT, MEDIA CHANNELS)**

Using customer insight research techniques – qualitative and quantitative data, using AI, machine learning, social media shares and mentions, customer surveys, internal analytics from web properties, internal analytics, crowd sourcing, sentiment analysis.

Evaluate customer awareness through Digital Marketing Mix – paid, shared, owned and earned, Ad copy and creative – qualities, tactics of good ad copy, Content marketing to create customer awareness, Keyword and market trends research, Keyword journey (generic vs long tail terms) Introduction and uses of website and various types of landing pages, Digital communications, Affiliate marketing, discussion on risks and constraints and budget planning.

Selection of resources – distinguish between In-house vs agency, Brief understanding of Consultants and Briefing Agencies. (30 HOURS).

## **Unit 3 (IDENTIFYING CUSTOMER BEHAVIOUR, LEGAL COMPLIANCES OF DIGITAL CAMPAIGNS)**

Management of Recommend KPIs, dashboards and reports for assessing channels, Describe options and tools for monitoring channels, details of Attribution modelling, distinguish between Influencer channels vs converting channels

Brief discussion on Data protection, international privacy law, Industry codes of practice, Disability and discrimination, Brand and trademark protection, Intellectual property rights, Contract law, Online advertising law, Content, copyright, media, Channel terms and conditions

Usages of best practices to avoid legal complications during data collection, precautions to take during email and SMS campaigns, privacy statements, cookies, spam, opt-in. ( 25hours)

## **Unit 4 – (CONSUMER JOURNEY THROUGH DIGITAL EXPERIENCE)**

Discuss the role Websites, key phrase analysis and selection Search engine optimisation (SEO), Search engine marketing (SEM) in understanding consumer behaviour and there by developing customer acquisition and conversion

Discuss the role of paid search or pay per click marketing (PPC), Blogs, Online PR, partnerships/affiliates, online communities, Email, Social media, Content marketing, user generated content in understanding consumer behaviour and there by developing customer acquisition and conversion

Understanding Customer journey by mapping his search across multiple medias like mobile, tablet, desktop, planning of relevant content audit, content planning and content calendars, Techniques of The Honeycomb model for social media strategy, Social listening and sentiment analysis (25hours)

## **Unit 5- (EVALUATING USER EXPERIENCE, EFFORTS TO IMPROVE CUSTOMER EXPERIENCE)**

Use of various techniques in evaluating user experience -website structure, navigation and design, User experience (UX), Impact of social media

Understanding the level of personalization, usability, changing purchase behaviour, pay by mobile, wearable. Discuss user experience testing methods, evaluate and analyse campaign on the basis of the test, objective of improvements to customer experience, Strategic options to improve customer experience. Resource allocation and budgeting to improve customer experience (25 hours)

### **COURSE OUTCOMES-**

- 1) Acquiring the knowledge of digital customer
- 2) Able to develop the skills of customer experience
- 3) Understanding Digital Campaigns
- 4) To know about the legal compliances of digital campaigns
- 5) Knowledge of precautions to be taken during digital campaign

## **RESOURCE MANAGEMENT**

**Subject Code: MBA031A**

**Credits: 4**

### **Course Objective:**

CO1: To develop the skill to manage resources to handle marketing projects in a successful manner

CO2: Develop the skills to manage and develop the marketing team

CO3: Know how best you can allocate resources to get right resource mix

CO4: Evaluate the resource mix and plans to optimise the resource mix

CO5: Develop the techniques to manage the marketing budget and evaluating the financial performance.

## **Unit-1 (IMPROVING TEAM PERFORMANCE, EFFECTIVENESS OF MARKETING TEAM, TEAM BUILDING)**

Discuss and evaluate the marketing competencies, understand the marketing personal through Skill Audit, analyse the need for training, preparation of development, evaluation of outsourced connections.

Discuss about operational planning, elaborate how the internal process is important in achieving organizational goal, importance of marketing structure and contribution of good marketing structure in improving performance, Techniques of Team management and its role to enhance performance, Team development techniques, Importance of individual development to contribute team performance

Discuss the various criteria for increasing the effectiveness of the team. Techniques of relationship building, Techniques to dealing with conflicts such as Brainstorming, Achieving

Consensus, Conflict Resolution, Mediation, Negotiation, Problem Sensitivity, Analytical Skills, Flexibility, Importance of teamwork and motivation in enhancing performance (30 Hours)

## **Unit 2 (MARKETING INFORMATION, PERSONNEL PERFORMANCE, MEASURES TO IMPROVE PERFORMANCE)**

Discuss the role of Relevant marketing information such as Internal data, Competitive Intelligence, Marketing Research, Marketing decision support system.

Evaluate the role of personnel performance in organizational growth, Discuss the assessment of performance and measures to improve the performance. Elaborate the link between performance and result.

Evaluation of team performance, performance management, discuss the role and ways of motivational techniques, Requirements of disciplinary and grievance procedures to increase performance. (30 hours)

## **Unit 3 (BUILDING MARKETING TEAM, USE OF TECHNOLOGY IN MARKETING, USE OF DATA IN ORGANISATION)**

Understand the importance and methods of team selection, Elaborate the Recruitment strategy and its impact on the organisation, Managing Team resilience, handling Talent management, discuss the advantage and disadvantage of Out-sourcing.

Discuss the use of CRM in getting internal data and analyse the effectiveness, Evaluate the efficiency of Digital platforms and communities, Discuss the trends and advances in technology and evaluate the effectiveness, Discuss the impact of technology on marketing activities

Discuss the Compliance with relevant legislation, discuss the methods of data audit and its uses, elaborate the techniques of Data monitoring and control ( 30 hours)

## **Unit 4 – (BALANCE FOR RESOURCE MIX, PLAN PROVISIONAL BUDGET, SPECIFIC BUDGETING)**

Need for auditing resource mix and methods of auditing the resource mix, Balancing human, financial, physical, technology and data resources to achieve desired results. Evaluate the risk involved and elaborate the benefits of the resource mix.

Discuss various budget setting methods such as incremental budgeting, zero based budgeting, cash limited budgeting, resource restricted budgeting, activity based budgeting, contingency budgeting.

Planning for specific budgets such as New product launch, brand positioning, communications campaigns. Allocation of budget among various marketing activities. (25 hours)

## **Unit 5- (MARKETING OPERATIONS, FINANCIAL PERFORMANCE, MAKING REPORTS OF FINANCIAL PERFORMANCE)**

Discuss the need to take measures for effective cost management process for marketing operation by Planning, Estimating, Budgeting, Financing, Funding, Managing, Controlling costs, Digital cost management systems.

Discuss the methods of financial performance of the marketing such as Transparent record keeping, Variance analysis, Budgetary adjustments, Balance sheets, Profit and Loss

Discuss the methods of evaluation and report by ROMI, Sales, P & L, Cash flow, Market share, Key stakeholders with an interest in financial reports. (25 hours)

### **COURSE OUTCOMES-**

- 1) Understanding how to manage market reports and techniques of budget allocation.
- 2) Maintaining balance of resource mix.
- 3) To improve the Team Performance.
- 4) To understand the Use of MIS In developing performance.
- 5) Knowing how to handle the project carefully with limited resources and maximising production.

### **Corporate & Business Law**

**Subject Code: MBA028A**

**Credits: 4**

#### **Unit 1: Nature of the contract and consideration**

The Indian contract act 1872 – Definition of contract - Essential elements of a valid contract – clarification of contracts – offer and acceptance and Communication of offer and Acceptance and Revocation.

Consideration – Capacity to contract – Free consent - Legality of object –void agreement.

Performance of contract – offer to perform contracts which need not be performed – by whom contract must be performed who can demand performance. Discharge of Contract – meaning – methods – by performance –by agreement – impossibility of performance.

#### **Unit 2: Breach of contract and the sale of goods act**

Remedies for Breach of Contract – Introduction Recession – Damages – Specific Performance – injunction - Quasi contracts. Contract of Indemnity and guarantee – Contract of bailment and pledge – Contract of Agency – Creation of agency – Rights, duties and liabilities of an agent - Termination of agency.

Sale of Goods Act :

Formation of contract of Sale - caveat emptor - Express and implied conditions and warranties – Performance of Contract of Sale – Rights of an unpaid Seller.

#### **Unit 3: Companies act and memorandum of association**

Meaning, Definition & Salient Features of Companies Act, 2013 - Kinds of Companies - Promotion, Role of Promoters-Incorporation of a Company.

Memorandum of Association, Contents & Alteration - Articles of Association, Contents & Alteration - Prospectus, Contents & Consequences of misstatement - Doctrine of Ultra Virus & Indoor Management.



#### **Unit 4: Directors and corporate governance**

Directors-Appointment, Qualification-Disqualification - Membership in a Company, Modes of acquiring Membership - Rights and Liabilities of Members, Termination of Membership - Corporate Governance- Meaning, benefits of good governance, factors influencing corporate governance.

#### **Unit 5: General and Statutory Meeting, Extraordinary Meetings**

General and Statutory Meeting, Extraordinary Meetings -Resolutions, Meaning and Kinds - Role of Company Secretary with respect to meetings. Meaning and modes of winding up - Powers of court in winding up - Consequences and procedures for winding up - Powers, Liabilities and Duties of Liquidators.

### **Managing Finance in a Digital World**

**SUBJECT CODE: MBA027A**

**CREDITS: 4**

#### **Course Objective**

To understand the central role that finance plays in an organisation, and how and why technologies used impact the finance function, how to use and examine data collected and processed by machines to create and preserve value for organisations and how the finance function is structured and shaped, and how it interacts with other parts of the organisation to achieve the objectives of the whole organisation.

#### **Unit1 - ROLE OF FINANCE FUNCTION**

Different types of organisations – functions of an organisation – the roles of finance function – enabling value creation through planning, forecasting and resource allocation – data collection – types of analysis to produce insight – potential impact of technology - How finance communicates to influence key stakeholders

#### **Unit 2 – TECHNOLOGY IN DIGITAL WORLD**

Characteristics and Dynamics of Fourth Industrial Revolution – Cloud Computing – Big Data Analytics – Process Automation – Artificial Intelligence – Data Visualisation – Block chain – Internet of things – Mobile – 3-D Printing – New areas of Finance to focus on – Areas of Finance susceptible to automation – Digital mindsets for Finance – Ethics of the use of technology

#### **Unit 3 - DATA AND INFORMATION IN A DIGITAL WORLD**

Using Data for: Decision making, Understanding the customer, Developing-customer value proposition, Enhancing operational efficiency, Monitoring data, Ethics of Data usage – Assessment of Data needs – Extraction, Transformation and Loading (ETL) Systems - Business Intelligence (BI) systems – Big Data Analytics – Data visualization

#### **Unit 4 – SHAPE AND STRUCTURE OF FINANCE FUNCTION**

Structure of Finance function from the roles that generate information to the roles that turn information into insights and communicate insights to decision makers – Hierarchical shape of Finance function – Shared Services and Outsourcing of Finance Function – Retained Finance – Automation & Diamond shape of Finance Function – Finance operation to generate

information and preliminary insight – FP & A , Taxation, corporate reporting, decision support to produce insights – Business partnering to influence organisations to make appropriate decisions – Leading Finance team to create the required impact for the organisation.

### **Unit 5 – FINANCE INTERACTING WITH ORGANISATIONS:**

Process management – product and service management – supply chain management Market segmentation – big data analytics in marketing – channel management – sales forecasting & management Staff acquisition – staff development – performance management – motivation and reward systems IT infrastructure – IT systems support – cost and benefits of IT systems

### **Course Outcome:**

CO1: To understand how the finance function enables, shapes and narrates value creation thorough planning, forecasting, resource allocation, performance management and financial reporting.

CO2: To understand key technologies and their impact on an organisation including, cloud computing, big data, data analytics, process automation, artificial intelligence, data visualisation, block chain, internet of things.

CO3: To understand how the finance function can use data and information to assist operations in enhancing operational efficiency.

CO4: To understand the contemporary transformation of the finance function in the digital era from roles that generate information to roles that turn information into insight and how finance communicates that insight to decision-makers.

CO5: To understand how the finance function helps manage operations, marketing and Sales, HR and IT functions in creating and preserving value.

### **Semester III**

<b>THIRD SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
<b>MBA032A</b>	<b>Analytics for Finance</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>4</b>	<b>F</b>
<b>MBA033A</b>	<b>Marketing Management &amp; Research</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>4</b>	<b>C</b>
<b>MBA034A</b>	<b>Financial Markets</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>4</b>	<b>C</b>
<b>MBA035A</b>	<b>Managing Brands (CIM)</b>	<b>4</b>		<b>-</b>	<b>4</b>	<b>S</b>
<b>MBA036A</b>	<b>Global Marketing Decisions (CIM)</b>	<b>4</b>		<b>-</b>	<b>4</b>	<b>S</b>
<b>MBA037A</b>	<b>Corporate Digital Communications (CIM)</b>	<b>4</b>		<b>-</b>	<b>4</b>	<b>S</b>
<b>MBA038A</b>	<b>Creating Entrepreneurial Change (CIM)</b>	<b>4</b>		<b>-</b>	<b>4</b>	<b>S</b>
	<b>TOTAL</b>	<b>28</b>			<b>28</b>	

**Analytics for Finance**  
**SUBJECT CODE: MBA032A**  
**CREDITS: 4**

**Course Objective:**

This subject illustrates the aspects of Financial Data Analysis. The students will gain exposure towards important financial concepts such as Optimization, Exchange Rate Analysis, Sharpe-Ratio, Mean-Variance Optimization and Trading Strategy Designing based on application-oriented study.

**Unit 1 (Introduction to Financial Analytics)**

Computational Intelligence, Mathematically Purity versus Fundamental Weakness, Need of Pragmatic & Practical Approach, Overview of Optimization Techniques, Analytics Laboratory, Financial Statistics, Financial Statistics with R.

**Unit 2 (Security Analysis & Risk Measurement)**

Return Analysis, Visualization of Security Data, Adjusting Stock Splits & Mergers, Cleansing of Security Data, Analyzing Exchange Rate, Normal Mixture Models, Generating Prices from Log Returns.

**Unit 3 (Sharpe Ratio & Markowitz Mean-Variance Optimization)**

Time Periods & Annualizing, Ranking Investment Candidates, The Quantmod R Package, Measuring Income Statement Growth, Quadratic Programming, Data Mining with Portfolio Optimization, Lasso and Ridge Regression for Penalties.

**Unit 4 (Financial Data Clustering)**

K-Means Clustering, Dissecting K-Means Algorithm, Gaussian Graphical Models, Covariance & Precision Matrices, Visualizing Covariance, The Wishart Distribution, Glasso Algorithm, Decision Making Based on Clustering.

**Unit 5 (Simulation of Trading Strategies)**

Foreign Exchange Market, Chart Graphical Analytics, Momentum Indicators, Entries & Exits and Profitability, The State Machine, Simulation Summary.

**Marketing Management & Research****SUBJECT CODE: MBA033A****CREDITS: 4****Course Objective:**

This course focuses on the practical application of marketing orientation, techniques and methods inside enterprises and organizations and on the management of a firm's marketing resources and activities. The learners will be provided with a solid grounding in marketing management, which includes engaging projects. The learners will be able to analyse consumer data, create marketing campaigns, develop digital / social media content and make successful marketing decisions. The learners will emerge with the experience and expertise to embark on managerial roles in marketing and the transferable skills to make an impact in any organization.

**Module 1: Introduction to marketing management**

Definition of marketing – marketing planning and process – association of needs and offerings – selling and marketing – consumer behavior and buying decision process – marketing mix – marketing research – customer relationship management – sales – marketing environment – developing marketing strategies and plans – value and value chain – marketing planning – components of a marketing plan.

**Module 2: Marketing research**

Marketing research, analysis and forecasting - information gathering and analysis - process of marketing research - research planning - types of research design - data collection - sample size analysis - forecasting - demand forecasting methods and logic - understanding consumers - factors influencing consumer behaviour and purchase decisions.

### **Module 3: Shaping the market offerings**

Definition of product – definition of services - classification and attributes of products - differentiation and the 4Ps - steering the product life - product hierarchy - product system and mix – packaging, labelling, warranties and guarantees – pricing – types of prices – methods of pricing – new product development - distribution channel management – roles and types of channels – e-business – retailing and wholesaling – brand positioning – competition – brand identity – brand strength – brand equity – product life cycle.

### **Module 4: Communicating value**

Integrated marketing communication – advertising – sales promotion – public relations and publicity – direct and interactive marketing – word of mouth of marketing – sales promotion – technology and marketing: social media marketing, e-marketing, search engine optimization, email marketing, display advertising, pay per click, blogging, social and business networking, product opinion sites, affiliate marketing, syndication on the internet, trust in internet marketing, ethical and legal issues.

### **Module 5: Marketing ethics**

Marketing ethics - fundamental issues in the ethics of marketing - principles of ethical marketing - specific issues in marketing ethics - responsibilities of the marketer - ethical issues in political marketing - ethical challenges of social marketing - marketing in synchronization and synonymity with social relevance - strategic businesses with social relevance.

## **Financial Markets**

**SUBJECT CODE: MBA034A**  
**CREDITS: 4**

### **Course objective:**

This course will aid the learners in understanding and familiarizing the concepts of financial markets and systems and their importance to an effective economy. It encompasses the knowledge about the financial intermediaries and regulatory bodies in the financial market. This module will cover knowledge about various financial instruments, their features and valuations. The course also sheds light on how financial markets in the real world operate and how various financial markets differ from one another in practice. Further, it develops knowledge of rising Foreign Capital, various methods of rising and regulations.

### **Module 1: Introduction to Financial Markets**

Indian Financial System – Concept of Investment and Savings - Evolution of Financial System in India - Financial System and Economic Development – Financial System Structure – Credit Creation - Money Markets and their functions - Capital Markets and their functions

### **Module 2: Regulatory Bodies and Financial Intermediaries**

The Reserve Bank of India and their Functions - The Securities and Exchange Board of India and their Functions - Stock Exchanges in India and their Objectives, Functions and Significance and its working - Major international stock exchanges – Financial Intermediaries - Commercial Banks – Insurance Companies – Mutual Funds – NBFCs - Developments – Functions of Financial Intermediaries – Role of Intermediaries in a Financial System

### **Module 3: Financial Instruments and Stock Market**

Money Market Instruments - Capital Market Instruments – Primary Market and Secondary Market – Over the counter and Exchange Markets - – Features and Valuation of Financial Instruments - Issue of financial instruments - Stock Market – Types and Functions - Primary issue, book building process, private placement, offer for sale, buy back of shares - Various innovative financial instruments Crypto currencies (e.g., Bitcoin) and Distributed ledger technology

#### **Module 4: Financial Markets – Debt, Commodity, and FOREX Market**

Debt Market and its types – Debt Market Instruments – Bonds – Debentures – Treasury Bills – Yield Curve – Interbank Markets - Operational Mechanism – Difficulties for development of Debt market – Commodity Market and its types – MCX, NCDEX and ICEX - Functions, administration, regulations and general mechanism – International commodity Market - Foreign Exchange Markets and its Instruments – Hedging - FOREX Derivative Markets – FX Futures, Options and FRAs

#### **Module 5: Foreign Capital**

Forms of foreign capital – FDI and FPI – FIIs - International financial instruments – ADR, GDR, IDR and Euro bonds - Role of foreign capital in Indian financial system – Trends in foreign capital inflows to India – Regulatory framework for foreign capital flows – FERA and FEMA Acts

### **Managing Brands (CIM)** **SUBJECT CODE: MBA035A** **CREDITS: 4**

#### **Course Objective:**

The Objective is to provide the understanding of the key principles of branding, conduct the measurement of brand equity and brand performance, practically developing a brand including positioning and communication and preparation of coherent reports related to brand audit.

#### **Module 1: Brand elements, Brand positioning & Customer relations**

Understand the different elements in the concept of branding. Elements include. –Promise -- Perception—Trust –Values –Voice –Personality Analyze Soft and hard brands -- Brand architecture -- Product branding and services/customer experience branding, Evaluating the process of maintaining long term relationship with customers while catering to their needs with respect to --Customer motivation -- Customer journey and Brand touch points.

#### **Module 2: Digital techniques & Brand strategy**

Understand how digital techniques help in brand positioning and how they add value to organizations for the following concepts : Brand objectives, Relationships with customers, Positioning attributes, Personalization. Implementation of an effective brand strategy and defining the following aspects: Purpose, Consistency, Emotional impact, Brand activation.

#### **Module 3: Marketing tools & building competitive advantage**

Explain how different marketing tools can improvise in gaining competitive advantage Targeting -- Competitor analysis -- Product/service mix -- Digital tools and media --Positioning perceptions, Understanding Brand relationship to organizational vision, mission and organizational behavior -- Brand personality, profile and positioning --Relationships with employees and customers.

#### **Module 4: Corporate brand identity & Information and Data Analysis**

Analyze the factors that support the creation of a brand identity and image and help in creating Brand value and Brand equity. Managing and understanding the internal and external branding

activity and its portfolio management, External and internal branding activity, Pricing strategy –Distribution--Market share and retention plan –Campaigns --Synergy with organizational marketing plan, Resource management --Licensing/Trademarks/Global legislation. Marketing tools, Market research and evaluation techniques, Reliable information sources, Analytical techniques.

### **Module 5: Brand management And Brand metrics**

Application of a range of techniques to maintain the corporate reputation Identity and image - -Crisis management --Positive and negative impact on corporate reputation, Maximizing resources to achieve brand objectives, Digital and offline evaluation tools, Brand equity/strength, Brand measurement dashboard, Conversion tracking, KPIs.

## **Global Marketing Decisions (CIM)**

**SUBJECT CODE: MBA036A**

**CREDITS: 4**

### **Course Objective:**

The Objective is to provide the opportunity to begin to understand external marketing environment and implication this has for marketers, analyzing the marketing environment and marketing-related decisions for a firm entering non-domestic markets, understanding on the cultural, economic, ethical and political environments and anticipation of the influences each will have on marketing strategies and decision making.

### **Module 1: External marketing environment & Strategic uncertainty**

Understand the organizational sector's external marketing environment using analysis techniques such as PESTEL, Porter's five forces analysis, Competitor analysis, and SWOT. Evaluating a global organization's strategic position within the marketplace by using competitive positioning, benchmarking, segmental analysis, value proposition. Use of forecasting techniques and market sensing to assess market stability and attractiveness. Understanding the role of competitive advantage and value creation in strategic planning in uncertain external markets.

### **Module 2: Internal marketing environment & Its strengths and Weaknesses**

Understand the role of Mintzberg's organizational structures, perform portfolio analysis, Utilize technology and conduct innovation audit, Understanding the product life-cycle and the stakeholder analysis, Ensuring cost-effectiveness, Resources Based View (RBV) of a global organization, approach towards the environment, Corporate Social Responsibility (CSR), and ethics , Evaluate the internal strengths of the global organization by understanding the capabilities and flexibility within the global organization.

### **Module 3: Developing a marketing strategy & Organization's value and brand equity**

Understand the various determinants of strategic options, which include E-commerce, digital and social media strategic opportunities, link to values and culture of a global organization, models such as the Porters model for competitive advantage and Kotler's warfare analogies in strategy, Understand how marketing strategies are influenced by Corporate image, Branding, Value associations, and brand proposition, branding strategies in global contexts.

### **Module 4: Role of innovation management & Market entry strategies**

Impact of new product development in marketing, Managing marketing of new products and driving innovations to help market the products, Concept of big ideas, Impact of product customization in marketing strategies, Assessing the competitive potential of mergers, acquisitions, and strategic alliances. Strategic choices in alliances which include Milk, harvest, divest, liquidate and consolidate.

**Module 5: Customer relationship management**

Role of customer relationship management ineffective marketing strategy, customer retention by maintaining trusts, fulfilling promises, recognizing customer loyalty, and customer retention program.

**Module 6: Strategic Decision making & Evaluating financial benefits and risks**

Assess and justify strategic decisions taking into account the following factors such as Stability versus uncertainty, Competitive advantage, Cost-effectiveness, Position of competitors internationally, Barriers to trade, Feasibility and viability. Assess financial benefits across various strategic marketing choices using techniques such as Present Net Value (NPV), Ratios (INITIAL Financial Descriptors), Apply investment Appraisal Techniques that involve calculating Return on Investment.

**Corporate Digital Communications (CIM)**

**SUBJECT CODE: MBA037A**

**CREDITS: 4**

**Course Objective:**

The objective of the course is to develop knowledge for identifying key stakeholders and determining the influence they have on the role of corporate reputation management in organizations. The course will help to critically appraise the corporate brand and the importance of digital communication in developing corporate positioning and building brand equity.

**Module 1: Stakeholders analysis and corporate communication**

Understand the different types of stakeholders, stakeholder's relationships, the stakeholder's influence, the various forces that can influence the organization's stakeholders, and assess their current and potential influence levels (external forces, relational forces and internal forces), critically appraise the nature and characteristics of corporate communication

**Module 2: Corporate reputation and corporate reputation management**

Understand the context and concepts of corporate reputation, importance and significance of managing organization's corporate reputation, the role of different stakeholders of organization in the context of corporate reputation management, evaluate the way an organization develops its identity

**Module 3: Building corporate strategy and a corporate brand**

Understand the meaning, elements and drivers of corporate branding; assess the compatibility of an organization's strategy in relation to its positioning and reputation, evaluate the nature of corporate brands; understand the levels of corporate endorsement and the concept of gap analysis in corporate branding

**Module 4: Corporate reputation and building brand equity**

Understand the relationship between corporate reputation and brand equity, the impact of corporate character on corporate brand, use of corporate strategies for using corporate reputation to build brand equity, monitoring and measuring brand equity

**Module 5: Digital communication strategies**

Understand the meaning of digital communication, online audiences, the concept of stimulating and embracing change through digital strategies, the effective use of different digital communication tools, evaluate trends and innovation in digital experience, and evaluate use of effective digital channels to support corporate reputation, Appraising recent trends and

innovation in the digital experience and evaluating the effectiveness of integrated channels to support corporate reputation

**Creating Entrepreneurial Change (CIM)**  
**SUBJECT CODE: MBA038A**  
**CREDITS: 4**

**Course Objective:**

The objective of the Course is, to expose the students to the entrepreneurial culture, develop an entrepreneurial mindset, industrial growth and understand the theories of entrepreneurship, and know the importance of a business plan and the major elements of a business plan.

**Module 1: Introduction to Entrepreneurship and Problems faced by entrepreneurs**

History and evolution of entrepreneurship, Qualities of successful entrepreneurs, Behavioral traits of entrepreneurs, Legal issues to consider when starting your business, Women Entrepreneurs, working environment, challenges in the path of women entrepreneurs.

**Module 2: Types of entrepreneurs and entrepreneurial models**

According to Type of Business, According to Use of Technology, According to Motivation, According to Growth, According to Stages, The Opportunist Model, The Enabler Model, The Advocate Model, The Producer Model

**Module 3: Stages in entrepreneurship development**

Sensing Market Opportunities, Identifying market gaps, Idea vs Opportunity Matching, Idea Testing with Potential Customers

**Module 4: Internal Environment Analysis and Entrepreneurial Motivation**

PEST to PESTEL to STEEPLE, Unique selling proposition, Competition Analysis, Porter's five forces – competitor strategies, Motivation, Maslow's theory, Herzberg's theory, McGregor's Theory

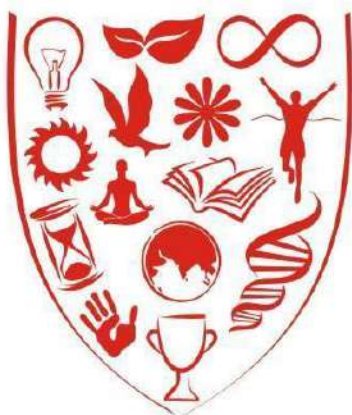
**Module 5: Business Plan, Institutions that Support Entrepreneurship**

Components of Business Plan, Market research, and feasibility report, Marketing Mix, Pricing strategies, financial considerations, Export marketing, Types of Organizations, Role of SMEs in India, Government support to SME, Sickness in SMEs – causes / remedial measure

**Semester IV**

FOURTH SEMESTER						Type
	Dissertation	-	-	40	20	C
MBA 100A	TOTAL		-	40	20	





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**School of Management**

**Syllabi and Course Structure**


**Bachelor of Business Administration  
Business Analytics (IoA)**

**Academic Programmes**

**Batch (2022-2025)**

**Summary Sheet**

Semester	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	Total	Min. Credit req. for degree
Credit	25	28	26	27	26	16	148	*10% Relaxation on MOOC, NPTEL, and SWAYAM

  
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Type	Foundation	Core	Specialization	Interdisciplinary	General
Total Credit	20	34	42	22	30

### Semester I

FIRST SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BBA615A	Principles of Management	3	1	-	4	F
BBA616A	Business Mathematics & Statistics	3	1	-	4	S
BBA617B	Business Economics	4		-	4	F
BBA618A	Fundamentals Of Management Accounting	3	1	-	4	ID
BBA619A	Fundamentals Of Financial Accounting	3	1	-	4	ID
DEN001A	Communication Skills	3		-	3	C
DIN001A	Culture Education – 1	2	-	-	2	G
	<b>TOTAL</b>	<b>19</b>	<b>4</b>	<b>-</b>	<b>25</b>	

### Semester II

SECOND SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BBA620A	Organization Behaviour	4		-	4	F
BBA621A	Principles of Marketing Management	4		-	4	F
BBA622A	Human Resource Management	4	-	-	4	C
BBA623A	Managing Finance in A Digital World	3	1	-	4	ID
BBA624B	Excel Foundations	2	-	2	3	S

  
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DEN002A	Professional Skill	3	-	-	3	G
DIN002A	Culture Education – 2	2	-	-	2	G
DCH001	Environmental Studies (EVS)	3	-	2	4	F
	<b>TOTAL</b>	<b>20</b>	<b>1</b>	<b>4</b>	<b>28</b>	

### Semester III

<b>THIRD SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA625A	<b>Statistics with R</b>	2	1	2	4	S
BBA626A	<b>Structured Query Language</b>	1	1	4	4	S
BBA627A	Research Methodology	3	1	-	4	C
BBA628A	Human Resource Development	3	-	-	4	ID
BBA629A	Comp. Applications III (MS Project)	3	-	-	3	ID
***	Open Elective	3	-	-	3	G
DEN003A	Life skill – 1	-	-	2	2	G
DIN003A	Value education-1	2	-	-	2	G
	<b>TOTAL</b>	<b>16</b>	<b>3</b>	<b>8</b>	<b>26</b>	

### Semester IV

<b>FOURTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA630A	Operation Management	4	-	-	4	C
BBA631A	<b>Python Programming</b>	2	1	2	4	S
BBA632A	<b>SaS and Tableau</b>	2	1	2	4	S
BBA642A	<b>Natural Language Processing</b>	2	-	4	4	S


BBA633A	Corporate governance and social responsibility	3	-	-	3	C
BBA641A	Leadership Skills	2	-	-	2	S
***	Open Elective	3	-		3	G
DEN004A	Life Skills - 2 (Aptitude)	-	-	2	2	G
DIN004A	Value Education – 2	3	-	-	1	G
	<b>TOTAL</b>	<b>21</b>	<b>2</b>	<b>10</b>	<b>27</b>	

### Semester V

<b>FIFTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA634A	International Business Management	4	-	-	4	C
BBA635A	Legal Environment for Business	3	-	-	3	ID
BBA636A	Corporate Strategy	3	-	-	4	C
BBA639A	Customer relationship management	3	-	-	3	C
BBA637A	<b>Machine Learning and Artificial Intelligence</b>	2	1	2	4	S
BBA638A	<b>Big Data Analytics</b>	2		4	4	S
BBA643A	<b>Social Media Analytics</b>	2	-	4	4	S
	<b>TOTAL</b>	<b>19</b>	<b>1</b>	<b>10</b>	<b>26</b>	

### Semester VI

<b>SIXTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA899A	Internship			32	16	G
	<b>TOTAL</b>	<b>-</b>	<b>-</b>	<b>32</b>	<b>16</b>	

  
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## **Program Objectives**

**POb1:** To educate students on comprehensive business administration concepts alongside business analytics specialization so as to develop them to be a business leader and successfully manage organizations.

**POb2:** To imbibe and train the students in the required analytical, technical, entrepreneurial, business skills to be an effective management professional.

**POb3:** To equip the students with the professional competence in the field of business analytics along with the several technologies and tools associated with it.

**POb4:** To prepare and develop the students technically and analytically with regards to various business domains and hone their managerial competencies and business acumen while attaining a holistic understanding.

**POb5:** To inculcate the view of the industrial and organizational establishments and their functionalities for taking viable decisions.

## **Program Outcomes**

**PO1:** Develop as an individual with the conceptual as well as practical knowledge in the field of analytics, comprising of business studies and metrics, statistics, information technology and management.

**PO2:** Develop the ability to adapt to the rapidly changing industry with the newly learned applied skills in the domains of analytics and business studies.

**PO3:** Develop critical thinking skills to take up the role as Business Analysts and Professionals in the Business Domains.

**PO4:** Apply analytics to analyze and interpret data using latest analytical tools to solve complex business problems pertaining to Finance, Marketing, Commerce, etc.

**PO5:** Perform Descriptive, Predictive and Prescriptive Analysis based on structured, semi-structured and unstructured data types.

**PO6:** Classify and employ the use of various tools and programming languages such as SQL, SAS, Python and R Programming to implement and deploy analytical models and algorithms.

**PO7:** Articulate, illustrate and demonstrate the ability to develop advanced analytical models based on specialized domains such as Social Media Analytics, Big Data Analytics, Machine Learning, etc.



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**PO8:** Compare, evaluate and report the inferences obtained from different machine learning algorithms and gain the ability to incorporate them so as to achieve proper decision making with regards to the said business domain such as Finance, Marketing, Accounting, Commerce, etc.

**PO9:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

**PO10:** Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

**PO11:** Elicit views of others, mediate disagreements and help reach conclusions in group settings

**PO12:** Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering

## **JECRC University**

### **BBA – Detailed Syllabus**

#### **Semester I:**

**SUBJECT: PRINCIPLES OF MANAGEMENT**

**SUBJECT CODE: BBA615A**

**CREDITS: 4**

**Course Objective:** The objective is to provide an understanding of basic concepts, principles and practices of management. The aim is to inculcate the ability to apply multifunctional approach to organizational objectives.

#### **Unit I**

Management: Concept and Need, Managerial Functions – An overview; Coordination: Essence of Management. Evolution of Management Thought, Classical Approach – Taylor, Fayol, Neo-Classical and Human Relations Approaches – Mayo, Hawthorne Experiments, Behavioural Approach, Systems Approach, Contingency Approach, MBO, Hammer and Champy- Business Process Re-engineering, Porter's Five-forces' Model.

#### **Unit II**

  
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Types of Plans; Strategic planning – Concept, process, Importance and limitations; Environmental Analysis and diagnosis (Internal and external environment) – Definition, Importance and Techniques (SWOT/TOWS/WOTSUP, BCG Matrix, Competitor Analysis); Decision-making: Process and Techniques; Perfect rationality and bounded rationality

### **Unit III**

Concept and process of organizing – An overview, Span of management, Different types of authority (line, staff and functional), Decentralization, Delegation of authority; Formal and Informal Structure; Principles of Organizing; Network Organisation Structure. Emerging types.

### **Unit IV**

a. Staffing: Concept of staffing - Recruitment and Selection; Orientation; Training and Development; Career Development; Performance Appraisal. b. Motivation & Leadership: Concept, Importance, extrinsic and intrinsic motivation; Major Motivation theories - Maslow's Need-Hierarchy Theory; Herzberg's Two-factor Theory, Vroom's Expectancy Theory. Leadership: Concept and Importance; Leadership Styles; c. Communication: Concept, purpose, process; Oral and written communication; Formal and informal communication networks, Barriers to communication, Overcoming barriers to communication. Emerging trends in communication.

### **Unit V**

Concept, Process, Limitations, Principles of Effective Control, Major Techniques of control - Accounting Ratio Analysis, HR Metrics, ROI, Budgetary Control, EVA, PERT/CPM. Emerging issues in Management.

**SUBJECT: BUSINESS MATHEMATICS & STATISTICS**

**SUBJECT CODE: BBA616A**

**CREDITS: 4**

**Course Objective:** The Objective is to provide, to expose students to basic statistical and mathematics concepts, to organize and present numerical data, to understand the Venn Diagrams, Sets, Intervals, Matrices, Vector Algebra and to compute correlation, interpret and to understand the construct various index numbers.

#### **Unit I - Set Theory**

Introduction to Sets, Sets and their Representation, Tabular or Roster Method, Rule Method or Set Builder, Empty or Void or Null Set, Finite sets and Infinite sets, Proper Subset, Improper Subset, Power Set, Universal Set, Open Interval, Closed Interval, Semi-Open or Semi Closed intervals, Infinite Intervals, Venn Diagrams, Operations on Sets, Union, Intersection of Sets, Disjoint Sets, Difference of Sets, Symmetric Difference of Sets, Complement of a Set, Laws of Algebra of Sets.

#### **Unit II- Matrices and Determinants**

  
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Definition of a Matrix, Addition & Subtraction of Matrices, Multiplication of Matrices, Transpose of a Matrix. System of linear equations, Gauss elimination method, Inverse of a Matrix, Determinants, Determinants of order one and more, Properties of Determinants, Multiplication of two Determinants, Minors and Cofactors, Cramer's rule for solution of linear equations, Adjoint of a Matrix, Rank of a Matrix.

### **Unit III- Vector Algebra**

Vectors, Types of Vectors, Operations on Vectors, Addition of Vectors, Properties of Operation of Addition, Subtraction, Properties of Operation of Subtraction, Multiplication by a scalar, Orthonormal Bases, Product of Two Vectors, Scalar Product or Dot Product of Two Vectors, Properties of Scalar Product, Vector Product or Cross Product, Properties of Vector Product.

### **Unit IV - Statistics**

Introduction to Statistics, Scale of Measurement, Nominal, Ordinal, Interval & Ratio. Frequency Distribution, Bar Chart, Pie Chart, Histogram, Frequency Polygon, Ogive, Pareto Chart, Stem-and-leaf Chart, Scatter Plot, Measure of Central Tendency, Properties, Advantages and Disadvantages of Arithmetic Mean, Geometric Mean, Harmonic Mean. Positional Averages, Median, Quartiles, Deciles, Percentiles & Mode. Measure of Dispersion, Range, Interquartile Range, Standard Deviation.

### **Unit V - Probability**

Introduction to Probability, Experiment, Event, Compound Event, Independent and Dependent Events, Mutually Exclusive Events, Equally Likely Events, Marginal, Union, Joint, Conditional Probability, Basic Probability Rules, General Rule of Addition, General Rule of Multiplication, Concept of Bayes' Theorem.

**SUBJECT: BUSINESS ECONOMICS**

**SUBJECT CODE: BBA617B**

**CREDITS: 4**

**Course Objective:** The Objective is to provide, to understand the key concepts of macroeconomic concepts of business, to know the factors determining supply and demand in various market structure, to know the various cost and revenue concepts under the functioning of various types of industries and to know main financial markets and institutions in facilitating commerce & development.

### **Unit I – Macro Economic context of business**

Determination of macroeconomic phenomena – equilibrium national income – growth in national income, price, inflation, unemployment, trade deficits and surpluses – stages of trade cycle – principles of public finance – effects of changes in the economic growth rate, interest rates. Government expenditure and taxation – index numbers

Concept of balance of payments – free trade and protectionists instruments policy, impact of exchange rate policies on business

### **Unit II – Institutional context of business**

Nature of globalisation and factors driving it (improved communications, political realignments, growth of global industries and institutions, cost differentials). Major institutions promoting global trade and development - Principal institutions encouraging international trade – globalisation of business – offshoring – industrial relocation – emergence of growth markets

  
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– main trading agreements and trading blocks. Identify the impacts of economic and institutional factors using the PESTEL framework.

### **Unit III – Micro Economic And Organisational Context Of Business**

Types of organisations – public, private & mutually owned organisations – types of Not for Profit Organisations – shareholders wealth management – principal – agent problem and its impact on the decisions of the organisation. Price mechanism – determinants of demand and supply – price elasticity of demand – effects of price elasticity of demand on Total revenue curve. Sources of internal and external economies of scale- outsourcing decisions and costs – minimum and maximum price policies in good and factor markets.

### **Unit IV – Informational context of business**

Data & information, graphs, charts and diagrams – scatter graphs, histograms, bar graphs, ogives. Big data and data analytics in business applications – time series analysis – correlation co-efficient – regression equation to predict the dependent variables – forecasting.

### **Unit V – Financial Context of Business**

Financial intermediaries – commercial banks – financial assets and financial markets – foreign exchange markets. Financial mathematics – simple & compound interests – annuities & perpetuities – Discounting techniques – NPV and IRR. Interest rates – interest rate changes on market demand – concepts of forwards, futures and options

## **SUBJECT: FUNDAMENTALS OF MANAGEMENT ACCOUNTING**

**SUBJECT CODE: BBA618A**

**CREDITS: 4**

**Course Objective:** The objective is to familiarise the students with the mechanics of to understand the management accounting, students learn the methods of costing, overheads and ascertain the various types of budget and approaches to analyse the profits.

### **Unit I - The Context of Management Accounting**

Purpose of management accounting and the role of the Management Accountant-need for management accounting-characteristics of financial information for operational, managerial and strategic levels within organisations- role of the management accountant-relationships between the management accountant and the organization's managers- The Global Management accounting principles. Role of CIMA as a professional body for Management Accountants-role of CIMA in developing the practice of management accounting

### **Unit II - Costing**

**Cost identification and classification**-classification of costs in relation to output classification of costs in relation to activity level appropriate costs having identified cost behaviour- classification of costs in relation to decisions – segregation of fixed and variable costs from semi-variable costs – relevant and irrelevant costs.

**Overheads** – overhead cost estimates – treatment of direct and indirect costs – overhead absorption rate – under and over absorption of overheads – Marginal cost pricing and full cost pricing.

### **Unit III – Planning and Control**

Preparation of budgets for planning and control-need for the preparation of forecasts and Plan-Preparation of functional budget- budget statements-impact of budgeted cash surpluses and shortfalls on business operations-preparation of flexible budget-Calculate budget variances – concepts of Zero-based Budget, Incremental budgeting, Rolling Budget.

  
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Application of variance analysis to reconcile budgeted and actual profits in a marginal Format- Principles of standard costing- Calculation of variances for materials, labour, variable overheads, sales prices and sales volumes- Preparation of a statement that reconciles budgeted profit with actual profit calculated using marginal costing- reasons for variances and the inter-relationships between variances

#### **Unit IV – Performance Measurement and Reporting**

Calculation of appropriate financial and non-financial performance measures-need for appropriate performance measures- Calculation appropriate financial and nonfinancial performance measures in a variety of contexts

Preparation of accounts and reports for manager- integration of the cost accounts with the financial accounting system- Prepare a set of integrated accounts, showing standard cost variances- preparation of accounts related to Job and batch costing- Cost accounting statements for management information in manufacturing, service and not-for-profit organisations.

#### **Unit V - Decision Making**

**Risk and uncertainty** - use of expected values and joint probabilities in decision making- calculate summary measures of central tendency and dispersion for both grouped and ungrouped data- Arithmetic mean, median, mode, range, variance, standard deviation and coefficient of variation for both ungrouped and grouped data- Graphs/diagrams and use of normal distribution tables – decision tree approach.

**Short term decision making** - The use of appropriate techniques for short-term decision making- breakeven charts, profit volume graphs, breakeven point, target profit, margin of safety- Make or buy Decisions- Calculate the profit maximizing sales mix after using limiting factor analysis.

**Use of appropriate techniques for long-term decision making** - The time value of money- financial mathematics - Discounting, compounding, annuities and perpetuities- Calculate the net present value, internal rate of return and payback for an investment or project

**SUBJECT: FUNDAMENTALS OF FINANCIAL ACCOUNTING**

**SUBJECT CODE: BBA619A**

**CREDITS: 4**

**Course Objective:** To understand the basics of accounting and concepts of double entry system. The students understand book keeping and preparation of final accounting statements for business organizations.

#### **Unit I- Accounting Principles, Concepts and Regulations**

The principles and concepts of financial accounting - need for accounting records; Identify the needs of different user groups; Distinguish between the financial and management accounts; capital and revenue, cash and profit, income and expenditure, assets and liabilities; the underlying assumptions, policies; the accounting equation.

#### **Unit II - Recording Accounting Transactions**

Accounting records; Prepare the books of prime entry; Applications the principles of double-entry Bookkeeping; nominal ledger accounts; the trial balance; the nature of accounting errors, prepare accounting entries for the correction of errors; Prepare accounting entries for noncurrent assets; Prepare a non-current asset register.

#### **Unit III - Accounting Reconciliations**

Bank reconciliation statements; Prepare petty cash statements under an imprest system; Prepare sales and purchase ledger control account reconciliations.

  
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**Unit IV- Preparation Of Accounting Entries For Specific Transactions**

Calculate sales of tax; Prepare accounting entries for sales tax; Prepare accounting entries for payroll; Prepare accounting entries for the issue of shares.

**Unit V - Preparation Of Financial Statements For Single Entities And Its Analysis**

Prepare accounting adjustments. Prepare accounting entries for accruals and prepayments; Prepare accounting entries for irrecoverable debts and allowances for receivables; Prepare accounting entries for inventories.

Prepare basic manufacturing accounts. Prepare financial statements from a trial balance; Prepare financial statements from incomplete records; Prepare a statement of cash flows. Identify information provided by accounting ratios the information provided by the calculation of accounting ratios reasons for the changes in accounting ratios.

Calculation of profitability ratios, liquidity ratios, risk ratios.

**SUBJECT: COMMUNICATION SKILLS****SUBJECT CODE: DEN001A****CREDITS: 3****\* BBA (common to all disciplines)-I Semester****Course Objectives :**

1. To enhance English language competence in reading, writing, listening and speaking.
2. Switch the approach from teacher-centred to student-centred one.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introducing the Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. To link communication skills with the organizational behaviour.
6. To inculcate skills that are very much required for employability and adjust in the professional Environment.

**Course Outcomes (CO):****At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in different contexts.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

**Syllabus: Theory**

<b>Unit I</b>	Basics of Organizational Communication: Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
<b>Unit II</b>	Basic Writing Skills: Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration

<b>Unit III</b>	Composition:, Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
<b>Unit IV</b>	Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
<b>Unit V</b>	Professional and Technical Communication : Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

### Syllabus: Lab

<b>Unit I</b>	Basics of Organizational Communication: Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time Management, Following Deadlines etc
<b>Unit II</b>	Write Dialogue from the different contexts of corporate culture: Employee and Employer, Customer and Service Provider, Customer and Product Review, how to react on Day-to-day corporate interactions- Memo, Notice, Email, Circular etc
<b>Unit III</b>	Composition: Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting Redrafting, Proof Reading, Editing etc
<b>Unit IV</b>	Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>Unit V</b>	Professional and Technical Communication: Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, presenting projects, proposals etc through PPT Making.

### Methodology for Evaluation

#### 1. Internal Assessment (Theory)

- a) Home Assignments: One from each Unit : 15 Marks
- b) In Semester Tests (Minimum two) : 30 Marks
- c) Attendance : 05 Marks

#### 2. Term End (Theory) : 50 Marks

#### 3. Internal Assessment (Lab)

- (a) Daily Performance in the Lab : 50 Marks

#### 4. Term End (Lab) : 50 Marks

  
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### **Suggested Reading:**

1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006
6. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
8. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006

### **SUBJECT: CULTURE EDUCATION I**

**SUBJECT CODE: DIN001A**

**CREDITS: 2**

### **Course Objectives**

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

### **Course Outcomes (CO):**

At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the richness of Indian Culture

CO2: Ability to represent the culture ethics in real life

### **Unit I- Holy Scriptures-A**

1. Introduction to Vedanta and Bhagavad Gita, Goals of Life – Purusharthas, Introduction to different Dharm Granthas (Various religious scriptures from Hindu, Muslim, Christian, Bodh, Jain religions)
2. Introduction to Yoga, Overview of Patanjali's Yoga Sutras

### **Unit II- Society and Culture-I**

3. Introduction to Indian Culture and Major Symbols of Indian Culture
4. Major Indian Cultural and Ethical Values- Respect, Compassion, Kindness, Forgiveness, Introspection, Honesty, Justice, Loyalty, Devotion, Self Sacrifice, Hospitality, Vasudhev Kutumbkum

### **Unit III- India in Progress-I**

5. Education, Science and Technology in Ancient India
6. Values from Indian History- War of Mahabharata, War of Kalinga, Freedom Struggle of India Major Farmer Movements, Major Religious and Social Upliftment Movements

### **Unit IV- Great Indian Personalities-I**

7. Life and works of the Great People of Ancient India- Sushruta, Dadhichi, Ashtvakra, Anusuya, Panini, Charaka, Kalidas, Aryabhata, Samudragupta, Ashoka, Chandragupta Mourya, Porus, Satyabhama, Dhruv, Prahlad, Chankya, Varahmihira, Bhism, Karan, Dronacharya, Meera Bai, Surdas, Dadudayal, Kabir, Mahatma Buddha, Mahavir, Guru Nanak Dev, Guru Gobind Singh, Mohammad Saheb, Jesus Christ, Veer Shivaji, Maharana Pratap, Maharani Laxmi Bai, Maharani Padmini, Hadi Rani Shal Kanwar, Panna Dhari

\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by committee of teachers.

**Suggested Reading:**

1. Glory of Indian Culture (English) Paperback by Giriraj Shah

2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies

by SarojBala , Kulbhushan Mishra

References

<https://knowindia.gov.in/culture-and-heritage/lifestyle-values-and-beliefs.php>

**Semester II:**

**SUBJECT: ORGANIZATION BEHAVIOUR**

**SUBJECT CODE: BBA620A**

**CREDITS: 4**

**Course Objective:** Understand how the organisations can be managed effectively considering the behaviour of various stakeholders of an organisation and analysing the skills required for the future advantage of an organisation.

**Unit I Organization behaviour – an introduction**

Meaning of organizations – Nature of organization behaviour – Basics of organization behaviour – Scope and evolution of organizational behaviour – Organizational arrangements and Organization behaviour – Key terminologies in Organization Behaviour - Organizational Behaviour Model (OB Model).

**Unit II Individual behaviour, intelligence and personality**

Meaning of individual behaviour – personal and environmental factors – Models of individual behaviour – nature and types of intelligence – theories and measurement of intelligence – Intelligence factors – intelligence in the context of organizational behaviour.

Nature and determinants of personality – Personality traits – Personality in the context of Organization Behaviour.

**Unit III Motivation and work stress**

Nature and importance of motivation – challenges and theories of motivation – Motivation and organizational culture – quality of work life – rewards and behaviour modification – problem employees – employee engagement.

Meaning of work stress – work stress model – stress management – Stress and organizational behaviour.

**Unit IV Group and team behaviour**

Nature and types of groups – Group dynamics and Organization behaviour – determinants of group dynamics – Importance of group dynamics in an organization – group development strategies – Group motivation – Group structuring and decision making.

Meaning of team – differences between group and team – Types and benefits of teams – effective team management – team conflicts and resolution – Team development and Organizational Behaviour.

  
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## **Unit V Organizational culture and leadership**

Meaning of leadership – leadership vs management – leadership styles and theories – formal and informal leadership – Ethics and leadership – leadership and organizational culture – Sustaining culture – changing organizational culture – workplace behaviour – Ethics of power.

### **Course outcomes:**

CO 1: Understand the basic of organizational behaviour in the context of the dynamic environment.

CO 2: Understanding the role of individual behaviour, intelligence and personality in the context of organizational development.

CO 3: Understanding importance of rewarding and motivating the stakeholders and managing the stress to effectively manage the organizational performance

CO 4: Understand the role of group and team dynamics in the current organizational environment

CO 5: Understand the importance of perception into organizational culture, leadership and ethics in an organizational development.

## **SUBJECT: PRINCIPLES OF MARKETING MANAGEMENT**

**SUBJECT CODE: BBA621A**

**CREDITS: 4**

**Course Objective:** To provide a holistic orientation of emerging marketing trends with the practical skills required to analyze consumer data, create marketing campaigns, develop digital/social media content and make successful marketing decisions and to equip students to be innovative, technically competent, and think critically through experiential and student-centric teaching approach.

## **Unit I: Fundamentals of Marketing Management**

Meaning & Definition of marketing -Role of Marketing -Relationship of Marketing with other functional areas -Market Concepts -Product concept -Selling concept -Marketing concept -Societal marketing concept -Approaches to marketing management -Functions of marketing -Scope of marketing: goods, services, events, organizations, etc. -Emerging trends in marketing.

## **Unit II: Marketing Plan**

Marketing Environment: Concept -Macro-environmental forces -The changing marketing environment -Analyzing needs and trends in Macro-Environment: Economic Environment, Technical Environment, Political, Environment and Socio-cultural Environment. Introduction to The Marketing Plan –Definition –Nature –Objectives -Structure of The Marketing Plan -The Process of marketing plan -Critical elements of external and internal analysis of Marketing Plan -Implementation of Marketing Plan.

## **Unit III: Marketing Mix**

Introduction to marketing mix -Marketing mix implementation: short term and long term tactics –Product: meaning, elements, product mix -Product mix strategies -Product line -Product lifecycle Product planning -New product development -Failure of new product -Product branding -Branding strategy and packaging –Pricing: Objectives -Factors influencing

  
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pricing policy -Methods of pricing -Pricing strategy. Physical Distribution: Meaning -Factors affecting channel selection -Types of marketing channels -Promotion: Meaning and significance of promotion -Personal selling & advertising (meaning only).

#### **Unit IV: Buyer behavior**

Market Segmentation: Levels and patterns of market segmentation -Bases for segmenting markets -Market segmentation - Targeting - Product Positioning - Types and bases of positioning - Product Differentiation -Meaning of consumer, customer, consumer behaviour and buying motives -Factors influencing buyer

behavior -Factors that influence consumer purchasing decisions -Buying process -Stages of the consumer buying behavior -Business to Business (B2B) buying process -Key factors influencing B2B purchasing decisions -Differences between Consumer goods and Industrial goods

#### **Unit V: Digital Marketing**

Introduction to Digital Marketing -Concept of Digital Marketing -Difference between traditional marketing and digital marketing -Trends and scenarios of the industry -Planning and Creating a Website -Search Engine Optimization (SEO), Search Engine Marketing (SEM), of Social Media Marketing, Blogging, Content Strategy, Email Marketing.

##### **Course outcomes:**

CO1: To understand the role and importance of marketing

CO2: Develop a marketing plan to generate better sales and profits

CO3: Formulate the product and price mix based to serve consumer needs.

CO4: Identify the factors influencing consumer behavior and purchase decision

CO5: Outline the digital tools to develop marketing strategies for the new age consumer

**SUBJECT: HUMAN RESOURCES MANAGEMENT**

**SUBJECT CODE: BBA622A**

**CREDITS: 4**

**Course Objective:** The objective of the subject is to understand the importance of effective and efficient management of human people in an organization to help the business gain a strategic and competitive advantage.

#### **Unit I: Human Resource Management (HRM) - Introduction**

Meaning of Human resources - Meaning of HRM - nature and functions of HRM - HR Manager - qualities and qualifications - Strategic Human Resource Management - Strategic management - corporate level strategies - Strategic HR issues - Organizational and HR strategies -

#### **Unit II: Job Analysis, team analysis and Job Environment**

Meaning of HR terms - Job design, job rotation, job enlargement, job enrichment, team work - Need for job analysis and team analysis - Job description - job specification - job sharing - ergonomics - employee empowerment - Job redesign

  
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### **Unit III: Human Resource Planning**

Meaning, features and scope of Human Resource Planning – process of and steps in Human Resource Planning – Barriers to effective implementation of Human Resource Planning – Human Resource Planning Vs Strategic planning – Human resource planning through people, finance and technology.

### **Unit IV: Performance appraisal and compensation management**

Meaning, need and purposes of performance appraisal – methods of performance appraisal – Group appraisal – Behavioral aspects of performance appraisal – Concept of MBO – the balanced score card – managerial appraisal – challenges of performance appraisal.

Concepts of transfer, promotion and demotion – types of promotions – types of transfer – reasons for demotion – concept of absenteeism – calculation and causes of absenteeism rate – measures to reduce absenteeism – concept of labour turnover – types and causes of labour turnover.

### **Unit V: Training and Development**

Assessment of training needs – training methods - Apprenticeship, understudy, job rotation, vestibule training, case study, role playing, sensitivity training, In-basket, management games, conferences and seminars, coaching and mentoring, management development programs; Training process outsourcing.

#### **Course Outcomes:**

CO1: Understand the role and importance of Human resource Management in effectively managing the human capital in an organization.

CO2: Understand the key terminologies in the context of Human Resource Management and their scope and benefits in a practical environment

CO3: Understand the importance of Human resource planning in the context of people, technology and finance

CO4: Understand the importance of performance appraisal and other concepts in the area of Human resource management

CO5: Understand the methods and purposes of training and development activities to gain a strategic advantage

### **SUBJECT: MANAGING FINANCE IN A DIGITAL WORLD**

**SUBJECT CODE: BBA623A**

**CREDITS: 4**

**Course Objective:** To understand the central role that finance plays in an organisation, and how and why technologies used impact the finance function, how to use and examine data collected and processed by machines to create and preserve value for organisations and how the finance function is structured and shaped, and how it interacts with other parts of the organisation to achieve the objectives of the whole organisation.

### **Unit I: Role Of Finance Function**



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Different types of organisations – functions of an organisation – the roles of finance function – enabling value creation through planning, forecasting and resource allocation – data collection – types of analysis to produce insight – potential impact of technology - How finance communicates to influence key stakeholders

## **Unit II: Technology In Digital World**

Characteristics and Dynamics of Fourth Industrial Revolution – Cloud Computing – Big Data Analytics – Process Automation – Artificial Intelligence – Data Visualisation – Block chain – Internet of things – Mobile – 3-D Printing – New areas of Finance to focus on – Areas of Finance susceptible to automation – Digital mindsets for Finance – Ethics of the use of technology

## **Unit III: Data And Information In A Digital World**

Using Data for: Decision making, Understanding the customer, Developing-customer value proposition, Enhancing operational efficiency, Monitoring data, Ethics of Data usage – Assessment of Data needs – Extraction, Transformation and Loading (ETL) Systems - Business Intelligence (BI) systems – Big Data Analytics – Data visualization

## **Unit IV: Shape And Structure Of Finance Function**

Structure of Finance function from the roles that generate information to the roles that turn information into insights and communicate insights to decision makers – Hierarchical shape of Finance function – Shared Services and Outsourcing of Finance Function – Retained Finance – Automation & Diamond shape of Finance Function – Finance operation to generate information and preliminary insight – FP & A, Taxation, corporate reporting, decision support to produce insights – Business partnering to influence organisations to make appropriate decisions – Leading Finance team to create the required impact for the organisation.

## **Unit V: Finance Interacting With Organisations**

Process management – product and service management – supply chain management

Market segmentation – big data analytics in marketing – channel management – sales forecasting & management

Staff acquisition – staff development – performance management – motivation and reward systems

IT infrastructure – IT systems support – cost and benefits of IT systems

## **Course Outcome:**

CO1: To understand how the finance function enables, shapes and narrates value creation through planning, forecasting, resource allocation, performance management and financial reporting.

CO2: To understand key technologies and their impact on an organisation including, cloud computing, big data, data analytics, process automation, artificial intelligence, data visualisation, block chain, internet of things.

CO3: To understand how the finance function can use data and information to assist operations in enhancing operational efficiency.

  
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CO4: To understand the contemporary transformation of the finance function in the digital era from roles that generate information to roles that turn information into insight and how finance communicates that insight to decision-makers.

CO5: To understand how the finance function helps manage operations, marketing and Sales, HR and IT functions in creating and preserving value.

### **Semester III:**

### **SUBJECT: STATISTICS WITH R**

**SUBJECT CODE: BBA625A**

**CREDITS: 4**

#### **Course Objective:**

The objective of this module is to make students exercise the fundamentals of statistical analysis in an R environment. They would be able to analyze data for the purpose of exploration using descriptive and inferential statistics. Students will understand probability and sampling distributions and learn the creative application of linear regression in multivariate context for predictive purpose.

#### **Unit I: Introduction to R Programming**

R and R Studio, Logical Arguments, Missing Values, Characters, Factors and Numeric, Help in R, Vector to Matrix, Matrix Access, Data Frames, Data Frame Access, Basic Data Manipulation Techniques, Usage of various apply functions – apply, lapply, sapply and tapply, Outliers treatment.

#### **Unit II: Descriptive Statistics**

Types of Data, Nominal, Ordinal, Scale and Ratio, Measures of Central Tendency, Mean, Mode and Median, Bar Chart, Pie Chart and Box Plot, Measures of Variability, Range, Inter-Quartile-Range, Standard Deviation, Skewness and Kurtosis, Histogram, Stem and Leaf Diagram, Standard Error of Mean and Confidence Intervals.

#### **Unit III: Probability, Probability & Sampling Distribution**

Experiment, Sample Space and Events, Classical Probability, General Rules Of Addition, Conditional Probability, General Rules For Multiplication, Independent Events, Bayes' Theorem, Discrete Probability Distributions: Binomial, Poisson, Continuous Probability Distribution, Normal Distribution & t-distribution, Sampling Distribution and Central Limit Theorem.

#### **Unit IV: Statistical Inference and Hypothesis Testing**

Population and Sample, Null and Alternate Hypothesis, Level of Significance, Type I and Type II Errors, One Sample t Test, Confidence Intervals, One Sample Proportion Test, Paired Sample t Test, Independent Samples t Test, Two Sample Proportion Tests, One Way Analysis of Variance and Chi Square Test.

#### **Unit V: Correlation and Regression**

Analysis of Relationship, Positive and Negative Correlation, Perfect Correlation, Correlation Matrix, Scatter Plots, Simple Linear Regression, R Square, Adjusted R Square, Testing of Slope, Standard Error of Estimate, Overall Model Fitness, Assumptions of Linear Regression, Multiple Regression, Coefficients of Partial Determination, Durbin Watson Statistics, Variance Inflation Factor.



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**SUBJECT: STRUCTURED QUERY LANGUAGE**  
**SUBJECT CODE: BBA626A**  
**CREDITS: 4**

**Course Objective:** This module will help students gain much needed knowledge pertaining to Relational Database Management Systems, Data Models, SQL query processing, Normalization along with an introduction to No SQL Database systems using Mongo DB.

**Unit I: Introduction to Database Management Systems**

Introduction-Database System Applications, Purpose of Database Systems, Views of Data, Data Abstraction, Instances and Schemas, Data Models, Database Languages, DDL, DML, Database Architecture, Database Users and Administrators, Database Design, ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship sets, Integrity Constraints, Views.

**Unit II: SQL Operators and Relational Theorems**

Relational Algebra and Calculus, Selection and Projection, Set Operations, Renaming, Joins, Division, Relational calculus, Tuple Relational Calculus, Domain Relational Calculus, Forms of Basic SQL Query, Nested Queries, Comparison Operators, Aggregate Operators, NULL values, Logical connectives, AND, OR and NOT, Outer Joins, Triggers.

**Unit III: Normalization**

Problems Caused by Redundancy, Decompositions, Functional Dependencies, Normal Forms, First, Second, Third Normal forms, BCNF, Properties of Decompositions, Loss less Join Decomposition, Dependency Preserving Decomposition, Multi Valued Dependencies, Fourth Normal Form, Join Dependencies, Fifth Normal Form.

**Unit IV: Transactions**

Transaction Management, Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent, Executions, Serializability, Recoverability, Implementation of Isolation, testing for serializability, Concurrency Control, Lock, Timestamp Based Protocols, Validation Based Protocols, Recovery, Failure Classification, Storage Structure, Atomicity, Log Based Recovery, Remote Backup Systems.

**Unit V: No SQL**

Overview of No SQL, Types of No SQL Databases, No SQL Storage Architecture, CRUD Operations in MongoDB, Querying, Modifying and Managing No SQL Databases, Indexing and Ordering, Migrating from RDBMS to No SQL, No SQL in Cloud, Database Administration.

**SUBJECT: RESEARCH METHODOLOGY**  
**SUBJECT CODE: BBA627A**  
**CREDITS: 4**

**Course Objective:** This module enables learners to develop the basic principles of research methods. The learners focus how to do research, with an emphasis on student-centered activities and problem solving. Learners will develop insights the key concepts as the scientific method; operationalizing constructs; independent and dependent variables, data types and ways of measurement, confounding variables experimental and non-experimental design questionnaire construction; developing and testing hypotheses; descriptive statistics and describing data graphically; and the ethics of research.

**Unit I: Research Formulation and Design**

  
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Motivation and objectives-Research methods and methodology. Types of research Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research. Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

#### **Unit II: Data Collection and Analysis**

Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statically package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

#### **Unit III: Statistical Softwares**

Computer and its role in research, Use of statistical software SPSS, GRETL etc. in research. Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.

#### **Unit IV: Research Ethics and Scholarly Publishing**

Ethics-ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing- IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

#### **Unit V: Interpretation and Report Writing**

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of writing Research Report Precautions for writing Research Reports, Conclusions.

### **SUBJECT: HUMAN RESOURCE DEVELOPMENT**

**SUBJECT CODE: BBA628A**

**CREDIT: 4**

**Course Objective:** This module will enable the learners to develop strong understanding and key skills which are required for human resource professionals. Learners will be able to understand the importance of human resource development and their role in effectively managing the personnel within the organization. Learners will develop insights into the fast-growing and emerging trends of Human Resource Development (HRD) in globalized economy.

#### **Unit I: Human Resource Development (HRD) -Macro Perspective**

Understand HRD Concept, Origin and Need of HRD, HRD as a Total System, Approaches to HRD; Human Development and HRD; HRD at Macro and Micro Climate

#### **Unit II: HRD–Micro Perspective**

Understand areas of HRD, HRD Interventions Performance Appraisal, Potential Appraisal, Feedback and Performance Coaching, Training, Career Planning, OD or Systems Development, Rewards, Employee Welfare and Quality of Work Life and Human Resource Information; Staffing for HRD: Roles of HR Developer; Physical and Financial Resources for HRD; HR Accounting; HRD Audit, Strategic HRD

#### **Unit III: Instructional Technology for HRD**

  
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Learning and HRD; Models and Curriculum; Principles of Learning; Group and Individual Learning; Transactional Analysis; Assessment Centre; Behaviour Modeling and Self-Directed Learning; Evaluating the HRD

#### **Unit IV: Human Resource Training and Development**

Concept and Importance of training and development; Assessing Training Needs; Designing and Evaluating T&D Programmes; Role, Responsibilities and challenges to Training Managers

#### **Unit V: Training Methods**

Training within Industry (TWI): On the Job & Off the Job Training; Management Development: Lecture Method; Role Play; In-basket Exercise; Simulation; Vestibule Training; Management Games; Case Study; Programmed Instruction; Team Development; Sensitivity Training; Globalization challenges and Strategies of Training Program, Review on T&D Programmes in India

### **SUBJECT: COMP. APPLICATIONS III (MS PROJECT)**

**SUBJECT CODE: BBA629A**

**CREDITS: 3**

**Course Objective:** The goal of this module is to help students explore MS Project application, providing information on relevant project management concepts while also offering specific procedures to build and track a Project Schedule. The students will gain expertise towards the MS Project application by learning about the tasks and dependencies, estimating durations, and working with project Views. They will also understand the advanced customizations and reporting elements under MS Project application.

#### **Unit I: Introduction**

MS Project Application, Project Family, Features in Project 2016 & 2019, Comparative study on MS Project Versions (2013, 2016 & 2019), The Project Interface, Backstage View, Ribbons and Tabs, Views, Reports, Defining Project Manager, Starting a Project, Task Master, Co-dependent Nature of Tasks, Estimating Task Time, Introducing the Work Breakdown Structure (WBS).

#### **Unit II: Scheduling Basics**

Starting a New Plan and Setting its Start Date, Setting Non-Working Days in the Project Calendar, Entering Plan's Title and Other Properties, Entering Task Names, Task Durations, Milestone Task, Creating Summary Tasks to Outline the Plan, Task Dependencies with Links, Switching Task Scheduling from Manual to Automatic, setting up Resources, Work Resources Names and Maximum Capacity, Pay Rates, Adjusting Working Time in Resource Calendar.

#### **Unit III: Resources Assignment and Plan Sharing**

Assigning Work Resources to Tasks, Controlling Work when Adding or Removing Resource Assignments, Assigning Cost Resources to Tasks, Checking the Plan's Duration, Cost & Work, Customizing Gantt Chart View, Customizing Timeline View, Customizing Reports, Copying and Printing Views & Reports, Saving Plan Baseline, Tracking a Plan as Scheduled through a Specific Date, Entering a Task's Completion Percentage and Actual Values for Tasks.

#### **Unit IV: Advanced Scheduling Techniques**

Viewing Task Relationships with Task Path, Adjusting Task Link Relationships, Setting Task Constraints, Interruptions, Work Time Adjustments, Controlling Task Scheduling using Task Types, Setting Resource Availability at Different Times, Applying Contours, Pay Rates and Material Resources to Tasks & Assignments, Examining Resource Allocations, Levelling Overallocated Resources, Sorting-Grouping-Filtering Project Details, Creating New Tables &

  
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New Views, Tracking Progress on Tasks and Assignments, Viewing and Reporting Project Status.

**Unit V: Advanced Formatting and Customizations**

Formatting Gantt Chart View, Timeline View, Network Diagram View, Calendar View, Printing and Exporting Views, Formatting Tables & Charts in a Report, Sharing Custom Elements between Plans, Recording & Editing Macros, Copying Project Data to other Programs, Opening & Saving to other File Formats from MS Project, creating a Resource Pool, Viewing Assignment Details in a Resource Pool. Updating Assignments in a Sharer Plan, updating a Resource's Information and Plan's Working Times in a Resource Pool, Linking New Plans to a Resource Pool, Creating Dependencies between Plans.

**SUBJECT: LIFE SKILLS-I**  
**SUBJECT CODE: DEN003A**  
**CREDIT: 2**

**Course Outcome:**

CO1: Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields.

CO2: Ability to learn by doing it practically in the classroom.

CO3: Ability to learn by creating an environment and adapting to the environment.

CO4: The ability to prepare the students as per the need of the Multi-cultural scenario around.

**Syllabus: Theory**

<b>Unit I</b>	Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion Basics of Narrating and describing things
<b>Unit II</b>	Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview CV/Resume Drafting and HR Interview advance theory Basics of Video Interviews and Video Profiles for Job
<b>Unit III</b>	Types of listening, advantages and disadvantages
<b>Unit IV</b>	Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report
<b>Unit V</b>	Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk

	Taking, Conflict management, Stress management, Team Building etc
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### Syllabus: Lab

<b>Unit I</b>	Debates / Speeches / Addressing the public / Extempore/Group Discussion Describing a hypothetical situation / theme / surroundings / appearance/personality traits/company/ a professional Concept/New Idea, / New Project through PPT and video aids
<b>Unit II</b>	Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview CV/Resume Drafting and HR Interview practice sessions elaborating the points as per the CV and industry demand Video Interviews and Video Profiles for Job-Practice session for Online Interviews
<b>Unit III</b>	Listening to variety of audio/video conversations including interviews, news, reports, reports, GDs, dialogues from body language, logic, wit and vocabulary perspectives
<b>Unit IV</b>	Group Discussion-Practice sessions, Presenting New Idea/Concept/Proposal/ Project/ Report
<b>Unit V</b>	Activities on how to be a strong Personality, Motivation, Case studies for Resourcefulness and out of the box thinking, Role plays and Case studies on Risk taking, Self confidence and Self-esteem, Decision Making, Emotion Management, Cultural Adaptability, Multicultural Perspective towards things, ideas, views, codes etc

### Methodology for Evaluation

#### 1. Internal Assessment (Theory)

- a) Home Assignments: One from each Unit : 15 Marks
- b) In Semester Tests (Minimum two) : 30 Marks
- c) Attendance: 05 Marks 2. Term End (Theory): 50 Marks

#### 3. Internal Assessment (Lab)

- (a) Daily Performance in the Lab: 50 Marks
- 4. Term End (Lab): 50 Marks

### Suggested Readings:

  
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1. A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.
2. Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
3. Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.
4. The Hard Truth about Soft Skills, by Amazone Publication.
5. 101 Great Answers to the Toughest Interview Questions. Ron Fry. High Bridge Company. 1996.
6. Michael Swan. Practical English Usage, Oxford University Press.

**SUBJECT: Value Education I**  
**SUBJECT CODE: DIN003A**  
**CREDIT: 2**

**Course Outcomes (CO):**

At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the ethical beauty of India

CO2: Ability to incorporate the values of human lives in real life applications

**Lessons from the Ramayana**

Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

**Lessons from the Mahabharata**

Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

**Lessons from the Upanishads**

Introduction to the Upanishads: Sruti versus Smriti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, Satyakama Jabala, Aruni, Shvetaketu.

  
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## **Message of the Bhagavad Gita**

Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War – The anguish of Arjuna – Counsel by Sri. Krishna – Key teachings of the Bhagavad Gita – Karma Yoga, Jnana Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

## **Life and Message of Swami Vivekananda**

Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji's life.

## **Life and Teachings of Spiritual Masters India**

Sri Rama, Sri Krishna, Sri Buddha, Adi Shankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda.

## **Insights into Indian Arts and Literature**

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

\*Each student shall write a detailed Report/ Critique on one topic leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce.

Alternatively a Student may undertake a Project on any one of the topics and submit a detail Project Report leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. If the topic is related to Performing Arts including Yoga, the performance on stage may be given instead of PPT. In case of Fine Arts, an exhibition or a portfolio may be presented in place of PPT.

**On the basis of the above points, a panel of experts from the department will award the credits.**

**SUBJECT: Open Elective\***  
**Semester IV:**  
**SUBJECT: OPERATION MANAGEMENT**  
**SUBJECT CODE: BBA630A**  
**CREDITS: 4**

  
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**Course Objective:** The objective is to provide the basic understanding of the methods and techniques of production and the economics of effective utilization of resources and the techniques employed to ensure the optimum use of resources.

### **Unit I: Introduction to Operations Management**

Definition – differences between operations management and production management – operations and productivity – operations strategy in global environment – using software for productivity analysis – Ethics, social responsibility and sustainability – developing missions and strategies – achieving competitive advantage through operations – strategic planning, core competencies and outsourcing – global operations strategy options.

### **Unit II: Designing operations**

Design of goods and services – product life cycle – generating new products – issues for product design – robust design, modular design, CAD and CAM, virtual reality technology, value analysis, sustainability and life cycle assessment (LCA) - product development continuum – acquisition, joint ventures and strategic alliances – defining a product – make or buy decisions, group technology – documents for production – service design – process chain network analysis (PCN), documents for service – application of decision tree to product design.

### **Unit III: Quality Management**

Defining quality – quality and strategy – total quality management (TQM) – continuous improvement, six sigma, benchmarking, JIT, Taguchi concepts – Tools of TQM – scatter diagrams, cause-and-effect diagrams – pareto charts – flowcharts – histograms – statistical process controls (SPC) – process capability ratio, process capability index – using software in SPX - role of inspection – TQM in services.

### **Unit IV: Supply Chain Management**

Importance of supply chain strategies – six sourcing strategies – many suppliers, few suppliers, vertical integration, joint ventures, keiretsu networks, virtual companies – supply chain risks – managing integrated supply chain – building the supply base – negotiations, contracting, centralized purchasing, e-procurement – logistics management – distribution management – ethics and sustainable supply chain management – measuring supply chain performance – asset committed to inventory, benchmarking the supply chain.

### **Unit V: Lean operations**

Lean Operations – elimination of wastages, throughput analysis and improving throughput – lean and just in time – lean layout, lean inventory, lean scheduling, lean quality – lean and the Toyota production system – continuous improvement, respect for people, processes and standard work practice – lean organizations – building a lean organization, lean sustainability – lean in services.

### **Course Outcomes:**

CO1: This course introduces the students with the concept and importance of operations management in an organization

CO2: The students will learn different techniques with regard to designing process for a product or a service

CO3: The students will get deep insight into the role of quality and the techniques available in the current age to manage the quality vis-à-vis managing the operations

CO4: The students will be able analyze and evaluate the importance of supply chain management in the current age of digital transformation

CO5: The student will be able understand the growing concept of Lean and lean management and the application in managing the operations in an organization

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Operations Management –Sustainability and supply chain management – Jay Heizer, Barry Render, Chuck Munson and Amit Sachan – Pearson Education
2. Operations and Supply Chain Management – F Robert Jacobs & Richard Chase – Mc Graw Hill Education
3. Operations Management – processes and supply chains – J Krajewski Le and K Malhotra Manoj – Pearson Education

**Reference Books:**

1. Supply Chain Management – Sunil Chopra – Pearson Education
  2. Lean Management Systems handbook – Rich Charron, James Harrington, Frank Voehl and Hal Viggini - CRC Press
  3. Statistical Process Control in automated manufacturing – Bert Keats and Norma Faris Hubele – CRC Press
- Total quality management – Besterfield Dale & Besterfield Carol – Pearson Education

**SUBJECT: PYTHON PROGRAMMING**

**SUBJECT CODE: BBA631A**

**CREDITS: 4**

**Course Objective:** This module will help students gain much needed knowledge pertaining to Python Programming, so as to prepare them for the advanced modules such as ML. Python scripting is user-friendly and is the most used language in industry when it comes to designing and scripting applications with respect to Emerging Technologies.

**Unit I: Introduction**

History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

**Unit II: Types, Operators and Expressions**

Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions.

  
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### Unit III: Data Structures and Control Flow

Lists, Operations, Slicing, Methods, Tuples, Sets, Dictionaries, Sequences, Comprehensions, Conditional blocks using If, Else and El-if, For Loop, For loop using Ranges, String, list and Dictionaries, While Loop, Loop Manipulation using Pass, Continue, Break and Else, Conditional and Loops Block.

### Unit IV: Functions Modules and Packages

Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Function Returning Values, Scope of the Variables in a Function - Global and Local Variables. Creating modules, Name Spacing, Introduction to PIP, Installing Packages via PIP, Using Python Packages.

### Unit V: Object Oriented Programming & Exception Handling

Classes, Self-Variable, Methods, Constructor Method, Inheritance, Overriding Methods, Data Hiding, Difference between an Error and Exception, Handling Exception, Try Except Block, Raising Exceptions, and User Defined Exceptions.

#### Course Outcomes:

CO1: To understand why Python is a useful scripting language.

CO2: To learn how to use lists, tuples, and dictionaries in Python programs.

CO3: To learn how to write loops and decision statements in Python.

CO4: To learn how to design object-oriented programs with Python classes.

CO5: To learn how to use exception handling in Python applications for error handling.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1				M			M
CO2	M		M		H	M	
CO3	H		H				
CO4	M		H		M		
CO5			M		H		H

H = Highly Related; M = Medium L = Low

#### Textbooks:

1. R.Nageswara Rao, 2018, Core Python Programming, Dreamtech.
2. John Hearty, 2016, Advanced Machine Learning with Python, Packt.

#### References:

1. Jake VanderPlas, 2016, Python Data Science Handbook: Essential Tools for Working with Data, O'Reilly.
2. Mark Lutz, 2010, Programming Python, O'Reilly.

**SUBJECT: SaS and TABLEAU**

**SUBJECT CODE: BBA632A**

**CREDITS: 4**

**Course Objective:** This course will provide students and exposure towards SaS, Tableau and its usability in the field of analytics. The course comprises an introduction to SaS, its procedures, visualizations along with Tableau application usage and visualization basics.

  
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### Unit I: Introduction to SaS

Overview of SaS university edition, Deploying SaS Studio on virtual platform, File Management, SaS libraries, importing data, Structure of Data and Data Types, Program Syntax, saving data, PROC IMPORT and PROC CONTENTS, Displaying Data and Generating Logs, List Input.

### Unit II: SaS Programming

Variables and Syntax Rules, Data Set Options, Operators, In-File Statement, Input Styles, Select Statements, Leave and Continue, Decision Making via SaS, Where Statement, Looping Constructs, SaS Functions, Arrays and Array Processing, Modifying and Combining Data Sets.

### Unit III: SaS Procedures

Proc Data, Proc Sort, Proc Means Sort, Proc Means, Proc Univariate, Proc Freq, Proc Plot, Proc Sgplot, Proc Summary, Proc Contents, Proc Append, Proc Copy, Proc SQL, Proc Delete, Proc Format, Proc Import, Proc Export, Proc Transpose, Proc GChart, Proc GPlot, Proc Report.

### Unit IV: Visualization with Tableau - I

Tableau Software Ecosystem, Toolbar Icons, Data Window and Aggregation, Tableau Data Source, Data Extract, Connect to Data, Measure Names, Number of Records & Measures, Heat Maps, Tree maps, Bar Chart, Line Chart, Area Fill Charts, Pie Chart, Scatter Plot, Circle View, Bullet Graph, Packed Bubble, Histogram, Boxplot and Gantt Chart, Sorting Data, Enhancing Views with Filters, Sets, Groups & Hierarchies.

### Unit V: Visualization with Tableau – II

Cross-tabulation, Dashboard Designing, Dashboard Actions, Joining Database, Functions in Tableau, Aggregate Functions, Numeric Functions, Date Functions, Stories, Advanced Mapping, Advanced Parameters, Tableau Best Practices, Combining Multiple Dashboards into Stories, Publishing Stories and Dashboards.

### Course Outcomes:

CO1: Deploy SaS in a virtual environment and import data for analysis.

CO2: Prepare and manipulate datasets for analysis in SaS.

CO3: Perform exploratory data analysis within SaS environment using various procedures and functions.

CO4: Understand Tableau Interface, Panes and Implement Visualization Techniques.

CO5: Prepare, Deploy and Publish Stories, Dashboards based on Analytical Cases.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M		M			M
CO2			M		H	M	
CO3	M		H		M	H	
CO4	M				M	M	
CO5			M			M	H

H = Highly Related; M = Medium L = Low

### Textbooks:

1. Ron Cody, 2018, An Introduction to SaS University Edition, SaS Institute.

2. Ron Cody, 2018, Learning SaS by Example, SaS Institute.
3. Deepti Gupta. 2018, Applied Analytics through Case Studies Using SaS, Apress.

**References:**

1. Joshua N. Milligan, 2015, Learning Tableau, Packt.
2. Ben Jones, 2014, Communication Data with Tableau: Designing, Developing and Delivering Data Visualization, O'Reilly.

**SUBJECT: Natural Language Processing**

**SUBJECT CODE: BBA642A**

**CREDITS: 4**

**Course Objective:**

The course introduces the concepts of Text Analytics, Unstructured Information Analysis for better decision making by deriving valuable insights. The course will help the students understand the roots behind Text Mining which evolved from Machine Learning, Natural Language Processing and Statistics. Upon completion, students are expected to be able to describe basic concepts and methods of Text Mining, Information Extraction, Text Classification and Clustering, Topic Modelling.

**Module 1: Introduction to Text Mining**

Basics of Text Mining, Natural Language Content Analysis, Core Text Mining Operations, Associations, Using Background Knowledge for Text Mining, Domain Ontologies, Domain Lexicons. Text Mining Preprocessing Techniques, Task Oriented Approaches, NLP Tasks, Tokenization, Part-of-Speech Tagging, Syntactical Parsing and Shallow Parsing.

**Module 2: Extracting Features, Relations from Text**

Finding Implicit Features, Finding Opinion Phrases and their Polarity, Context-Specific Word Semantic Orientation, Analysis of Word and Document Frequency, tf-idf, Zipf's Law, bind tf\_idf Function, Subsequence Kernels for Relation Extraction, Capturing Relation Patterns with a String Kernel.

**Module 3: Text Categorization and Clustering**

Applications of Text Categorization, Document Representation, Knowledge Engineering Approach to Text Categorization, Machine Learning Approach to Text Categorization, Evaluation of Text Classifiers. Clustering Tasks in Text Analysis, Clustering Algorithms and Clustering of Textual Data.

**Module 4: Relationships between Words**

Tokenizing by N-gram, Counting and Filtering N-gram, Analyzing Bigrams to provide Context in Sentiment Analysis, visualizing a Network of Bigrams using graph, Counting and Correlating Pairs of Words with the widyr Package, Counting and Correlating among Sections, Examining Pairwise Correlation.

**Module 5: Topic Modelling and Probabilistic Models for Information Extraction**

Latent Dirichlet Allocation, Word Topic Probabilities, Per-Document Classification, By-words Assignments, Alternative LDA Implementations. Hidden Markov models, Stochastic Context Free Grammar, Conditional Random fields, Parallel Learning Algorithms.

**Course Outcomes:**

- CO1: Understand approaches to Syntax and Semantics in NLP.  
CO2: Understand various methods for Statistical approaches to Machine Translation.  
CO3: Build Models which extract information from Textual Unstructured Data.



CO4: Understand and implement Topic Modelling and Probabilistic Models for Information Extraction.

CO5: Implement and deploy programs based on Relationship Extraction, POS Tagging and Clustering Algorithms based on NLP.

**Textbooks:**

1. Julia Silge, David Robinson, 2018, Text Mining with R-A Tidy Approach, O'Reilly

**References:**

1. Matthew L. Jockers, 2014, Text Analysis with R for Students of Literature, Springer.
2. James Pustejovsky, Amber Stubbs, 2012, Natural Language Annotation for Machine Learning, O'Reilly.
3. Steve R. Poteet, 2007, Natural Language Processing with Text Mining, Springer.
4. James Sanger, Ronen Feldman, 2002, The Text Mining Handbook: Advanced Approaches in Analysing Unstructured Data, Cambridge.

**SUBJECT: CORPORATE GOVERNANCE AND SOCIAL RESPONSIBILITY**

**SUBJECT CODE: BBA633A**

**CREDITS: 3**

**Course Objective:**

This course aims to provide students with a thorough grounding in a number of key introductory and advanced topics of corporate governance and its relevance for corporate social responsibility. Content includes relevant applied theories, current research, and practice.

**Unit I: Introduction**

Definitions and the evolution of Corporate Governance Basic definitions in the field of Corporate Governance and the historical development of Corporate Governance from the Wall Street Crash until nowadays will be discussed.

**Unit II: Parties involved in Corporate Governance**

Corporate Governance is based on the relationship of many players (such as shareholders, management and board of directors, stakeholders) involved in governing a corporation. This meeting is devoted to discussing their rights, duties and responsibilities.

**Unit III: Corporate Governance Theories**

Organizational Theories (including Stewardship, Resource and Institutional Theory), Economic Theories (such as Agency, Finance and Managerial Theory) and the Stakeholder Theory will be presented on this meeting

**Unit IV: Corporate Social Responsibility (CSR)**

CSR is about how business takes account of its economic, social and environmental impacts in the way it operates – maximizing the benefits and minimizing the downsides. The course discussion will be based on these issues, Corporate Social Responsibility in India, Recent developments

**Unit V: The International Environment for Corporate Governance**

International Corporate Governance. OECD and BIS Principles. Implementation. Pitfalls. Final Review. The International Environment for CG

**Course Outcomes:**

CO1: Distinguish the various expectations and demands that emanate from stakeholders in business firms.

CO2: Corporate Governance is based on the relationship of many players.



CO3: Define governance in business and recognize the legitimacy of business as an institution in a global society.

CO4: Describe the ethical and current social responsibility issues and the influence of these issues on society.

CO5: International Corporate Governance

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Harsh Srivastava, `` The business of social responsibility,’’ books for change
2. CV. Baxi and Ajit Prasad, `` Corporate social responsibility – concepts and cases,’’ Excel
3. Dr. M. Mahmoudi, Global strategic management,’’ Deep & Deep Publications Pvt. Ltd.

**Reference Books:**

1. S K. Bhatia, `` International Human resource management – Global perspective,’’ Deep & Deep Publications Pvt. Ltd.
2. J.P. Sharma, ``Governance, Ethics and Social responsibility of business, ‘Ane books Ltd.
3. Kotler Philip and Lee Nancy, `` Corporate social responsibility; doing the best for your company,’’ John Wiley
4. Simpson, Justine and Taylor, John R, `` Corporate Governance Ethics and and CSR,’’ Kogan Page Publishers
8. Velasquez Manuel G, Business Ethics: Concepts and Cases, Pearson
5. Fernando A.C.: Business Ethics, Pearson Education

**SUBJECT: LEADERSHIP SKILLS**

**SUBJECT CODE: BBA641A**

**CREDITS: 2**

**Course Outcomes:**

On successful completion of this course, the students will be able:

CO1: To know the role, functions and different styles of leadership

CO2: To know and apply the theories of leadership

CO3: To know the meaning of power and politics in context of leadership

CO4: To make the students aware about developing leadership skills in themselves

CO5: To make the students aware about different and innovative leadership

  
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## **Unit I: Introduction to Leadership:**

Leadership, role and functions of a Leader, Leadership motives Characteristics of an Effective Leader, Leadership as a process – the complexities of leadership – Effective leadership behaviors and attitudes – Leadership and power, coercion, Management, Trait approach, Leadership Behaviour and styles – Lewins Leadership styles, Ohio state Leadership study, The University of Michigan Study, Blake and Moutons Managerial Grid.

## **Unit II: Leadership Theories:**

Traditional Theories (A Brief Overview) • Trait Theory • Behavioral Theories • Fiedler's Contingency Model • Path – Goal Leadership Theory • Situational Leadership Theory • The Managerial Grid Modern Theories • Charismatic Leadership • Transactional and Transformational Leadership • Substitutes for Leadership • Authentic Leadership

## **Unit III: Power and Politics:**

Meaning Power, Distinction between Power & Authority, Bases or Sources of Power, Acquisition of Power, Symbols of Power and Powerlessness, Organizational Politics, Reasons for Organizational Politics, Managing Organizational Politics

## **Unit IV: Developing Leadership Skills:**

What Skills do Leaders Need? ; Leadership Training Programs, Designing Effective Training, Special Techniques of Leadership Training: Behavior Role Model, Case, Discussion and Business Games & Simulation, Challenges in designing training programmes

## **Unit V: Innovative Leadership and Design Thinking**

Innovative Leadership, Concept of emotional and social intelligence, Synthesis of human and artificial intelligence, Why does culture matter for today's global leaders, Design Thinking, What is design thinking, Key elements of design thinking: - Discovery - Interpretation - Ideation - Experimentation - Evolution. ,How to transform challenges into opportunities? How to develop human-centric solutions for creating social good

Reference books:

1. Leadership in Organizations: Gray Yukl, Pearson Education (Sixth Edition)
2. Sham Lal. Indian Realities in Bits and Pieces, Rupa and Co. New Delhi
3. Surendra Kumar & Pradeep Kapur. India of My Dreams, Academic Foundation, New Delhi
4. Nissam, Urlah. India: Economic, Political and Social Issues

  
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5. Drucker, Peter and Maciariello, Joseph: 366 Days of Insight and Motivation for Getting the Right Things Done: Rutledge

**SUBJECT: OPEN ELECTIVE\***

**SUBJECT CODE:**

**CREDITS: 3**

**Life Skills 2 (Aptitude)**

**Subject Code: DEN004A**

**Credits: 2**

**Course Objectives:**

1. Students will be able to interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience.
2. Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
3. Students will be able to reason, model, and draw conclusions or make decisions with mathematical, statistical, and quantitative information.
4. Students will be able to critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
5. Students will be able to use appropriate technology in a given context.

**Course Outcomes (CO):** At the end of this course students will have:

CO1: Demonstrate procedural fluency with real number arithmetic operations and use those operations to represent real-world scenarios and to solve stated problems. Demonstrate number sense, including dimensional analysis and conversions between fractions, decimals, and percentages. Determine when approximations are appropriate and when exact calculations are necessary.

CO2: Solve linear equations, graph and interpret linear models, and read and apply formulas. Demonstrate a basic understanding of displays of univariate data such as bar graphs, histograms, dotplots, and circle graphs, including appropriate labeling.

CO3: Take charge of their own learning through good classroom habits, time management, and persistence. Participate in the classroom community through written and oral communication.

**Syllabus: Theory**

  
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UNIT 1	<p>Number System:</p> <ul style="list-style-type: none"> <li>a. Number system</li> <li>b. Power cycle</li> <li>c. Remainder cycle</li> <li>d. Factors, Multiples</li> <li>e. HCF and LCM</li> </ul>
UNIT 2	<p>Data Arrangements and Blood Relations:</p> <ul style="list-style-type: none"> <li>a. Linear Arrangement</li> <li>b. Circular Arrangement</li> <li>c. Multi-dimensional Arrangement</li> <li>d. Blood Relations</li> </ul>
UNIT 3	<p>Time and Work:</p> <ul style="list-style-type: none"> <li>a. Work with different efficiencies</li> <li>b. Pipes and cisterns</li> <li>c. Work equivalence</li> <li>d. Division of wages</li> </ul>
UNIT 4	<p>Coding &amp; Decoding, Series, Analogy, Odd Man Out and Visual Reasoning:</p> <ul style="list-style-type: none"> <li>a. Coding and Decoding</li> <li>b. Series</li> <li>c. Analogy</li> <li>d. Odd Man Out</li> <li>e. Visual Reasoning</li> </ul>

UNIT 5	<p>Percentages, Simple Interest and Compound Interest:</p> <p>a. Percentages as Fractions and Decimals</p> <p>b. Percentage Increase / Decrease</p> <p>c. Simple Interest</p> <p>d. Compound Interest</p> <p>e. Relation Between Simple and Compound Interest</p>
UNIT 6	<p>Permutation, Combination and Probability:</p> <p>a. Fundamental Counting Principle</p> <p>b. Permutation and Combination</p> <p>c. Computation of Permutation</p> <p>d. Circular Permutations</p> <p>e. Computation of Combination</p> <p>f. Probability</p>
UNIT 7	<p>Data Interpretation and Data Sufficiency:</p> <p>a. Data Interpretation – Tables</p> <p>b. Data Interpretation - Pie Chart</p> <p>c. Data Interpretation - Bar Graph</p> <p>d. Data Sufficiency</p>

UNIT 8	Profit and Loss, Partnerships and Averages:  a. Basic terminologies in profit and loss  b. Partnership  c. Averages  d. Weighted average  e. Mixtures and allegations
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### Methodology for Evaluation

#### 1. Internal Assessment

a) Class/ Home Assignments (Minimum One from each Unit) : 30 Marks

b) In Semester Tests (Minimum two) : 30 Marks

#### 2. Term End : 40 Marks

\*Note: Minimum one class assignment shall be given in each turn in the Lab which will be attempted by the students in the class itself and evaluated by the end of the day. Balance work shall be completed at home and submitted at the beginning of the next turn in Lab.

### Suggested Reading:

1. Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;
2. The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;
3. How to Ace the Brainteaser Interview, by John Kador, Mc Graw Hill Publishers.
4. Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
5. Quicker Maths, by M tyra& K Kundan, BSC Publishing Co. Pvt. Ltd., Delhi;
6. Owl Purdue University online teaching resource

## Semester V

**SUBJECT: INTERNATIONAL BUSINESS MANAGEMENT**

**SUBJECT CODE: BBA634A**

  
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## **CREDITS: 4**

**Course Objective:** The Objective is to provide the understanding of the international business environment and its competitive and investment climate and also would provide knowledge of international business and finance activities of the organization and the investigation of changes in firms strategies and accounting policies as per the change in business environment and also the understanding of various aspects of international trade, finance and currency derivatives.

### **Unit I: International business: An Overview**

Understand the evolution of international trade theories, Introduction to Forex Markets: Absolute advantage, Relative advantage, and H-O theory, Leontief Paradox, Porter's Diamond paradox; Foreign Exchange (Forex) Market, Communication in Forex Markets, Currency Quotes- both in global and domestic market, calculation of forward rates using spot rates, calculation of discount/premium on spot rate using spot and forward rates, Spot Rates with and without transaction costs.

### **Unit II: Principles and monetary systems of international trade**

Understand the theories of absolute cost advantage, comparative cost advantage theory, Interest rate Parity, PPP Principle, International Fisher Effect, The International Monetary System: Bretton Wood system, Exchange Rate Regimes, International Banking, Concept and Development of Universal banking, Global depository receipt, Indian depository receipt.

### **Unit III: Exposure of currency and its measurement**

Understand the fundamental functions of currency Exposure and its Management: Types of Forex Exposures: Transaction, Translation, and Economic Exposure and their management; Country Risk-Analysis and Management. Multinational payments Management: Leading, Lagging, Pooling and Netting, foreign exchange risk management system.

### **Unit IV: Financial derivatives**

Understanding the factors influencing costs and benefits of FDI, Financial Derivatives with respect to currency: Forwards and Futures, Interest rate futures and currency futures; Determination of forward and futures prices; Options and related terminology, Calculating the pay-off from options and its representation.

### **Unit V: Pricing & Its strategies**

Understanding on Pricing of Options- Binomial model and Black-Scholes model; trading strategies involving options; Introduction to Swaps, Interest rate swaps, currency swaps, cross currency swaps; Forward rate agreements (FRA). Interest rate caps, floors, collars, cost-oriented export pricing methods and market-oriented export pricing methods.

### **Course Outcomes:**

CO1: This course introduces the students with the understanding about the international business theories and introduction to forex markets.

CO2: The students will learn the different approaches used in the international monetary systems.

CO3: The students will get a sound understanding of the various financial derivatives and foreign direct investments.

CO4: The student will get a deep analysis of the various financial pricing techniques held in use for international trade.

CO5: The student will understand the impact of methods and principles introduced in international finance.

### **Textbooks:**

  
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1. Francis cherunilam, *International business*,
2. Charles W.L. Hill and G. Thomas M. hult, *International business*
3. John H. dunning, *Governments, globalization and International business*

**Reference Books:**

1. Paul R. Krugman and Maurice Obstfeld, *International Finance: Theory & Practice*.

**SUBJECT: LEGAL ENVIRONMENT FOR BUSINESS**

**SUBJECT CODE: BBA635A**

**CREDITS: 3**

**Course Objective:** To understand various laws applicable in India i.e. Contracts Act, Special Contracts, Partnerships, LLP's, companies etc. On completion of this course, learners will be able to: appreciate the relevance of business law to individuals and businesses and the role of law in an economic, political and social context.

**Unit I: (Law of Contracts, Special Contract, Indemnity & Guarantee)**

The Indian Contract Act, 1872 - Definition of contract -Law of contracts - Nature of contract - Classifications - Essential elements of a contract Offer and acceptance, consideration, capacity of parties- Minors-persons of unsound mind-persons disqualified by law- Free consent, legality of object and consideration, performance of contract, discharge of contract, breach of contract, remedies for breach of contract-Quasi contract- Performance. Special Contracts - Bailment and Pledge- Bailment Definition Essential elements Rights and duties of bailor and bailee Finder of lost goods. Pledge Essentials Rights and duties of Pawner and Pawnee. Indemnity and Guarantee- Indemnity - Definition, nature of liability of surety, rights of surety, discharge of surety. Meaning and definition of guarantee.

**Unit II: (Law of Agency & Sale of Goods Act)**

Essentials, kinds of agents, rights and duties of agent and principal, creation of agency, termination of agency-Sub agents and substituted agents-Relationship. **Sale of Goods Act, 1930** Formation of contract of sale - Essentials of contract of sale goods and their classifications- Conditions on warranties Transfer of property in goods Performance of contract of sale Unpaid seller and his rights

**Unit III: (The Indian Partnership Act 1932, The Limited Liability Partnership)**

Nature- rights and duties of partners- Registration and dissolution of firms- **The Limited Liability Partnership Act 2008**- Introduction- nature and scope- features- incorporation and differences with other forms of organization.

**Unit IV: (Companies Act and its Basics)**

- Company - Definition - Characteristics - Classifications -History and framework of Company Law in India - Companies Act 2013 - one person company, small company, associate company, dormant company, producer company; association not for profit; illegal association. Promotion and formation of a company- Body Corporate - promoter- legal position-duties remuneration- Memorandum of Association - Articles of Association - Contents and alteration -Incorporation of Company - On-line registration of a company - CIN

  
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- Companies With Charitable Objects - Doctrines of Indoor Management, Constructive Notice, Ultra-vires - Lifting up of Corporate veil - Conversion of Companies. Share Capital – Types - Public Offer - Private Placement - Prospectus - Contents of Prospectus – Types of prospectus – Deemed prospectus - Shelf Prospectus - Red Herring Prospectus - Abridged prospectus-Liability for Misstatements in Prospectus – Issue and Allotment of Securities – Types - Voting Rights –DVR- Application of Premiums - Sweat Equity Shares - Issue and Redemption of Preference Shares-Transfer and Transmission of Securities- Punishment for impersonation of Shareholder - Further Issue of Share Capital- Bonus Shares- Debenture Issue

#### **Unit V: (Membership in company and meetings)**

Modes of acquiring membership-rights and liabilities of members- cessation of membership- Register of Members - Company meetings – Annual General Meeting - Extraordinary General Meeting- Notice Of Meeting - Quorum - Chairman - Proxies - Voting -Show of Hands – E-Voting - Poll- Postal Ballot- Motions - Resolutions - Types - Minutes - Books of accounts - Annual Return- Directors - Types - legal position – Appointment - Duties – Disqualifications- DIN - Vacation of Office - Resignation - Removal - Meetings of Board - Resolutions and Proceedings- Powers of Board - Key Managerial Personnel- CEO- CFO - Audit and Audit Committee – related party- transactions - Corporate Social Responsibility- Winding up - Contributory – Modes of winding up - Winding Up by Tribunal - Petition for Winding Up- Powers of Tribunal- Liquidators - Appointments- Submission of Report - Powers and Duties - Effect of Winding Up Order- Voluntary Winding Up - Circumstances - Declaration Of Solvency - Meeting of Creditors- Commencement of Voluntary Winding Up- Appointment of Company Liquidator- Final Meeting and Dissolution of Company Official Liquidators – Appointment -Powers - Functions - Winding up of unregistered companies.

#### **Course Outcomes**

CO1: Ability to apply knowledge of Indian Contract Act, Sale of Goods Act, Partnership Act and LLP. Ability to identify, and solve legal issues in connection with business.

CO2: Identify the fundamental legal principles behind contractual agreements.

CO3: Know about the concept of company and shares.

CO4: Know about the application of company law in India. Understand the use of the memorandum of association and article of association in a company, they also learn from this course.

CO5: Use of various documents and forms in a company. Understand the relationship between company and its stakeholders.

**SUBJECT: CORPORATE STRATEGY**

**SUBJECT CODE: BBA636A**

**CREDITS: 4**

**Course Outcomes:** On successful completion of the module students will be able to:

  
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1. Analyze and evaluate critically real-life company situations and develop creative solutions, using a strategic management perspective.

2. To enable students to know and develop strategies for business to remain competitive

### **Unit I: Introduction to Strategy**

Concepts of strategy, Environmental issues (PESTLE), SWOT analysis, The internal resources, capabilities and competences of an organization, Strategic choices

### **Unit II: Managing growth and scale**

Strategic management process, Environment and Organizational Appraisal, Strategic Business Unit and levels of strategy.

### **Unit III: Strategy Formulation**

Industry life Cycle analysis, Corporate level strategies, Expansion and Stability, Integration and Diversification, Internationalization, Co-operative and Digitalization, Business Level Strategies, Cost leadership, Differentiation, Focus business strategy, Introduction to functional Level Strategies-Marketing, Financial, HRM, Product, Research and Development

### **Unit IV: Strategy Analysis and Implementation**

Process of Strategic Choice, Strategic Analysis, McKinsey 7s, Porter's five forces model, BCG Matrix, Nature of Strategy implementation and barriers to strategy implementation

### **Suggested Reference Books:**

1. Strategic Management by Kazmi
2. Entrepreneur Development New Venture Creation Satish Taneja and S.L Gupta Galgotia Publication
3. Entrepreneurship Management; Dr. Aruna Kaulgud; Thomson Publication
4. Essentials of Entrepreneurship and small business Management; Thomas Zimmerer and Norman S; Pearson Publication
5. Websites of corporates

**SUBJECT: CUSTOMER RELATIONSHIP MANAGEMENT**

**SUBJECT CODE: BBA639A**

**CREDITS: 3**

### **Course Outcomes:**

On successful completion of this course, the students will be able:

CO1: To be aware of the nuances of customer relationship

CO2: To analyze the CRM link with the other aspects of marketing

CO3: To impart the basic knowledge of the Role of CRM in increasing the sales of the company

  
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CO4: To make the students aware of the different CRM models in service industry

CO5: To make the students aware and analyze the different issues in CRM

### **Unit I: Evolution of Customer Relationship**

CRM- Definition, Emergence of CRM Practice, Factors responsible for CRM growth, CRM process, framework of CRM, Benefits of CRM, Types of CRM, Scope of CRM, Customer Profitability, Features Trends in CRM , CRM and Cost-Benefit Analysis, CRM and Relationship Marketing.

### **Unit II: CRM Concepts**

Customer Value, Customer Expectation, Customer Satisfaction, Customer Centricity, Customer Acquisition, Customer Retention, Customer Loyalty, Customer Lifetime Value. Customer Experience Management, Customer Profitability, Enterprise Marketing Management, Customer Satisfaction Measurements, Web based Customer Support.

### **Unit III: Planning for CRM**

Steps in Planning-Building Customer Centricity, Setting CRM Objectives, Defining Data Requirements, Planning Desired Outputs, Relevant issues while planning the Outputs, Elements of CRM plan, CRM Strategy: The Strategy Development Process, Customer Strategy Grid.

### **Unit IV: CRM and Marketing Strategy**

CRM Marketing Initiatives, Sales Force Automation, Campaign Management, Call Centres. Practice of CRM: CRM in Consumer Markets, CRM in Services Sector, CRM in Mass Markets, CRM in Manufacturing Sector.

### **Unit V: Challenges of CRM Implementation**

CRM Planning and Implementation Issues and Problems in implementing CRM, Information Technology tools in CRM, Challenges of CRM Implementation. CRM Implementation Roadmap, Road Map (RM) Performance: Measuring CRM performance, CRM Metrics.

Text Books:

1. Francis Buttle, Stan Maklan, Customer Relationship Management: Concepts and Technologies, 3rd edition, Routledge Publishers, 2015
2. Kumar, V., Reinartz, Werner Customer Relationship Management Concept, Strategy and Tools, 1st edition, Springer Texts, 2014

## Reference Books:

1. Jagdish N.Sheth, Atul Parvatiyar & G.Shainesh, "Customer Relationship Management", Emerging Concepts, Tools and Application", 2010, TMH.
2. Dilip Soman & Sara N-Marandi," Managing Customer Value" 1st edition, 2014, Cambridge.
3. Alok Kumar Rai, "Customer Relationship Management: Concepts and Cases", 2008, PHI.
4. Ken Burnett, the Handbook of Key "Customer Relationship Management", 2010, Pearson Education.
5. Mukesh Chaturvedi, Abinav Chaturvedi, "Customer Relationship Management- An Indian Perspective", 2010 Excel Books, 2nd edition

## **SUBJECT: MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE**

**SUBJECT CODE: BBA637A**

**CREDITS: 4**

**Course Objective:** After this course students will gain critical knowledge and understanding about major Data Mining procedures like Decision Tree, Cluster Analysis, Neural Networks, Support Vector Machine, Bayesian Networks and Machine Learning fundamentals. Students will be able to apply and practice this gained knowledge in a variety of Business Scenarios.

### **Unit I: Classification and Regression Tree**

Classification & Regression, working of a Decision Tree, Attribute Selection Measures, Information Gain, Gain Ratio, Gini Index, Building Decision Trees, CART, C5.0, and CHAID Trees, Prediction by Decision Tree, Advantages and Disadvantages of Decision Trees, Model Overfitting, Building Decision Trees in R.

### **Unit II: Clustering**

Cluster Analysis versus Factor Analysis, Overview of Basic Clustering Methods, Agglomerative Hierarchical Clustering, Within-Group Linkage, Nearest Neighbor or Single Linkage, Furthest Neighbor or Complete Linkage, Centroid Clustering, Ward's Method, K-Means Algorithm, Dendrogram, Profiling of Cluster, Cluster Evaluation.

### **Unit III: Support Vector Machine**

Decision Boundaries for Support Vector Machine, Maximum Margin Hyperplanes, Structural Risk Minimization, Linear SVM-Separable Case, Linear SVM-Non-Separable Case, Kernel Function, Kernel Trick, Kernel Hilbert Space, Model Evaluation.

### **Unit IV: Market Basket Analysis**

Market Basket Analysis and Association Analysis, Market Basket Data, Stores, Customers, Orders, Items, Order Characteristics, Product Popularity, Tracking Marketing Interventions, Association Rules, Support, Confidence, Lift, Chi-Square Value, Sequential Pattern Analysis.

### **Unit V: Introduction to Artificial Intelligence**

Current Trends in AI, Intelligent Agents, Environments, Problem Solving Agents, Searching Techniques, Knowledge and Reasoning in AI, Forms of Learning, Structure of a Neural Network, Analogy with Biological Neural Network, Activation Functions, Gradient Descent, Model Accuracy.

  
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**Course Outcomes:**

CO1: Understand and employ a wide variety of Statistical and Machine Learning Algorithms.

CO2: Identify the characteristics of Datasets, Problem Statement and develop Machine Learning programs with reference to known Computing Techniques.

CO3: Understand the Model Performance Evaluation and select the best one based on the solution.

CO4: Implement Machine Learning techniques and the Programming Framework to obtain acceptable decisions for the Real-World problems.

CO5: Employ the use of Artificial Neural Networks to solve real time high sized input analysis and predictions.

**Textbooks:**

1. Kevin Knight, Elaine Rich, B.Nair, 2017, *Artificial Intelligence*, McGraw.

**References:**

1. Han, Jiawei and Kamber, Micheline, 2012, *Data Mining: Concepts and Techniques*, Morgan Kaufman Publishers.

2. Anand Rajaraman, 2011, *Mining of Massive Datasets*, Cambridge University Press.

3. Mitchell, 2013, *Machine Learning*, McGraw Hill.

Stuart Russell, Peter Norvig, 2004, *Artificial Intelligence – A Modern Approach*, Pearson.

**SUBJECT: BIG DATA ANALYTICS****SUBJECT CODE: BBA638A****CREDITS: 4**

**Course Objective:** This course will help students gain knowledge and understanding about Big Data Technology, Hadoop Ecosystem and various tools related to it. The students will learn about the HDFS File System, Map Reduce Framework, analysing data using Hbase and Hive along with the Integration of R with Hadoop.

**Unit I: Introduction to Big Data**

What Is Big Data? History of Data Management, Evolution of Big Data, Structuring of Big Data, Elements of Big Data, Application of Big Data in the Business Context, Careers in Big Data. Business Applications of Big Data: The Significance of Social Network Data, Financial Fraud and Big Data, Fraud Detection in Insurance, Use of Big Data in the Retail Industry.

**Unit II: Technologies for Handling Big Data**

Distributed and Parallel Computing for Big Data, Understanding Hadoop, Cloud Computing, Grid Computing and In-Memory Technology for Big Data. VMWare Installation of Hadoop, Linux and its Shell Commands, Different Hadoop Distributions and their advantages, Hortonworks, Cloudera, MapR.

**Unit III: Understanding the Hadoop Ecosystem**

The Hadoop Ecosystem, Storing Data with HDFS, Design of HDFS, HDFS Concepts, Command Line Interface to HDFS, Hadoop File Systems, Java Interface to Hadoop, Anatomy of a file read, Anatomy of a file write, Replica placement and Coherency Model. Parallel Copying with distcp, keeping an HDFS Cluster Balanced.

**Unit IV: Map Reduce Fundamentals**

Origins of Map Reduce, How Map Reduce Works, Optimization Techniques for Map Reduce Jobs, Applications of Map Reduce, Java Map Reduce classes (new API), Data flow, combiner functions, running a distributed Map Reduce Job. Configuration API, setting up the development environment, Managing Configuration.

  
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## **Unit V: Integrating R with Hadoop, Understanding Hive & Hbase**

Understanding R-Hadoop, Integration Procedure, Packages needed for R under Hadoop Ecosystem, Text Mining for Deriving Useful Information using R within Hadoop, Introduction to Hive & Hbase, Hive and Hbase Architecture, Understanding Queries, Mining Big Data with Hive & Hbase.

### **Course Outcomes:**

CO1: Understand the fundamentals of Big Data and its Applications in various Domains.

CO2: Conceptualize and Incorporate the Technologies behind Big Data.

CO3: Understand HDFS File Structure, Map Reduce Framework, the architectures related to them and to use them to solve complex problems.

CO4: Integrate R with Hadoop and solve analytical problems.

CO5: Understand and Use Hive/Hbase shell pertaining to relational data handling under Hadoop.

### **Textbooks:**

1. Arshdeep Bahga, 2016, *Big Data Science & Analytics: A Hands-On Approach*, VPT.

### **References:**

1. Tom White, 2012, *Hadoop: The Definitive Guide*, O'Reilly.
2. Adam Shook and Donald Miner, 2012, *Map Reduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems*, O'Reilly.
3. Dean Wampler, Edward Capriolo & Jason Rutherglen, 2012, *Programming Hive*, O'Reilly.
4. Lars George, 2011, *HBase - The Definitive Guide: Random Access to Your Planet-Size Data*, O'Reilly.

## **SUBJECT: SOCIAL MEDIA ANALYTICS**

**SUBJECT CODE: BBA643A**

**CREDITS: 4**

**Course Objective:** This course aims at giving exposure on the advanced aspects with regards to Analytics. The course comprises Social-Media, Mobile, Text Analytics along with Web Scrapping and the future advancements in the field of Analytics.

### **Unit I: Overview**

Social Media, On-Line Social Network, Off-Line Social Network, Metrics and Measurement, Dashboard, Target Audience, Desired Action, Content, Market Research Online Communities, Cluster Analysis, Conjoint Analysis, Multidimensional Scaling, Social Media Listening, Social Media Scoring, Social Media Modelling.

### **Unit II: Mobile Analytics**

Understanding Mobile Analytics Concepts, difference between Mobile Analytics and Site Analytics, Natural language Processing with Mobile Analytics, Text Mining for Mobile Analytics, Mobile Analytics Tools, Churn Analytics.

### **Unit III: Text Analytics**

Text Data, Sources of Text Data, Information Clusters, Patterns, Trends, Tagging, Natural Learning Process, Lexical Analysis, Social Network Nodes, Linkage Structure, Node Labelling, Content-Based Classification, Word Stemming, Stemming Algorithms, Polarity of the Attitude, Psychological Profiling, Sentiment Analysis.

### **Unit IV: Web Scrapping**

  
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Web Scrapping of unstructured data, Gathering data from HTTP and HTTPS format, Web Scrapping from XML and JSON file, Regular expressions, Extraction Strategies, Term Document Matrix, Data Cleansing, Data Manipulation and Data Transformation after Scrapping.

#### **Unit V: Future of Analytics**

Introduction to Big Data, Predictive Analysis for Business, Social Information Processing and Distributed Computing, Advances in Machine Learning, Traditional Data Models Evolve, Analytics to Solve Social Problems, Location Based Data Explosion, Data Privacy Backlash, Internet of Things, Artificial Intelligence.

#### **Course Outcomes:**

CO1: Apply and use Social Media Analytics for the betterment of the business.

CO2: Use Mobile Analytics for solving complex business problems and to stop churn.

CO3: Evaluate the business problem and apply analytics techniques for better output.

CO4: Analyze and understand patterns and techniques in Social Media & Mobile Analytics to solve complex problems.

CO5: Identify the areas of research with regards to future implementation of social media analytics based on managerial disciplines.

#### **Textbooks:**

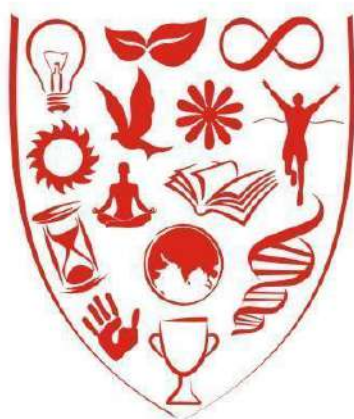
1. Galit Shamuelli, 2017, *Data Mining for Business Analytics: Concepts, Techniques and Applications with R*, Wiley.

#### **References:**

1. Luis Torgo, 2017, *Data Mining with R: Learning Case Studies*, Chapman.
2. Zaki & Meira, 2014, *Data Mining and Analysis Fundamental Concepts and Algorithms*, Cambridge.
3. Han, Kamber & Pei, 2013, *Data Mining: Concepts and Techniques*, Morgan Kaufmann.
4. Han, Jiawei and Kamber, Micheline, 2012, *Data Mining: Concepts and Techniques*, Morgan Kaufman.

### **Semester VI:**

**SUBJECT: INTERNSHIP**  
**SUBJECT CODE: BBA899A**  
**CREDITS: 16**



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**Syllabi and Course Structure**

**Bachelor of Business Administration**

**Digital Marketing (DMI)**

**Academic Programmes**

**Batch (2022-2025)**

**Summary Sheet**

<b>Semester</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>6<sup>th</sup></b>	<b>Total</b>	<b>Min. Credit req. for degree</b>
<b>Credit</b>	<b>25</b>	<b>28</b>	<b>26</b>	<b>27</b>	<b>26</b>	<b>16</b>	<b>148</b>	<b>*10% Relaxation on MOOC, NPTEL, and SWAYAM.</b>


  
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Type	Foundation	Core	Specialization	Interdisciplinary	General
Total Credit	44	34	36	9	25

FIRST SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BBA615A	Principles of Management	3	1	-	4	F
BBA616A	Business Mathematics & Statistics	3	1	-	4	S
BBA617B	Business Economics	4		-	4	F
BBA618A	Fundamentals Of Management Accounting	3	1	-	4	ID
BBA619A	Fundamentals Of Financial Accounting	3	1	-	4	ID
DEN001A	Communication Skills	3		-	3	C
DIN001A	Culture Education – 1	2	-	-	2	G
	<b>TOTAL</b>	<b>21</b>	<b>4</b>	<b>-</b>	<b>25</b>	

SECOND SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type

  
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BBA620A	Organization Behaviour	4		-	4	F
BBA621A	Principles of Marketing Management	4		-	4	F
BBA622A	Human Resource Management	4	-	-	4	C
BBA623A	Managing Finance in A Digital World	3	1	-	4	F
BBA624B	Excel Foundations	2	-	2	3	ID
DEN002A	Professional Skill	3	-	-	3	G
DIN002A	Cultural Education – 2	2	-	-	2	G
DCH001	Environmental Studies (EVS)	3	-	2	4	F
	<b>TOTAL</b>	<b>25</b>	<b>1</b>	<b>4</b>	<b>28</b>	

<b>THIRD SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA657A	<b>Marketing Principles &amp; Communication</b>	4			4	S
BBA658A	<b>Fundamentals of Digital Marketing</b>	4			4	S
BBA627A	Research Methodology	3	1		4	F
BBA628A	Human Resource Development	4			4	C


  
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BBA629A	Comp. Applications III (MS Project)	3			3	ID
***	Open Elective	3			3	G
DEN003A	Life Skills - 1 (Personality Development)	2			2	G
DIN003A	Value Education -1	2			2	G
	<b>TOTAL</b>	<b>25</b>	<b>1</b>		<b>26</b>	

<b>FOURTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA630A	Operation Management	4	-		4	F
BBA659A	<b>Campaigns Planning</b>	4			4	S
BBA660A	<b>Digital Marketing Techniques</b>	4			4	S
BBA663A	<b>Digital Optimisation</b>	4	-	-	4	S
BBA633A	Corporate governance and Social responsibility	3	-		3	F
BBA641A	Leadership Skills	2	-	-	2	F
***	Open Elective	3	-		3	G
DEN004A	Life Skills - 2 (Aptitude)	2	-		2	G
DIN004A	Value Education - 2	1	-		1	G
	<b>TOTAL</b>	<b>27</b>			<b>27</b>	

<b>FIFTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA634A	International Business Management	4	-	-	4	C
BBA635A	Legal Environment for Business	3	-	-	3	ID
BBA636A	Corporate Strategy	4	-	-	4	C
BBA639A	Customer relationship management	3	-	-	3	S
BBA661A	<b>Marketing &amp; Digital Strategy</b>	4	-	-	4	S
BBA662A	<b>Innovation in Marketing</b>	4		-	4	S
BBA650A	<b>Digital Customer Experience</b>	4		-	4	S
	<b>TOTAL</b>	<b>26</b>	<b>-</b>	<b>10</b>	<b>26</b>	

<b>SIXTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA899A	Internship	-	-	32	16	G
	<b>TOTAL</b>	<b>-</b>	<b>-</b>	<b>32</b>	<b>16</b>	

  
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### **Program Educational Objective (PEO)- BBA- Digital Marketing (DMI)**

- I Demonstrate cognitive knowledge about the skills needed in online marketing campaigns, as well as in identifying, assessing and selecting digital market opportunities.
- II Gaining a understanding about emerging digital marketing trends and critically assess the use of digital marketing tools
- III Develop the skills to build an actionable digital marketing strategy that aligns with your business goals.
- IV Learn to develop a digital plan that breaks up group and thinks and aligns departments around a common vision
- V Understand the basic concepts of brand building and Marketing Analytics

### **Program Outcome (PO) – BBA- Digital Marketing (DMI)**

**PO 1:** Understanding of important marketing concepts, role and function of marketing within organisations

**PO 2:** Understand how marketing activities are planned and executed within organisation

**PO 3:** Understand the fundamentals of digital marketing along various tools and campaigns used in digital marketing

**PO 4:** Demonstrate the role of customer behavior in framing effective marketing campaigns

**PO 5:** Develop a successful marketing campaign plan including identifying the various resources required to deliver the campaign objective

**PO 6:** Understand the principles for customer relationship management and evaluate customer experience metrics.

**PO 7:** Develop the technique of integrating digital and offline marketing

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**BBA – Detailed Syllabus**

**Semester 1:**

**SUBJECT: PRINCIPLES OF MANAGEMENT**

**SUBJECT CODE: BBA615A**

  
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**Course Objective:** The objective is to provide an understanding of basic concepts, principles and practices of management. The aim is to inculcate the ability to apply multifunctional approach to organizational objectives.

### **Unit I**

Management: Concept and Need, Managerial Functions – An overview; Coordination: Essence of Management. Evolution of Management Thought, Classical Approach – Taylor, Fayol, Neo-Classical and Human Relations Approaches – Mayo, Hawthorne Experiments, Behavioural Approach, Systems Approach, Contingency Approach, MBO, Hammer and Champy- Business Process Re-engineering, Porter's Five-forces' Model.

### **Unit II**

Types of Plan; Strategic planning – Concept, process, Importance and limitations; Environmental Analysis and diagnosis (Internal and external environment) – Definition, Importance and Techniques (SWOT/TOWS/WOTSUP, BCG Matrix, Competitor Analysis); Decision-making: Process and Techniques; Perfect rationality and bounded rationality

### **Unit III**

Concept and process of organizing – An overview, Span of management, Different types of authority (line, staff and functional), Decentralization, Delegation of authority; Formal and Informal Structure; Principles of Organizing; Network Organisation Structure. Emerging types.

### **Unit IV**

a. Staffing: Concept of staffing - Recruitment and Selection; Orientation; Training and Development; Career Development; Performance Appraisal. b. Motivation & Leadership: Concept, Importance, extrinsic and intrinsic motivation; Major Motivation theories - Maslow's Need-Hierarchy Theory; Herzberg's Two-factor Theory, Vroom's Expectancy Theory. Leadership: Concept and Importance; Leadership Styles; c. Communication: Concept, purpose, process; Oral and written communication; Formal and informal communication networks, Barriers to communication, Overcoming barriers to communication. Emerging trends in communication.

### **Unit V**

Concept, Process, Limitations, Principles of Effective Control, Major Techniques of control - Accounting Ratio Analysis, HR Metrics, ROI, Budgetary Control, EVA, PERT/CPM. Emerging issues in Management.

  
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**SUBJECT: BUSINESS MATHEMATICS & STATISTICS**  
**SUBJECT CODE: BBA616A**  
**CREDITS: 4**

**Course Objective:** The Objective is to provide, to expose students to basic statistical and mathematics concepts, to organize and present numerical data, to understand the Venn Diagrams, Sets, Intervals, Matrices, Vector Algebra and to compute correlation, interpret and to understand the construct various index numbers.

**Unit I - Set Theory**

Introduction to Sets, Sets and their Representation, Tabular or Roster Method, Rule Method or Set Builder, Empty or Void or Null Set, Finite sets and Infinite sets, Proper Subset, Improper Subset, Power Set, Universal Set, Open Interval, Closed Interval, Semi-Open or Semi Closed intervals, Infinite Intervals, Venn Diagrams, Operations on Sets, Union, Intersection of Sets, Disjoint Sets, Difference of Sets, Symmetric Difference of Sets, Complement of a Set, Laws of Algebra of Sets.

**Unit II - Matrices and Determinants**

Definition of a Matrix, Addition & Subtraction of Matrices, Multiplication of Matrices, Transpose of a Matrix. System of linear equations, Gauss elimination method, Inverse of a Matrix, Determinants, Determinants of order one and more, Properties of Determinants, Multiplication of two Determinants, Minors and Cofactors, Cramer's rule for solution of linear equations, Adjoint of a Matrix, Rank of a Matrix.

**Unit III- Vector Algebra**

Vectors, Types of Vectors, Operations on Vectors, Addition of Vectors, Properties of Operation of Addition, Subtraction, Properties of Operation of Subtraction, Multiplication by a scalar, Orthonormal Bases, Product of Two Vectors, Scalar Product or Dot Product of Two Vectors, Properties of Scalar Product, Vector Product or Cross Product, Properties of Vector Product.

**Unit IV - Statistics**

Introduction to Statistics, Scale of Measurement, Nominal, Ordinal, Interval & Ratio. Frequency Distribution, Bar Chart, Pie Chart, Histogram, Frequency Polygon, Ogive, Pareto Chart, Stem-and-leaf Chart, Scatter Plot, Measure of Central Tendency, Properties, Advantages and Disadvantages of Arithmetic Mean, Geometric Mean, Harmonic Mean. Positional Averages, Median, Quartiles, Deciles, Percentiles & Mode. Measure of Dispersion, Range, Interquartile Range, Standard Deviation.

**Unit V - Probability**

Introduction to Probability, Experiment, Event, Compound Event, Independent and Dependent Events, Mutually Exclusive Events, Equally Likely Events, Marginal, Union, Joint, Conditional Probability, Basic Probability Rules, General Rule of Addition, General Rule of Multiplication, Concept of Bayes' Theorem.

**SUBJECT: BUSINESS ECONOMICS**

  
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**SUBJECT CODE: BBA617B**  
**CREDITS: 4**

**Course Objective:**

The Objective is to provide, to understand the key concepts of macroeconomic concepts of business, to know the factors determining supply and demand in various market structure, to know the various cost and revenue concepts under the functioning of various types of industries and to know main financial markets and institutions in facilitating commerce & development.

**Unit I – Macro Economic context of business**

Determination of macroeconomic phenomena – equilibrium national income – growth in national income, price, inflation, unemployment, trade deficits and surpluses – stages of trade cycle – principles of public finance – effects of changes in the economic growth rate, interest rates. Government expenditure and taxation – index numbers

Concept of balance of payments – free trade and protectionists instruments policy, impact of exchange rate policies on business

**Unit II – Institutional context of business**

Nature of globalisation and factors driving it (improved communications, political realignments, growth of global industries and institutions, cost differentials). Major institutions promoting global trade and development - Principal institutions encouraging international trade – globalisation of business – offshoring – industrial relocation – emergence of growth markets – main trading agreements and trading blocks. Identify the impacts of economic and institutional factors using the PESTEL framework.

**Unit III – Micro Economic and Organisational Context Of Business**

Types of organisations – public, private & mutually owned organisations – types of Not-for-Profit Organisations – shareholders wealth management – principal – agent problem and its impact on the decisions of the organisation. Price mechanism – determinants of demand and supply – price elasticity of demand – effects of price elasticity of demand on Total revenue curve#. Sources of internal and external economies of scale- outsourcing decisions and costs – minimum and maximum price policies in good and factor markets.

**Unit IV – Informational context of business**

Data & information, graphs, charts and diagrams – scatter graphs, histograms, bar graphs, ogives. Big data and data analytics in business applications – time series analysis – correlation co-efficient – regression equation to predict the dependent variables – forecasting

**Unit V – Financial Context of Business**

Financial intermediaries – commercial banks – financial assets and financial markets – foreign exchange markets. Financial mathematics – simple & compound interests – annuities & perpetuities – Discounting techniques – NPV and IRR. Interest rates – interest rate changes on market demand – concepts of forwards, futures and options.

  
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**SUBJECT: FUNDAMENTALS OF MANAGEMENT ACCOUNTING**  
**SUBJECT CODE: BBA618A**  
**CREDITS: 4**

**Course Objective:** The objective is to familiarise the students with the mechanics of to understand the management accounting, students learn the methods of costing, overheads and ascertain the various types of budget and approaches to analyse the profits.

**Unit I - The Context Of Management Accounting**

Purpose of management accounting and the role of the Management Accountant-need for management accounting-characteristics of financial information for operational, managerial and strategic levels within organisations- role of the management accountant-relationships between the management accountant and the organization's managers- The Global Management accounting principles. Role of CIMA as a professional body for Management Accountants-role of CIMA in developing the practice of management accounting

**Unit II - Costing**

**Cost identification and classification**-classification of costs in relation to output classification of costs in relation to activity level appropriate costs having identified cost behaviour-classification of costs in relation to decisions – segregation of fixed and variable costs from semi-variable costs – relevant and irrelevant costs.

**Overheads** – overhead cost estimates – treatment of direct and indirect costs – overhead absorption rate – under and over absorption of overheads – Marginal cost pricing and full cost pricing.

**Unit III– Planning And Control**

Preparation of budgets for planning and control-need for the preparation of forecasts and Plan-Preparation of functional budget- budget statements-impact of budgeted cash surpluses and shortfalls on business operations-preparation of flexible budget-Calculate budget variances – concepts of Zero based Budget, Incremental budgeting, Rolling Budget.

Application of variance analysis to reconcile budgeted and actual profits in a marginal Format-Principles of standard costing-Calculation of variances for materials, labour, variable overheads, sales prices and sales volumes-Preparation of a statement that reconciles budgeted profit with actual profit calculated using marginal costing- reasons for variances and the inter-relationships between variances

**Unit IV – Performance Measurement And Reporting**

Calculation of appropriate financial and non-financial performance measures-need for appropriate performance measures-Calculation appropriate financial and nonfinancial performance measures in a variety of contexts

Preparation of accounts and reports for manager-integration of the cost accounts with the financial accounting system-Prepare a set of integrated accounts, showing standard cost variances- preparation of accounts related to Job and batch costing-Cost accounting statements for management information in manufacturing, service and not-for-profit organisations.

**Unit V- Decision Making**

  
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**Risk and uncertainty** - use of expected values and joint probabilities in decision making- calculate summary measures of central tendency and dispersion for both grouped and ungrouped data-Arithmetic mean, median, mode, range, variance, standard deviation and coefficient of variation for both ungrouped and grouped data-Graphs/diagrams and use of normal distribution tables – decision tree approach.

**Short term decision making** - The use of appropriate techniques for short-term decision making-breakeven charts, profit volume graphs, breakeven point, target profit, margin of safety- Make or buy Decisions-Calculate the profit maximizing sales mix after using limiting factor analysis-

**Use of appropriate techniques for long-term decision making** - The time value of money-financial mathematics - Discounting, compounding, annuities and perpetuities-Calculate the net present value, internal rate of return and payback for an investment or project

**SUBJECT: FUNDAMENTALS OF FINANCIAL ACCOUNTING**  
**SUBJECT CODE: BBA619A**  
**CREDITS: 4**

**Course Objective:** To understand the basics of accounting and concepts of double entry system. The students understand book keeping and preparation of final accounting statements for business organizations.

**Unit I - Accounting Principles, Concepts And Regulations**

The principles and concepts of financial accounting - need for accounting records; Identify the needs of different user groups; Distinguish between the financial and management accounts; capital and revenue, cash and profit, income and expenditure, assets and liabilities; the underlying assumptions, policies; the accounting equation.

**Unit II - Recording Accounting Transactions**

Accounting records; Prepare the books of prime entry; Applications the principles of double-entry Bookkeeping; nominal ledger accounts; the trial balance; the nature of accounting errors, prepare accounting entries for the correction of errors; Prepare accounting entries for noncurrent assets; Prepare a non-current asset register.

**Unit III- Accounting Reconciliations**

Bank reconciliation statements; Prepare petty cash statements under an imprest system; Prepare sales and purchase ledger control account reconciliations.

**Unit IV - Preparation of Accounting Entries for Specific Transactions**

Calculate sales of tax; Prepare accounting entries for sales tax; Prepare accounting entries for payroll; Prepare accounting entries for the issue of shares.

**Unit V- Preparation of Financial Statements for Single Entities and Its Analysis**

Prepare accounting adjustments. Prepare accounting entries for accruals and prepayments; Prepare accounting entries for irrecoverable debts and allowances for receivables; Prepare accounting entries for inventories.

Prepare basic manufacturing accounts. Prepare financial statements from a trial balance; Prepare financial statements from incomplete records; Prepare a statement of cash flows.

  
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Identify information provided by accounting ratios the information provided by the calculation of accounting ratios reasons for the changes in accounting ratios.  
Calculation of profitability ratios, liquidity ratios, risk ratios.

**SUBJECT: COMMUNICATION SKILLS**

**SUBJECT CODE: DEN001A**

**CREDITS: 3**

**BBA. (common to all disciplines)-I Semester**

**Course Objectives :** 1. To enhance English language competence in reading, writing, listening and speaking. 2. Switch the approach from teacher-centred to student-centred one. 3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.

4. Introducing the Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.

5. To link communication skills with the organizational behaviour.

6. To inculcate skills that are very much required for employability and adjust in the professional Environment.

**Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in different contexts.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

**Syllabus: Theory**

<b>Unit I</b>	Basics of Organizational Communication: Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
<b>Unit II</b>	Basic Writing Skills: Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
<b>Unit III</b>	Composition:, Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
<b>Unit IV</b>	Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
<b>Unit V</b>	Professional and Technical Communication : Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

  
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**Syllabus: Lab**

<b>Unit I</b>	Basics of Organizational Communication: Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time Management, Following Deadlines etc
<b>Unit II</b>	Write Dialogue from the different contexts of corporate culture: Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
<b>Unit III</b>	Composition:, Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of DraftingRedrafting, Proof Reading, Editing etc
<b>Unit IV</b>	Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>Unit V</b>	Professional and Technical Communication : Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

**Methodology for Evaluation**

## 1. Internal Assessment (Theory)

a) Home Assignments: One from each Unit : 15 Marks

b) In Semester Tests (Minimum two) : 30 Marks

c) Attendance : 05 Marks

2. Term End (Theory) : 50 Marks

## 3. Internal Assessment (Lab)

(a) Daily Performance in the Lab : 50 Marks

4. Term End (Lab) : 50 Marks

**Suggested Reading:**

1. Practical English Usage. Michael Swan. OUP. 1995

2. Remedial English Grammar. F.T. Wood. Macmillan. 2007

3. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.

4. On Writing Well. William Zinsser. Harper Resource Book. 2001

5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006

6. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.

7. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.

8. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006



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**SUBJECT: CULTURE EDUCATION I**

**Semester-I**

**SUBJECT CODE: DIN001A**

**CREDITS: 2**

**Course Objectives:** 1. To make the students feel gratitude towards the rich religious and cultural heritage of India.

2. To understand the role of great personalities and movements in the progress of India.

**Course Outcomes (CO):**

At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the richness of Indian Culture

CO2: Ability to represent the culture ethics in real life

**Unit I- Holy Scriptures-A**

1. Introduction to Vedanta and Bhagavad Gita, Goals of Life – Purusharthas, Introduction to different Dharm Granthas (Various religious scriptures from Hindu, Muslim, Christian, Bodh, Jain religions)

2. Introduction to Yoga, Overview of Patanjali's Yoga Sutras

**Unit II- Society and Culture-I**

3. Introduction to Indian Culture and Major Symbols of Indian Culture

4. Major Indian Cultural and Ethical Values- Respect, Compassion, Kindness, Forgiveness, Introspection, Honesty, Justice, Loyalty, Devotion, Self Sacrifice, Hospitality, Vasudhev Kutumbkum

**Unit III- India in Progress-I**

5. Education , Science and Technology in Ancient India

6. Values from Indian History- War of Mahabharata, War of Kalinga, Freedom Struggle of India Major Farmer Movements, Major Religious and Social Upliftment Movements

**Unit IV- Great Indian Personalities-I**

7. Life and works of the Great People of Ancient India- Sushruta, Dadhichi, Ashtvakra, Anusuya, Panini, Charaka, Kalidas, Aryabhatta, Samudragupta, Ashoka, Chandragupta Mourya, Porus, Satyabhama, Dhruv, Prahlad, Chankya, Varahmihira, Bhism, Karan, Dronacharya, Meera Bai, Surdas, Dadudayal, Kabir, Mahatma Buddha, Mahavir, Guru Nanak Dev, Guru Gobind Singh, Mohammad Saheb, Jesus Christ, Veer Shivaji, Maharana Pratap, Maharani Laxmi Bai, Maharani Padmini, Hadi Rani Shal Kanwar, Panna Dhai

\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by committee of teachers.

**Suggested Reading:**

1. Glory of Indian Culture (English) Paperback by Giriraj Shah

2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies by Saroj Bala , Kulbhushan Mishra

  
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## References

<https://knowindia.gov.in/culture-and-heritage/lifestyle-values-and-beliefs.php>

### Semester II:

#### **SUBJECT: ORGANIZATION BEHAVIOUR**

**SUBJECT CODE: BBA620A**

**CREDITS: 4**

**Course Objective:** Understand how the organisations can be managed effectively considering the behaviour of various stakeholders of an organisation and analysing the skills required for the future advantage of an organisation.

#### **Unit I Organization behaviour – an introduction**

Meaning of organizations – Nature of organization behaviour – Basics of organization behaviour – Scope and evolution of organizational behaviour – Organizational arrangements and Organization behaviour – Key terminologies in Organization Behaviour - Organizational Behaviour Model (OB Model).

#### **Unit II Individual behaviour, intelligence and personality**

Meaning of individual behaviour – personal and environmental factors – Models of individual behaviour – nature and types of intelligence – theories and measurement of intelligence – Intelligence factors – intelligence in the context of organizational behaviour.

Nature and determinants of personality – Personality traits – Personality in the context of Organization Behaviour.

#### **Unit III Motivation and work stress**

Nature and importance of motivation – challenges and theories of motivation – Motivation and organizational culture – quality of work life – rewards and behaviour modification – problem employees – employee engagement.

Meaning of work stress – work stress model – stress management – Stress and organizational behaviour.

#### **Unit IV Group and team behaviour**

Nature and types of groups – Group dynamics and Organization behaviour – determinants of group dynamics – Importance of group dynamics in an organization – group development strategies – Group motivation – Group structuring and decision making.

Meaning of team – differences between group and team – Types and benefits of teams – effective team management – team conflicts and resolution – Team development and Organizational Behaviour.

#### **Unit V Organizational culture and leadership**

Meaning of leadership – leadership vs management – leadership styles and theories – formal and informal leadership – Ethics and leadership – leadership and organizational culture – Sustaining culture – changing organizational culture – workplace behaviour – Ethics of power.

**Course outcomes:**

  
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CO 1: Understand the basic of organizational behaviour in the context of the dynamic environment.

CO 2: Understanding the role of individual behaviour, intelligence and personality in the context of organizational development.

CO 3: Understanding importance of rewarding and motivating the stakeholders and managing the stress to effectively manage the organizational performance

CO 4: Understand the role of group and team dynamics in the current organizational environment

CO 5: Understand the importance of perception into organizational culture, leadership and ethics in an organizational development.

## **SUBJECT: PRINCIPLES OF MARKETING MANAGEMENT**

**SUBJECT CODE: BBA621A**

**CREDITS: 4**

**Course Objective:** To provide a holistic orientation of emerging marketing trends with the practical skills required to analyze consumer data, create marketing campaigns, develop digital/social media content and make successful marketing decisions and to equip students to be innovative, technically competent, and think critically through experiential and student-centric teaching approach.

### **Unit I: Fundamentals of Marketing Management**

Meaning & Definition of marketing -Role of Marketing -Relationship of Marketing with other functional areas -Market Concepts -Product concept -Selling concept -Marketing concept -Societal marketing concept -Approaches to marketing management -Functions of marketing -Scope of marketing: goods, services, events, organizations, etc. -Emerging trends in marketing.

### **Unit II: Marketing Plan**

Marketing Environment: Concept -Macro-environmental forces -The changing marketing environment -Analyzing needs and trends in Macro-Environment: Economic Environment, Technical Environment, Political, Environment and Socio-cultural Environment. Introduction to The Marketing Plan –Definition –Nature –Objectives -Structure of The Marketing Plan -The Process of marketing plan -Critical elements of external and internal analysis of Marketing Plan -Implementation of Marketing Plan.

### **Unit III: Marketing Mix**

Introduction to marketing mix -Marketing mix implementation: short term and long term tactics –Product: meaning, elements, product mix -Product mix strategies -Product line -Product lifecycle Product planning -New product development -Failure of new product -Product branding -Branding strategy and packaging –Pricing: Objectives -Factors influencing pricing policy -Methods of pricing -Pricing strategy. Physical Distribution: Meaning -Factors affecting channel selection -Types of marketing channels –Promotion: Meaning and significance of promotion – Personal selling & advertising (meaning only).

### **Unit IV: Buyer behavior**

  
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Market Segmentation: Levels and patterns of market segmentation -Bases for segmenting markets -Market segmentation - Targeting - Product Positioning - Types and bases of positioning - Product Differentiation -Meaning of consumer, customer, consumer behaviour and buying motives -Factors influencing buyer

behavior -Factors that influence consumer purchasing decisions -Buying process -Stages of the consumer buying behavior -Business to Business (B2B) buying process -Key factors influencing B2B purchasing decisions -Differences between Consumer goods and Industrial goods

### **Unit V: Digital Marketing**

Introduction to Digital Marketing –Concept of Digital Marketing -Difference between traditional marketing and digital marketing -Trends and scenarios of the industry -Planning and Creating a Website -Search Engine Optimization (SEO), Search Engine Marketing (SEM), of Social Media Marketing, Blogging, Content Strategy, Email Marketing.

### **Course outcomes:**

CO1: To understand the role and importance of marketing

CO2: Develop a marketing plan to generate better sales and profits

CO3: Formulate the product and price mix based to serve consumer needs.

CO4: Identify the factors influencing consumer behavior and purchase decision

CO5: Outline the digital tools to develop marketing strategies for the new age consumer

**SUBJECT: HUMAN RESOURCES MANAGEMENT**

**SUBJECT CODE: BBA622A**

**CREDITS: 4**

**Course Objective:** The objective of the subject is to understand the importance of effective and efficient management of human people in an organization to help the business gain a strategic and competitive advantage.

### **Unit I: Human Resource Management (HRM) - Introduction**

Meaning of Human resources – Meaning of HRM – nature and functions of HRM – HR Manager – qualities and qualifications – Strategic Human Resource Management – Strategic management – corporate level strategies – Strategic HR issues – Organizational and HR strategies -

### **Unit II: Job Analysis, team analysis and Job Environment**

Meaning of HR terms – Job design, job rotation, job enlargement, job enrichment, team work – Need for job analysis and team analysis – Job description – job specification – job sharing – ergonomics – employee empowerment – Job redesign

### **Unit III: Human Resource Planning**

  
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Meaning, features and scope of Human Resource Planning – process of and steps in Human Resource Planning – Barriers to effective implementation of Human Resource Planning – Human Resource Planning Vs Strategic planning – Human resource planning through people, finance and technology.

#### **Unit IV: Performance appraisal and compensation management**

Meaning, need and purposes of performance appraisal – methods of performance appraisal – Group appraisal – Behavioral aspects of performance appraisal – Concept of MBO – the balanced score card – managerial appraisal – challenges of performance appraisal.

Concepts of transfer, promotion and demotion – types of promotions – types of transfer – reasons for demotion – concept of absenteeism – calculation and causes of absenteeism rate – measures to reduce absenteeism – concept of labour turnover – types and causes of labour turnover.

#### **Unit V: Training and Development**

Assessment of training needs – training methods - Apprenticeship, understudy, job rotation, vestibule training, case study, role playing, sensitivity training, In-basket, management games, conferences and seminars, coaching and mentoring, management development programs; Training process outsourcing.

#### **Course Outcomes:**

CO1: Understand the role and importance of Human resource Management in effectively managing the human capital in an organization.

CO2: Understand the key terminologies in the context of Human Resource Management and their scope and benefits in a practical environment

CO3: Understand the importance of Human resource planning in the context of people, technology and finance

CO4: Understand the importance of performance appraisal and other concepts in the area of Human resource management

CO5: Understand the methods and purposes of training and development activities to gain a strategic advantage

**SUBJECT: MANAGING FINANCE IN A DIGITAL WORLD**

**SUBJECT CODE: BBA623A**

**CREDITS: 4**

**Course Objective:** To understand the central role that finance plays in an organisation, and how and why technologies used impact the finance function, how to use and examine data collected and processed by machines to create and preserve value for organisations and how the finance function is structured and shaped, and how it interacts with other parts of the organisation to achieve the objectives of the whole organisation.

#### **Unit I: Role Of Finance Function**

  
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Different types of organisations – functions of an organisation – the roles of finance function – enabling value creation through planning, forecasting and resource allocation – data collection – types of analysis to produce insight – potential impact of technology - How finance communicates to influence key stakeholders

## **Unit II: Technology In Digital World**

Characteristics and Dynamics of Fourth Industrial Revolution – Cloud Computing – Big Data Analytics – Process Automation – Artificial Intelligence – Data Visualisation – Block chain – Internet of things – Mobile – 3-D Printing – New areas of Finance to focus on – Areas of Finance susceptible to automation – Digital mindsets for Finance – Ethics of the use of technology

## **Unit III: Data And Information In A Digital World**

Using Data for: Decision making, Understanding the customer, Developing-customer value proposition, Enhancing operational efficiency, Monitoring data, Ethics of Data usage – Assessment of Data needs – Extraction, Transformation and Loading (ETL) Systems - Business Intelligence (BI) systems – Big Data Analytics – Data visualization

## **Unit IV: Shape And Structure Of Finance Function**

Structure of Finance function from the roles that generate information to the roles that turn information into insights and communicate insights to decision makers – Hierarchical shape of Finance function – Shared Services and Outsourcing of Finance Function – Retained Finance – Automation & Diamond shape of Finance Function – Finance operation to generate information and preliminary insight – FP & A , Taxation, corporate reporting, decision support to produce insights – Business partnering to influence organisations to make appropriate decisions – Leading Finance team to create the required impact for the organisation.

## **Unit V: Finance Interacting With Organisations**

Process management – product and service management – supply chain management

Market segmentation – big data analytics in marketing – channel management – sales forecasting & management

Staff acquisition – staff development – performance management – motivation and reward systems

IT infrastructure – IT systems support – cost and benefits of IT systems

### **Course Outcome:**

CO1: To understand how the finance function enables, shapes and narrates value creation thorough planning, forecasting, resource allocation, performance management and financial reporting.

CO2: To understand key technologies and their impact on an organisation including, cloud computing, big data, data analytics, process automation, artificial intelligence, data visualisation, block chain, internet of things.

  
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CO3: To understand how the finance function can use data and information to assist operations in enhancing operational efficiency.

CO4: To understand the contemporary transformation of the finance function in the digital era from roles that generate information to roles that turn information into insight and how finance communicates that insight to decision-makers.

CO5: To understand how the finance function helps manage operations, marketing and Sales, HR and IT functions in creating and preserving value.

### **Semester III**

#### **SUBJECT: MARKETING PRINCIPLES & COMMUNICATION**

**SUBJECT CODE: BBA657A**

**CREDITS: 4**

**Course Objective:** The objective is to provide, Knowledge and understanding of the role and function of marketing within organizations, and the factors that influence customer behaviour,

#### **Unit I: Marketing Concepts – An Introduction**

Meeting the needs of the consumer by identifying, awaiting and satisfying their requirements – Understanding the management process – Customer retention – Customer acquisition (Secured)

#### **Unit II: Marketing Function**

Link between the organization and the customer – Marketing functions -- Consumer needs and wants, Communication--to provide internal information, support to customers and the supply chain, Internal service provision, Understanding the concept and elements of the marketing mix

#### **Unit III: Customer buying and decision-making process – Influencing factors.**

The process of need recognition, Information search, alternatives evaluation, Purchase decision, and post-purchase evaluation - Impulse purchases and high-value purchases. Customer needs/wants - Functional benefits - Emotional benefits - Physiological needs - Luxury or necessity - Other influences: Social, cultural, and Personal influences

#### **Unit IV: Elements of the extended marketing mix (7Ps)**

The 4Ps – Product, Price, Promotion, Place; The extended 3Ps – People, Process and Physical evidence. Coordinated marketing mix – Benefits. Building focus and preparation of budget economies – Ensuring brand positioning – Taking competitive advantage by understanding online and offline journeys

#### **Unit V: Application of extended marketing mix in a variety of contexts**

Importance of B2B - Price and negotiation, Personal selling and trade promotion, Relationships and service; Importance of Not-for-Profit - Ideas and services, Direct channels, Opportunity cost, Emphasis on public relations

#### **SUBJECT: FUNDAMENTALS OF DIGITAL MARKETING**

**SUBJECT CODE: BBA658A**

**CREDITS: 4**

  
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**Course Objective:** The Objective is to Understand the fundamentals of digital Marketing, impact of digital technology in marketing, use of digital marketing tools, digital marketing campaigns and to know how to development of digital marketing content.

**Unit I: Evolution of digital technology.**

What is digital Marketing, Origin and evolution of digital marketing, introduction of online business, Growth of online business, impact of online transactions on business, effects of social media on business and marketing activities.

**Unit II: Digital Marketing platforms**

Available digital marketing platform - Purpose and functions of websites, Crowdsourcing and crowdfunding systems, Online auctions and third-party websites, Social media in customer buying and selling, Influencer Marketing, email marketing, SEO marketing, PPC.

**Unit III: Impact of digital technology on customer behaviour**

Consumer as researcher, Digital word of mouth, Brand shifting, Low tolerance level, Boost in customer engagement, Impact of AI, impulsive buying behaviour, Personalised shopping experience.

**Unit IV: Role of social media in customer engagement.**

What is social media engagement, Its Importance, Likes and Favourites, Comments, DMs, Replies, Shares and Retweets, Saves, Clicks, Mentions, Boosting social media engagement, advantages and disadvantages of social media platforms, Concerns of social media platforms.

**Unit V: Use of digital marketing tools in different customer contexts.**

Advantages and disadvantages of digital marketing tools, Opportunities and threats of these tools, Using the tools in different customer contexts, B2B, B2C, Not-for-Profit

**SUBJECT: RESEARCH METHODOLOGY**

**SUBJECT CODE: BBA627A**

**CREDITS: 4**

**Course Objective:** This module enables learners to develop the basic principles of research methods. The learners focus how to do research, with an emphasis on student-centered activities and problem solving. Learners will develop insights the key concepts as the scientific method; operationalizing constructs; independent and dependent variables, data types and ways of measurement, confounding variables experimental and non-experimental design questionnaire construction; developing and testing hypotheses; descriptive statistics and describing data graphically; and the ethics of research.

**Unit I: Research Formulation and Design**

Motivation and objectives-Research methods and methodology. Types of research Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research. Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

**Unit II: Data Collection and Analysis**

Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statically package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

  
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### **Unit III: Statistical Softwares**

Computer and its role in research, Use of statistical software SPSS, GRETl etc. in research. Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.

### **Unit IV: Research Ethics and Scholarly Publishing**

Ethics-ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing- IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

### **Unit V: Interpretation and Report Writing**

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of writing Research Report Precautions for writing Research Reports, Conclusions.

## **SUBJECT: HUMAN RESOURCE DEVELOPMENT**

**SUBJECT CODE : BBA628A**

**CREDIT: 4**

**Course Objective:** This module will enable the learners to develop strong understanding and key skills which are required for human resource professionals. Learners will be able to understand the importance of human resource development and their role in effectively managing the personnel within the organization. Learners will develop insights into the fast-growing and emerging trends of Human Resource Development (HRD) in globalized economy.

### **Unit I: Human Resource Development (HRD) -Macro Perspective**

Understand HRD Concept, Origin and Need of HRD, HRD as a Total System, Approaches to HRD; Human Development and HRD; HRD at Macro and Micro Climate

### **Unit II: HRD–Micro Perspective**

Understand areas of HRD, HRD Interventions Performance Appraisal, Potential Appraisal, Feedback and Performance Coaching, Training, Career Planning, OD or Systems Development, Rewards, Employee Welfare and Quality of Work Life and Human Resource Information; Staffing for HRD: Roles of HR Developer; Physical and Financial Resources for HRD; HR Accounting; HRD Audit, Strategic HRD

### **Unit III: Instructional Technology for HRD**

Learning and HRD; Models and Curriculum; Principles of Learning; Group and Individual Learning; Transactional Analysis; Assessment Centre; Behaviour Modeling and Self Directed Learning; Evaluating the HRD

### **Unit IV: Human Resource Training and Development**

Concept and Importance of training and development; Assessing Training Needs; Designing and Evaluating T&D Programmes; Role, Responsibilities and challenges to Training Managers

### **Unit V: Training Methods**

Training within Industry (TWI): On the Job & Off the Job Training; Management Development: Lecture Method; Role Play; In-basket Exercise; Simulation; Vestibule Training; Management Games; Case Study; Programmed Instruction; Team Development; Sensitivity Training; Globalization challenges and Strategies of Training Program, Review on T&D Programmes in India

## **SUBJECT: COMP. APPLICATIONS III (MS PROJECT)**

  
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**SUBJECT CODE: BBA629A**

**CREDITS: 3**

**Course Objective:** The goal of this module is to help students explore MS Project application, providing information on relevant project management concepts while also offering specific procedures to build and track a Project Schedule. The students will gain expertise towards the MS Project application by learning about the tasks and dependencies, estimating durations, and working with project Views. They will also understand the advanced customizations and reporting elements under MS Project application.

**Unit I: Introduction**

MS Project Application, Project Family, Features in Project 2016 & 2019, Comparative study on MS Project Versions (2013, 2016 & 2019), The Project Interface, Backstage View, Ribbons and Tabs, Views, Reports, Defining Project Manager, Starting a Project, Task Master, Co-dependent Nature of Tasks, Estimating Task Time, Introducing the Work Breakdown Structure (WBS).

**Unit II: Scheduling Basics**

Starting a New Plan and Setting its Start Date, Setting Non-Working Days in the Project Calendar, Entering Plan's Title and Other Properties, Entering Task Names, Task Durations, Milestone Task, Creating Summary Tasks to Outline the Plan, Task Dependencies with Links, Switching Task Scheduling from Manual to Automatic, setting up Resources, Work Resources Names and Maximum Capacity, Pay Rates, Adjusting Working Time in Resource Calendar.

**Unit III: Resources Assignment and Plan Sharing**

Assigning Work Resources to Tasks, Controlling Work when Adding or Removing Resource Assignments, Assigning Cost Resources to Tasks, Checking the Plan's Duration, Cost & Work, Customizing Gantt Chart View, Customizing Timeline View, Customizing Reports, Copying and Printing Views & Reports, Saving Plan Baseline, Tracking a Plan as Scheduled through a Specific Date, Entering a Task's Completion Percentage and Actual Values for Tasks.

**Unit IV: Advanced Scheduling Techniques**

Viewing Task Relationships with Task Path, Adjusting Task Link Relationships, Setting Task Constraints, Interruptions, Work Time Adjustments, Controlling Task Scheduling using Task Types, Setting Resource Availability at Different Times, Applying Contours, Pay Rates and Material Resources to Tasks & Assignments, Examining Resource Allocations, Levelling Overallocated Resources, Sorting-Grouping-Filtering Project Details, Creating New Tables & New Views, Tracking Progress on Tasks and Assignments, Viewing and Reporting Project Status.

**Unit V: Advanced Formatting and Customizations**

Formatting Gantt Chart View, Timeline View, Network Diagram View, Calendar View, Printing and Exporting Views, Formatting Tables & Charts in a Report, Sharing Custom Elements between Plans, Recording & Editing Macros, Copying Project Data to other Programs, Opening & Saving to other File Formats from MS Project, Creating a Resource Pool, Viewing Assignment Details in a Resource Pool. Updating Assignments in a Sharer Plan, Updating a Resource's Information and Plan's Working Times in a Resource Pool, Linking New Plans to a Resource Pool, Creating Dependencies between Plans.

**SUBJECT: LIFE SKILLS-I**

**SUBJECT CODE: DEN003A**

  
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**CREDIT: 2****Course Objective:**

1. Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields.
2. Ability to learn by doing it practically in the classroom.
3. Ability to learn by creating an environment and adapting to the environment.
4. The ability to prepare the students as per the need of the Multi-cultural scenario around.

**Syllabus: Theory**

<b>Unit I</b>	Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion Basics of Narrating and describing things
<b>Unit II</b>	Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview CV/Resume Drafting and HR Interview advance theory Basics of Video Interviews and Video Profiles for Job
<b>Unit III</b>	Types of listening, advantages and disadvantages
<b>Unit IV</b>	Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report
<b>Unit V</b>	Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc

**Syllabus: Lab**

<b>Unit I</b>	Debates / Speeches / Addressing the public / Extempore/Group Discussion Describing a hypothetical situation / theme / surroundings / appearance/personality traits/company/ a professional Concept/New Idea, / New Project through PPT and video aids
<b>Unit II</b>	Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview CV/Resume Drafting and HR Interview practice sessions elaborating the points as per the CV and industry demand Video Interviews and Video Profiles for Job-Practice session for Online Interviews

<b>Unit III</b>	Listening to variety of audio/video conversations including interviews, news, reports, reports, GDs, dialogues from body language, logic, wit and vocabulary perspectives
<b>Unit IV</b>	Group Discussion-Practice sessions, Presenting New Idea/Concept/Proposal/ Project/ Report
<b>Unit V</b>	Activities on how to be a strong Personality, Motivation, Case studies for Resourcefulness and out of the box thinking, Role plays and Case studies on Risk taking, Self confidence and Self-esteem, Decision Making, Emotion Management, Cultural Adaptability, Multicultural Perspective towards things, ideas, views, codes etc

### **Methodology for Evaluation**

#### 1. Internal Assessment (Theory)

- a) Home Assignments: One from each Unit : 15 Marks
- b) In Semester Tests (Minimum two) : 30 Marks
- c) Attendance : 05 Marks

#### 2. Term End (Theory) : 50 Marks

#### 3. Internal Assessment (Lab)

- (a) Daily Performance in the Lab : 50 Marks

- 4. Term End (Lab) : 50 Marks

### **Suggested Readings:**

1. A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.
2. Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
3. Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa & Co.
4. The Hard Truth about Soft Skills, by Amazone Publication.
5. 101 Great Answers to the Toughest Interview Questions. Ron Fry. High Bridge Company. 1996.
6. Michael Swan. Practical English Usage, Oxford University Press.

**SUBJECT: VALUE EDUCATION I**

  
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**SUBJECT CODE: DIN003A**  
**CREDIT: 2**

**Course Outcomes (CO):**

At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the ethical beauty of India

CO2: Ability to incorporate the values of human lives in real life applications

**Lessons from the Ramayana**

Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

**Lessons from the Mahabharata**

Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

**Lessons from the Upanishads**

Introduction to the Upanishads: Sruti versus Smriti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, Satyakama Jabala, Aruni, Shvetaketu.

**Message of the Bhagavad Gita**

Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War – The anguish of Arjuna – Counsel by Sri. Krishna – Key teachings of the Bhagavad Gita – Karma Yoga, Jnana Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

**Life and Message of Swami Vivekananda**

Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji's life.

**Life and Teachings of Spiritual Masters India**

  
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Sri Rama, Sri Krishna, Sri Buddha, Adi Shankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda.

### **Insights into Indian Arts and Literature**

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

\*Each student shall write a detailed Report/ Critique on one topic leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce.

Alternatively a Student may undertake a Project on any one of the topics and submit a detail Project Report leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. If the topic is related to Performing Arts including Yoga, the performance on stage may be given instead of PPT. In case of Fine Arts, an exhibition or a portfolio may be presented in place of PPT.

**On the basis of the above points, a panel of experts from the department will award the credits.**

**SUBJECT: Open Elective  
SUBJECT CODE:  
CREDITS:3**

**SEMESTER IV:  
SUBJECT: OPERATION MANAGEMENT  
SUBJECT CODE: BBA630A  
CREDITS:4**

### **Course Objective:**

The objective is to provide the basic understanding of the methods and techniques of production and the economics of effective utilization of resources and the techniques employed to ensure the optimum use of resources.

### **Unit I: Introduction to Operations Management**

Definition – differences between operations management and production management – operations and productivity – operations strategy in global environment – using software for productivity analysis – Ethics, social responsibility and sustainability – developing missions and strategies – achieving competitive advantage through operations – strategic planning, core competencies and outsourcing – global operations strategy options.

### **Unit II: Designing operations**

Design of goods and services – product life cycle – generating new products – issues for product design – robust design, modular design, CAD and CAM, virtual reality technology, value analysis, sustainability and life cycle assessment (LCA) - product development

  
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continuum – acquisition, joint ventures and strategic alliances – defining a product – make or buy decisions, group technology – documents for production – service design – process chain network analysis (PCN), documents for service – application of decision tree to product design.

### **Unit III: Quality Management**

Defining quality – quality and strategy – total quality management (TQM) – continuous improvement, six sigma, benchmarking, JIT, Taguchi concepts – Tools of TQM – scatter diagrams, cause-and-effect diagrams – pareto charts – flowcharts – histograms – statistical process controls (SPC) – process capability ratio, process capability index – using software in SPX - role of inspection – TQM in services.

### **Unit IV: Supply Chain Management**

Importance of supply chain strategies – six sourcing strategies – many suppliers, few suppliers, vertical integration, joint ventures, keiretsu networks, virtual companies – supply chain risks – managing integrated supply chain – building the supply base – negotiations, contracting, centralized purchasing, e-procurement – logistics management – distribution management – ethics and sustainable supply chain management – measuring supply chain performance – asset committed to inventory, benchmarking the supply chain.

### **Unit V: Lean operations**

Lean Operations – elimination of wastages, throughput analysis and improving throughput – lean and just in time – lean layout, lean inventory, lean scheduling, lean quality – lean and the Toyota production system – continuous improvement, respect for people, processes and standard work practice – lean organizations – building a lean organization, lean sustainability – lean in services.

### **Course Outcomes:**

CO1: This course introduces the students with the concept and importance of operations management in an organization

CO2: The students will learn different techniques with regard to designing process for a product or a service

CO3: The students will get deep insight into the role of quality and the techniques available in the current age to manage the quality vis-à-vis managing the operations

CO4: The students will be able analyze and evaluate the importance of supply chain management in the current age of digital transformation

CO5: The student will be able understand the growing concept of Lean and lean management and the application in managing the operations in an organization

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i><b>Course Outcome</b></i>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							

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CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Operations Management – Sustainability and supply chain management – Jay Heizer, Barry Render, Chuck Munson and Amit Sachan – Pearson Education
2. Operations and Supply Chain Management – F Robert Jacobs & Richard Chase – Mc Graw Hill Education
3. Operations Management – processes and supply chains – J Krajewski Le and K Malhotra Manoj – Pearson Education

**References:**

1. Supply Chain Management – Sunil Chopra – Pearson Education
2. Lean Management Systems handbook – Rich Charron, James Harrington, Frank Voehl and Hal Viggini - CRC Press
3. Statistical Process Control in automated manufacturing – Bert Keats and Norma Faris Hubele – CRC Press  
Total quality management – Besterfield Dale & Besterfield Carol – Pearson Education.

**SUBJECT: CAMPAIGNS PLANNING**

**SUBJECT CODE: BBA659A**

**CREDITS:4**

**Course Objective:** This course aims to provide students with thorough knowledge of campaign planning. It covers every aspect of campaign planning including identifying its components, analyzing the marketing environment, setting campaign objectives and strategy development, followed by monitoring the campaign and campaign development.

**Unit I: Campaign planning and its components**

Campaign planning – components of campaign planning – creative brief, situational analysis, marketing and communication objectives, communications strategy development, campaign tactics, and evaluation.

**Unit II: Marketing environment**

Analysis of internal marketing environment - planning campaigns – mission, vision, and strategies of organization - organizational structures - internal stakeholders - portfolios of products and services – marketing plans – inform decision making – pros and cons of campaigns. Analysis of external marketing environment - PESTLE analysis - external stakeholders - network analysis - customer & Competitor analysis.

**Unit III: Campaign objectives and strategy**

Recommendation of campaign objectives and strategy - brand building - understanding attitudes and behavior – product launch - customer retention & acquisition - marketing objective - marketing mix - campaign budget setting methods - cost identification and analysis

  
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- human resources - outsourced skills- resource constraints - preparation of media plan for effective campaigning - customer-value proposition - multichannel planning - integration of digital and offline communications tool - buying processes. Support campaign planning - project management - critical path analysis - resource scheduling - Gantt charts - internal support and engagement for the plan - presenting plans - engaging support from management and other stakeholders - internal communication mechanisms scheduling - prompt deliveries.

#### **Unit IV: Monitoring a campaign**

Monitoring a campaign - consumer satisfaction and retention - financial implications and adapting campaigns - performance metrics and KPIs - goal tracking - tracking marketing channels- online/offline measurement tools - customer feedback - real-time monitoring - communication process- effectiveness of media evaluation - evaluating the financials.

#### **Unit V: Campaign development**

The process of developing campaigns for future - collecting feedback from stakeholders - linking of objectives and preparation of reports.

#### **Course Outcomes:**

CO1: The students will obtain an understanding of the basics of campaign planning, its objectives, and strategies.

CO2: The students will be able to undertake an internal and external situational analysis

CO3: The students will get a sound understanding of the principles and methods of monitoring a campaign.

CO4: The student will learn the procedure for undertaking a post-campaign evaluation.

CO5: The students will be able to identify the key aspects for future campaign development.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

#### **Textbooks:**

1. Parente D; Advertising Campaign Strategy A Guide To Marketing Communications Plans; Cengage Learning.
2. Jim Avery; Advertising Campaign Planning; Routledge.
3. Robyn Blakeman; Advertising Campaign Design: Just The Essentials; Taylor & Francis Limited.

  
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**References:**

1. James Mahoney; Strategic Communication: Campaign Planning; Oxford University Press.
2. Ruchi Gupta; Advertising; Scholar Tech Press.
3. Helen Katz; The Media Handbook: A Complete Guide to Advertising Media Selection, Planning, Research, and Buying; Routledge.

**SUBJECT: DIGITAL MARKETING TECHNIQUES****SUBJECT CODE: BBA660A****CREDITS: 4**

**Course Objective:** This course aims to create awareness of the concepts of digital marketing and its impact on modern business. The students will learn the various digital marketing techniques including email advertising, social media advertising, Search Engine Optimization (SEO), Google Adwords and Adsense etc., and will be able to recognize its significance in communicating the value to the customers and building a strong brand for businesses.

**Unit I: Introduction to digital marketing**

Digital marketing – definition – platforms – email marketing – its importance and platforms – creating emails – creating a contact management and segmentation strategy - understanding email deliverability & tracking emails - how to create effective & unique email content, outlining the design of your marketing emails - open rates and CTR of email - drive leads from email - opt-in lists – developing relationships with lead nurturing & automation content marketing - understanding content marketing - generating content ideas - planning a long-term content strategy - building a content creation framework - becoming an effective writer - extending the value of your content through repurposing - how to effectively promote content - measuring and analyzing your content - developing a growth marketing mindset – creating a blog post, creating topic clusters and pillar pages – promotion of blog post – use of infographics in content.

**Unit II: Search Engine Optimization**

Search Engine Optimization (SEO) – meaning and importance - SEO growth in recent years- ecosystem of a search engine - kinds of traffic - keyword research & analysis (free and paid tool & extension) - recent google updates & how google algorithms works on page optimization (OPO) - off-Page optimization. Miscellaneous SEO tools: Google webmaster tools , site map creators , browser-based analysis tools, page rank tools, pinging and indexing tools, dead links identification tools , open site explorer, domain information tools, Quick Sprout, Google My Business.

**Unit III: Google Adwords and Google Adsense**

Google AdWords – fundamentals - account structure - key terminologies in Google AdWords - creating an AdWords account - different types of AdWords and its campaign & ads creation process - ad approval process – keyword match types - keyword targeting & selection (Keyword planner) - display planner - different types of extensions - creating location extensions - creating call extensions - create review extensions - bidding techniques – manual /auto – demographic targeting/bidding - CPC-based, CPA-based & CPM-based accounts - Google Analytics Individual Qualification (GAIQ) - Google AdSense : Understanding ad networks and AdSense's limitations - learning which situations are best for using AdSense - setting up an AdSense account - creating new ad units - displaying ads on a website, configuring channels and ad styles - allowing and blocking ads - reviewing the AdSense



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dashboard - running AdSense reports and custom reports - exporting data - reviewing payee and account settings.

#### **Unit IV: Social media marketing and web analytics**

Social Media Marketing (SMM) - Facebook marketing - Twitter marketing - LinkedIn marketing - Google plus marketing - YouTube marketing - Pinterest marketing - Snapchat marketing - Instagram marketing - social media automation tools - social media Ad Specs - the ROI in social media marketing - tools and dashboards - reputation management - Web Analytics: The need & importance of Web Analytics - introducing Google Analytics - the Google Analytics layout - basic reporting - basic campaign and conversion tracking - Google tag manager - social media analytics - social CRM & analytics - other web analytics tools - making better decisions - common mistakes analysts make.

#### **Unit V: Youtube advertising (Video Ads) & conversions**

Youtube advertising (Video Ads) – meaning – benefits of advertising on Youtube - creating Youtube campaigns - choose the audience for video ads, Instream ads , Invideo ads , In-search ads, In-display ads - measuring your Youtube ad performance - drive leads and sales from Youtube ads conversions: understanding conversion tracking - types of conversions - setting up conversion tracking - optimizing conversions - track offline conversions - analyzing conversion data - conversion optimizer.

#### **Course Outcomes:**

CO1: The students will be able to gain knowledge on digital marketing, email marketing, and content marketing.

CO2: The students will be able to understand Search Engine Optimization tools and techniques.

CO3: The students will be equipped with skills in the creation of Google AdWords & Google AdSense.

CO4: The student will obtain knowledge of social media marketing and web analytics.

CO5: The students will be able to gain knowledge on Youtube advertising & conversions

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

#### **Textbooks:**

  
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1. Damian Ryan & Calvin Jones; Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation; Kogan.
2. Ian Dodson; The Art of Digital Marketing: The Definitive Guide to Creating Strategic; Wiley.
3. Alan Charlesworth; Digital Marketing: A Practical Approach; Routledge.

#### **References:**

1. Melissa S. Barker, Donald I. Barker, Nicholas F. Bormann, Krista E. Neher; Social Media Marketing: A Strategic Approach; South-Western Publications.
2. Dave Kerpen; Likeable Social Media: How to Delight Your Customers, Create an Irresistible Brand, and Be Generally Amazing on Facebook (& Other Social Networks); McGraw Hill Education.
3. Bernoff; Groundswell: Winning In A World Of Social Technologies; Harvard Business Review Press.

### **SUBJECT: DIGITAL OPTIMISATION**

**SUBJECT CODE: BBA663A**

**CREDITS: 4**

**Course Objective:** 1. Analyzing the factors that affect the digital environment of the organization

2. Creating knowledge and skill to optimise digital marketing performance.
3. Learning digital metrics and analytics
4. Knowledge of digital measures to analyse optimization.
5. Digital marketing innovation.

#### **Unit I: Digital Micro& Macro Environment, Digital Ecosystem, Audit Findings**

Evaluate digital analysis tools and frameworks, understand the Digital culture framework such as Readiness, Essentials, Performance, Evaluate the impact and influence on key drivers within the digital environment, inside the organisation, within market sector and among the stakeholders.

Study the new trends in the business models and its impact on the organisation. Discuss the changes taking place in the Email, Websites, Online PR, Search Engine Optimisation, Blogs, Social networks, Online advertising, digital products/services, pricing models, distribution. Understand the changes and emerging trends in digital platform.

Evaluate the digital tools frameworks to evaluate the analysis. Discuss effective techniques of digital market research, Identification of reliable resources of data, Justification of findings through evidence.

#### **Unit II: Digital Environment, Innovation, Impact of Innovation**

Discuss the opportunities and threats within the wider digital environment, elaborate the changes required to be adopted by the organisation, evaluate the business process re-engineering requirements.

Evaluate the impact of wider digital environment on marketing activities, customer experience and ethical issues.

Discuss the digital marketing evolution, role of AI, IOT, connected home, smart cities and crowd sourcing.

Discuss the changes in the consumer behavior due to the innovation in the digital marketing.

  
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### **Unit III: Conversion Rates, Converting Channels, Digital Performance Indicators**

Evaluate the role CRO audit, Online and offline integration, Visuals, copywriting, content Design and UX, online psychology on the conversion ratio

Discuss the converting channels such as measuring A/B testing, Implementation and reporting, return on marketing spend. Discuss on the measures to improve the conversion ratio.

Discuss the digital performance indicators – evaluate the difference between analytics and insights, how to use vanity metrics and discuss the technique measuring return on investment. Elaborate the techniques of creating digital goals and objectives.

### **Unit IV: Optimization Of Digital Marketing, Use Of Data, Assess Digital Matrix**

Discuss the methods of getting integration and improvement of digital marketing activities such as Testing, Different options and Gaining customer feedback

Understand the Marketing automation and establishing trigger points for actions, study Multi-touch attribution modelling and customer touchpoints .

Elaborate the Application of data in improvement planning, evaluate Data versus Key Performance Indicators (KPIs), Use of Landing pages

### **Unit V: Measuring Digital Integration, Maximizing Digital Optimization, Technical Implementation of Monitoring System**

Relevant digital measurement tools, services and methods, Value of measuring digital integration

Integration of digital measurement in organisations, Stages involved in maximising digital optimisation

Use findings to make improvements to marketing plans in the future.

### **COURSE OUTCOMES-**

CO1: Understanding Digital metrics and analytics

CO2: Use of digital optimization

CO3: Assess the Digital Performance indicators

CO4: Analysing Audit Findings.

CO5: Knowing about the weaknesses to improvise marketing plans in future.

### **SUBJECT: CORPORATE GOVERNANCE AND SOCIAL RESPONSIBILITY**

**SUBJECT CODE: BBA633A**

**CREDITS:3**

#### **Course Objective:**

This course aims to provide students with a thorough grounding in a number of key introductory and advanced topics of corporate governance and its relevance for corporate social responsibility. Content includes relevant applied theories, current research, and practice.

#### **Module 1: Introduction**

Definitions and the evolution of Corporate Governance Basic definitions in the field of Corporate Governance and the historical development of Corporate Governance from the Wall Street Crash until nowadays will be discussed.

  
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## Module 2: Parties involved in Corporate Governance

Corporate Governance is based on the relationship of many players (such as shareholders, management and board of directors, stakeholders) involved in governing of a corporation. This meeting is devoted to discuss their rights, duties and responsibilities.

## Module 3: Corporate Governance Theories

Organizational Theories (including Stewardship, Resource and Institutional Theory), Economic Theories (such as Agency, Finance and Managerial Theory) and the Stakeholder Theory will be presented on this meeting

## Module 4: Corporate Social Responsibility (CSR)

CSR is about how business takes account of its economic, social and environmental impacts in the way it operates – maximizing the benefits and minimizing the downsides. The course discussion will be based on these issues, Corporate Social Responsibility in India, Recent developments

## Module 5: The International Environment for Corporate Governance

International Corporate Governance. OECD and BIS Principles. Implementation. Pitfalls. Final Review. The International Environment for CG

### Course Outcomes:

CO1: Distinguish the various expectations and demands that emanate from stakeholders on business firms.

CO2: Corporate Governance is based on the relationship of many players.

CO3: Define governance in business and recognize the legitimacy of business as an institution in a global society.

CO4: Describe the ethical and current social responsibility issues and the influence of these issues on society.

CO5: International Corporate Governance

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

### Textbooks:

1. Harsh Srivastava, "The business of social responsibility," books for change
2. CV. Baxi and Ajit Prasad, "Corporate social responsibility – concepts and cases," Excel
3. Dr. M. Mahmoudi, Global strategic management," Deep & Deep Publications Pvt. Ltd.

  
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**Reference Books:**

1. S K. Bhatia, `` International Human resource management – Global perspective,’’ Deep & Deep Publications Pvt. Ltd.
2. J.P. Sharma, ``Governance, Ethics and Social responsibility of business, ‘Ane books Ltd.
3. Kotler Philip and Lee Nancy, `` Corporate social responsibility; doing the best for your company,’’ John Wiley
4. Simpson, Justine and Taylor, John R, `` Corporate Governance Ethics and and CSR,’’ Kogan Page Publishers
8. Velasquez Manuel G, Business Ethics: Concepts and Cases, Pearson
5. Fernando A.C.: Business Ethics, Pearson Education

**SUBJECT: LEADERSHIP SKILLS****SUBJECT CODE: BBA641A****CREDITS: 2****Course Outcomes:**

On successful completion of this course, the students will be able:

CO1: To know the role, functions and different styles of leadership

CO2: To know and apply the theories of leadership

CO3: To know the meaning of power and politics in context of leadership

CO4: To make the students aware about developing leadership skills in themselves

CO5: To make the students aware about different and innovative leadership

**Unit I: Introduction to Leadership:**

Leadership, role and functions of a Leader, Leadership motives Characteristics of an Effective Leader, Leadership as a process – the complexities of leadership – Effective leadership behaviors and attitudes – Leadership and power, coercion, Management, Trait approach, Leadership Behaviour and styles – Lewins Leadership styles, Ohio state Leadership study, The University of Michigan Study, Blake and Moutons Managerial Grid.

**Unit II: Leadership Theories:**

Traditional Theories (A Brief Overview) • Trait Theory • Behavioral Theories • Fiedler's Contingency Model • Path – Goal Leadership Theory • Situational Leadership Theory • The Managerial Grid Modern Theories • Charismatic Leadership • Transactional and Transformational Leadership • Substitutes for Leadership • Authentic Leadership

**Unit III: Power and Politics:**

Meaning Power, Distinction between Power & Authority, Bases or Sources of Power, Acquisition of Power, Symbols of Power and Powerlessness, Organizational Politics, Reasons for Organizational Politics, Managing Organizational Politics

**Unit IV: Developing Leadership Skills:**  
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What Skills do Leaders Need? ;Leadership Training Programs, Designing Effective Training ,Special Techniques of Leadership Training: Behavior Role Model, Case, Discussion and Business Games & Simulation, Challenges in designing training programmes

### **Unit V: Innovative Leadership and Design Thinking**

Innovative Leadership, Concept of emotional and social intelligence , Synthesis of human and artificial intelligence , Why does culture matter for today's global leaders , Design Thinking ,What is design thinking, Key elements of design thinking: - Discovery - Interpretation - Ideation - Experimentation - Evolution. , How to transform challenges into opportunities? How to develop human-centric solutions for creating social good

#### **Reference books:**

1. Leadership in Organizations: Gray Yukl, Pearson Education (Sixth Edition)
2. Sham Lal. Indian Realities in Bits and Pieces, Rupa and Co. New Delhi
3. Surendra Kumar & Pradeep Kapur. India of My Dreams, Academic Foundation, New Delhi
4. Nissam, Urlah. India: Economic, Political and Social Issues
5. Drucker, Peter and Maciariello, Joseph: 366 Days of Insight and Motivation for Getting the Right Things Done: Rutledge

**SUBJECT: OPEN ELECTIVE\***  
**SUBJECT CODE:**  
**CREDITS: 3**

**Life Skills 2 (Aptitude)**  
**Subject Code: DEN004A**  
**Credits: 2**

#### **Course Objectives:**

  
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1. Students will be able to interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience.
2. Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
3. Students will be able to reason, model, and draw conclusions or make decisions with mathematical, statistical, and quantitative information.
4. Students will be able to critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
5. Students will be able to use appropriate technology in a given context.

**Course Outcomes (CO):** At the end of this course students will have:

CO1: Demonstrate procedural fluency with real number arithmetic operations and use those operations to represent real-world scenarios and to solve stated problems. Demonstrate number sense, including dimensional analysis and conversions between fractions, decimals, and percentages. Determine when approximations are appropriate and when exact calculations are necessary.

CO2: Solve linear equations, graph and interpret linear models, and read and apply formulas. Demonstrate a basic understanding of displays of univariate data such as bar graphs, histograms, dotplots, and circle graphs, including appropriate labeling.

CO3: Take charge of their own learning through good classroom habits, time management, and persistence. Participate in the classroom community through written and oral communication.

**Syllabus: Theory**

UNIT 1	<p>Number System:</p> <ol style="list-style-type: none"> <li>a. Number system</li> <li>b. Power cycle</li> <li>c. Remainder cycle</li> <li>d. Factors, Multiples</li> <li>e. HCF and LCM</li> </ol>
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UNIT 2	<p>Data Arrangements and Blood Relations:</p> <ul style="list-style-type: none"> <li>a. Linear Arrangement</li> <li>b. Circular Arrangement</li> <li>c. Multi-dimensional Arrangement</li> <li>d. Blood Relations</li> </ul>
UNIT 3	<p>Time and Work:</p> <ul style="list-style-type: none"> <li>a. Work with different efficiencies</li> <li>b. Pipes and cisterns</li> <li>c. Work equivalence</li> <li>d. Division of wages</li> </ul>
UNIT 4	<p>Coding &amp; Decoding, Series, Analogy, Odd Man Out and Visual Reasoning:</p> <ul style="list-style-type: none"> <li>a. Coding and Decoding</li> <li>b. Series</li> <li>c. Analogy</li> <li>d. Odd Man Out</li> <li>e. Visual Reasoning</li> </ul>
UNIT 5	<p>Percentages, Simple Interest and Compound Interest:</p> <ul style="list-style-type: none"> <li>a. Percentages as Fractions and Decimals</li> <li>b. Percentage Increase / Decrease</li> <li>c. Simple Interest</li> <li>d. Compound Interest</li> </ul>

	e. Relation Between Simple and Compound Interest
UNIT 6	Permutation, Combination and Probability: a. Fundamental Counting Principle b. Permutation and Combination c. Computation of Permutation d. Circular Permutations e. Computation of Combination f. Probability
UNIT 7	Data Interpretation and Data Sufficiency: a. Data Interpretation – Tables b. Data Interpretation - Pie Chart c. Data Interpretation - Bar Graph d. Data Sufficiency

UNIT 8	Profit and Loss, Partnerships and Averages:  a. Basic terminologies in profit and loss  b. Partnership  c. Averages  d. Weighted average  e. Mixtures and allegations
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### Methodology for Evaluation

#### 1. Internal Assessment

a) Class/ Home Assignments (Minimum One from each Unit) : 30 Marks

b) In Semester Tests (Minimum two) : 30 Marks

#### 2. Term End : 40 Marks

\*Note: Minimum one class assignment shall be given in each turn in the Lab which will be attempted by the students in the class itself and evaluated by the end of the day. Balance work shall be completed at home and submitted at the beginning of the next turn in Lab.

### Suggested Reading:

1. Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;
2. The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;
3. How to Ace the Brainteaser Interview, by John Kador, Mc Graw Hill Publishers.
4. Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
5. Quicker Maths, by M tyra& K Kundan, BSC Publishing Co. Pvt. Ltd., Delhi;
6. Owl Purdue University online teaching resource

### Semester V:

**SUBJECT: INTERNATIONAL BUSINESS MANAGEMENT**

**SUBJECT CODE: BBA634A**

  
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## CREDITS: 4

**Course Objective:** The Objective is to provide the understanding of the international business environment and its competitive and investment climate and also would provide knowledge of international business and finance activities of the organization and the investigation of changes in firms strategies and accounting policies as per the change in business environment and also the understanding of various aspects of international trade, finance and currency derivatives.

### **Unit I: International business: An Overview**

Understand the evolution of international trade theories, Introduction to Forex Markets: Absolute advantage, Relative advantage, and H-O theory, Leontief Paradox, Porter's Diamond paradox; Foreign Exchange (Forex) Market, Communication in Forex Markets, Currency Quotes- both in global and domestic market, calculation of forward rates using spot rates, calculation of discount/premium on spot rate using spot and forward rates, Spot Rates with and without transaction costs.

### **Unit II: Principles and monetary systems of international trade**

Understand the theories of absolute cost advantage, comparative cost advantage theory, Interest rate Parity, PPP Principle, International Fisher Effect, The International Monetary System: Bretton Wood system, Exchange Rate Regimes, International Banking, Concept and Development of Universal banking, Global depository receipt, Indian depository receipt.

### **Unit III: Exposure of currency and its measurement**

Understand the fundamental functions of currency Exposure and its Management: Types of Forex Exposures: Transaction, Translation, and Economic Exposure and their management; Country Risk-Analysis and Management. Multinational payments Management: Leading, Lagging, Pooling and Netting, foreign exchange risk management system.

### **Unit IV: Financial derivatives**

Understanding the factors influencing costs and benefits of FDI, Financial Derivatives with respect to currency: Forwards and Futures, Interest rate futures and currency futures; Determination of forward and futures prices; Options and related terminology, Calculating the pay-off from options and its representation.

### **Unit V: Pricing & Its strategies**

Understanding on Pricing of Options- Binomial model and Black-Scholes model; trading strategies involving options; Introduction to Swaps, Interest rate swaps, currency swaps, cross currency swaps; Forward rate agreements (FRA). Interest rate caps, floors, collars, cost-oriented export pricing methods and market- oriented export pricing methods.

### **Course Outcomes:**

CO1: This course introduces the students with the understanding about the international business theories and introduction to forex markets.

CO2: The students will learn the different approaches used in the international monetary systems.

CO3: The students will get a sound understanding of the various financial derivatives and foreign direct investments.

CO4: The student will get a deep analysis of the various financial pricing techniques held in use for international trade.

CO5: The student will understand the impact of methods and principles introduced in international finance.

  
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**Textbooks:**

1. Francis cherunilam, *International business*,
2. Charles W.L. Hill and G. Thomas M. hult, *International business*
3. John H. dunning, *Governments, globalization and International business*

**Reference Books:**

1. Paul R. Krugman and Maurice Obstfeld, *International Finance: Theory & Practice*.

**SUBJECT: LEGAL ENVIRONMENT FOR BUSINESS****SUBJECT CODE: BBA635A****CREDITS: 3**

**Course Objective:** To understand various laws applicable in India i.e. Contracts Act, Special Contracts, Partnerships, LLP's, companies etc. On completion of this course, learners will be able to: appreciate the relevance of business law to individuals and businesses and the role of law in an economic, political and social context.

**Unit I: (Law of Contracts, Special Contract, Indemnity & Guarantee)**

The Indian Contract Act, 1872 - Definition of contract -Law of contracts - Nature of contract - Classifications - Essential elements of a contract Offer and acceptance, consideration, capacity of parties- Minors-persons of unsound mind-persons disqualified by law- Free consent, legality of object and consideration, performance of contract, discharge of contract, breach of contract, remedies for breach of contract-Quasi contract- Performance. Special Contracts - Bailment and Pledge- Bailment Definition Essential elements Rights and duties of bailor and bailee Finder of lost goods. Pledge Essentials Rights and duties of Pawner and Pawnee. Indemnity and Guarantee- Indemnity - Definition, nature of liability of surety, rights of surety, discharge of surety. Meaning and definition of guarantee.

**Unit II: (Law of Agency & Sale of Goods Act)**

Essentials, kinds of agents, rights and duties of agent and principal, creation of agency, termination of agency-Sub agents and substituted agents-Relationship. **Sale of Goods Act, 1930** Formation of contract of sale - Essentials of contract of sale goods and their classifications- Conditions on warranties Transfer of property in goods Performance of contract of sale Unpaid seller and his rights

**Unit III: (The Indian Partnership Act 1932, The Limited Liability Partnership)**

Nature- rights and duties of partners- Registration and dissolution of firms- **The Limited Liability Partnership Act 2008**- Introduction- nature and scope- features- incorporation and differences with other forms of organization.

**Unit IV: (Companies Act and its Basics)**

- Company - Definition – Characteristics – Classifications –History and framework of Company Law in India - Companies Act 2013 - one person company, small company, associate company, dormant company, producer company; association not for profit; illegal



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association. Promotion and formation of a company- Body Corporate - promoter- legal position-duties remuneration- Memorandum of Association – Articles of Association - Contents and alteration -Incorporation of Company - On-line registration of a company – CIN - Companies With Charitable Objects - Doctrines of Indoor Management, Constructive Notice, Ultra-vires - Lifting up of Corporate veil - Conversion of Companies. Share Capital – Types - Public Offer - Private Placement - Prospectus - Contents of Prospectus – Types of prospectus – Deemed prospectus - Shelf Prospectus - Red Herring Prospectus - Abridged prospectus-Liability for Misstatements in Prospectus – Issue and Allotment of Securities – Types - Voting Rights –DVR- Application of Premiums - Sweat Equity Shares - Issue and Redemption of Preference Shares-Transfer and Transmission of Securities- Punishment for impersonation of Shareholder - Further Issue of Share Capital- Bonus Shares- Debenture Issue

### **Unit V: (Membership in company and meetings)**

Modes of acquiring membership-rights and liabilities of members- cessation of membership- Register of Members - Company meetings – Annual General Meeting - Extraordinary General Meeting- Notice Of Meeting - Quorum - Chairman - Proxies - Voting -Show of Hands – E-Voting - Poll- Postal Ballot- Motions - Resolutions - Types - Minutes - Books of accounts - Annual Return- Directors - Types - legal position – Appointment - Duties – Disqualifications- DIN - Vacation of Office - Resignation - Removal - Meetings of Board - Resolutions and Proceedings- Powers of Board - Key Managerial Personnel- CEO- CFO - Audit and Audit Committee – related party- transactions - Corporate Social Responsibility- Winding up - Contributory – Modes of winding up - Winding Up by Tribunal - Petition for Winding Up- Powers of Tribunal- Liquidators - Appointments- Submission of Report - Powers and Duties - Effect of Winding Up Order- Voluntary Winding Up - Circumstances - Declaration Of Solvency - Meeting of Creditors- Commencement of Voluntary Winding Up- Appointment of Company Liquidator- Final Meeting and Dissolution of Company Official Liquidators – Appointment -Powers - Functions - Winding up of unregistered companies.

### **Course Outcomes**

CO1: Ability to apply knowledge of Indian Contract Act, Sale of Goods Act, Partnership Act and LLP. Ability to identify, and solve legal issues in connection with business.

CO2: Identify the fundamental legal principles behind contractual agreements.

CO3: Know about the concept of company and shares.

CO4: Know about the application of company law in India. Understand the use of the memorandum of association and article of association in a company, they also learn from this course.

CO5: Use of various documents and forms in a company. Understand the relationship between company and its stakeholders.

## **SUBJECT: CORPORATE STRATEGY**

**SUBJECT CODE: BBA636A**

**CREDITS: 4**

**Course Outcomes:** On successful completion of the module students will be able to:

1. Analyze and evaluate critically real-life company situations and develop creative solutions, using a strategic management perspective.

  
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2.To enable students to know and develop strategies for business to remain competitive

### **Unit I: Introduction to Strategy**

Concepts of strategy, Environmental issues (PESTLE), SWOT analysis, The internal resources, capabilities and competences of an organization, Strategic choices

### **Unit II: Managing growth and scale**

Strategic management process, Environment and Organizational Appraisal, Strategic Business Unit and levels of strategy.

### **Unit III: Strategy Formulation**

Industry life Cycle analysis, Corporate level strategies, Expansion and Stability, Integration and Diversification, Internationalization, Co-operative and Digitalization, Business Level Strategies, Cost leadership, Differentiation, Focus business strategy, Introduction to functional Level Strategies-Marketing, Financial, HRM, Product, Research and Development

### **Unit IV: Strategy Analysis and Implementation**

Process of Strategic Choice, Strategic Analysis, Mckinsey 7s , Porters five forces model BCG Matrix, Nature of Strategy implementation and barriers to strategy implementation

### **Suggested Reference Books:**

1. Strategic Management by Kazmi
2. Entrepreneur Development New Venture Creation Satish Taneja and S.L Gupta Galgotia Publication
3. Entrepreneurship Management; Dr. Aruna Kaulgud; Thomson Publication
4. Essentials of Entrepreneurship and small business Management; Thomas Zimmerer and Norman S; Pearson Publication
5. Websites of corporates

**SUBJECT: CUSTOMER RELATIONSHIP MANAGEMENT**

**SUBJECT CODE: BBA639A**

**CREDITS: 3**

### **Course Outcomes:**

On successful completion of this course, the students will be able:

CO1: To be aware of the nuances of customer relationship

CO2: To analyze the CRM link with the other aspects of marketing

CO3: To impart the basic knowledge of the Role of CRM in increasing the sales of the company

  
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CO4: To make the students aware of the different CRM models in service industry

CO5: To make the students aware and analyze the different issues in CRM

### **Unit I: Evolution of Customer Relationship**

CRM- Definition, Emergence of CRM Practice, Factors responsible for CRM growth, CRM process, framework of CRM, Benefits of CRM, Types of CRM, Scope of CRM, Customer Profitability, Features Trends in CRM , CRM and Cost-Benefit Analysis, CRM and Relationship Marketing.

### **Unit II: CRM Concepts**

Customer Value, Customer Expectation, Customer Satisfaction, Customer Centricity, Customer Acquisition, Customer Retention, Customer Loyalty, Customer Lifetime Value. Customer Experience Management, Customer Profitability, Enterprise Marketing Management, Customer Satisfaction Measurements, Web based Customer Support.

### **Unit III: Planning for CRM**

Steps in Planning-Building Customer Centricity, Setting CRM Objectives, Defining Data Requirements, Planning Desired Outputs, Relevant issues while planning the Outputs, Elements of CRM plan, CRM Strategy: The Strategy Development Process, Customer Strategy Grid.

### **Unit IV: CRM and Marketing Strategy**

CRM Marketing Initiatives, Sales Force Automation, Campaign Management, Call Centres. Practice of CRM: CRM in Consumer Markets, CRM in Services Sector, CRM in Mass Markets, CRM in Manufacturing Sector.

### **Unit V: Challenges of CRM Implementation**

CRM Planning and Implementation Issues and Problems in implementing CRM, Information Technology tools in CRM, Challenges of CRM Implementation. CRM Implementation Roadmap, Road Map (RM) Performance: Measuring CRM performance, CRM Metrics.

Text Books:

1. Francis Buttle, Stan Maklan, Customer Relationship Management: Concepts and Technologies, 3rd edition, Routledge Publishers, 2015
2. Kumar, V., Reinartz, Werner Customer Relationship Management Concept, Strategy and Tools, 1st edition, Springer Texts, 2014

  
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#### Reference Books:

1. Jagdish N.Sheth, Atul Parvatiyar & G.Shainesh, “Customer Relationship Management”, Emerging Concepts, Tools and Application”, 2010, TMH.
2. Dilip Soman & Sara N-Marandi,” Managing Customer Value” 1st edition, 2014, Cambridge.
3. Alok Kumar Rai, “Customer Relationship Management: Concepts and Cases”, 2008, PHI.
4. Ken Burnett, the Handbook of Key “Customer Relationship Management”, 2010, Pearson Education.
5. Mukesh Chaturvedi, Abinav Chaturvedi, “Customer Relationship Management- An Indian Perspective”, 2010 Excel Books, 2nd edition

### **SUBJECT: Marketing & Digital Strategy**

**SUBJECT CODE: BBA661A**

**CREDITS: 4**

#### **Course Objective:**

1. To understand micro and macro environment analysis and the required inputs for strategic decision.
2. The learners will be able to understand how businesses achieve competitive advantage
3. To make learners understand about the resource requirement for delivering the strategic marketing plan including digital strategy.
4. To make learners understand about the strategic approach to marketing planning.
5. To make learners understand the risk assessment procedure of organisation.

#### **Unit I : Environment Analysis, Resources and Competences, Marketing Analysis Techniques**

PESTEL, Porter’s five forces, SWOT analysis , types of market orientation, organisation’s culture using cultural web model, leadership style and management style, Differentiate about core and threshold competences and resources, Explain about long termism and ethics in marketing, Identify ways to achieve competitive advantage , Analysis of online and offline activity, Understanding the current skill requirement and challenges faced by the organisation in gathering the data and analysing it, Determine the barriers to competitive advantage , Compare and contrast between conventional and disruptive marketing models, Explain the concepts of having social presence.( 12 hours )

#### **Unit II: Environmental Audit, Market Analysis,Digital Marketing**

Concepts of AAA Bottom line audit , Social and Environmental Footprints , Difference between social and environmental Audit, ISO 140001 , Research Methodologies for Online and Offline Marketing Audits , Evaluate the changes in market conditions and demand , Guerrilla marketing , online and offline marketing environment. impact of digital market environment and its capabilities and limitations, concept of MIS, Identify and recommend about the risk and barriers and ways to overcome it in market planning.(10 hours)

#### **Unit III : Goals, Strategic Marketing Plan, Market Strategic Decisions**

  
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Explain the relationship between objectives, mission and vision statement of an organization. Explain about the elements of marketing objectives, digital strategy models such as Monday, Hive, clickup etc , nine key elements of brand strategy. how to develop strategic marketing plans with reference to strategic marketing framework. Construct profit and sales projections.

Explain the concept of one-to-one marketing. Evaluate the suitability, feasibility and acceptability of strategic marketing decisions.

Discuss about different groups of stakeholders and their expectations using Mendelow's matrix.

Explain market intelligence and organizational dynamics.

Calculate the return on investment and interpret.

#### **Unit IV: 7Ps, Implementation of Marketing Strategy**

How to develop a successful marketing mix strategy and understand the marketing mix models developed by Mc Carthy 4 P's and the later extension into 7p's

Compare and contrast between traditional and digital marketing communication

Identify the four steps involved in digital marketing strategy framework and steps to develop the action plan for traditional and digital marketing strategies.

Understand the regulatory and legal factors.

Explain the resource and competence requirements for implementation of strategy.

Define the scope of other alternatives like outsourcing, franchising and other agencies.

Explain the concept of CSF.

#### **Unit V: Risk, Financial And Non-Financial Indicators, Post-Implementation**

Explain risk, how to assess the risk faced by an organisation and ways adopted to mitigate with it. Explain the response of organisational risk towards risk. Explain the social and ethical aspects of risk assessment process. Calculate and interpret ratio analysis.

Determine the KPI's for CSF's and evaluate.

Explain steps involved in project planning.

Identify and explain other technical aspects of measuring and monitoring system of implementation. Define strategic gap and ways to reduce it. Explain methods involved in analyzing the post-implantation stage and how to deal with it. Identify different methods of collecting data.

### **COURSE OUTCOMES**

CO1: Ability to apply knowledge for financial and Non-Financial Indicators

CO2: Know about the Marketing Strategy in digital marketing

CO3: Identify the Goals and Objectives of Companies and implementing the strategies according to that.

CO4: Knowing the Risk factors in business and market.

CO5: Knowing the difference between Micro and Macro Environment.

**SUBJECT: Innovation in Marketing**

**SUBJECT CODE: BBA662A**

**CREDITS: 4**

**Course Objective:**

  
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1. Creates understanding to develop innovation to deal challenges.
2. Understand the key factors to develop innovation in marketing function.
3. Ability to use internal and external marketing.
4. Ability to understand the case related to innovation of marketing
5. Develop plan for communication of innovation.

### **Unit I: Business Opportunities & Challenges, Study of Innovation, Implementing Innovation**

Evaluating Environmental scanning, trends, discovery theory, Disruptive innovation and digital disruption, Emerging economies and innovations, Competitive advantage – new competitive approaches. Evaluate Intuitive, ‘gut feel’, insights, Discovery-driven planning, Traditional business plans, Developing business models, Internal and external approaches, Business process re- engineering. Identification of challenges like External environmental factors, Competition, Leadership buys, Budget/Capital requirements, Resistance to change.

### **Unit II: Types Of Innovation, Innovative Organisation, Factors Developing Innovative Approaches**

Discuss the salient features of most innovative organization such as Vision and styles of leadership, Organizational structures, Key individuals, and team working, Creative climate/culture, External focus – market orientation, boundary spanning and networks

- Invention, creativity and innovation
- Disruptive and sustaining innovations
- Product, process and platform innovation
- Open and closed approaches to innovation
- Radical and incremental forms of innovation
- Market pull vs. technology push
- Business model innovation

Discuss and evaluate Cross-functional and self-managing teams, Role of Learning, training and development in building innovation, Information sharing, Support of innovative business models, use of Adaptive/flexible approaches, Use of appropriate market research techniques and sources of information and Use of innovation networks.

### **Unit III : Customer Relationship, Options For Innovation, Service Development**

Study various innovative approaches such as Generating ideas, Screening, Business analysis, Development of a small-scale trial, Testing techniques, Commercial launch, Effective exit routes for unsuccessful ventures to enhance the service development

Discuss the methods to build better customer relationship idea goras, crowdsourcing, online forums and other open platforms, conducting user trials, involving leading practitioners, supplier engagement, round table conferences.

  
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- Product/service/process/programme Business model
- Out-sourced vs internally implemented
- Adaptable/flexible/agile Benchmarking
- Collaborative/partnerships

Assessing acceptability, feasibility or suitability

#### **Unit IV: Innovation Proposal, Business Case For Change, Launch Of Innovative Approaches**

Assessing the risks and benefits of an innovation proposal

Discuss the risks and benefits of the proposal - Strategic/operational/tactical, Financial, Reputational, Competition

Understand the Factors driving change and the Scope of change required, evaluating the need for change and commitment from stakeholder groups, Structure the business case and Project proposal

Understand the Background of the business plan, choosing right research techniques, Selection of relevant sources of information. Setting the objective and creating a strategy and tactics, action and evaluating measurement criteria.

#### **Unit V: Measuring Success, Support Chosen Innovation, Cultural Change And Innovation Options**

Discuss the impact of Current organisational culture, Levels of trust and openness, Space and support for ideas, Attitudes to risk taking, Degrees of freedom to experiment, Fit with business strategy, Strategies for culture change, Development of a culture for managing risk

- Internal communication plans
- External communication plans
- Target audiences
- Key messages
- Implementation
- Evaluation and measurement criteria
- Agency relationships

Discuss and evaluate - Soft and hard measures of success, Achievement of objectives, ROI, Metric dashboards, Latest trends in metrics and their impact.

#### **COURSE OUTCOMES-**

CO1: Knowing about the strengths and weaknesses of organisation.

CO2: Ability to cope up with the challenges of innovation.

CO3: Knowing the qualities of innovative organisation.

CO4: Understanding different factors that support innovation.

CO5: Understanding Innovation in Customer Relationship.

**SUBJECT: Digital Customer Experience**

**SUBJECT CODE: BBA650A**



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## **CREDITS: 4**

- Course Objective:**
1. Develop skills to take strategic decisions.
  2. Understand the digital customer and take decisions accordingly.
  3. Management of digital channel selection
  4. Understand the legal compliance involved in digital technology
  5. Learning how to improve the digital experience of customers.

### **Unit I : Channel Goals, Channel Selection, Digital Customer Persona**

Explain the framework for setting business objective, define the purpose and mission, Setting goals for different channels, methods of customer acquisition, efforts to be taken for customer retention, Customer conversion, gathering and understanding customer experience , Efforts to attain organisation growth

Identification of qualities of an appropriate channel for the set objective, factors contributing to the success of the channel, Common mistakes – cautions to take, Types of channel, identification of target audience, Channel planning, selection of persons to handle the channel, risk involved in relation to channel usage.

Evaluate the various sources of customer data, identify online research sources, collection of customer behaviour, identifying current and changing consumer behaviour, importance of abandoned cart items, searching and browsing history, Technique of identifying consumer personas.

### **Unit II: Customer Awareness, Customer Experience Management, Media Channels**

Using customer insight research techniques – qualitative and quantitative data, using AI, machine learning, social media shares and mentions, customer surveys, internal analytics from web properties, internal analytics, crowd sourcing, sentiment analysis. Evaluate customer awareness through Digital Marketing Mix – paid, shared, owned and earned, Ad copy and creative – qualities, tactics of good ad copy, Content marketing to create customer awareness, Keyword and market trends research, Keyword journey (generic vs long tail terms). Introduction and uses of website and various types of landing pages, Digital communications, Affiliate marketing, discussion on risks and constraints and budget planning. Selection of resources – distinguish between In-house vs agency, Brief understanding of Consultants and Briefing Agencies.

### **Unit III: Identifying Customer Behaviour, Legal Compliances Of Digital Campaigns**

Management of Recommend KPIs, dashboards and reports for assessing channels, Describe options and tools for monitoring channels, details of Attribution modelling, distinguish between Influencer channels vs converting channels.

Brief discussion on Data protection, international privacy law, Industry codes of practice, Disability and discrimination, Brand and trademark protection, Intellectual property rights, Contract law, Online advertising law, Content, copyright, media, Channel terms and conditions.

Usages of best practices to avoid legal complications during data collection, precautions to take during email and SMS campaigns, privacy statements, cookies, spam, opt-in.

### **Unit IV: Consumer Journey Through Digital Experience**

  
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Discuss the role Websites, key phrase analysis and selection Search engine optimisation (SEO), Search engine marketing (SEM) in understanding consumer behaviour and there by developing customer acquisition and conversion.

Discuss the role of paid search or pay per click marketing (PPC), Blogs, Online PR, partnerships/affiliates, online communities, Email, Social media, Content marketing, user generated content in understanding consumer behaviour and there by developing customer acquisition and conversion.

Understanding Customer journey by mapping his search across multiple medias like mobile, tablet, desktop, planning of relevant content audit, content planning and content calendars, Techniques of The Honeycomb model for social media strategy, Social listening and sentiment analysis

#### **Unit V: Evaluating User Experience, Efforts To Improve Customer Experience**

Use of various techniques in evaluating user experience -website structure, navigation and design, User experience (UX), Impact of social media

Understanding the level of personalization, usability, changing purchase behaviour, pay by mobile, wearable

Discuss user experience testing methods, evaluate and analyse campaign on the basis of the test, objective of improvements to customer experience, Strategic options to improve customer experience. Resource allocation and budgeting to improve customer experience.

#### **COURSE OUTCOMES-**

CO1: Acquiring the knowledge of digital customer

CO2: Able to develop the skills of customer experience


CO3: Understanding Digital Campaigns

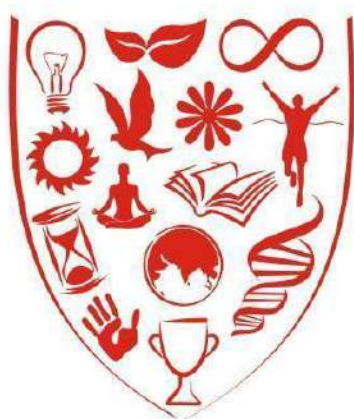
CO4: To know about the legal compliances of digital campaigns

CO5: Knowledge of precautions to be taken during digital campaign

#### **Semester VI:**

**SUBJECT: INTERNSHIP**  
**SUBJECT CODE: BBA899A**  
**CREDITS: 16**

  
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**Syllabi and Course Structure**

**Bachelor of Business Administration**

**Finance and Leadership (CIMA)**

**Academic Programmes**

**Batch (2022-2025)**

**Summary Sheet**

Semester	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	Total	Min. Credit req. for degree
Credit	25	27	26	27	26	16	148	*10% Relaxation on MOOC, NPTEL, and SWAYAM.

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Type	Foundation	Core	Specialization	Interdisciplinary	General
Total Credit	34	45	35	10	24

FIRST SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BBA615A	Principles of Management	3	1	-	4	F
BBA616A	Business Mathematics & Statistics	3	1	-	4	F
BBA617B	Business Economics	4		-	4	F
BBA618A	Fundamentals Of Management Accounting	3	1	-	4	F
BBA619A	Fundamentals Of Financial Accounting	3	1		4	F
DEN001A	Communication Skills	3		-	3	G
DIN001A	Culture Education – 1	2	-	-	2	G
	<b>TOTAL</b>	<b>21</b>	<b>4</b>		<b>25</b>	

  
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<b>SECOND SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA620A	Organization Behavior	4	-	-	4	F
BBA621A	Principles of Marketing Management	4		-	4	C
BBA622A	Human Resource Management	4	-	-	4	C
BBA623A	Managing Finance In A Digital World	3	1	-	4	S
BBA624B	Excel Foundations	2	-	2	3	ID
DEN002A	Professional Skills	3	-	-	3	G
DIN002A	Culture Education – 2	2	-	-	2	G
DCH001	Environmental Studies	3	-	2	4	F
	<b>TOTAL</b>	<b>25</b>	<b>1</b>	<b>4</b>	<b>28</b>	

<b>THIRD SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA675A	<b>Management Accounting (Cima P1)</b>	4			4	S
BBA676A	<b>Financial Reporting Cima F1</b>	4			4	S
BBA627A	Research Methodology	3	1		4	F
BBA628A	Human Resource Development	4			4	C

  
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BBA629A	Comp. Applications III (MS Project)	3			3	ID
***	Open Elective	3			3	G
DEN003A	Life Skills - 1 (Personality Development)	2			2	G
DIN003A	Value Education -1	2			2	G
	<b>TOTAL</b>	<b>25</b>	<b>1</b>		<b>26</b>	

<b>FOURTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA630A	Operation Management	4	-		4	S
BBA677A	<b>Managing Performance – Cima E2</b>	4			4	S
BBA678A	<b>Advanced Management Accounting (P2 Cima)</b>	4			4	C
BBA681A	<b>Strategic Management (E3 Cima)</b>	4	-	-	4	S
BBA633A	Corporate governance and Social responsibility	3	-		3	F
BBA641A	Leadership Skills	2	-	-	2	C
***	Open Elective	3	-		3	G
DEN004A	Life Skills - 2 (Aptitude)	2	-		2	G
DIN004A	Value Education – 2	1	-		1	G

  
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	<b>TOTAL</b>	<b>27</b>			<b>27</b>	
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<b>FIFTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA634A	International Business Management	4	-	-	4	C
BBA635A	Legal Environment for Business	3	-	-	3	ID
BBA636A	Corporate Strategy	4	-	-	4	C
BBA639A	Customer relationship management	3	-	-	3	C
BBA679A	<b>Advanced Financial Reporting Cima F2</b>	4	-	-	4	S
BBA680A	<b>Strategic Management (E3 Cima)</b>	4		-	4	S
BBA682A	<b>Risk Management (P3 - Cima)</b>	4		-	4	S
	<b>TOTAL</b>	<b>26</b>	<b>-</b>	<b>-</b>	<b>26</b>	

<b>SIXTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BBA899A	Internship	-	-	32	16	G
	<b>TOTAL</b>	<b>-</b>	<b>-</b>	<b>32</b>	<b>16</b>	

**Program Educational Objective (PEO)- BBA Finance and Leadership**

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- I. Develop leadership skills, creativity and entrepreneurship
- II. Analyse and develop solutions for business problems and issues by integrating knowledge from various disciplines.
- III. To be able to take effective decisions in the organisation with respect to a dynamic business environment.
- IV. Enabling success through technology and other modern digital finance techniques.
- V. Demonstrating professional expertise and possessing deep level of knowledge and commitment to the area of practice

**Program Outcome (PO) – BBA Finance and Leadership**

**PO 1:** An understanding of the knowledge of finance, accounting, reporting, quantitative analysis and statistics, Human Resource management, Technology and Management topics to enable the students to apply the topics to short term business decision making.

**PO2:** Enables the students to identify and develop appropriate strategies that can be used for different business circumstances by integrating knowledge from various disciplines – effective leadership, organizational management, competencies and skills management, cultural and behavioral analysis.

**PO3:** Application of management accounting tools and technical to assist the management in planning and decision making

**PO 4:** Enable the students to understand the governance practices followed globally and the importance of ethical practices and ethical code of conduct in finance and accounting profession

**PO 5:** Demonstrate the importance of IT systems enabling success in Operations management, Finance management, HR Management, Customer Relationship Management, Project Management

**PO 6:** Enables students to understand the importance of Governance, Regulations and Legal compliances in reporting a socially responsible strategy enhancing the value of the entire organization.

**PO 7:** Helps students update with the life skills, business computing expertise, professionalism skills, research & development skills and communication skills towards their professional development

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**BBA – Detailed Syllabus**

**Semester 1:**

**SUBJECT: PRINCIPLES OF MANAGEMENT**

**SUBJECT CODE: BBA615A**

**CREDITS: 4**

**Course Objective:** The objective is to provide an understanding of basic concepts, principles and practices of management. The aim is to inculcate the ability to apply multifunctional approach to organizational objectives.

  
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## **Unit I**

Management: Concept and Need, Managerial Functions – An overview; Coordination: Essence of Management. Evolution of Management Thought, Classical Approach – Taylor, Fayol, Neo-Classical and Human Relations Approaches – Mayo, Hawthorne Experiments, Behavioural Approach, Systems Approach, Contingency Approach, MBO, Hammer and Champy- Business Process Re-engineering, Porter's Five-forces' Model.

## **Unit II**

Types of Plan; Strategic planning – Concept, process, Importance and limitations; Environmental Analysis and diagnosis (Internal and external environment) – Definition, Importance and Techniques (SWOT/TOWS/WOTSUP, BCG Matrix, Competitor Analysis); Decision-making: Process and Techniques; Perfect rationality and bounded rationality

## **Unit III**

Concept and process of organizing – An overview, Span of management, Different types of authority (line, staff and functional), Decentralization, Delegation of authority; Formal and Informal Structure; Principles of Organizing; Network Organisation Structure. Emerging types.

## **Unit IV**

a. Staffing: Concept of staffing - Recruitment and Selection; Orientation; Training and Development; Career Development; Performance Appraisal. b. Motivation & Leadership: Concept, Importance, extrinsic and intrinsic motivation; Major Motivation theories - Maslow's Need-Hierarchy Theory; Herzberg's Two-factor Theory, Vroom's Expectancy Theory. Leadership: Concept and Importance; Leadership Styles; c. Communication: Concept, purpose, process; Oral and written communication; Formal and informal communication networks, Barriers to communication, Overcoming barriers to communication. Emerging trends in communication.

## **Unit V**

Concept, Process, Limitations, Principles of Effective Control, Major Techniques of control - Accounting Ratio Analysis, HR Metrics, ROI, Budgetary Control, EVA, PERT/CPM. Emerging issues in Management.

**SUBJECT: BUSINESS MATHEMATICS & STATISTICS**

**SUBJECT CODE: BBA616A**

**CREDITS: 4**

  
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**Course Objective:** The Objective is to provide, to expose students to basic statistical and mathematics concepts, to organize and present numerical data, to understand the Venn Diagrams, Sets, Intervals, Matrices, Vector Algebra and to compute correlation, interpret and to understand the construct various index numbers.

### **Unit I - Set Theory**

Introduction to Sets, Sets and their Representation, Tabular or Roster Method, Rule Method or Set Builder, Empty or Void or Null Set, Finite sets and Infinite sets, Proper Subset, Improper Subset, Power Set, Universal Set, Open Interval, Closed Interval, Semi-Open or Semi Closed intervals, Infinite Intervals, Venn Diagrams, Operations on Sets, Union, Intersection of Sets, Disjoint Sets, Difference of Sets, Symmetric Difference of Sets, Complement of a Set, Laws of Algebra of Sets.

### **Unit II - Matrices and Determinants**

Definition of a Matrix, Addition & Subtraction of Matrices, Multiplication of Matrices, Transpose of a Matrix. System of linear equations, Gauss elimination method, Inverse of a Matrix, Determinants, Determinants of order one and more, Properties of Determinants, Multiplication of two Determinants, Minors and Cofactors, Cramer's rule for solution of linear equations, Adjoint of a Matrix, Rank of a Matrix.

### **Unit III- Vector Algebra**

Vectors, Types of Vectors, Operations on Vectors, Addition of Vectors, Properties of Operation of Addition, Subtraction, Properties of Operation of Subtraction, Multiplication by a scalar, Orthonormal Bases, Product of Two Vectors, Scalar Product or Dot Product of Two Vectors, Properties of Scalar Product, Vector Product or Cross Product, Properties of Vector Product.

### **Unit IV - Statistics**

Introduction to Statistics, Scale of Measurement, Nominal, Ordinal, Interval & Ratio. Frequency Distribution, Bar Chart, Pie Chart, Histogram, Frequency Polygon, Ogive, Pareto Chart, Stem-and-leaf Chart, Scatter Plot, Measure of Central Tendency, Properties, Advantages and Disadvantages of Arithmetic Mean, Geometric Mean, Harmonic Mean. Positional Averages, Median, Quartiles, Deciles, Percentiles & Mode. Measure of Dispersion, Range, Interquartile Range, Standard Deviation.

### **Unit V - Probability**

Introduction to Probability, Experiment, Event, Compound Event, Independent and Dependent Events, Mutually Exclusive Events, Equally Likely Events, Marginal, Union, Joint, Conditional Probability, Basic Probability Rules, General Rule of Addition, General Rule of Multiplication, Concept of Bayes' Theorem.

**SUBJECT: BUSINESS ECONOMICS**

**SUBJECT CODE: BBA617B**

**CREDITS: 4**

### **Course Objective:**

The Objective is to provide, to understand the key concepts of macroeconomic concepts of business, to know the factors determining supply and demand in various market structure, to know the various cost and revenue concepts under the functioning of various types of industries and to know main financial markets and institutions in facilitating commerce & development.

### **Unit I – Macro Economic context of business**

  
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Determination of macroeconomic phenomena – equilibrium national income – growth in national income, price, inflation, unemployment, trade deficits and surpluses – stages of trade cycle – principles of public finance – effects of changes in the economic growth rate, interest rates. Government expenditure and taxation – index numbers

Concept of balance of payments – free trade and protectionists instruments policy, impact of exchange rate policies on business

## **Unit II – Institutional context of business**

Nature of globalisation and factors driving it (improved communications, political realignments, growth of global industries and institutions, cost differentials). Major institutions promoting global trade and development - Principal institutions encouraging international trade – globalisation of business – offshoring – industrial relocation – emergence of growth markets – main trading agreements and trading blocks. Identify the impacts of economic and institutional factors using the PESTEL framework.

## **Unit III – Micro Economic and Organisational Context Of Business**

Types of organisations – public, private & mutually owned organisations – types of Not-for-Profit Organisations – shareholders wealth management – principal – agent problem and its impact on the decisions of the organisation. Price mechanism – determinants of demand and supply – price elasticity of demand – effects of price elasticity of demand on Total revenue curve#. Sources of internal and external economies of scale- outsourcing decisions and costs – minimum and maximum price policies in good and factor markets.

## **Unit IV – Informational context of business**

Data & information, graphs, charts and diagrams – scatter graphs, histograms, bar graphs, ogives. Big data and data analytics in business applications – time series analysis – correlation co-efficient – regression equation to predict the dependent variables – forecasting

## **Unit V – Financial Context of Business**

Financial intermediaries – commercial banks – financial assets and financial markets – foreign exchange markets. Financial mathematics – simple & compound interests – annuities & perpetuities – Discounting techniques – NPV and IRR. Interest rates – interest rate changes on market demand – concepts of forwards, futures and options.

### **SUBJECT: FUNDAMENTALS OF MANAGEMENT ACCOUNTING**

**SUBJECT CODE: BBA618A**

**CREDITS: 4**

**Course Objective:** The objective is to familiarise the students with the mechanics of to understand the management accounting, students learn the methods of costing, overheads and ascertain the various types of budget and approaches to analyse the profits.

## **Unit I - The Context Of Management Accounting**

Purpose of management accounting and the role of the Management Accountant-need for management accounting-characteristics of financial information for operational, managerial

  
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and strategic levels within organisations- role of the management accountant-relationships between the management accountant and the organization's managers- The Global Management accounting principles. Role of CIMA as a professional body for Management Accountants-role of CIMA in developing the practice of management accounting

## **Unit II - Costing**

**Cost identification and classification**-classification of costs in relation to output classification of costs in relation to activity level appropriate costs having identified cost behaviour-classification of costs in relation to decisions – segregation of fixed and variable costs from semi-variable costs – relevant and irrelevant costs.

**Overheads** – overhead cost estimates – treatment of direct and indirect costs – overhead absorption rate – under and over absorption of overheads – Marginal cost pricing and full cost pricing.

## **Unit III– Planning And Control**

Preparation of budgets for planning and control-need for the preparation of forecasts and Plan-Preparation of functional budget- budget statements-impact of budgeted cash surpluses and shortfalls on business operations-preparation of flexible budget-Calculate budget variances – concepts of Zero based Budget, Incremental budgeting, Rolling Budget.

Application of variance analysis to reconcile budgeted and actual profits in a marginal Format-Principles of standard costing-Calculation of variances for materials, labour, variable overheads, sales prices and sales volumes-Preparation of a statement that reconciles budgeted profit with actual profit calculated using marginal costing- reasons for variances and the inter-relationships between variances

## **Unit IV – Performance Measurement And Reporting**

Calculation of appropriate financial and non-financial performance measures-need for appropriate performance measures-Calculation appropriate financial and nonfinancial performance measures in a variety of contexts

Preparation of accounts and reports for manager-integration of the cost accounts with the financial accounting system-Prepare a set of integrated accounts, showing standard cost variances- preparation of accounts related to Job and batch costing-Cost accounting statements for management information in manufacturing, service and not-for-profit organisations.

## **Unit V- Decision Making**

**Risk and uncertainty** - use of expected values and joint probabilities in decision making-calculate summary measures of central tendency and dispersion for both grouped and ungrouped data-Arithmetic mean, median, mode, range, variance, standard deviation and coefficient of variation for both ungrouped and grouped data-Graphs/diagrams and use of normal distribution tables – decision tree approach.

**Short term decision making** - The use of appropriate techniques for short-term decision making-breakeven charts, profit volume graphs, breakeven point, target profit, margin of safety- Make or buy Decisions-Calculate the profit maximizing sales mix after using limiting factor analysis-

  
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**Use of appropriate techniques for long-term decision making** - The time value of money- financial mathematics - Discounting, compounding, annuities and perpetuities- Calculate the net present value, internal rate of return and payback for an investment or project

**SUBJECT: FUNDAMENTALS OF FINANCIAL ACCOUNTING**  
**SUBJECT CODE: BBA619A**  
**CREDITS: 4**

**Course Objective:** To understand the basics of accounting and concepts of double entry system. The students understand book keeping and preparation of final accounting statements for business organizations.

**Unit I - Accounting Principles, Concepts And Regulations**

The principles and concepts of financial accounting - need for accounting records; Identify the needs of different user groups; Distinguish between the financial and management accounts; capital and revenue, cash and profit, income and expenditure, assets and liabilities; the underlying assumptions, policies; the accounting equation.

**Unit II - Recording Accounting Transactions**

Accounting records; Prepare the books of prime entry; Applications the principles of double-entry Bookkeeping; nominal ledger accounts; the trial balance; the nature of accounting errors, prepare accounting entries for the correction of errors; Prepare accounting entries for noncurrent assets; Prepare a non-current asset register.

**Unit III- Accounting Reconciliations**

Bank reconciliation statements; Prepare petty cash statements under an imprest system; Prepare sales and purchase ledger control account reconciliations.

**Unit IV - Preparation of Accounting Entries for Specific Transactions**

Calculate sales of tax; Prepare accounting entries for sales tax; Prepare accounting entries for payroll; Prepare accounting entries for the issue of shares

**Unit V- Preparation of Financial Statements for Single Entities and Its Analysis**

Prepare accounting adjustments. Prepare accounting entries for accruals and prepayments; Prepare accounting entries for irrecoverable debts and allowances for receivables; Prepare accounting entries for inventories.

Prepare basic manufacturing accounts. Prepare financial statements from a trial balance; Prepare financial statements from incomplete records; Prepare a statement of cash flows. Identify information provided by accounting ratios the information provided by the calculation of accounting ratios reasons for the changes in accounting ratios. Calculation of profitability ratios, liquidity ratios, risk ratios.

**SUBJECT: COMMUNICATION SKILLS**  
**SUBJECT CODE: DEN001A**  
**CREDITS: 3**

**BBA. (common to all disciplines)-I Semester**

**Course Objectives :**

  
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1. To enhance English language competence in reading, writing, listening and speaking.
2. Switch the approach from teacher-centred to student-centred one.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introducing the Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. To link communication skills with the organizational behaviour.
6. To inculcate skills that are very much required for employability and adjust in the professional Environment.

#### **Course Outcomes (CO):**

##### **At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within

realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in different contexts.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

#### **Syllabus: Theory**

<b>Unit I</b>	Basics of Organizational Communication: Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
<b>Unit II</b>	Basic Writing Skills: Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
<b>Unit III</b>	Composition:, Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
<b>Unit IV</b>	Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
<b>Unit V</b>	Professional and Technical Communication : Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

#### **Syllabus: Lab**

<b>Unit I</b>	Basics of Organizational Communication: Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time Management, Following Deadlines etc
<b>Unit II</b>	Write Dialogue from the different contexts of corporate culture: Employee



	and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
<b>Unit III</b>	Composition:, Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of DraftingRedrafting, Proof Reading, Editing etc
<b>Unit IV</b>	Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>Unit V</b>	Professional and Technical Communication : Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

### Methodology for Evaluation

1. Internal Assessment (Theory)
  - a) Home Assignments: One from each Unit : 15 Marks
  - b) In Semester Tests (Minimum two) : 30 Marks
  - c) Attendance : 05 Marks
2. Term End (Theory) : 50 Marks
3. Internal Assessment (Lab)
  - (a) Daily Performance in the Lab : 50 Marks
4. Term End (Lab) : 50 Marks

### Suggested Reading:

1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006
6. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
8. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006

**SUBJECT: CULTURE EDUCATION I**  
**Semester-I**  
**SUBJECT CODE: DIN001A**  
**CREDITS: 2**

### Course Objectives:

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.

  
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2. To understand the role of great personalities and movements in the progress of India.

Course Outcomes (CO):

At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the richness of Indian Culture

CO2: Ability to represent the culture ethics in real life

### **Unit I- Holy Scriptures-A**

1. Introduction to Vedanta and Bhagavad Gita, Goals of Life – Purusharthas, Introduction to different Dharm Granthas (Various religious scriptures from Hindu, Muslim, Christian, Bodh, Jain religions)

2. Introduction to Yoga, Overview of Patanjali's Yoga Sutras

### **Unit II- Society and Culture-I**

3. Introduction to Indian Culture and Major Symbols of Indian Culture

4. Major Indian Cultural and Ethical Values- Respect, Compassion, Kindness, Forgiveness, Introspection, Honesty, Justice, Loyalty, Devotion, Self Sacrifice, Hospitality, Vasudheva Kutumbakam

### **Unit III- India in Progress-I**

5. Education, Science and Technology in Ancient India

6. Values from Indian History- War of Mahabharata, War of Kalinga, Freedom Struggle of India, Major Farmer Movements, Major Religious and Social Upliftment Movements

### **Unit IV- Great Indian Personalities-I**

7. Life and works of the Great People of Ancient India- Sushruta, Dadhichi, Ashtvakra, Anusuya, Panini, Charaka, Kalidas, Aryabhatta, Samudragupta, Ashoka, Chandragupta Mourya, Porus, Satyabhama, Dhruv, Prahlad, Chanakya, Varahmihira, Bhishm, Karan, Dronacharya, Meera Bai, Surdas, Dadudayal, Kabir, Mahatma Buddha, Mahavir, Guru Nanak Dev, Guru Gobind Singh, Mohammad Saheb, Jesus Christ, Veer Shivaji, Maharana Pratap, Maharani Laxmi Bai, Maharani Padmini, Hadi Rani Shal Kanwar, Panna Dhai

\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by committee of teachers.

### **Suggested Reading:**

1. Glory of Indian Culture (English) Paperback by Giriraj Shah

2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies

by Saroj Bala, Kulbhushan Mishra

References


<https://knowindia.gov.in/culture-and-heritage/lifestyle-values-and-beliefs.php>

## **Semester II**

**SUBJECT: ORGANIZATION BEHAVIOUR**

**SUBJECT CODE: BBA620A**

**CREDITS: 4**

  
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**Course Objective:** Understand how the organisations can be managed effectively considering the behaviour of various stakeholders of an organisation and analysing the skills required for the future advantage of an organisation.

**Unit I Organization behaviour – an introduction**

Meaning of organizations – Nature of organization behaviour – Basics of organization behaviour – Scope and evolution of organizational behaviour – Organizational arrangements and Organization behaviour – Key terminologies in Organization Behaviour - Organizational Behaviour Model (OB Model).

**Unit II Individual behaviour, intelligence and personality**

Meaning of individual behaviour – personal and environmental factors – Models of individual behaviour – nature and types of intelligence – theories and measurement of intelligence – Intelligence factors – intelligence in the context of organizational behaviour.

Nature and determinants of personality – Personality traits – Personality in the context of Organization Behaviour.

**Unit III Motivation and work stress**

Nature and importance of motivation – challenges and theories of motivation – Motivation and organizational culture – quality of work life – rewards and behaviour modification – problem employees – employee engagement.

Meaning of work stress – work stress model – stress management – Stress and organizational behaviour.

**Unit IV Group and team behaviour**

Nature and types of groups – Group dynamics and Organization behaviour – determinants of group dynamics – Importance of group dynamics in an organization – group development strategies – Group motivation – Group structuring and decision making.

Meaning of team – differences between group and team – Types and benefits of teams – effective team management – team conflicts and resolution – Team development and Organizational Behaviour.

**Unit V Organizational culture and leadership**

Meaning of leadership – leadership vs management – leadership styles and theories – formal and informal leadership – Ethics and leadership – leadership and organizational culture – Sustaining culture – changing organizational culture – workplace behaviour – Ethics of power.

**Course outcomes:**

CO 1: Understand the basic of organizational behaviour in the context of the dynamic environment.

CO 2: Understanding the role of individual behaviour, intelligence and personality in the context of organizational development.

CO 3: Understanding importance of rewarding and motivating the stakeholders and managing the stress to effectively manage the organizational performance

CO 4: Understand the role of group and team dynamics in the current organizational environment

CO 5: Understand the importance of perception into organizational culture, leadership and ethics in an organizational development.

**SUBJECT: PRINCIPLES OF MARKETING MANAGEMENT**

**SUBJECT CODE: BBA621A**

**CREDITS: 4**

  
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**Course Objective:** To provide a holistic orientation of emerging marketing trends with the practical skills required to analyze consumer data, create marketing campaigns, develop digital/social media content and make successful marketing decisions and to equip students to be innovative, technically competent, and think critically through experiential and student-centric teaching approach.

### **Unit I: Fundamentals of Marketing Management**

Meaning & Definition of marketing -Role of Marketing -Relationship of Marketing with other functional areas -Market Concepts -Product concept -Selling concept -Marketing concept -Societal marketing concept -Approaches to marketing management -Functions of marketing -Scope of marketing: goods, services, events, organizations, etc. -Emerging trends in marketing.

### **Unit II: Marketing Plan**

Marketing Environment: Concept -Macro-environmental forces -The changing marketing environment -Analyzing needs and trends in Macro-Environment: Economic Environment, Technical Environment, Political, Environment and Socio-cultural Environment. Introduction to The Marketing Plan –Definition –Nature –Objectives -Structure of The Marketing Plan -The Process of marketing plan -Critical elements of external and internal analysis of Marketing Plan -Implementation of Marketing Plan.

### **Unit III: Marketing Mix**

Introduction to marketing mix -Marketing mix implementation: short term and long term tactics –Product: meaning, elements, product mix -Product mix strategies -Product line -Product lifecycle Product planning -New product development -Failure of new product -Product branding -Branding strategy and packaging –Pricing: Objectives -Factors influencing pricing policy -Methods of pricing -Pricing strategy. Physical Distribution: Meaning -Factors affecting channel selection -Types of marketing channels –Promotion: Meaning and significance of promotion –Personal selling & advertising (meaning only).

### **Unit IV: Buyer behavior**

Market Segmentation: Levels and patterns of market segmentation -Bases for segmenting markets -Market segmentation - Targeting - Product Positioning - Types and bases of positioning - Product Differentiation -Meaning of consumer, customer, consumer behaviour and buying motives -Factors influencing buyer

behavior -Factors that influence consumer purchasing decisions -Buying process -Stages of the consumer buying behavior -Business to Business (B2B) buying process -Key factors influencing B2B purchasing decisions -Differences between Consumer goods and Industrial goods

### **Unit V: Digital Marketing**

Introduction to Digital Marketing –Concept of Digital Marketing -Difference between traditional marketing and digital marketing -Trends and scenarios of the industry -Planning and Creating a Website -Search Engine Optimization (SEO), Search Engine Marketing (SEM), of Social Media Marketing, Blogging, Content Strategy, Email Marketing.

**Course outcomes:**

  
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CO1: To understand the role and importance of marketing  
CO2: Develop a marketing plan to generate better sales and profits  
CO3: Formulate the product and price mix based to serve consumer needs.  
CO4: Identify the factors influencing consumer behavior and purchase decision  
CO5: Outline the digital tools to develop marketing strategies for the new age consumer

**SUBJECT: HUMAN RESOURCES MANAGEMENT**

**SUBJECT CODE: BBA622A**

**CREDITS: 4**

**Course Objective:** The objective of the subject is to understand the importance of effective and efficient management of human people in an organization to help the business gain a strategic and competitive advantage.

**Unit I: Human Resource Management (HRM) - Introduction**

Meaning of Human resources – Meaning of HRM – nature and functions of HRM – HR Manager – qualities and qualifications – Strategic Human Resource Management – Strategic management – corporate level strategies – Strategic HR issues – Organizational and HR strategies -

**Unit II: Job Analysis, team analysis and Job Environment**

Meaning of HR terms – Job design, job rotation, job enlargement, job enrichment, team work – Need for job analysis and team analysis – Job description – job specification – job sharing – ergonomics – employee empowerment – Job redesign

**Unit III: Human Resource Planning**

Meaning, features and scope of Human Resource Planning – process of and steps in Human Resource Planning – Barriers to effective implementation of Human Resource Planning – Human Resource Planning Vs Strategic planning – Human resource planning through people, finance and technology.

**Unit IV: Performance appraisal and compensation management**

Meaning, need and purposes of performance appraisal – methods of performance appraisal – Group appraisal – Behavioral aspects of performance appraisal – Concept of MBO – the balanced score card – managerial appraisal – challenges of performance appraisal.

Concepts of transfer, promotion and demotion – types of promotions – types of transfer – reasons for demotion – concept of absenteeism – calculation and causes of absenteeism rate – measures to reduce absenteeism – concept of labour turnover – types and causes of labour turnover.

**Unit V: Training and Development**

  
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Assessment of training needs – training methods - Apprenticeship, understudy, job rotation, vestibule training, case study, role playing, sensitivity training, In-basket, management games, conferences and seminars, coaching and mentoring, management development programs; Training process outsourcing.

**Course Outcomes:**

CO1: Understand the role and importance of Human resource Management in effectively managing the human capital in an organization.

CO2: Understand the key terminologies in the context of Human Resource Management and their scope and benefits in a practical environment

CO3: Understand the importance of Human resource planning in the context of people, technology and finance

CO4: Understand the importance of performance appraisal and other concepts in the area of Human resource management

CO5: Understand the methods and purposes of training and development activities to gain a strategic advantage

**SUBJECT: MANAGING FINANCE IN A DIGITAL WORLD**

**SUBJECT CODE: BBA623A**

**CREDITS: 4**

**Course Objective:** To understand the central role that finance plays in an organisation, and how and why technologies used impact the finance function, how to use and examine data collected and processed by machines to create and preserve value for organisations and how the finance function is structured and shaped, and how it interacts with other parts of the organisation to achieve the objectives of the whole organisation.

**Unit I: Role Of Finance Function**

Different types of organisations – functions of an organisation – the roles of finance function – enabling value creation through planning, forecasting and resource allocation – data collection – types of analysis to produce insight – potential impact of technology - How finance communicates to influence key stakeholders

**Unit II: Technology In Digital World**

Characteristics and Dynamics of Fourth Industrial Revolution – Cloud Computing – Big Data Analytics – Process Automation – Artificial Intelligence – Data Visualisation – Block chain – Internet of things – Mobile – 3-D Printing – New areas of Finance to focus on – Areas of Finance susceptible to automation – Digital mindsets for Finance – Ethics of the use of technology

**Unit III: Data And Information In A Digital World**

  
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Using Data for: Decision making, Understanding the customer, Developing-customer value proposition, Enhancing operational efficiency, Monitoring data, Ethics of Data usage – Assessment of Data needs – Extraction, Transformation and Loading (ETL) Systems – Business Intelligence (BI) systems – Big Data Analytics – Data visualization

#### **Unit IV: Shape And Structure Of Finance Function**

Structure of Finance function from the roles that generate information to the roles that turn information into insights and communicate insights to decision makers – Hierarchical shape of Finance function – Shared Services and Outsourcing of Finance Function – Retained Finance – Automation & Diamond shape of Finance Function – Finance operation to generate information and preliminary insight – FP & A, Taxation, corporate reporting, decision support to produce insights – Business partnering to influence organisations to make appropriate decisions – Leading Finance team to create the required impact for the organisation.

#### **Unit V: Finance Interacting With Organisations**

Process management – product and service management – supply chain management

Market segmentation – big data analytics in marketing – channel management – sales forecasting & management

Staff acquisition – staff development – performance management – motivation and reward systems

IT infrastructure – IT systems support – cost and benefits of IT systems

#### **Course Outcome:**

CO1: To understand how the finance function enables, shapes and narrates value creation through planning, forecasting, resource allocation, performance management and financial reporting.

CO2: To understand key technologies and their impact on an organisation including, cloud computing, big data, data analytics, process automation, artificial intelligence, data visualisation, block chain, internet of things.

CO3: To understand how the finance function can use data and information to assist operations in enhancing operational efficiency.

CO4: To understand the contemporary transformation of the finance function in the digital era from roles that generate information to roles that turn information into insight and how finance communicates that insight to decision-makers.

CO5: To understand how the finance function helps manage operations, marketing and Sales, HR and IT functions in creating and preserving value.

#### **Semester III:**

**SUBJECT: MANAGEMENT ACCOUNTING (CIMA P1)**

**SUBJECT CODE: BBA675A**

  
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## **CREDIT: 4**

**Course Objective:** The Objective is to provide the purpose and types of organization structure, the management functions, theories, and their applications, to comprehend the role of managers and the decision-making process and to know the various leadership styles and their significance.

### **Unit I: Cost Accounting for Decision and Control**

Inventory control – profit reporting – cost and management transformation – costing applied to different types of organizations – costing applied to digital cost objects. Marginal costing – absorption costing – product and service costing under ABC – features of digital costing

### **Unit II: Budgeting and Budgetary Control**

The purposes of forecasts, plans and budgets - the purposes of budgets, including planning, communication, coordination, motivation, authorization, control and evaluation, and how these may conflict. Forecasts of financial results - projected product/service volumes, revenue and costs employing appropriate forecasting techniques and taking account of cost structures.

Budgets based on forecasts – preparation of a budget for any account in the master budget, based on projections/forecasts and managerial target - alternative approaches to budgeting.

The principles that underlie the use of budgets for control – the concept of the budget as a control system and the use of responsibility accounting and its importance in the construction of functional budgets that support the overall master budget. Analysis performance using budgets, recognizing alternative approaches and sensitivity to variable factors - analysis the consequences of 'what if' scenarios.

### **Unit III: Short Term Decision Making – I**

Concepts of cost and revenue relevant to pricing and product decisions - principles of decision making, including the identification and use of relevant cash flows and qualitative factors - conflicts between cost accounting for profit reporting and inventory valuation, and information required for decision making - issues that arise in pricing decisions and the conflict between marginal cost principles, and the need for full recovery of all costs incurred. Marginal costing, full cost recovery for pricing decisions,

### **Unit IV: Short Term Decision Making – II**

Analyse short-term pricing and product decisions – application of relevant cost analysis to various types of short-term decisions - break-even analysis in multiple product contexts - product mix decisions, including circumstances where linear programming methods are needed to identify 'optimal' solutions - explain why joint costs must be allocated to final products for financial reporting purposes but why this is unhelpful when decisions concerning process and product viability have to be taken.

### **Unit V: Dealing with Risk and Uncertainty**

Analysis of information to assess risk and its impact on short-term decisions - the nature of risk and uncertainty and the attitudes to risk by decision makers – analysis of risk using sensitivity analysis, expected values, standard deviations and probability tables – application decision models to deal with uncertainty in decision making

**SUBJECT: FINANCIAL REPORTING (CIMA F1)**

**SUBJECT CODE: BBA676A**

**CREDITS: 4**

  
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**Course Objective:** Financial Reporting is designed to cover the regulation and preparation of financial statements and how the information contained in them can be used. It provides the competencies required to produce financial statements for both individual entities and groups using appropriate international financial reporting standards. It also gives insight into how to effectively source and manage cash and working capital, which are essential for both the survival and success of organizations. The final part focuses on the basic principles and application of business taxation.

**Unit I: Regulatory environment of financial reporting**

Identify the major regulators and their purpose - National regulators, IFRS Foundation, IASB, IOSCO. Standard setting process, Difference between rule based and principle based standard, Introduction corporate governance principles financial reporting. Need and Scope of corporate governance. Different approaches to corporate governance.

**Unit II: Framework and International Accounting Standards**

Identify the main elements of financial statements contained in the IFRS conceptual framework, Objectives and overall purpose of financial reporting, Qualitative characteristics of financial information, Reporting entity and its boundaries, Recognition (and derecognition), Measurement bases, Presentation and disclosure, Concept of capital maintenance  
Specific financial reporting standards related to: Non-current assets, Leases, Impairment, Inventory, Events after the period.

**Unit III: Preparation of financial statements**

Application of financial reporting standards to prepare: Statement of financial position, Statement of comprehensive income, Statement of changes in equity, Statement of cash flows.

**Unit IV: Principle of taxation**

Features of direct & indirect taxation, corporate and personal taxes. Basis of taxation, Computation of corporate tax. Exempt income, Income taxed under different rules, Allowable expenditure, Capital allowances, Tax reliefs, Tax on sale of asset. Taxation across international borders including corporate residence, Types of overseas operations, Double taxation, Transfer pricing. Ethics of taxation - Tax avoidance and tax evasion.

**Unit V: Managing cash and working capital**

Distinguish between the types and sources of short-term finance which includes, Trade payables, Overdrafts, Short term loans, Debt factoring, Trade terms, Tradepartners, Banks. Calculation of Operating cycle and Cash flow cycle. Application of techniques to manage Receivables, Payables and Inventory management, Risks relating to working capital. Short-term cash flow forecast.

**SUBJECT: RESEARCH METHODOLOGY**

**SUBJECT CODE: BBA627A**

**CREDITS: 4**

**Course Objective:** This module enables learners to develop the basic principles of research methods. The learners focus how to do research, with an emphasis on student-centered activities and problem solving. Learners will develop insights the key concepts as the scientific method; operationalizing constructs; independent and dependent variables, data types and ways of measurement, confounding variables experimental and non-experimental design questionnaire construction; developing and testing hypotheses; descriptive statistics and describing data graphically; and the ethics of research.

**Unit I: Research Formulation and Design**

  
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Motivation and objectives-Research methods and methodology. Types of research Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research. Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

#### **Unit II: Data Collection and Analysis**

Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statically package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

#### **Unit III: Statistical Softwares**

Computer and its role in research, Use of statistical software SPSS, GRETL etc. in research. Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.

#### **Unit IV: Research Ethics and Scholarly Publishing**

Ethics-ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing- IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

#### **Unit V: Interpretation and Report Writing**

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of writing Research Report Precautions for writing Research Reports, Conclusions.

### **SUBJECT: HUMAN RESOURCE DEVELOPMENT**

#### **SUBJECT CODE: BBA628A**

#### **CREDIT: 4**

**Course Objective:** This module will enable the learners to develop strong understanding and key skills which are required for human resource professionals. Learners will be able to understand the importance of human resource development and their role in effectively managing the personnel within the organization. Learners will develop insights into the fast-growing and emerging trends of Human Resource Development (HRD) in globalized economy.

#### **Unit I: Human Resource Development (HRD) -Macro Perspective**

Understand HRD Concept, Origin and Need of HRD, HRD as a Total System, Approaches to HRD; Human Development and HRD; HRD at Macro and Micro Climate

#### **Unit II: HRD–Micro Perspective**

Understand areas of HRD, HRD Interventions Performance Appraisal, Potential Appraisal, Feedback and Performance Coaching, Training, Career Planning, OD or Systems Development, Rewards, Employee Welfare and Quality of Work Life and Human Resource Information; Staffing for HRD: Roles of HR Developer; Physical and Financial Resources for HRD; HR Accounting; HRD Audit, Strategic HRD

#### **Unit III: Instructional Technology for HRD**

  
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Learning and HRD; Models and Curriculum; Principles of Learning; Group and Individual Learning; Transactional Analysis; Assessment Centre; Behaviour Modeling and Self Directed Learning; Evaluating the HRD

#### **Unit IV: Human Resource Training and Development**

Concept and Importance of training and development; Assessing Training Needs; Designing and Evaluating T&D Programmes; Role, Responsibilities and challenges to Training Managers

#### **Unit V: Training Methods**

Training within Industry (TWI): On the Job & Off the Job Training; Management Development: Lecture Method; Role Play; In-basket Exercise; Simulation; Vestibule Training; Management Games; Case Study; Programmed Instruction; Team Development; Sensitivity Training; Globalization challenges and Strategies of Training Program, Review on T&D Programmes in India.

**SUBJECT: COMP. APPLICATIONS III (MS PROJECT)**

**SUBJECT CODE: BBA629A**

**CREDITS: 3**

#### **Course Objective:**

The goal of this module is to help students explore MS Project application, providing information on relevant project management concepts while also offering specific procedures to build and track a Project Schedule. The students will gain expertise towards the MS Project application by learning about the tasks and dependencies, estimating durations, and working with project Views. They will also understand the advanced customizations and reporting elements under MS Project application.

#### **Unit I: Introduction**

MS Project Application, Project Family, Features in Project 2016 & 2019, Comparative study on MS Project Versions (2013, 2016 & 2019), The Project Interface, Backstage View, Ribbons and Tabs, Views, Reports, Defining Project Manager, Starting a Project, Task Master, Co-dependent Nature of Tasks, Estimating Task Time, Introducing the Work Breakdown Structure (WBS).

#### **Unit II: Scheduling Basics**

Starting a New Plan and Setting its Start Date, Setting Non-Working Days in the Project Calendar, Entering Plan's Title and Other Properties, Entering Task Names, Task Durations, Milestone Task, Creating Summary Tasks to Outline the Plan, Task Dependencies with Links, Switching Task Scheduling from Manual to Automatic, setting up Resources, Work Resources Names and Maximum Capacity, Pay Rates, Adjusting Working Time in Resource Calendar.

#### **Unit III: Resources Assignment and Plan Sharing**

Assigning Work Resources to Tasks, Controlling Work when Adding or Removing Resource Assignments, Assigning Cost Resources to Tasks, Checking the Plan's Duration, Cost & Work, Customizing Gantt Chart View, Customizing Timeline View, Customizing Reports, Copying and Printing Views & Reports, Saving Plan Baseline, Tracking a Plan as Scheduled through a Specific Date, Entering a Task's Completion Percentage and Actual Values for Tasks.

#### **Unit IV: Advanced Scheduling Techniques**

Viewing Task Relationships with Task Path, Adjusting Task Link Relationships, Setting Task Constraints, Interruptions, Work Time Adjustments, Controlling Task Scheduling using Task Types, Setting Resource Availability at Different Times, Applying Contours, Pay Rates and Material Resources to Tasks & Assignments, Examining Resource Allocations, Levelling

  
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Overallocated Resources, Sorting-Grouping-Filtering Project Details, Creating New Tables & New Views, Tracking Progress on Tasks and Assignments, Viewing and Reporting Project Status.

#### **Unit V: Advanced Formatting and Customizations**

Formatting Gantt Chart View, Timeline View, Network Diagram View, Calendar View, Printing and Exporting Views, Formatting Tables & Charts in a Report, Sharing Custom Elements between Plans, Recording & Editing Macros, Copying Project Data to other Programs, Opening & Saving to other File Formats from MS Project, Creating a Resource Pool, Viewing Assignment Details in a Resource Pool. Updating Assignments in a Sharer Plan, Updating a Resource's Information and Plan's Working Times in a Resource Pool, Linking New Plans to a Resource Pool, Creating Dependencies between Plans.

**SUBJECT: LIFE SKILLS-I**

**SUBJECT CODE: DEN003A**

**CREDIT: 2**

#### **COURSE OBJECTIVE**

1. Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields.
2. Ability to learn by doing it practically in the classroom.
3. Ability to learn by creating an environment and adapting to the environment.
4. The ability to prepare the students as per the need of the Multi-cultural scenario around.

#### **Syllabus: Theory**

<b>Unit I</b>	Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion Basics of Narrating and describing things
<b>Unit II</b>	Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview CV/Resume Drafting and HR Interview advance theory Basics of Video Interviews and Video Profiles for Job
<b>Unit III</b>	Types of listening, advantages and disadvantages
<b>Unit IV</b>	Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report
<b>Unit V</b>	Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc

## Syllabus: Lab

<b>Unit I</b>	Debates / Speeches / Addressing the public / Extempore/Group Discussion Describing a hypothetical situation / theme / surroundings / appearance/personality traits/company/ a professional Concept/New Idea, / New Project through PPT and video aids
<b>Unit II</b>	Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview CV/Resume Drafting and HR Interview practice sessions elaborating the points as per the CV and industry demand Video Interviews and Video Profiles for Job-Practice session for Online Interviews
<b>Unit III</b>	Listening to variety of audio/video conversations including interviews, news, reports, reports, GDs, dialogues from body language, logic, wit and vocabulary perspectives
<b>Unit IV</b>	Group Discussion-Practice sessions, Presenting New Idea/Concept/Proposal/ Project/ Report
<b>Unit V</b>	Activities on how to be a strong Personality, Motivation, Case studies for Resourcefulness and out of the box thinking, Role plays and Case studies on Risk taking, Self confidence and Self-esteem, Decision Making, Emotion Management, Cultural Adaptability, Multicultural Perspective towards things, ideas, views, codes etc

### Methodology for Evaluation

#### 1. Internal Assessment (Theory)

- a) Home Assignments: One from each Unit : 15 Marks
  - b) In Semester Tests (Minimum two) : 30 Marks
  - c) Attendance : 05 Marks
- #### 2. Term End (Theory) : 50 Marks

#### 3. Internal Assessment (Lab)

- (a) Daily Performance in the Lab : 50 Marks
- #### 4. Term End (Lab) : 50 Marks

### Suggested Readings:

- 1. A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.

  
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2. Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
3. Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.
4. The Hard Truth about Soft Skills, by Amazone Publication.
5. 101 Great Answers to the Toughest Interview Questions. Ron Fry. High Bridge Company. 1996.
6. Michael Swan. Practical English Usage, Oxford University Press.

**SUBJECT: Value Education I**  
**SUBJECT CODE: DIN003A**  
**CREDIT: 2**

**Course Outcomes (CO):**

At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the ethical beauty of India

CO2: Ability to incorporate the values of human lives in real life applications

**Lessons from the Ramayana**

Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

**Lessons from the Mahabharata**

Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

**Lessons from the Upanishads**

Introduction to the Upanishads: Sruti versus Smriti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, Satyakama Jabala, Aruni, Shvetaketu.

**Message of the Bhagavad Gita**

  
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Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War – The anguish of Arjuna – Counsel by Sri. Krishna – Key teachings of the Bhagavad Gita – Karma Yoga, Jnana Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

### **Life and Message of Swami Vivekananda**

Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendranath – Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception in India – Message from Swamiji's life.

### **Life and Teachings of Spiritual Masters India**

Sri Rama, Sri Krishna, Sri Buddha, Adi Shankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda.

### **Insights into Indian Arts and Literature**

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

\*Each student shall write a detailed Report/ Critique on one topic leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce.

Alternatively a Student may undertake a Project on any one of the topics and submit a detail Project Report leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. If the topic is related to Performing Arts including Yoga, the performance on stage may be given instead of PPT. In case of Fine Arts, an exhibition or a portfolio may be presented in place of PPT.

**On the basis of the above points, a panel of experts from the department will award the credits.**

**SUBJECT: Open Elective**

**SUBJECT CODE:**

**CREDITS:3**

**SEMESTER IV:**

**SUBJECT: OPERATION MANAGEMENT**

**SUBJECT CODE: BBA630A**

**CREDITS:4**

  
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**Course Objective:**

The objective is to provide the basic understanding of the methods and techniques of production and the economics of effective utilization of resources and the techniques employed to ensure the optimum use of resources.

**Unit I: Introduction to Operations Management**

Definition – differences between operations management and production management – operations and productivity – operations strategy in global environment – using software for productivity analysis – Ethics, social responsibility and sustainability – developing missions and strategies – achieving competitive advantage through operations – strategic planning, core competencies and outsourcing – global operations strategy options.

**Unit II: Designing operations**

Design of goods and services – product life cycle – generating new products – issues for product design – robust design, modular design, CAD and CAM, virtual reality technology, value analysis, sustainability and life cycle assessment (LCA) - product development continuum – acquisition, joint ventures and strategic alliances – defining a product – make or buy decisions, group technology – documents for production – service design – process chain network analysis (PCN), documents for service – application of decision tree to product design.

**Unit III: Quality Management**

Defining quality – quality and strategy – total quality management (TQM) – continuous improvement, six sigma, benchmarking, JIT, Taguchi concepts – Tools of TQM – scatter diagrams, cause-and-effect diagrams – pareto charts – flowcharts – histograms – statistical process controls (SPC) – process capability ratio, process capability index – using software in SPX - role of inspection – TQM in services.

**Unit IV: Supply Chain Management**

Importance of supply chain strategies – six sourcing strategies – many suppliers, few suppliers, vertical integration, joint ventures, keiretsu networks, virtual companies – supply chain risks – managing integrated supply chain – building the supply base – negotiations, contracting, centralized purchasing, e-procurement – logistics management – distribution management – ethics and sustainable supply chain management – measuring supply chain performance – asset committed to inventory, benchmarking the supply chain.

**Unit V: Lean operations**

Lean Operations – elimination of wastages, throughput analysis and improving throughput – lean and just in time – lean layout, lean inventory, lean scheduling, lean quality – lean and the Toyota production system – continuous improvement, respect for people, processes and standard work practice – lean organizations – building a lean organization, lean sustainability – lean in services.

**Course Outcomes:**

CO1: This course introduces the students with the concept and importance of operations management in an organization

CO2: The students will learn different techniques with regard to designing process for a product or a service

CO3: The students will get deep insight into the role of quality and the techniques available in the current age to manage the quality vis-à-vis managing the operations



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CO4: The students will be able analyze and evaluate the importance of supply chain management in the current age of digital transformation

CO5: The student will be able understand the growing concept of Lean and lean management and the application in managing the operations in an organization

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Operations Management – Sustainability and supply chain management – Jay Heizer, Barry Render, Chuck Munson and Amit Sachan – Pearson Education
2. Operations and Supply Chain Management – F Robert Jacobs & Richard Chase – Mc Graw Hill Education
3. Operations Management – processes and supply chains – J Krajewski Le and K Malhotra Manoj – Pearson Education

**References:**

1. Supply Chain Management – Sunil Chopra – Pearson Education
2. Lean Management Systems handbook – Rich Charron, James Harrington, Frank Voehl and Hal Viggini - CRC Press
3. Statistical Process Control in automated manufacturing – Bert Keats and Norma Faris Hubele – CRC Press  
Total quality management – Besterfield Dale & Besterfield Carol – Pearson Education

**SUBJECT: MANAGING PERFORMANCE (CIMA E2)**

**SUBJECT CODE: BBA677A**

**CREDITS:4**

**Course Objective:** The objective is to provide knowledge of new business models in the digital ecosystem. Different styles of management along with managing relationships in an organization. Tools and techniques to manage projects and project leadership.

**Unit I: Business Models & Value Creation**

Definition of ecosystems - Participants and roles - Interactions and dynamics - Rules and governance - Technology - Risks and opportunities-Stakeholders and relevant value - Stakeholder analysis - Resources, process, activities, and people in creating value - Products, services, customer segments, channels, and platforms to deliver value - Distribution of value

  
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to key stakeholders.-Disruption - Ways to build disruptive and resilient business models - Creating digital operating models - Types of digital operating models

### **Unit II: Managing Performance I**

Power, authority, delegation, and empowerment - Contingent and situational leadership - Transactional and transformational leadership - Leadership of virtual teams - Leadership and ethics-Target setting and employee alignment - Employee empowerment and engagement - Performance reporting and review - Rewards and sanctions in managing performance - Different approaches to coaching and mentoring to improve performance - Diversity and equity practices - Health and safety - Organisational culture

### **Unit III: Managing Performance II**

Characteristics of high-performing teams - Motivating team members - Communication process - Digital tools for communication - Negotiation process - Strategies for negotiation - Sources and types of conflicts - Strategies for managing conflicts - • Leadership and ethics

### **Unit IV: Managing Projects**

Overall project objectives - Objectives relating to time, cost, and quality - Purpose and activities associated with key stages of the project life cycle-Workstreams - Work breakdown schedule, Gantt charts, network analysis - PERT charts - Sources and types of project risks - Scenario planning - Managing project risks - Project management software

### **Unit V: Project Leadership**

Project structures and their impact on project performance - Role of project manager - Role of key members of the project team - Life cycle of project teams - Managing key stakeholders of projects - Leading and motivating the project team

### **Course Outcomes:**

CO1: To understand the fundamentals of business models and how new business and operating models can be developed to improve the performance of organizations.

CO2: To understand how to create and preserve value using Human capital as an intangible asset of the organization.

CO3: To understand how different styles of leadership can be used to improve the performance of individuals so they can achieve organizational goals

CO4: To understand how to use project management concepts and techniques to implement strategies effectively and efficiently.

CO5: The To understand how the management concepts are s linked to capital investment decision-making that is covered in other areas of the Management Level

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							

  
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CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. CIMA Study Material.
2. CIMA Exam Kit and CIMA - Management case study

**Reference Books:**

1. Digital business models in the industrial ecosystem – Kai-ingo Voigt, Julian M Muller
2. Project management absolute beginner's guide -Author Gregory horine
3. The Ecosystem advantage – Charles Araujo

**SUBJECT: ADVANCED MANAGEMENT ACCOUNTING (CIMA P2)**

**SUBJECT CODE: 678A**

**CREDITS: 4**

**Course Objective:** The objective is to demonstrate the techniques for managing the costs using costing and cost driver analysis and controlling the performance of organizational units. It also aims to evaluate capital investment decisions to acquire the capacity to create value and understand the importance of risk and control in the medium term.

**Unit I: Managing the cost of creating value**

Engendering cost-conscious culture – Activity Based costing – activity-based management – Activity Based management as a tool to transform efficiency of repetitive overhead activities, analyze and improve customer profitability and improve channel performance – concepts of JIT and TQM – Kaizen costing – Business Process Re-engineering – target costing – value chain analysis – life cycle costing.

**Unit II: Capital Investment decision making**

Incremental cash flows - tax, inflation and other factors – perpetuities – qualitative issues – sources & integrity of data – role of business intelligence systems – investment decision making process – discounting – capital investments as real options – investment appraisal using payback, accounting rate of return, Net Present Value and Internal Rate of Return.

**Unit III: Managing and controlling the performance of organizational units**

Responsibility centers – objectives of each responsibility centre – controllable and uncontrollable costs and revenues – data analytics in performance management – Critical success factors and key performance indicators – benchmarking – non financial performance indicators – balanced score card -

**Unit IV: Behavioral aspects in performance management and transfer pricing**

Internal competition – internal trading – transfer pricing – transfer pricing for intermediate goods where market exists and where no market exists – types of transfer prices and when to use them – effects of transfer pricing on autonomy, responsibility centre and group profitability – use and ethics of transfer pricing

**Unit V: Risk and control**

Quantification of risk – use of probabilistic models to interpret distribution of project outcomes – stress testing of projects – decision trees – decision making under uncertainty – upside &

  
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downside risks – TARA framework – business risks – information system and data in managing risks.

**Course Outcomes:**

CO1: This course introduces the student with the use of cost management, quality and process management and value management.

CO2: The students will learn different criteria, process and techniques that are used to decide which project to undertake.

CO3: The students will get deep insight into the structure and strategies of organizations and the alignment with each other to ensure effective implementation of strategies.

CO4: The student will get deep understanding of managing the performance of business units to ensure that they achieve the strategic and other organizational objectives.

CO5: The student will be able to analyze risks and uncertainties that organizations face in the medium term that are mainly operational in nature

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Advanced Management Accounting – Study Text – Kaplan Publications
2. Advanced Management Accounting – Practice Kit – Kaplan Publications
3. Advanced Management Accounting – Study Text - BPP

**Reference Books:**

1. Advanced cost and management accounting – Vashist & Saxena, Sultan Chand & Sons
2. Problems and solutions on advanced management accounting – K Hariharan – Wolters Kluwer
3. Advanced Management Accounting – text and cases – Jawaharlal – Sultan Chand & Co
4. Robbins Fundamentals of Management – Pearson Education India

**SUBJECT: STRATEGIC MANAGEMENT (E3 CIMA)**

**SUBJECT CODE: BBA681A**

**CREDITS: 4**

  
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## **Unit I : The Strategy Process**

Introduction to strategy process, Define strategy, explain the purpose of strategy, outline the rational and emergent processes of arriving at strategy generating strategic options – mission, vision, values and stakeholders, the role of governance and ethics in the strategy process.

## **Unit II: Analysing the organisational eco system**

External environmental analysis – markets and competitions, society and regulation, impact of strategic networks and platforms on organisational strategy, resources and value creation within the organisational ecosystem. Stakeholder analysis and network.

## **Unit III: Generating strategic options and Making strategic choices**

Framework for generating strategic options, strategic options and choice, develop criteria for evaluation of the options, value analysis and portfolio analysis, developing strategic performance management systems.

## **Unit IV: Strategic Control**

Develop detailed action plans, communicate action plans, align incentives to performance, advise on resource availability, assess impact of strategy on organisation, understanding the impact and context of change. Change management – the role of the leader in managing change.

## **Unit V: Digital Strategy**

Digital technologies, digital enterprise, digital strategy – governance and elements of digital strategies, economics of digitisation, digital ecosystem, digital consumption, data metrics.

### **Course Outcome:**

CO1: Explain the purpose of strategy, discuss the types and levels of strategy

CO2: Analyse the elements of the ecosystem, discuss the impact of the eco system on organisational strategy, discuss the drivers of change in the ecosystem.

CO3: How to generate and develop options, evaluating options, produce strategy by integration of choices into coherent strategy.

CO4: Develop strategic performance management system, advise on resource allocation to support strategy implementation, recommend change management techniques and methodologies.

CO5: Describe the governance of digital transformation, analyse digital transformation, discuss the various elements of digital strategies.

**SUBJECT: CORPORATE GOVERNANCE AND SOCIAL RESPONSIBILITY**  
**SUBJECT CODE: BBA633A**  
**CREDITS:3**

**Course Objective:**

This course aims to provide students with a thorough grounding in a number of key introductory and advanced topics of corporate governance and its relevance for corporate social responsibility. Content includes relevant applied theories, current research, and practice.

**Module 1: Introduction**

Definitions and the evolution of Corporate Governance Basic definitions in the field of Corporate Governance and the historical development of Corporate Governance from the Wall Street Crash until nowadays will be discussed.

**Module 2: Parties involved in Corporate Governance**

Corporate Governance is based on the relationship of many players (such as shareholders, management and board of directors, stakeholders) involved in governing of a corporation. This meeting is devoted to discuss their rights, duties and responsibilities.

**Module 3: Corporate Governance Theories**

Organizational Theories (including Stewardship, Resource and Institutional Theory), Economic Theories (such as Agency, Finance and Managerial Theory) and the Stakeholder Theory will be presented on this meeting

**Module 4: Corporate Social Responsibility (CSR)**

CSR is about how business takes account of its economic, social and environmental impacts in the way it operates – maximizing the benefits and minimizing the downsides. The course discussion will be based on these issues, Corporate Social Responsibility in India, Recent developments

**Module 5: The International Environment for Corporate Governance**

International Corporate Governance. OECD and BIS Principles. Implementation. Pitfalls. Final Review. The International Environment for CG

**Course Outcomes:**

CO1: Distinguish the various expectations and demands that emanate from stakeholders on business firms.

CO2: Corporate Governance is based on the relationship of many players.

CO3: Define governance in business and recognize the legitimacy of business as an institution in a global society.

CO4: Describe the ethical a current social responsibility issues and the influence of these issues on society.

CO5: International Corporate Governance

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

  
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Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Harsh Srivastava, `` The business of social responsibility,’’ books for change
2. CV. Baxi and Ajit Prasad, `` Corporate social responsibility – concepts and cases,’’ Excel
3. Dr. M. Mahmoudi, Global strategic management,’’ Deep & Deep Publications Pvt. Ltd.

**Reference Books:**

1. S K. Bhatia, `` International Human resource management – Global perspective,’’ Deep & Deep Publications Pvt. Ltd.
2. J.P. Sharma, ``Governance, Ethics and Social responsibility of business, ‘Ane books Ltd.
3. Kotler Philip and Lee Nancy, `` Corporate social responsibility; doing the best for your company,’’ John Wiley
4. Simpson, Justine and Taylor, John R, `` Corporate Governance Ethics and and CSR,’’ Kogan Page Publishers
8. Velasquez Manuel G, Business Ethics: Concepts and Cases, Pearson
5. Fernando A.C.: Business Ethics, Pearson Education

**SUBJECT: LEADERSHIP SKILLS**

**SUBJECT CODE: BBA641A**

**CREDITS: 2**

**Course Outcomes:**

On successful completion of this course, the students will be able:

CO1: To know the role, functions and different styles of leadership

CO2: To know and apply the theories of leadership

CO3: To know the meaning of power and politics in context of leadership

CO4: To make the students aware about developing leadership skills in themselves

CO5: To make the students aware about different and innovative leadership

**Unit I: Introduction to Leadership:**

Leadership, role and functions of a Leader, Leadership motives Characteristics of an Effective Leader, Leadership as a process – the complexities of leadership – Effective leadership behaviors and attitudes – Leadership and power, coercion, Management, Trait approach, Leadership Behaviour and styles – Lewins Leadership styles, Ohio state Leadership study, The University of Michigan Study, Blake and Moutons Managerial Grid.

**Unit II: Leadership Theories:**

  
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Traditional Theories (A Brief Overview) • Trait Theory • Behavioral Theories • Fiedler's Contingency Model • Path – Goal Leadership Theory • Situational Leadership Theory • The Managerial Grid Modern Theories • Charismatic Leadership • Transactional and Transformational Leadership • Substitutes for Leadership • Authentic Leadership

### **Unit III: Power and Politics:**

Meaning Power, Distinction between Power & Authority, Bases or Sources of Power, Acquisition of Power, Symbols of Power and Powerlessness, Organizational Politics, Reasons for Organizational Politics, Managing Organizational Politics

### **Unit IV: Developing Leadership Skills:**

What Skills do Leaders Need? ; Leadership Training Programs, Designing Effective Training, Special Techniques of Leadership Training: Behavior Role Model, Case, Discussion and Business Games & Simulation, Challenges in designing training programmes

### **Unit V: Innovative Leadership and Design Thinking**

Innovative Leadership, Concept of emotional and social intelligence, Synthesis of human and artificial intelligence, Why does culture matter for today's global leaders, Design Thinking, What is design thinking, Key elements of design thinking: - Discovery - Interpretation - Ideation - Experimentation - Evolution. ,How to transform challenges into opportunities? How to develop human-centric solutions for creating social good

Reference books:

1. Leadership in Organizations: Gray Yukl, Pearson Education (Sixth Edition)
2. Sham Lal. Indian Realities in Bits and Pieces, Rupa and Co. New Delhi
3. Surendra Kumar & Pradeep Kapur. India of My Dreams, Academic Foundation, New Delhi
4. Nissam, Utlah. India: Economic, Political and Social Issues
5. Drucker, Peter and Maciariello, Joseph: 366 Days of Insight and Motivation for Getting the Right Things Done: Rutledge.

**SUBJECT: OPEN ELECTIVE\***

**SUBJECT CODE:**

**CREDITS: 3**

  
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**Life Skills 2 (Aptitude)**  
**Subject Code: DEN004A**  
**Credits: 2**

**Course Objectives:**

1. Students will be able to interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience.
2. Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
3. Students will be able to reason, model, and draw conclusions or make decisions with mathematical, statistical, and quantitative information.
4. Students will be able to critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
5. Students will be able to use appropriate technology in a given context.

**Course Outcomes (CO):** At the end of this course students will have:

CO1: Demonstrate procedural fluency with real number arithmetic operations and use those operations to represent real-world scenarios and to solve stated problems. Demonstrate number sense, including dimensional analysis and conversions between fractions, decimals, and percentages. Determine when approximations are appropriate and when exact calculations are necessary.

CO2: Solve linear equations, graph and interpret linear models, and read and apply formulas. Demonstrate a basic understanding of displays of univariate data such as bar graphs, histograms, dotplots, and circle graphs, including appropriate labeling.

CO3: Take charge of their own learning through good classroom habits, time management, and persistence. Participate in the classroom community through written and oral communication.

**Syllabus: Theory**

UNIT 1	Number System:  a. Number system  b. Power cycle  c. Remainder cycle  d. Factors, Multiples  e. HCF and LCM
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UNIT 2	<p>Data Arrangements and Blood Relations:</p> <ul style="list-style-type: none"> <li>a. Linear Arrangement</li> <li>b. Circular Arrangement</li> <li>c. Multi-dimensional Arrangement</li> <li>d. Blood Relations</li> </ul>
UNIT 3	<p>Time and Work:</p> <ul style="list-style-type: none"> <li>a. Work with different efficiencies</li> <li>b. Pipes and cisterns</li> <li>c. Work equivalence</li> <li>d. Division of wages</li> </ul>
UNIT 4	<p>Coding &amp; Decoding, Series, Analogy, Odd Man Out and Visual Reasoning:</p> <ul style="list-style-type: none"> <li>a. Coding and Decoding</li> <li>b. Series</li> <li>c. Analogy</li> <li>d. Odd Man Out</li> <li>e. Visual Reasoning</li> </ul>
UNIT 5	<p>Percentages, Simple Interest and Compound Interest:</p> <ul style="list-style-type: none"> <li>a. Percentages as Fractions and Decimals</li> <li>b. Percentage Increase / Decrease</li> <li>c. Simple Interest</li> <li>d. Compound Interest</li> </ul>

	e. Relation Between Simple and Compound Interest
UNIT 6	Permutation, Combination and Probability: a. Fundamental Counting Principle b. Permutation and Combination c. Computation of Permutation d. Circular Permutations e. Computation of Combination f. Probability
UNIT 7	Data Interpretation and Data Sufficiency: a. Data Interpretation – Tables b. Data Interpretation - Pie Chart c. Data Interpretation - Bar Graph d. Data Sufficiency

UNIT 8	Profit and Loss, Partnerships and Averages:  a. Basic terminologies in profit and loss  b. Partnership  c. Averages  d. Weighted average  e. Mixtures and allegations
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### Methodology for Evaluation

#### 1. Internal Assessment

a) Class/ Home Assignments (Minimum One from each Unit) : 30 Marks

b) In Semester Tests (Minimum two) : 30 Marks

#### 2. Term End : 40 Marks

\*Note: Minimum one class assignment shall be given in each turn in the Lab which will be attempted by the students in the class itself and evaluated by the end of the day. Balance work shall be completed at home and submitted at the beginning of the next turn in Lab.

### Suggested Reading:

1. Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;
2. The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;
3. How to Ace the Brainteaser Interview, by John Kador, Mc Graw Hill Publishers.
4. Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
5. Quicker Maths, by M tyra& K Kundan, BSC Publishing Co. Pvt. Ltd., Delhi;
6. Owl Purdue University online teaching resource

### Semester V:

**SUBJECT: INTERNATIONAL BUSINESS MANAGEMENT**

**SUBJECT CODE: BBA634A**

**CREDITS: 4**

  
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**Course Objective:** The Objective is to provide the understanding of the international business environment and its competitive and investment climate and also would provide knowledge of international business and finance activities of the organization and the investigation of changes in firms strategies and accounting policies as per the change in business environment and also the understanding of various aspects of international trade, finance and currency derivatives.

**Unit I: International business: An Overview**

Understand the evolution of international trade theories, Introduction to Forex Markets: Absolute advantage, Relative advantage, and H-O theory, Leontief Paradox, Porter's Diamond paradox; Foreign Exchange (Forex) Market, Communication in Forex Markets, Currency Quotes- both in global and domestic market, calculation of forward rates using spot rates, calculation of discount/premium on spot rate using spot and forward rates, Spot Rates with and without transaction costs.

**Unit II: Principles and monetary systems of international trade**

Understand the theories of absolute cost advantage, comparative cost advantage theory, Interest rate Parity, PPP Principle, International Fisher Effect, The International Monetary System: Bretton Wood system, Exchange Rate Regimes, International Banking, Concept and Development of Universal banking, Global depository receipt, Indian depository receipt.

**Unit III: Exposure of currency and its measurement**

Understand the fundamental functions of currency Exposure and its Management: Types of Forex Exposures: Transaction, Translation, and Economic Exposure and their management; Country Risk-Analysis and Management. Multinational payments Management: Leading, Lagging, Pooling and Netting, foreign exchange risk management system.

**Unit IV: Financial derivatives**

Understanding the factors influencing costs and benefits of FDI, Financial Derivatives with respect to currency: Forwards and Futures, Interest rate futures and currency futures; Determination of forward and futures prices; Options and related terminology, Calculating the pay-off from options and its representation.

**Unit V: Pricing & Its strategies**

Understanding on Pricing of Options- Binomial model and Black-Scholes model; trading strategies involving options; Introduction to Swaps, Interest rate swaps, currency swaps, cross currency swaps; Forward rate agreements (FRA). Interest rate caps, floors, collars, cost-oriented export pricing methods and market-oriented export pricing methods.

**Course Outcomes:**

CO1: This course introduces the students with the understanding about the international business theories and introduction to forex markets.

CO2: The students will learn the different approaches used in the international monetary systems.

CO3: The students will get a sound understanding of the various financial derivatives and foreign direct investments.

CO4: The student will get a deep analysis of the various financial pricing techniques held in use for international trade.

CO5: The student will understand the impact of methods and principles introduced in international finance.

**Textbooks:**

  
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1. Francis cherunilam, *International business*,
2. Charles W.L. Hill and G. Thomas M. hult, *International business*
3. John H. dunning, *Governments, globalization and International business*

**Reference Books:**

1. Paul R. Krugman and Maurice Obstfeld, *International Finance: Theory & Practice*.

**SUBJECT: LEGAL ENVIRONMENT FOR BUSINESS**

**SUBJECT CODE: BBA635A**

**CREDITS: 3**

**Course Objective:** To understand various laws applicable in India i.e. Contracts Act, Special Contracts, Partnerships, LLP's, companies etc. On completion of this course, learners will be able to: appreciate the relevance of business law to individuals and businesses and the role of law in an economic, political and social context.

**Unit I: (Law of Contracts, Special Contract, Indemnity & Guarantee)**

The Indian Contract Act, 1872 - Definition of contract -Law of contracts - Nature of contract - Classifications - Essential elements of a contract Offer and acceptance, consideration, capacity of parties- Minors-persons of unsound mind-persons disqualified by law- Free consent, legality of object and consideration, performance of contract, discharge of contract, breach of contract, remedies for breach of contract-Quasi contract- Performance. Special Contracts - Bailment and Pledge- Bailment Definition Essential elements Rights and duties of bailor and bailee Finder of lost goods. Pledge Essentials Rights and duties of Pawner and Pawnee. Indemnity and Guarantee- Indemnity - Definition, nature of liability of surety, rights of surety, discharge of surety. Meaning and definition of guarantee.

**Unit II: (Law of Agency & Sale of Goods Act)**

Essentials, kinds of agents, rights and duties of agent and principal, creation of agency, termination of agency-Sub agents and substituted agents-Relationship. **Sale of Goods Act, 1930** Formation of contract of sale - Essentials of contract of sale goods and their classifications- Conditions on warranties Transfer of property in goods Performance of contract of sale Unpaid seller and his rights

**Unit III: (The Indian Partnership Act 1932, The Limited Liability Partnership)**

Nature- rights and duties of partners- Registration and dissolution of firms- **The Limited Liability Partnership Act 2008**- Introduction- nature and scope- features- incorporation and differences with other forms of organization.

**Unit IV: (Companies Act and its Basics)**

- Company - Definition - Characteristics - Classifications -History and framework of Company Law in India - Companies Act 2013 - one person company, small company, associate company, dormant company, producer company; association not for profit; illegal association. Promotion and formation of a company- Body Corporate - promoter- legal

  
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position-duties remuneration- Memorandum of Association – Articles of Association - Contents and alteration -Incorporation of Company - On-line registration of a company – CIN - Companies With Charitable Objects - Doctrines of Indoor Management, Constructive Notice, Ultra-vires - Lifting up of Corporate veil - Conversion of Companies. Share Capital – Types - Public Offer - Private Placement - Prospectus - Contents of Prospectus – Types of prospectus – Deemed prospectus - Shelf Prospectus - Red Herring Prospectus - Abridged prospectus-Liability for Misstatements in Prospectus – Issue and Allotment of Securities – Types - Voting Rights –DVR- Application of Premiums - Sweat Equity Shares - Issue and Redemption of Preference Shares-Transfer and Transmission of Securities- Punishment for impersonation of Shareholder - Further Issue of Share Capital- Bonus Shares- Debenture Issue

#### **Unit V: (Membership in company and meetings)**

Modes of acquiring membership-rights and liabilities of members- cessation of membership- Register of Members - Company meetings – Annual General Meeting - Extraordinary General Meeting- Notice Of Meeting - Quorum - Chairman - Proxies - Voting -Show of Hands – E-Voting - Poll- Postal Ballot- Motions - Resolutions - Types - Minutes - Books of accounts - Annual Return- Directors -Types - legal position – Appointment - Duties – Disqualifications- DIN - Vacation of Office - Resignation - Removal - Meetings of Board - Resolutions and Proceedings- Powers of Board - Key Managerial Personnel- CEO- CFO - Audit and Audit Committee – related party- transactions - Corporate Social Responsibility- Winding up - Contributory – Modes of winding up - Winding Up by Tribunal - Petition for Winding Up- Powers of Tribunal- Liquidators - Appointments- Submission of Report - Powers and Duties - Effect of Winding Up Order- Voluntary Winding Up - Circumstances - Declaration Of Solvency - Meeting of Creditors- Commencement of Voluntary Winding Up- Appointment of Company Liquidator- Final Meeting and Dissolution of Company Official Liquidators – Appointment -Powers - Functions - Winding up of unregistered companies.

#### **Course Outcomes**

CO1: Ability to apply knowledge of Indian Contract Act, Sale of Goods Act, Partnership Act and LLP. Ability to identify, and solve legal issues in connection with business.

CO2: Identify the fundamental legal principles behind contractual agreements.

CO3: Know about the concept of company and shares.

CO4: Know about the application of company law in India. Understand the use of the memorandum of association and article of association in a company, they also learn from this course.

CO5: Use of various documents and forms in a company. Understand the relationship between company and its stakeholders.

#### **SUBJECT: CORPORATE STRATEGY**

**SUBJECT CODE: BBA636A**

**CREDITS: 4**

**Course Outcomes:** On successful completion of the module students will be able to:

1. Analyze and evaluate critically real-life company situations and develop creative solutions, using a strategic management perspective.
- 2.To enable students to know and develop strategies for business to remain competitive

  
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## **Unit I: Introduction to Strategy**

Concepts of strategy, Environmental issues (PESTLE), SWOT analysis, The internal resources, capabilities and competences of an organization, Strategic choices

## **Unit II: Managing growth and scale**

Strategic management process, Environment and Organizational Appraisal, Strategic Business Unit and levels of strategy.

## **Unit III: Strategy Formulation**

Industry life Cycle analysis, Corporate level strategies, Expansion and Stability, Integration and Diversification, Internationalization, Co-operative and Digitalization, Business Level Strategies, Cost leadership, Differentiation, Focus business strategy, Introduction to functional Level Strategies-Marketing, Financial, HRM, Product, Research and Development

## **Unit IV: Strategy Analysis and Implementation**

Process of Strategic Choice, Strategic Analysis, Mckinsey 7s, Porters five forces model BCG Matrix, Nature of Strategy implementation and barriers to strategy implementation

### **Suggested Reference Books:**

1. Strategic Management by Kazmi
2. Entrepreneur Development New Venture Creation Satish Taneja and S.L Gupta Galgotia Publication
3. Entrepreneurship Management; Dr. Aruna Kaulgud; Thomson Publication
4. Essentials of Entrepreneurship and small business Management; Thomas Zimmerer and Norman S; Pearson Publication
5. Websites of corporates

**SUBJECT: CUSTOMER RELATIONSHIP MANAGEMENT**

**SUBJECT CODE: BBA639A**

**CREDITS: 3**

### **Course Outcomes:**

On successful completion of this course, the students will be able:

CO1: To be aware of the nuances of customer relationship

CO2: To analyze the CRM link with the other aspects of marketing

CO3: To impart the basic knowledge of the Role of CRM in increasing the sales of the company

CO4: To make the students aware of the different CRM models in service industry

CO5: To make the students aware and analyze the different issues in CRM

## **Unit I: Evolution of Customer Relationship**

  
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CRM- Definition, Emergence of CRM Practice, Factors responsible for CRM growth, CRM process, framework of CRM, Benefits of CRM, Types of CRM, Scope of CRM, Customer Profitability, Features Trends in CRM, CRM and Cost-Benefit Analysis, CRM and Relationship Marketing.

## **Unit II: CRM Concepts**

Customer Value, Customer Expectation, Customer Satisfaction, Customer Centricity, Customer Acquisition, Customer Retention, Customer Loyalty, Customer Lifetime Value. Customer Experience Management, Customer Profitability, Enterprise Marketing Management, Customer Satisfaction Measurements, Web based Customer Support.

## **Unit III: Planning for CRM**

Steps in Planning-Building Customer Centricity, Setting CRM Objectives, Defining Data Requirements, Planning Desired Outputs, Relevant issues while planning the Outputs, Elements of CRM plan, CRM Strategy: The Strategy Development Process, Customer Strategy Grid.

## **Unit IV: CRM and Marketing Strategy**

CRM Marketing Initiatives, Sales Force Automation, Campaign Management, Call Centres. Practice of CRM: CRM in Consumer Markets, CRM in Services Sector, CRM in Mass Markets, CRM in Manufacturing Sector.

## **Unit V: Challenges of CRM Implementation**

CRM Planning and Implementation Issues and Problems in implementing CRM, Information Technology tools in CRM, Challenges of CRM Implementation. CRM Implementation Roadmap, Road Map (RM) Performance: Measuring CRM performance, CRM Metrics.

Text Books:

1. Francis Buttle, Stan Maklan, Customer Relationship Management: Concepts and Technologies, 3rd edition, Routledge Publishers, 2015
2. Kumar, V., Reinartz, Werner Customer Relationship Management Concept, Strategy and Tools, 1st edition, Springer Texts, 2014

Reference Books:

1. Jagdish N.Sheth, Atul Parvatiyar & G.Shainesh, "Customer Relationship Management", Emerging Concepts, Tools and Application", 2010, TMH.



2. Dilip Soman & Sara N-Marandi,” Managing Customer Value” 1st edition, 2014, Cambridge.
3. Alok Kumar Rai, “Customer Relationship Management: Concepts and Cases”, 2008, PHI.
4. Ken Burnett, the Handbook of Key “Customer Relationship Management”, 2010, Pearson Education.
5. Mukesh Chaturvedi, Abinav Chaturvedi, “Customer Relationship Management- An Indian Perspective”, 2010 Excel Books, 2nd edition

**SUBJECT: Advanced Financial Reporting Cima F2**

**SUBJECT CODE: BBA679A**

**CREDITS:4**

**Course Objective:** The objective of the course is to acquaint students with sources of long-term finance and to enhance the analysis, application and evaluation skills in financial and non-financial reporting

**Unit I: Financing Capital Projects**

Characteristics of different types of shares: Ordinary and preference shares, Characteristics of long-term debts: Bonds and other types of long-term debt, Operations of stock and bond markets including the role of advisors.

Calculate cost of equity and debts using weighted average cost of capital, Cost of equity using dividend valuation model (with or without growth in dividends), post-tax cost of bank borrowing. Yield to maturity of bonds and post-tax cost of bonds. Post-tax costs of convertible bonds up to and including conversion.

**Unit II: Financial Reporting Standards**

Explain the financial reporting standards for: Revenue (IFRS 15), Leases (IFRS 16), Provisions (IAS 37), Financial instruments (IAS 32 and IFRS 9), Intangible assets (IAS 38), Income taxes (IAS 12), Effect of changes in foreign currency rates (IAS 21).

Discuss disclosure requirements related to: Transaction between related parties (IAS 24) and Earnings per share (IAS 33)

**Unit III: Group Accounts**

Explain relevant financial reporting standards for group accounts which include: IAS 1 - Presentation of Financial Statements, IAS 27 - Separate Financial Statements, IAS 28 - Investment in Associates and Joint Ventures, IFRS 3 - Business Combinations, IFRS 5 - Non-current Assets Held for Sale or Discontinued Operations, IFRS 10 - Consolidated Financial Statements, IFRS 11 - Joint Arrangements.

Prepare the following based on financial reporting standards: Consolidated statement of financial position, consolidated statement of comprehensive income, consolidated statement of changes in equity, consolidated statement of cash flows.

**Unit IV: Integrated Reporting**

Describe the role of the International Integrated Reporting Council, Discuss the International <IR> Framework. Benefits and Limitations of Framework.

Explain the measurement and disclosure issues of: Financial capital, Manufactured capital, Intellectual capital, Human capital, Social and relational capital and Natural capital.

**Unit V: Analysing Financial Statements**

  
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Analyse financial statements to provide insight on: Performance, Position, Adaptability, Prospects. Reporting of ratios along the dimensions of the Gartner Data Analytics maturity Link to organization's business model. Recommend actions based on insights from the interpretation of financial statements. Discuss the limitations of data and the tools used for interpreting financial statements

### **Course Outcomes**

CO1: Acquaint students with how to effectively source long-term finance, particularly their capital investments.

CO2: Apply the financial reporting standards to more complex aspects of group accounting

CO3: Understand the recognition and measurements of various elements of the financial statements.

CO4: Acquire an understanding about Integrated reporting and its need.

CO5: Evaluate and analyse financial statements and provide insights about the financial performance and position of the organization over time and in comparison with other firms.

**SUBJECT: Strategic Management (E3 Cima)**

**SUBJECT CODE: BBA680A**

**CREDITS: 4**

**Course Objective:** The course aims at implementing the strategies by aligning their structures, people, process, projects and relationships. It aims to develop skills and abilities of the strategic leaders of organizations, enabling them to create the vision and direction for the growth and long-term sustainable success of the organization. It focuses on successfully managing and leading change within the process of strategy formulation and implementation.

### **Unit I: The strategy Process**

Meaning of strategy – levels of strategy – styles in strategic planning – the role of management accountant - Outline the rational and emergent processes of arriving at strategy- Different definitions of strategy - Essential features and characteristics of strategy - Intended and emergent strategy - Corporate, business and functional strategies - Analysis of organisational ecosystem - Generating options, Strategic choice, Strategic control.

### **Unit II: Analysing the organisational ecosystem**

Analyse the elements of the ecosystem - Impact of the ecosystem on organisational strategy - Analyse Markets and competition, Society and regulation - SWOT analysis - PESTEL analysis - Competitor analysis - Customer analysis - Wider ecosystems - Industry ecosystems - drivers of change in the ecosystem - Institutional and systemic, Social, Market, Technology, Sustainability – Globalization – Geopolitics – Demography - Customer empowerment - Digital technology – Automation - Value creation in ecosystems - Participants and interactions in networks and platforms - Technology enablers in networks - Process of creating networks and platforms - Stakeholder analysis in networks - Corporate social responsibility

### **Unit III: Generating strategic options and making strategic choices**

Generate and developing options – Roles and responsibility of leaders of organisations for strategy - Definition of purpose, vision and values of organisations - Linkage between purpose, vision and values to each other and to strategy - Product/market matrix - Generic strategies - Trend analysis - System modeling - Scenario planning - Tangible and intangible value drivers and data to measure them - Game theory perspectives - Real option perspectives - Evaluate options - Produce strategy by the integration of choices into coherent strategy - Suitability, acceptability and feasibility framework - Value chain analysis - Managing product portfolio

  
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#### **Unit IV: Strategic control**

Strategic performance management system - resource allocation to support strategy implementation - change management techniques and methodologies - Action plans - Target setting - Critical success factors (CSFs) - Key performance indicators (KPIs) - Audit of key resources and capabilities required to implement strategy - Matching resources to strategy - Types of change - Impact of change on organisational culture - Resistance to change - Approaches and styles of change management - Role of change leader in communication.

#### **Unit V: Digital strategies**

Governance of digital transformation - Analyse digital transformation - various elements of digital strategies - Role of board and senior leadership in digital strategy - Digital disruption – Surviving digital disruption – Artificial intelligence – Cloud and mobile computing – Internet of Things – Big Data – Block chain – Data visualisation – Data visualisation - Describe the roles and responsibilities of the board and executive leadership in digital strategy – digital disruption – roles of leaders – economics of digitalisation – digital ecosystems – digital consumption – data and metrics.

#### **Course Outcomes:**

CO1: To under the role of strategic management accountant in the current competitive environment.

CO2: It aims to throw light of the strategic management process.

CO3: To be able to understand the importance of governance, ethics, and values.

CO4: The workings of digital transformation in managing the strategies in the digital era.

CO5: To understand the strategic performance management system and change management.

#### **Textbooks:**

1. CIMA study material by Kaplan.
2. CIMA Exam Kit by Kaplan

#### **Reference Books:**

1. Strategic Management - planning for domestic and global competition - John A Pearce, Richard B Robinson - Himalaya Publications
2. Strategic Management - Azhar Kazmi - McGraw Hill Education

**SUBJECT: Risk Management (P3 - Cima)**

**SUBJECT CODE: BBA682A**

**CREDITS: 4**

#### **Unit I: Enterprise risk**

Analyse the sources of risks, types of risks, evaluate the impact of risk, assess the likelihood of risks, analyse the interaction of different risks. Roles and responsibilities, risk tolerance, appetite and capacity, risk management frameworks, risk analytics.

Learning outcome: Analyse the sources and types of risk, evaluate risk, discuss ways of managing risks.

  
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## **Unit II: Strategic risk**

Analyse relevance of the assumptions on which strategy is based, Discuss potential sources and types of disruptions to strategy, sources of reputational risk, impact of reputational risk on strategy. The role of board and its committees in managing risk, failure of governance and its impact on strategy.

Learning outcome: Analyse risks associated with formulating strategy, evaluate the sources and impact of reputational risks, explain governance risks.

## **Unit III: Internal Controls**

Discuss the roles and responsibilities for internal control, purpose of internal control, feature of internal control. Committees of sponsoring organisations of the Treadway Commission (COSO) internal control and risk management framework. Assess control weakness, assess compliance failure, recommend internal controls for risk management. Forms of internal audit, internal audit process, effective internal audit and internal audit report.

Learning outcome: Analyse internal control system, recommend internal controls for risk management, discuss various issues relating to internal audit in organisations.

## **Unit IV: Cyber risk**

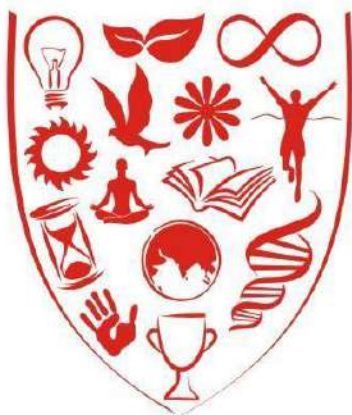
Nature and impact of cyber risks, types of cyber risks, risk of security vulnerabilities. Review cyber security objectives security controls, centralisation in cyber security. Forensic analysis, malware analysis, penetration testing, software security, evaluate cyber risk reporting framework.

Learning objective: Analyse cyber threats, review cyber security processes, discuss cyber security tools and techniques, evaluate cyber risk reporting.

### **Semester VI:**

**SUBJECT: INTERNSHIP**  
**SUBJECT CODE: BBA899A**  
**CREDITS: 16**

  
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**Bachelor of Commerce**

**Finance & Analytics**

**Academic Programmes**

**Batch (2022-2025)**

  
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### Summary Sheet

Semester	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	Total	Min. Credit Req. For Degree
Credit	22	27	24	27	24	24	148	*10% relaxation for Mooc, NPTEL & Swayam courses

Type	Foundation	Core	Specialization	Interdisciplinary	General
Total Credit	31	40	52	12	22

### Semester I

FIRST SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM615B	Business and Technology	3	-	-	3	F
BCM616A	Financial Accounting	3	1	-	4	C
BCM618A	Introduction To Business Analytics	2	1	2	3	S
BCM619	Business Mathematics & Statistics	3	1	-	4	F
BCM617	Corporate And Business Law	3	1	-	3	ID
DEN001A	Communication Skills	3	-	-	3	G
DIN001A	Culture Education – 1	-	-	4	2	G
	<b>TOTAL</b>	<b>17</b>	<b>4</b>	<b>6</b>	<b>22</b>	

### Semester II

SECOND SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type

  
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BCM 620A	Organisation Behaviour	4	-	-	4	F
BCM 622A	Management Accounting	3	1	-	4	C
BCM 621A	Marketing Management	3		-	3	F
BCM 623A	Corporate Accounting	4	-	-	4	C
BCM 624A	Business Analytics Using Excel	2	-	2	3	S
DEN002A	Professional Skills	3	-	-	3	G
DIN002A	Culture Education – 2	-	-	4	2	G
DCH001	Environmental Studies (EVS)	3	-	2	4	F
	<b>TOTAL</b>	<b>22</b>	<b>1</b>	<b>8</b>	<b>27</b>	

### Semester III

THIRD SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM 625A	Banking & Financial Services	3	1	-	3	F
BCM 626A	E-Business & Cyber Laws	3	1	-	3	ID
BCM 627A	Research Methodology	3	1	-	4	F
BCM 628A	<b>Programming For Business Analytics</b>	2		4	4	S
BCM 629A	<b>Business Statistics With R</b>	3		2	4	S
***	Open Elective	3	-	-	3	G
DEN003A	Life Skills-1 (Personality Development)	2	-	-	2	G
DIN003A	Value Education – 1	1	1	-	1	G
	<b>TOTAL</b>	<b>20</b>	<b>4</b>	<b>6</b>	<b>24</b>	

### Semester IV

FOURTH SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM 630A	Entrepreneurship	3	1	-	3	F
BCM 631A	Business Variables Analytics	2	1	2	4	S

  
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BCM 632A	Audit And Assurance	3	1	-	4	C
BCM 633A	Financial Predictive Analytics	3		2	4	S
BCM 634A	E-Accounting	3	1	-	3	C
BCM 635A	Logistics And Supply Chain Management	3	1	-	3	ID
***	Open Elective	3	-	-	3	G
DEN004A	Life Skills - 2 (Aptitude)	2	-	-	2	G
DIN004A	Value Education – 2	1	-	-	1	G
BCM643A	Big Data	3		2	4	S
	<b>TOTAL</b>	<b>23</b>	<b>5</b>	<b>6</b>	<b>31</b>	

### Semester V

<b>FIFTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BCM 636A	Machine Learning for Business Analytics	2	1	2	4	S
BCM 637A	Direct Taxation	3	1	-	4	C
BCM 638A	Financial Econometrics	3	1	-	4	S
BCM 639A	Marketing Analytics	3	1	-	4	S
BCM 641A	Logistics And Supply Chain Analytics	3	1	-	4	S
BCM 642A	Accounting And Fraud Analytics	3	1	-	4	S
BCM 644A	Hr Analytics	3		2	4	S
	<b>TOTAL</b>	<b>20</b>	<b>6</b>	<b>4</b>	<b>28</b>	

### Semester VI

<b>SIXTH SEMESTER</b>
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Sub Code	Sub Name	L	T	P	C	Type
BCM799A	Internship	-	-	32	16	C
	<b>TOTAL</b>	-	-	<b>32</b>	<b>16</b>	

**Program Educational Objective (PEO)-B.Com Finance and Analytics**

- To build a strong footing of understanding in different areas of Commerce
- To develop the skill of applying concepts and practices used in Commerce
- To develop an attitude for working commendably and proficiently in a business surroundings
- To integrate knowledge, skill and attitude that will stand an environment of learning and creativity among the students.
- To enable a student to be capable of making decisions at personal and professional level.

**Program Outcome (PO) B.Com Finance and Analytics**

1. Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
2. Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
3. Elicit views of others, mediate disagreements and help reach conclusions in group settings
4. Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering
5. Develop as an individual with the conceptual as well as practical knowledge in the field of analytics, comprising of business studies and metrics, statistics, information technology and management.
6. Develop the ability to adapt to the rapidly changing industry with the newly learned applied skills in the domains of analytics and business studies.
7. Develop critical thinking skills to take up the role as Business Analysts and Professionals in the Business Domains.
8. Apply analytics to analyze and interpret data using latest analytical tools to solve complex business problems pertaining to Finance, Marketing, Commerce, etc.
9. Perform Descriptive, Predictive and Prescriptive Analysis based on structured, semi-structured and unstructured data types.

  
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10. Classify and employ the use of various tools and programming languages such as SQL, SAS, Python and R Programming to implement and deploy analytical models and algorithms.
11. Articulate, illustrate and demonstrate the ability to develop advanced analytical models based on specialized domains such as Financial Predictive Analytics, Marketing Analytics, Machine Learning, etc.
12. Compare, evaluate and report the inferences obtained from different machine learning algorithms and gain the ability to incorporate them so as to achieve proper decision making with regards to the said business domain such as Finance, Marketing, Accounting, Commerce, etc.

### **Semester I**

<b>FIRST SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BCM615B	Business and Technology	3	-	-	3	F
BCM616A	Financial Accounting	3	1	-	4	C
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DEN001A	Communication Skills	3	-	-	3	G
DIN001A	Culture Education – 1	-	-	4	2	G
	<b>TOTAL</b>	<b>17</b>	<b>4</b>	<b>6</b>	<b>22</b>	

**Business and Technology**  
**SUBJECT CODE: BCM615B**  
**CREDITS: 3**

**Unit 1: The business organisation, its stakeholders, and the external environment**

  
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The purpose and types of business organisation -Stakeholders in business organisations -Political and legal factors affecting business -Macroeconomic factors -Micro economic factors -Social and demographic factors -Technological factors -Environmental factors -Competitive factors

### **Unit 2: Business organisational structure, functions and governance**

The formal and informal business organisation- Business organisational structure and design- Organisational culture in business -Committees in business organisations -Governance and social responsibility in business

### **Unit 3: Accounting and reporting systems, compliance, control, technology and security**

The relationship between accounting and other business functions -Accounting and finance functions within business organisations -Principles of law and regulation governing accounting and auditing -The sources and purpose of internal and external financial information, provided by business -Financial systems, procedures and related IT applications -Internal controls, authorisation, security of data and compliance within business -Fraud and fraudulent behaviour and their prevention in business, including money laundering. -The impact of Financial Technology (Fintech) on accounting systems

### **Unit 4: Leading and managing individuals and teams & Personal effectiveness and communication**

Leadership, management and supervision -Recruitment and selection of employees -Individual and group behaviour in business organisations -Team formation, development and management -Motivating individuals and groups -Learning and training at work -Review and appraisal of individual performance- The application and impact of Financial Technology (FinTech) in accountancy and audit -Personal effectiveness techniques- Consequences of ineffectiveness at work -Competence frameworks and personal development -Sources of conflicts and techniques for conflict resolution and referral -Communicating in business

### **Unit 5: Professional ethics in accounting and business**

Fundamental principles of ethical behaviour -The role of regulatory and professional bodies in promoting ethical and professional standards in the accountancy profession -Corporate codes of ethics- Ethical conflicts and dilemmas

## **Financial Accounting**

**SUBJECT CODE: BCM616A**

**CREDITS: 4**

### **Unit 1: Purpose of financial accounting**

Define financial accounting – purposes of financial statements for the users – main elements of financial reports – conceptual framework – definitions of asset, liability, equity, income & expenses-prudence.

  
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**Unit 2: Qualitative characteristics of financial statements**

Concepts of relevance, faithful presentation, materiality, substance over form, going concern, business entity, accruals, consistency, comparability, verifiability, understandability and timeliness

**Unit 3: Accounting records & double entry accounting system**

Main data sources for accounting – different business documents such as sales order, purchase order, goods received note, quotation, goods despatched note, invoice, credit & debit notes, receipt, remittance advice, cash vouchers – understand the double entry accounting & duality concept – types of transactions such as sales, purchases, payments & receipts.

**Unit 4: Recording transactions**

Recording into journals – ledger accounts – balancing of ledger accounts – accounting for discounts, sales tax – recording cash transactions – accounting & valuation of inventories – accruals & prepayments – tangible & non-tangible assets – depreciation & amortisation accounting – receivables & payables – provisions & contingencies – errors & rectification – bank reconciliation statements

**Module 5: Trial balance, financial statements**

Statements of profit or loss and other comprehensive income, cash flow statements, balance sheet – events after reporting period – interpretation of financial statements – use of basic ratios related to profitability, liquidity, activity and resource utilisation-Describe the principle of the equity method of accounting for Associate entities

**Introduction to Business Analytics****SUBJECT CODE: BCM618A****CREDITS: 3****Module Overview**

This subject covers the complete life cycle of Business Intelligence/Analytics, covering Operational/Transactional Data Sources, Data Transformation, Data Mart/Warehousing design-build, Analytical Reporting and Dashboards. It will also help the students to develop deeper understanding on these concepts using Business Intelligence Tools.

**Unit 1: Introduction & Data Type**

Overview of Business Analytics, Key Purpose of Using IT in Business, Enterprise Applications (ERP/CRM) and Bespoke IT Applications, Digital Data, Overview of Database, Structured data, Unstructured data, Semi-Structured data, Difference between different types of data.

**Unit 2 : Introduction to OLTP, OLAP & BI**  
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OLTP (On-Line Transaction Processing), OLAP (On-Line Analytical Processing), OLAP Architecture, Data Models for OLTP and OLAP, Role of OLAP Tools in the BI Architecture, OLAP Operations on Multidimensional data, Leveraging ERP Data using Analytics, Defining Business Intelligence (BI), Evolution of BI and Roles of DSS, EIS, MIS, and Digital Dashboards, The BI Value Chain, BI component Framework, BI Applications, Roles & Responsibilities, Popular BI Tools.

### **Unit 3 :Basics of Data Integration & Multidimensional Data Modeling**

Data Warehousing, Data Mart, Operational Data Storage, Data Mapping & Data Staging, Data Integration & Technologies, Data Quality & Data Profiling, Data Modeling Basics, Types of Data Model & Data Modeling Techniques, Fact Table & Dimension Table, Typical Dimension Models and Dimension Modeling Life Cycle.

### **Unit 4:Measures, Metrics, KPIs, and Performance Management & BI Road Ahead**

Understanding Measure and Performance, Measurement System Terminology, Navigating a Business Enterprise, Role of Metrics, and Metrics Supply Chain, Fact based Decision Making and KPIs, Measures to Business Decisions and Beyond, Understanding BI and Mobility, BI and Cloud Computing, BI for ERP Systems, Social CRM & BI.

### **Unit 5 :Basics of Enterprise Reporting**

Reporting Perspectives, Report Standardization and Presentation Practices, Enterprise Reporting Characteristics in OLAP World, Balanced Scorecard, Dashboards, Creating Dashboard, Scorecards vs. Dashboards, The Buzz Behind Analysis, Creating Enterprise Reports.

### **Case Studies and Exercises**

## **Business Mathematics & Statistics**

**SUBJECT CODE: BCM619A**

**CREDITS: 4**

### **Unit 1: Set Theory**

Introduction to Sets, Sets and their Representation, Tabular or Roster Method, Rule Method or Set Builder, Empty or Void or Null Set, Finite sets and Infinite sets, Proper Subset, Improper Subset, Power Set, Universal Set, Open Interval, Closed Interval, Semi-Open or Semi Closed intervals, Infinite Intervals, Venn Diagrams, Operations on Sets, Union, Intersection of Sets, Disjoint Sets, Difference of Sets, Symmetric Difference of Sets, Complement of a Set, Laws of Algebra of Sets.

### **Unit 2: Matrices and Determinants**

  
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Definition of a Matrix, Addition & Subtraction of Matrices, Multiplication of Matrices, Transpose of a Matrix. System of linear equations, Gauss elimination method, Inverse of a Matrix, Determinants, Determinants of order one and more, Properties of Determinants, Multiplication of two Determinants, Minors and Cofactors, Cramer's rule for solution of linear equations, Adjoint of a Matrix, Rank of a Matrix.

### **Unit 3: Vector Algebra**

Vectors, Types of Vectors, Operations on Vectors, Addition of Vectors, Properties of Operation of Addition, Subtraction, Properties of Operation of Subtraction, Multiplication by a scalar, Orthonormal Bases, Product of Two Vectors, Scalar Product or Dot Product of Two Vectors, Properties of Scalar Product, Vector Product or Cross Product, Properties of Vector Product.

### **Unit 4: Statistics**

Introduction to Statistics, Scale of Measurement, Nominal, Ordinal, Interval & Ratio. Frequency Distribution, Bar Chart, Pie Chart, Histogram, Frequency Polygon, Ogive, Pareto Chart, Stem-and-leaf Chart, Scatter Plot, Measure of Central Tendency, Properties, Advantages and Disadvantages of Arithmetic Mean, Geometric Mean, Harmonic Mean. Positional Averages, Median, Quartiles, Deciles, Percentiles & Mode. Measure of Dispersion, Range, Interquartile Range, Standard Deviation.

### **Unit 5: Probability**

Introduction to Probability, Experiment, Event, Compound Event, Independent and Dependent Events, Mutually Exclusive Events, Equally Likely Events, Marginal, Union, Joint, Conditional Probability, Basic Probability Rules, General Rule of Addition, General Rule of Multiplication, Concept of Baye's Theorem.

## **Corporate and Business Law**

**SUBJECT CODE: BCM617A**

**CREDITS: 3**

### **Unit 1: Nature of the contract and consideration**

The Indian contract act 1872 – Definition of contract - Essential elements of a valid contract – clarification of contracts – offer and acceptance and Communication of offer and Acceptance and Revocation.

Consideration – Capacity to contract – Free consent - Legality of object – void agreement.

Performance of contract – offer to perform contracts which need not be performed – by whom contract must be performed who can demand performance. Discharge of Contract – meaning – methods – by performance – by agreement – impossibility of performance.

### **Unit 2: Breach of contract and the sale of goods act**

  
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Remedies for Breach of Contract – Introduction Recession – Damages – Specific Performance – injunction  
- Quasi contracts. Contract of Indemnity and guarantee – Contract of bailment and pledge – Contract of  
Agency – Creation of agency – Rights, duties and liabilities of an agent - Termination of agency.

Sale of Goods Act :

Formation of contract of Sale - caveat emptor - Express and implied conditions and warranties –  
Performance of Contract of Sale – Rights of an unpaid Seller.

### **Unit 3: Companies act and memorandum of association**

Meaning, Definition & Salient Features of Companies Act, 2013 - Kinds of Companies - Promotion, Role  
of Promoters-Incorporation of a Company.

Memorandum of Association, Contents & Alteration - Articles of Association, Contents & Alteration -  
Prospectus, Contents & Consequences of misstatement - Doctrine of Ultra Virus & Indoor Management.

### **Unit 4: Directors and corporate governance**

Directors-Appointment, Qualification-Disqualification - Membership in a Company, Modes of acquiring  
Membership - Rights and Liabilities of Members, Termination of Membership - Corporate Governance-  
Meaning, benefits of good governance, factors influencing corporate governance.

### **Unit 5: General and Statutory Meeting, Extraordinary Meetings**

General and Statutory Meeting, Extraordinary Meetings -Resolutions, Meaning and Kinds - Role of  
Company Secretary with respect to meetings. Meaning and modes of winding up - Powers of court in  
winding up - Consequences and procedures for winding up - Powers, Liabilities and Duties of Liquidators.

## **Communication Skills**

**SUBJECT CODE: DEN001A**

**CREDITS: 3**

### **Course Objectives**

1. To enhance English language competence in reading, writing, listening and speaking.
2. Switch the approach from teacher-centred to student-centred one.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. To link communication skills with the organizational behaviour.

  
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6. To inculcate skills that are very much required for employability and adjust in the professional Environment.

**Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in different contexts.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

**Syllabus: Theory**

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
<b>UNIT 2</b>	<b>Basic Writing Skills:</b> Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
<b>UNIT 3</b>	<b>Composition:</b> , Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

**Syllabus: Lab**

  
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<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time- management, Following Deadlines etc
<b>UNIT 2</b>	<b>Write Dialogue from the different contexts of corporate culture:</b> Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
<b>UNIT 3</b>	<b>Composition:</b> , Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Draftinga CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

## **Methodology for Evaluation**

### **Assesment Theory**

1. Internal Assessment (Theory)
  - a) Home Assignments: One from each Unit: 15 Marks
  - b) In Semester Tests (Minimum two) : 30 Marks
  - c) Attendance : 05 Marks
2. Term End (Theory) : 50 Marks

### **Assessment Lab**

1. Internal Assessment (Lab)
  - (a) Daily Performance in the Lab : 50 Marks
2. Term End (Lab) : 50 Marks

### **Suggested Reading:**

1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
8. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006

### **Cultural Education-1**

**SUBJECT CODE: DIN001A**

**CREDITS: 2**

### **Course Objectives**

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

### **Course Outcomes (CO)**

At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the richness of Indian Culture

CO2: Ability to represent the culture ethics in real life

### **UNIT-I : Holy Scriptures -A**

Introduction to Vedanta and Bhagavad Gita, Goals of Life – Purusharthas, Introduction to different Dharm Granthas (Various religious scriptures from Hindu, Muslim, Christian, Bodh, Jain religions), Introduction to Yoga, Overview of Patanjali's Yoga Sutras

## **UNIT-II : Society and Culture-I**

Introduction to Indian Culture and Major Symbols of Indian Culture; Major Indian Cultural and Ethical Values- Respect, Compassion, Kindness, Forgiveness, Introspection, Honesty, Justice, Loyalty, Devotion, Self Sacrifice, Hospitality, Vasudhev Kutumbkum

## **UNIT-III : India in Progress-I**

Education , Science and Technology in Ancient India; Values from Indian History- War of Mahabharata, War of Kalinga, Freedom Struggle of India, Major Farmer Movements, Major Religious and Social Upliftment Movements

## **UNIT-IV: Great Indian Personalities-I**

Life and works of the Great People of Ancient India- Sushruta, Dadhichi, Ashtvakra, Anusuya, Panini, Charaka, Kalidas, Aryabhatta, Samudragupta, Ashoka, Chandragupt Mourya, Porus, Satyabhama, Dhruv, Prahlad, Chankya, Varahmihira, Bhism, Karan, Dronacharya, Meera Bai, Surdas, Dadudayal, Kabir, Mahatma Buddha, Mahavir, Guru Nanak Dev, Guru Gobind Singh, Mohammad Saheb, Jesus Christ, Veer Shivaji, Maharana Pratap, Maharani Laxmi Bai, Maharani Padmini, Hadi Rani Shal Kanwar, Panna Dhai

\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by committee of teachers.

### **Suggested Reading:**

1. Glory of Indian Culture (English) Paperback by Giriraj Shah
2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies by Saroj Bala , Kulbhushan Mishra

### **References**

<https://knowindia.gov.in/culture-and-heritage/lifestyle-values-and-beliefs.php>

### **Semester II**

<b>SECOND SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BCM 620A	Organisation Behaviour	4	-	-	4	F
BCM 622A	Management Accounting	3	1	-	4	C
BCM 621A	Marketing Management	3		-	3	F
BCM 623A	Corporate Accounting	4	-	-	4	C
BCM 624A	Business Analytics Using Excel	2	-	2	3	S
DEN002A	Professional Skills	3	-	-	3	G
DIN002A	Culture Education – 2	-	-	4	2	G
DCH001A	Environmental Studies (EVS)	3	-	2	4	F

	<b>TOTAL</b>	<b>22</b>	<b>1</b>	<b>8</b>	<b>27</b>	
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## **ORGANISATION BEHAVIOUR**

**SUBJECT CODE: BCM 620A**

**CREDITS: 4**

### **Course Objective:**

Understand how the organisations can be managed effectively considering the behaviour of various stakeholders of an organisation and analysing the skills required for the future advantage of an organisation.

### **Unit 1: Organization behavior – an introduction**

Meaning of organizations – Nature of organization behavior – Basics of organization behavior – Scope and evolution of organizational behavior – Organizational arrangements and Organization behavior – Key terminologies in Organization Behavior - Organizational Behavior Model (OB Model)

### **Unit 2: Individual behavior, intelligence and personality**

Meaning of individual behavior – personal and environmental factors – Models of individual behavior – nature and types of intelligence – theories and measurement of intelligence – Intelligence factors – intelligence in the context of organizational behavior.

Nature and determinants of personality – Personality traits – Personality in the context of Organization Behavior

### **Unit 3: Motivation and work stress**

Nature and importance of motivation – challenges and theories of motivation – Motivation and organizational culture – quality of work life – rewards and behavior modification – problem employees – employee engagement

Meaning of work stress – work stress model – stress management – Stress and organizational behavior

### **Unit 4: Group and team behavior**

Nature and types of groups – Group dynamics and Organization behavior – determinants of group dynamics – Importance of group dynamics in an organization – group development strategies – Group motivation – Group structuring and decision making.

Meaning of team – differences between group and team – Types and benefits of teams – effective team management – team conflicts and resolution – Team development and Organizational Behavior

### **Unit 5: Organizational culture and leadership**

Meaning of leadership – leadership vs management – leadership styles and theories – formal and informal leadership – Ethics and leadership – leadership and organizational culture – Sustaining culture – changing organizational culture – workplace behaviour – Ethics of power.

### **Course outcomes:**

CO 1: Understand the basic of organizational behaviour in the context of the dynamic environment.

CO 2: Understanding the role of individual behaviour, intelligence and personality in the context of organizational development.

CO 3: Understanding importance of rewarding and motivating the stakeholders and managing the stress to effectively manage the organizational performance

CO 4: Understand the role of group and team dynamics in the current organizational environment

CO 5: Understand the importance of perception into organizational culture, leadership and ethics in an organizational development.

**Management Accounting**  
**SUBJECT CODE: BCM622A**  
**CREDITS: 4**

**Course Objective:**

To understand the various types of management information and data. To understand the accounting of material labour and overheads. To understand various costing methods. To understand and solve questions of budgeting and its implication. To understand the standard costing concepts in detail and carry out variance analysis. To understand how to measure the performance of the organisation.

**Unit 1 (Characteristics of Management Information, Data analysis and Statistical Techniques)**

Accounting for Management, Source of Data, Cost Classification, Production and Nonproduction, Presentation of Information, Reports, Tables, Charts, Graphs and Interpretation of Information **Data Analysis & Statistical Techniques** - Sampling Methods. Forecasting Techniques – Equation, Linear Function- High/Low Analysis- Analysis of Cost Data- Historical and Forecasting Data - Index Numbers - Linear Regression-Series Analysis, Summarising and Analysing the Data, Spreadsheet

**Unit 2 (Accounting For Costs, Material, Labour & Overheads and various methods of Costing)**

Accounting for Material Costs – Ordering, Receiving & Issuing Material, Methods of Valuing Purchases and Issues (FIFO & Weighted Average Methods Only) – EOQ – Inventory Levels – Accounting for Labour – Direct & Indirect Cost of Labour – Remuneration Methods (Individual & Group) – Labour Turnover – Overtime & Idle Time – Labour Efficiency, Capacity & Volume Ratios

Accounting for Overheads – Allocation of Overheads to Production & Nonproduction Departments – Apportion Service Overheads to Production Departments - Production Overhead Absorption Rates – Entries for Accounting of Material, Labour & Overhead Costs. **Absorption, Marginal Costing & Cost Accounting Methods** - Concept of Contribution, Effects of Absorption and Marginal Costing, Reconcile the Profit – Advantages and Disadvantage of Absorption and Marginal Costing, Job and Batch Costing, Process Costing, Service and Operation Costing, Alternative Costing Principles

**Unit 3: Budgeting, Capital Budgeting and DCF techniques**

Nature, Purpose, Budget Preparation-Cash Budget – Sales Budget-Master Budget – What If Analysis, Flexible Budgets, Budgetary Control and Reporting, Behavioural Aspect of Budgeting. **Capital Budgeting & Discounted Cash Flows** - Capital Investing- Capital and Revenue Expenditure, Compounding and Discounting, NPV, IRR, Annuity and Perpetuity – Cash Flow

*Learning Outcome: Identifying Importance of Capital Budgeting & Cash Flows.*

#### **Unit 4 (Standard Costing)**

Standard Costing Systems, Variance Calculations and Analysis, Sales Price and Volume, Material Price and Usage, Labour Rate and Efficiency, Fixed Overhead, Reconciliation of Budgeting Profit and Actual Profit

#### **Unit 5 (Performance Measurement and its application)**

Performance Measurement Overview, Cost Reduction and Volume Enhancement, Monitoring Performance and Reporting. **Application of Performance Measurement** - Calculate and Measure of Financial Measurement, Balance Scorecard, Economy, Efficiency and Effectiveness, Unit Costs, Resource's Utilization, Profitability, Quality of Service

#### **Course Outcomes:**

CO1: Discuss the Principles of Cost & Management Accounting.

CO2: Demonstrating to Application of Management Functions.

CO3: Explain the Application of Accounting Methods.

CO4: Describing the role of Decision Making & Control.

CO5: Illustrate techniques to various Business Contexts.

### **Marketing Management**

**SUBJECT CODE: BCM621A**

**CREDITS: 3**

#### **Course Objective:**

To provide a holistic orientation of emerging marketing trends with the practical skills required to analyse consumer data, create marketing campaigns, develop digital / social media content and make successful marketing decisions and to equip students to be innovative, technically competent and think critically through experiential and student-centric teaching approach.

#### **Unit 1: Fundamentals of Marketing Management**

Meaning & Definition of marketing -Role of Marketing -Relationship of Marketing with other functional areas -Market Concepts -Product concept -Selling concept -Marketing concept -Societal marketing concept -Approaches to marketing management -Functions of marketing -Scope of marketing: goods, services, events, organizations, etc. -Emerging trends in marketing.

#### **Unit 2: Marketing Plan**

Marketing Environment: Concept -Macro-environmental forces -The changing marketing environment - Analyzing needs and trends in Macro-Environment: Economic Environment, Technical Environment, Political, Environment and Socio-cultural Environment. Introduction to The Marketing Plan –Definition – Nature –Objectives -Structure of The Marketing Plan -The Process of marketing plan -Critical elements of external and internal analysis of Marketing Plan -Implementation of Marketing Plan.

#### **Unit 3: Marketing Mix**

Introduction to marketing mix -Marketing mix implementation: short term and long term tactics –Product: meaning, elements, product mix -Product mix strategies -Product line -Product lifecycle Product planning -New product development -Failure of new product -Product branding -Branding strategy and packaging – Pricing: Objectives -Factors influencing pricing policy -Methods of pricing -Pricing strategy. Physical Distribution: Meaning -Factors affecting channel selection -Types of marketing channels –Promotion: Meaning and significance of promotion – Personal selling & advertising (meaning only).

#### **Unit 4: Buyer behavior**

Market Segmentation: Levels and patterns of market segmentation -Bases for segmenting markets -Market segmentation - Targeting - Product Positioning - Types and bases of positioning - Product Differentiation - Meaning of consumer, customer, consumer behaviour and buying motives -Factors influencing buyer behavior -Factors that influence consumer purchasing decisions -Buying process -Stages of the consumer buying behavior -Business to Business (B2B) buying process -Key factors influencing B2B purchasing decisions -Differences between Consumer goods and Industrial goods

#### **Unit 5: Digital Marketing**

Introduction to Digital Marketing –Concept of Digital Marketing -Difference between traditional marketing and digital marketing -Trends and scenarios of the industry -Planning and Creating a Website -Search Engine Optimization (SEO), Search Engine Marketing (SEM), of Social Media Marketing, Blogging, Content Strategy, Email Marketing.

#### **Course outcomes:**

CO1: To understand the role and importance of marketing

CO2: Develop a marketing plan to generate better sales and profits

CO3: Formulate the product and price mix based to serve consumer needs.

CO4: Identify the factors influencing consumer behavior and purchase decision

CO5: Outline the digital tools to develop marketing strategies for the new age consumer

### **Corporate Accounting**

**SUBJECT CODE: BCM623A**

**CREDITS: 4**

#### **Course Objective:**

To understand the advanced concepts that are critical for the finalisation of accounts. Advanced accounting of areas like shares and debentures along with restructuring, amalgamation and group accounting will be few of the topics around which the syllabus will be concentrated around.

#### **Unit 1: Accounting for shares & Debentures**

Accounting for Share Capital & Debentures, Issue, forfeiture and reissue of forfeited shares: concept & process of book building; Issue of rights and bonus shares; Buy back of shares; Redemption of preference shares. Issue of Debenture and Its classification. Different terms of issue of debenture. Redemption of debenture.

#### **Unit 2: Profit Prior to Incorporation & Company Financial Statements**

Process on incorporation of a company. Difference between incorporation and commencement of a company. Accounting of incomes and expenses during Pre- and Post-Incorporation period. Basis of allocation and apportionment of income and expenses for the Pre and Post-Incorporation period. Meaning – Preparation of Financial Statements of Companies as per Schedule III of the Companies Act, 2013 (excluding Cash Flow statement) - Treatment of special items: Depreciation, Interest on Debentures, Provision for Tax, Dividends, Interim, Proposed, Corporate Dividend Tax, Unclaimed dividend.

### **Unit 3: Preparation and Presentation of Cash flow statement & Accounting for Amalgamation**

Meaning of Cash flow, Types of Cash flow, Estimation of cash flow using Direct and Indirect methods. (Simple problems only). Amalgamation of Companies, Concepts and accounting treatment as per relevant Indian Accounting Standard (excluding intercompany holdings).

### **Unit 4: Reconstruction of a company & Preparing group financial statements**

Internal reconstruction: concepts and accounting treatment excluding scheme of reconstruction. Accounts of Holding Companies/Parent Companies, Preparation of simple consolidated balance sheet and income statement with one subsidiary company

### **Unit 5: Valuation of shares & Accounting for banking companies**

Concept of Valuation. Need for Valuation. Special Factors affecting valuation of Shares. Methods of Valuation – Net Assets Method, Yield Basis Method, Fair Value Method. Accounts of Banking Companies, Difference between balance sheet of banking and non-banking companies; Prudential norms; Asset structure of a commercial bank; non-performing assets (NPA), Cash Flow Statement Concept of funds, Preparation of cash flow statement as per Indian Accounting Standard (IndAS)

### **Course Outcomes:**

CO1: Illustrate the process of preparation of final accounts of a company as per Schedule III of the Companies Act 2013.

CO2: Develop understanding on the difference between commencement and incorporation of a company and the accounting treatment for transactions during the two phases.

CO3: To enable the students to develop awareness about mergers and acquisition.

CO4: Illustrate the accounting and reporting for group companies.

CO5: Understand and appreciate the need for share valuation and the various methods.

## **Business Analytics using Excel**

**Subject Code: BCM 624A**

**CREDITS: 3**

### **Course Objective:**

To comprehend and employ the use of MS Excel application for analysing, visualizing and reporting solutions based on business problems and tasks. This module aims at imparting hands-on training towards formulas and functions as well as how to use which formula for which particular problem scenario. The students will be equipped with the knowledge of various analytical procedures and tools which are available in MS Excel.

### **Unit 1: Introduction**



Spreadsheet Applications, MS Excel Overview, Advantage and Disadvantages, Introduction to Buzzwords – Dashboards, Reports, Data Visualization, Business Intelligence, Decision Support Systems, Business Analytics, Data Visualization, Storytelling and its importance in Business Analytics, Visual Perception.

## Unit 2: Working with Data

Excel Workbooks and Worksheets, Worksheet Cells, Selecting and Moving Cells, Excel Add-Ins, Data Formats, Formulas and Functions, Cell References, Range Names, Sorting Data, Querying Data, Importing Data, Data Filtering, Formatting, Highlighting, Aggregating, Operators.

## Unit 3: Data Cleaning

Editing Imported Workbook, Delete Unnecessary Columns & Rows, Resizing Columns & Rows, Copying, Moving Worksheet Data, Replacing Data in Fields, Text Functions – Clean, Concatenate, Exact, Find, Fixed, Left, Len, Lower, Mid, Proper, Replace, Rept, Right, Search, Substitute, Text, Trim, Upper, Value Functions, Converting Text Function Formulas to Text, Data Validation.

## Unit 4: Excel Data Presentation

Tables, Line and Bar Charts, Scatter Charts, Scatter Charts vs Line Charts, Correlation Analysis, Bullet Graphs, Pie Charts, Doughnut Charts, Surface Charts, Radar Charts, Interactive Charts and Dashboards, Conditional Formatting, Pivot Table, Customizing Pivot Table, Changing Layout, Renaming Fields, Formatting Numbers, Hiding or Showing Data, Sorting, Pivot Charts, Conditional Formatting with Pivot Tables.

## Unit 5: Advanced Excel

Counting Items in a Dataset, COUNT, COUNTA, COUNTBLANK, COUNTIFS, PERMUT & COMBIN, Descriptive Statistics, Mean, Mode and Median, AVEDEV, AVERAGE, AVERAGEA, AVERAGEIF & AVERAGEIFS, TRIMMEAN, MEDIAN, MODE, Finding Values, MAX, MAXA, MIN, MINA, LARGE, SMALL, FREQUENCY, PROB, Standard Deviation and Variance, STDEV, STDEV.S, STDEV.A, STDEV.P, VAR.S, VARA, VAR.P, What-If Analysis, Goal Seek & Solver.

### Course outcomes:

CO 1: Describe and demonstrate the importance of MS Excel and its functionalities.

CO 2: Identify, interpret and explain the fundamentals concepts pertaining to working with data in MS Excel.

CO 3: Employ the use of various text functions and techniques for pre-processing and cleaning the data.

CO 4: Create and demonstrate the working of interactive dashboards and charts using MS Excel application.

CO 5: Classify different techniques and functions for descriptive statistics and advanced-excel.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M		M				M
CO2		M				M	
CO3	M		H				
CO4			H	M		M	
CO5		M					M

H = Highly Related; M = Medium; L = Low

### References:

1. David Whigham, *Business Data Analysis using Excel*, Oxford.
2. Manisha Nigam, *Advanced Analytics with Excel*, BPB.
3. Alfred P. Rovai, *Statistical Fundamentals Using MS Excel*, Amazon.
4. Danielle Stein Fairhurst, *Using Excel for Business Analysis*, Wiley.

5. Gordon S. Linoff, *Data Analysis using SQL and Excel*, Wiley.
6. Dr. Renjini D., *Data Analysis for Business Decisions using Excel*, Bharti.

### **Professional Skills**

**Subject code: DEN002A**

**Credits: 3**

### **Course Objectives**

1. To enhance Professional competence in reading, writing, listening and speaking.
2. Switch the approach from providing information about the language to use the language.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student centred learning rather than on the teacher-centred learning.
5. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
6. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

### **Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in professional scenario.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels as per the demand of the corporate culture

### **Syllabus: Theory**

#### **UNIT 1 Professional Grooming and Professional Culture:**

Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management

**UNIT 2 Advanced Grammar:** Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents

**UNIT 3 Composition:** Memo, Notice, Circular, Book Review, Research Article, Reports

**UNIT 4 Vocabulary Building:** Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms

**UNIT 5 Reading Comprehension:** Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction

### **Syllabus: Lab**

#### **UNIT 1 Professional Grooming and Professional Culture**

Role plays and Activities on Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management

**UNIT 2 Advanced Grammar:** Exercise Sessions for Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents

**UNIT 3 Composition:** Memo, Notice, Circular, Book Review, Research Article, Reports – Giving Assignments based on practical applications, Practice sessions on different topics

**UNIT 4 Vocabulary Building:** Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms-Activities related to the appropriate use of words

**UNIT 5 Reading Comprehension:** Practice Reading Unseen Paragraphs- Finding Suitable title, Summarizing, Analyzing, Finding new words etc

### **Methodology for Evaluation**

1. Internal Assessment (Theory)
  - a) Home Assignments: One from each Unit : 15 Marks
  - b) In Semester Tests (Minimum two) : 30 Marks
  - c) Attendance : 05 Marks
2. Term End (Theory) : 50 Marks
3. Internal Assessment (Lab)

- (a) Daily Performance in the Lab : 50 Marks  
4. Term End (Lab) : 50 Marks

**Suggested Readings:**

1. Felix Eskey. Tech Talk, University of Michigan. 2005
2. Michael Swan. Practical English Usage, Oxford University Press. 2005
3. Anderson, Paul. Technical Communication: A Reader Centered Approach, V Edition, Harcourt, 2003.
4. Thampi, G. Balamohan. Meeting the World: Writings on Contemporary Issues. Pearson, 2013.
5. Lynch, Tony. Study Listening. New Delhi: CUP, 2008.
6. Kenneth, Anderson, Tony Lynch, Joan Mac Lean. Study Speaking. New Delhi: CUP, 2008.
7. Marks, Jonathan. English Pronunciation in Use. New Delhi: CUP, 2007.
8. Syamala, V. Effective English Communication For You (Functional Grammar, Oral and Written Communication): Emerald, 2002.

**Cultural Education II**  
**Subject Code: DIN002A**  
**Credits: 2**

**Objectives**

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

**Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to acknowledge and appreciate the richness of Indian Culture

CO2: Ability to represent the culture ethics in real life

**UNIT-I Holy Scriptures-II**

1. Bhagavad Gita and Life Management
2. Highlights of Indian Scriptures - Major Incidents and terms from various religious scriptures including Ramayana, Mahabharata, Guru Granth Sahib, Bible, Quran, Jain Scriptures, Bodhi Scriptures
3. Historicity of Ramayana and Mahabharata

**UNIT-II Society and Culture-II**

4. Indian Society: Its Strengths and Weaknesses
5. Health and Lifestyle related issues
6. Conservation of cultural heritage

**UNIT-III India in Progress-II**

7. Role & Position of Women in Indian Society- Rituals like Sati, Dakin, Kanyavadh, Pardah, Devdasi, Child Marriage, Measures of Women Empowerment including Education, Constitutional and other Rights
8. Indian Models of Economy, Business and Management

**UNIT-IV Great Indian Personalities-II**

9. Life and works of the Great People of Modern India- Raja Ram Mohan Roy, Swami Vivekananda, Madan Mohan Malviya, Ishwarchand VidyaSagar, Jyotiba Phule, Homi Bhabha, B.R. Ambedkar, Mahatma Gandhi, Chandra Shekhar Aazad, Abdul Hamid, Badshah Khan, Bhagat Singh, Ashfaqullah, Vir Sawarkar, Vir Banda Bahadur, Vir Haqiqat Rai, Subhash Chandra Bose, Mother Teresa, Jagdish Chandra Basu, JRD Tata, Ratan Tata, Dada Saheb Phalke, Major Dhyan Chand, A.P.J. Abdul Kalam, Kailash Satyarthi, Aruna Roy, Mahasweta Devi, Udaya Kumar, Narayan Murthy, Azim Premji

\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by a committee of teachers.

**Suggested Reading:**

1. Glory of Indian Culture (English) Paperback by Giriraj Shah
2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies by Saroj Bala, Kulbhushan Mishra

## References

<https://knowindia.gov.in/culture-and-heritage/life-style-values-and-beliefs.php>

## ENVIRONMENTAL STUDIES

SUBJECT CODE: DCH001A

CREDITS: 4

### Objectives:

Environmental studies deals with every issue that affects an organism. It is essentially a multidisciplinary approach that brings about an appreciation of our natural world and human impacts on its integrity. It is an applied science as it seeks practical answers to making human civilization sustainable on the earth's finite resources. Its components include biology, geology, chemistry, physics, engineering, sociology, health, anthropology, economics, statistics, computers and philosophy. As we look around at the area in which we live, we see that our surroundings were originally a natural landscape such as a forest, a river, a mountain, a desert, or a combination of these elements. Most of us live in landscapes that have been heavily modified by human beings, in villages, towns or cities. But even those of us who live in cities get our food supply from surrounding villages and these in turn are dependent on natural landscapes such as forests, grasslands, rivers, seashores, for resources such as water for agriculture, fuel wood, fodder, and fish.

The basic objective of this course is to provide basic understanding to the students with the nature and the environment.

### UNIT I

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

### UNIT II

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources. - Equitable use of resources for sustainable lifestyles.

### UNIT III

Concept of an ecosystem- Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

### UNIT IV

Biodiversity and its Conservation

□ Introduction-Definition: genetic, species and ecosystem diversity.

□ Bio-geographical classification of India.

□ Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.

□ Biodiversity at global, National and local levels.

- India as a mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

## **UNIT V**

### **Environmental Pollution:**

Definition, Causes, effects and control measures of: -

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides

## **UNIT-VI: Social Issues and the Environment**

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act. - Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Public awareness.

## **UNIT-7: Human Population and the Environment**

- Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare.
- Role of information Technology in Environment and human health.
- Case Studies.

## **UNIT-8: Field Work (Practical).**

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

## **Course outcomes(CO)**

- I CO1: It deals with every issue that affects the organization.
- II CO 2: To understand the multidisciplinary nature of environmental studies.
- III CO3:To understand about the renewable and non renewable resources.
- IV CO4: Knowing about the concept of the ecosystem.
- V CO5: To know impact of population on environment.

## **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		H			M	M	
CO2			H		M	M	
CO3			M		H	L	L
CO4		M		H		M	L
CO5			L		M	L	

H = Highly Related; M = Medium L = Low

#### Reference Books:

1. Agarwal K.C. 2001 Environmental Biology, Nidi publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Map in Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail: Mapincenet, net.
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Clanderson Press Oxford.
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental & Encyclopedia, Jaico Publ. House, Mumbai, 1196p
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press, 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay
10. Heywood, V.H & Watson, R. T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p
12. McKinney, M.L. & Schoeb, R.M. 1996. Environmental Science systems & solutions, Web enhanced edition 639p.
13. Mhaskar A.K. Matter Hazardous. Techno-Science Publications.
14. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co.
15. Odium, E.P. 1971. Fundamentals of Ecology, W.B. Saunders Co. USA. 574p
16. Rao M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
17. Sharma B.K., 2001. Environmental Chemistry Goel Publ. House, Meerut.
18. Townsend C., Harper J, and Micheal Begon, Essentials of Ecology, Blackwell Science
19. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and standards, Vol I and II, Enviro Media
20. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications
21. Wagner K.D., 1998. Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

#### Semester III

THIRD SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM 625A	Banking & Financial Services	3	1	-	3	F
BCM 626A	E-Business & Cyber Laws	3	1	-	3	ID

BCM 627A	Research Methodology	3	1	-	4	F
BCM 628A	Programming For Business Analytics	2		4	4	S
BCM 629A	Business Statistics With R	3		2	4	S
****	Open Elective	3	-	-	3	G
DEN003A	Life Skills - 1 (Personality Development)	2	-	-	2	G
DIN003A	Value Education – 1	1	1	-	1	G
	<b>TOTAL</b>	<b>20</b>	<b>4</b>	<b>6</b>	<b>24</b>	

### **Banking & Financial Services**

**SUBJECT CODE: BCM625A**

**CREDITS: 3**

#### **Course Objective:**

The Banking& Financial Services module introduces the learners to the world of financial services and facilitates an understanding of the various financial services. The learners will be able to apply financial concepts, theories, and tools and will be in a position to evaluate the environment related to financial services. This module provides insights on the concepts of merchant banking, issue of securities, leasing, factoring, credit rating, etc. Additionally, it equips learners with the knowledge of the financial markets such as money markets and capital markets

#### **Module 1: Indian Banking System**

Introduction to banking: Nature of the Indian banking system, Banking concepts: Retail Banking, Corporate banking, wholesale banking, banking system in India, Relationship between banker and customer, types of Deposit account, Banking Sector reforms.

#### **Module 2: Electronic Banking**

Electronic Banking: Meaning and benefits of E Banking, Innovations in banking due to technology, Automated Teller Machines, Telebanking, Internet Banking, Mobile Banking, Electronic Funds Transfer, ECS, NEFT, RTGS, UPI, Risk Management of E-Banking.

#### **Module 3: Negotiable Instruments and Customer Relationship**

Meaning and characteristics of Negotiable instruments: Cheques, Bills of Exchange and Promissory notes. Legal Framework of Banker-Customer Relationship, Bankers Disclosure, Termination of relationship, Bankers Right of Lien and set-off

#### **Module 4: Financial Service management**

Introduction to financial services, financial services, concept, objectives, Financial services market, concept and constituents, Financial services sector problems, Financial services environment, forces and players in financial markets. Financial Services: Leasing, Merchant banking, Hire purchase and installment system, Consumer finance, Credit cards, Credit Mutual Fund, Factoring, Securitization of debts, Treasury management, Depositories and Pledge

#### **Module 5: Money market and Stock exchange**

Money market and stock exchange, Money market –characteristics and functions, money market instruments: call money, Treasury bills, certificates of deposits, commercial bills, trade bills, Indian capital market, constituents, New financial institutions and instruments, Investor protection. Stock exchange: functions, services, features and role. Stock exchange traders, Regulations of stock exchanges, Depository and SEBI functions and working.

**Course Outcomes:**

CO1: Acquaint the students with the knowledge of various banking concepts specifically, merchant banking and public issue management

CO2: Understand the fundamentals of financial services and financial markets.

CO3: Obtain an overview of money markets and stock exchange functioning.

CO4: Appreciate the relevance of leasing, factoring, and securitization to business

CO5: Understand the fundamentals of venture capital, credit rating, and pension fund.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM**

**OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Desai Vasant Indian Banking –Nature and problems, Sultan Chand and Sons.
2. Khan, M.Y., Financial Services, Tata McGraw Hill, New Delhi.

**Reference Books:**

1. Bhole, L.M., Financial Institutions and Markets: Structure, Growth and Innovations, Tata Mc-Grow Hill., New Delhi
2. Siddaiah, T., Financial Services, Pearson Education, New Delhi

**E-Business & Cyber Laws**

**SUBJECT CODE: BCM626A**

**CREDITS: 3**

**Course Objective:**

The objective of the course is to equip the students with the emerging trends in business. It further introduces the students with the impact of information technology on various aspects of business and also helps them familiarize with cyber world and cyber regulations



### **Module 1: E-Business**

E-business vs. E-commerce, transformation of business structure, Trends: E-Business Models, E-business Design: Knowledge building, capacity evaluation, design steps.

### **Module 2: E-Marketing**

Traditional Marketing, Identifying Web presence Goals – Browsing Behaviour Model, Online Marketing, E-advertising – Internet Marketing Trends – E branding– E marketing strategies. Concept and Definition of E-Retailing - Different Models of E-Retailing, Model for Web based Information System in E-Retailing; Key Technologies of B2C Model in E-Retailing – EPOS System, Functions of an EPOS system

### **Module 3: E-Business Technologies**

Customer relationship management (CRM) - Organizing around the customer; CRM design and infrastructure - CRM Trends; Selling-chain management - Need for selling-chain management - Order acquisition process – Trends, Enterprise resource planning (ERP) – Integration of information technology systems - Forces influencing ERP – Implementation strategies - ERP trends; Supply chain Management - Internet-enabled SCM - Supply-chain planning and execution - SCM issues and trends; E-procurement - Transformation to web based technology - Cost savings and return of investment - Buyer focus - Seller focus - Trends.

### **Module 4: Cyber World**

Cyber space–cybercrimes–types: cyber stalking, forgery and fraud, crime related to IPR (copyright issues, trademark issues, software patenting issues), cyber terrorism, & computer vandalism.

### **Module 5: Cyber Regulations**

Cyber Law, scope of cyber laws - e-commerce, online contracts, IPRs, E-taxation, e-governance and cybercrimes, issues relating to investigation, cyber forensic, relevant provisions under IT Act 2000

### **Course Outcomes:**

CO1: Understand the concepts and workings of E-Business

CO2: Understand the use and application of E-Marketing in E-Business

CO3: Understand different E-Technologies, their application, and drawbacks

CO4: Understand and learn about the Cyber World – opportunities and threats

CO5: Learn about various Cyber regulations and related laws application to E-business environments.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							

CO4							
CO5							

H = Highly Related; M = Medium L = Low

#### **Textbooks:**

1. E-business, Dr. Ravi Kalakota, Pearson Education Asia
2. E-Business and Commerce, Brahm Canzer, Dreamtech press, New Delhi
3. E-Business essentials, Rajat Chatterjee, Global India Publication, New Delhi

#### **Reference Books:**

1. E-Business essentials, Matt Haig, Kogan Page India Ltd
2. IT Act 2000, IT Amendment Bill 2006, IT Amendment Bill 2008
3. Ajit Prakashan's Information Technology Act, 2000 (Cyber Law) (IT Act 2000: Bare Acts with Short Notes)

### **Research Methodology** **SUBJECT CODE: BCM627A** **CREDITS: 4**

#### **Course Objective:**

This module enables learners to develop the basic principles of research methods. The learners focus on how to do research, with an emphasis on student-centered activities and problem solving. Learners will develop insights the key concepts as the scientific method; operationalizing constructs; independent and dependent variables, data types and ways of measurement, confounding variables experimental and non-experimental design questionnaire construction; developing and testing hypotheses; descriptive statistics and describing data graphically; and the ethics of research.

#### **Module 1: Research Formulation and Design**

Motivation and objectives-Research methods and methodology. Types of research: Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research. Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

#### **Module 2: Data Collection and Analysis**

Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statically package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

#### **Module 3: Statistical Softwares**

Computer and its role in research, Use of statistical software SPSS, GRETL etc. in research. Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.

#### **Module 4: Research Ethics and Scholarly Publishing**

Ethics-ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copyright, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing- IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

#### **Module 5: Interpretation and Report Writing**

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of writing Research Report Precautions for writing Research Reports, Conclusions.

#### **Course Outcomes:**

CO1: Understand and apply the fundamental principles of the research process as they relate to answering research questions.

CO2: Describe the appropriate use of basic research techniques and research design as they apply to answering different questions.

CO3: Explain critically analyses information particularly in relation to identifying causal and spurious relations in research claims.

CO4: Identify appropriate techniques underlying different research approaches

CO5: Understand and effectively interpret and communicate research findings

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM**

#### **OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i><b>Course Outcome</b></i>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

#### **Textbooks:**

1. Kothari, C.R., 2019. Research Methodology: Methods and Techniques. New Age International.
2. Sinha, S.C. and Dhiman, A.K., 2019. Research Methodology, Ess Publications. 2 volumes.

**Reference Books:**

1. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
2. Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing.

**Programming for Business Analytics**

**SUBJECT CODE: BCM628A**

**CREDITS: 4**

**Course Objective:**

This module introduces Students to various programming languages in the field of Analytics like SQL, R, SAS, Python and forms the foundation for further analysis of Datasets. Students will learn the basics of these programming languages and learn data manipulation techniques.

**Module 1: Introduction: Database Management Systems**

Definition, Characteristics of DBMS, Architecture & Security, Types of Data Models, Concepts and constraints of RDBMS, Introduction to Structured Query Language, MySQL Installer, download sample Database, Loading Sample Database.

**Module 2: Data definition and Manipulation**

SQL Process, SQL Commands – DDL, DML, DCL, DQL, SQL Constraints, Data Integrity, Data Types, SQL Operators, Expressions, Querying Database, Retrieving result sets, Sub Queries, Syntax for various Clauses of SQL, Functions and Joins, Indexes, Views, Transactions.

**Module 3: Basics of SAS**

Introduction to SAS, Installation of SAS university Edition, prerequisites for data analysis using SAS, SAS Architecture, Data Types, Formats and Informats, SAS coding- Data step and proc step, Libraries, Importing external data, Reading and Manipulating Data, Functions, Data Transformations, Conditional Statements.

**Module 4: Python: Basics of Python**

Installation of Anaconda Navigator, Data types – string, tuples, set, lists, dictionary, Arrays. Spyder, Importing and Exporting Files, Data Manipulation, Descriptive Statistics and Documentation with Jupiter.

**Module 5: R Programming**

Basics of R, Installation of R studio, Vectors, Matrices, Data types, Importing files, Writing files, Merging Files, Data Manipulation, Creation and Deletion of New Variables, Sorting of Data, Functions, Graphical Presentation and Descriptive Statistics.

**Course outcomes:**

CO 1: Learn Data Models, Data Independence and Data Views and build custom Entity Relationship Diagrams based on different problem sets.

CO 2: Employ the use of Structured Query Language to perform DBMS related tasks and implement relational data query.

CO 3: Perform several tasks with regards to Data Analytics, Visualization, Data Manipulation using SAS programming.

CO 4: Employ and use Python packages and functions to deploy analytical systems/programs.

CO 5: Learn R programming and understand its effectiveness with respect to Data Analytics.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM**

#### **OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						M
CO2		M			H	M	
CO3	H		H				
CO4	M		M	M	M		
CO5			M		H		L

H = Highly Related; M = Medium L = Low

#### **Textbooks:**

1. DuBois. (2014). *MySQL cookbook*. O' Reilly
2. Delwiche & Slaughter. (2012). *SAS: The little SAS Book*. SAS Institute

#### **Reference Books:**

1. Hemedinger & McDaniel. (2010). *SAS for dummies*. Wiley
2. McKinney. (2017). *Python for Data Analysis*. O' Reilly
3. Golemund. (2014). *R: Hands-on Programming*; Garrett, O' Reilly

### **Business Statistics with R**

**SUBJECT CODE: BCM629A**

**CREDITS:4**

#### **Course Objective:**

The objective of this module is to make students exercise the fundamentals of statistical analysis in an R environment. They would be able to analyze data for the purpose of exploration using descriptive and inferential statistics. Students will understand probability and sampling distributions and learn the creative application of linear regression in a multivariate context for predictive purposes.

#### **Module 1: Introduction to R Programming**

R and R Studio, Logical Arguments, Missing Values, Characters, Factors and Numeric, Help in R, Vector to Matrix, Matrix Access, Data Frames, Data Frame Access, Basic Data Manipulation Techniques, Usage of various apply functions – apply, lapply, sapply and tapply, Outliers treatment.

### **Module 2: Descriptive Statistics**

Types of Data, Nominal, Ordinal, Scale and Ratio, Measures of Central Tendency, Mean, Mode and Median, Bar Chart, Pie Chart and Box Plot, Measures of Variability, Range, Inter-Quartile-Range, Standard Deviation, Skewness and Kurtosis, Histogram, Stem and Leaf Diagram, Standard Error of Mean and Confidence Intervals.

### **Module 3: Probability, Probability & Sampling Distribution**

Experiment, Sample Space and Events, Classical Probability, General Rules Of Addition, Conditional Probability, General Rules For Multiplication, Independent Events, Bayes' Theorem, Discrete Probability Distributions: Binomial, Poisson, Continuous Probability Distribution, Normal Distribution & t-distribution, Sampling Distribution and Central Limit Theorem.

### **Module 4: Statistical Inference and Hypothesis Testing**

Population and Sample, Null and Alternate Hypothesis, Level of Significance, Type I and Type II Errors, One Sample t Test, Confidence Intervals, One Sample Proportion Test, Paired Sample t Test, Independent Samples t Test, Two Sample Proportion Tests, One Way Analysis of Variance and Chi Square Test.

### **Module 5: Correlation and Regression**

Analysis of Relationship, Positive and Negative Correlation, Perfect Correlation, Correlation Matrix, Scatter Plots, Simple Linear Regression, R Square, Adjusted R Square, Testing of Slope, Standard Error of Estimate, Overall Model Fitness, Assumptions of Linear Regression, Multiple Regression, Coefficients of Partial Determination, Durbin Watson Statistics, Variance Inflation Factor.

### **Course outcomes:**

CO 1: Install, Code and Use R Programming Language in R Studio IDE to perform basic tasks on Vectors, Matrices and Data frames.

CO 2: Describe key terminologies, concepts and techniques employed in Statistical Analysis.

CO 3: Define, Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.

CO 4: Conduct and Interpret a variety of Hypothesis Tests to aid Decision Making.

CO 5: Understand, Analyse, Interpret Correlation and Regression to analyse the underlying relationships between different variables.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM**

#### **OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7

CO1	H				M		
CO2		M		L		M	
CO3	M		M	M			
CO4				H	M		
CO5		M			M		H

H = Highly Related; M = Medium L = Low

#### **Textbooks:**

1. Ken Black, 2013, *Business Statistics*, New Delhi, Wiley.
2. Lee, Cheng. et al., 2013, *Statistics for Business and Financial Economics*, New York: Heidelberg Dordrecht
3. Anderson, David R., Thomas A. Williams and Dennis J. Sweeney, 2012, *Statistics for Business and Economics*, New Delhi: South Western.

#### **Reference Books:**

1. Waller, Derek, 2008, *Statistics for Business*, London: BH Publications.
2. Levin, Richard I. and David S. Rubin, 1994, *Statistics for Management*, New Delhi: Prentice Hall

### **Life Skills 1 (Personality Development)**

**SUBJECT CODE: DEN003A**

**CREDITS: 2**

#### **THEORY**

##### **UNIT 1**

Basics of Organizational Communication: Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture

##### **UNIT 2**

Basic Writing Skills: Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration

##### **UNIT 3**

Composition:, Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,

##### **UNIT 4**

Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms

##### **UNIT 5**

Professional and Technical Communication : Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

#### **LAB**

##### **UNIT 1**

Basics of Organizational Communication: Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time management, Following Deadlines etc

## **UNIT 2**

Write Dialogue from the different contexts of corporate culture: Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc

## **UNIT 3**

Composition:, Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting Redrafting, Proof Reading, Editing etc

## **UNIT 4**

Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc

## **UNIT 5**

Professional and Technical Communication: Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making

### **Value Education 1**

**SUBJECT CODE: DIN003A**

**CREDITS: 1**

### **Lessons from the Ramayana**

Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

### **Lessons from the Mahabharata**

Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

### **Lessons from the Upanishads**

Introduction to the Upanishads: Sruti versus Smriti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, Satyakama Jabala, Aruni, Shvetaketu.

### **Message of the Bhagavad Gita**

Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War – The anguish of Arjuna – Counsel by Sri. Krishna – Key teachings of the Bhagavad Gita – Karma Yoga, Jnana



Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

### **Life and Message of Swami Vivekananda**

Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji's life.

### **Life and Teachings of Spiritual Masters**

India Sri Rama, Sri Krishna, Sri Buddha, Adi Shankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda.

### **Insights into Indian Arts and Literature**

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

## **Human Resource Development (Open Elective)**

**SUBJECT CODE: DBA628A**

**CREDITS: 3**

### **Module 1: Human Resource Development (HRD) -Macro Perspective**

Understand HRD Concept, Origin and Need of HRD, HRD as a Total System, Approaches to HRD; Human Development and HRD; HRD at Macro and Micro Climate

### **Module 2: HRD–Micro Perspective**

Understand areas of HRD, HRD Interventions Performance Appraisal, Potential Appraisal, Feedback and Performance Coaching, Training, Career Planning, OD or Systems Development, Rewards, Employee Welfare and Quality of Work Life and Human Resource Information; Staffing for HRD: Roles of HR Developer; Physical and Financial Resources for HRD; HR Accounting; HRD Audit, Strategic HRD

### **Module 3: Instructional Technology for HRD**

Learning and HRD; Models and Curriculum; Principles of Learning; Group and Individual Learning; Transactional Analysis; Assessment Centre; Behaviour Modelling and Self Directed Learning; Evaluating the HRD

### **Module 4: Human Resource Training and Development**

Concept and Importance of training and development; Assessing Training Needs; Designing and Evaluating T & D Programmes; Role, Responsibilities and challenges to Training Managers

### **Module 5: Training Methods**

Training within Industry (TWI): On the Job & Off the Job Training; Management Development: Lecture Method; Role Play; In-basket Exercise; Simulation; Vestibule Training; Management Games; Case Study; Programmed Instruction; Team Development; Sensitivity Training; Globalization challenges and Strategies of Training Program, Review on T&D Programmes in India

## **Semester IV**

FOURTH SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM 630A	Entrepreneurship	3	1	-	3	F
BCM 631A	Business Variables Analytics	2	1	2	4	S
BCM 632A	Audit And Assurance	3	1	-	4	C
BCM 633A	Financial Predictive Analytics	3		2	4	S
BCM 634A	E-Accounting	3	1	-	3	C
BCM 635A	Logistics And Supply Chain Management	3	1	-	3	ID
***	Open Elective	3	-	-	3	G
DEN004A	Life Skills - 2 (Aptitude)	2	-	-	2	G
DIN004A	Value Education – 2	1	1	-	1	G
BCM643A	<b>Big Data</b>	3		2	4	S
	<b>TOTAL</b>	<b>26</b>	<b>6</b>	<b>6</b>	<b>31</b>	

#### Entrepreneurship

**SUBJECT CODE: BCM 630A**

**CREDITS: 3**

#### Course Objective:

The objective of the course is to expose the students to the entrepreneurial cultural and industrial growth and understand the scope of an entrepreneurship and to know the importance of business plan and major elements of business plan. Learners will develop insights to facilitate the development of an entrepreneurial mind-set and equip them with necessary cutting-edge knowledge and skills vital for generating value in a knowledge-based economy.

#### Module 1: Introduction to Entrepreneurship

Understand the meaning and concept of Entrepreneurship, the history and evolution of entrepreneurship, qualities and behavioral traits of successful entrepreneurs, role of entrepreneurship in economic development, myths about entrepreneurs and agencies in entrepreneurship management

#### Module 2: Types of Entrepreneurs and Stages in Entrepreneurship development

Types of entrepreneurs based on factors such as type of business, use of technology, motivation, growth, stages; sensing Market Opportunities, identify market gaps, Idea vs Opportunity Matching, idea testing with potential customers

#### Module 3: Entrepreneurial Motivation

Understand Motivation, Maslow's theory, Herzberg's theory, McGregor's Theory, McClelland's Need – Achievement Theory, Culture & Society, Values / Ethics, Risk taking behavior

#### **Module 4: Environment Analysis and Business Plans**

Understand PEST to PESTEL to STEEPLE, Unique Selling Proposition (USP), Competition Analysis, Porter's five forces – competitor strategies, Components of Business Plan, Market research and feasibility report, Marketing Mix, Types of Organisations (sole proprietorship, partnership, corporations, Limited Liability company)

#### **Module 5: Organizations that Support Entrepreneurship**

Industrial Parks, Special Economic Zone, MSME Act, Role of SME in India, Government support to SME, Sickness in SMEs – causes / remedial measure, exemptions from Income Tax, financial assistance to MSME, modernisation assistance to small scale unit, the Small Industries Development Bank of India (SIDBI), the State Small Industries Development Corporation (SSIDC), Export oriented units, Khadi and Village Industries Commission (KVIC)

#### **Course Outcomes:**

CO1: Critically evaluate processes and organizational forms involved in co-creating value to solve complex challenges in collaboration with different types of entrepreneurs.

CO2: Understand theories of entrepreneurship, business development and entrepreneurship development

CO3: Articulate the characteristics required to become successful entrepreneurs. Identify and appraise strategies for growth of new ventures.

CO4: Create alternative Business Plans, appraise them, and conclude on the most suitable Business Plan. Also prioritize the next best alternatives.

CO5: Develop an entrepreneurial mind-set by understanding and applying key debates in the areas of entrepreneurial opportunity, motivation, marketing and finance

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

#### **Textbooks:**

1. Taxmann's Entrepreneurship Development by CA (Dr.) Abha Mathur
2. Entrepreneurship Development by Monica Loss & F.L. Bascunan

#### **Reference Books:**

1. Knowledge Management: Enabling Business Growth by Ganesh Natarajan and Sandhya Shekhar
2. Supply Chain Management: Strategy, Planning, and Operations by Sunil Chopra and Peter  
Mind Secrets of Customer Relationship Management by James G. Barnes

**Business Variables Analytics**  
**SUBJECT CODE: BCM 631A**  
**CREDITS: 4**

**Course Objective:**

This course will enable students to exercise Multivariate Techniques in an R environment in different Business Cases. They will know the different techniques covered under the scope of Multivariate Analysis and will be able to apply and build select Predictive Models in the context of Binary Classification and Time Series.

**Module 1: Overview of Multivariate Statistics)**

Nature of Multivariate Analysis, Validity and Reliability, Types of Multivariate Techniques, PCA and Factor Analysis, Multiple Regression, Logistic Regression, Canonical Correlation, Conjoint Analysis, Cluster Analysis, Multi-Dimensional Scaling, Correspondence Analysis, Structural Equation Modeling, Multivariate Model Building.

**Module 2: Data Cleaning and Multivariate Techniques**

Graphical Examination of Data, Convert Un-Tidy Data into Tidy Data. Missing Data, Imputation of Missing Data by Central Tendency and kNN Method. Outliers, Winsorization of Outliers, Testing the Assumptions of Multivariate Analysis, Incorporating Non Metric Data with Dummy Variables, Managerial Overview of the Results.

**Module 3: Logistic Regression**

Binary Classification versus Point Estimation, Odds versus Probability, Logit Function, Classification Matrix, Individual Group Classification Efficiency, Overall Classification Efficiency, Nagelkerke R Square, Receiver Operating Characteristic Curve, Sensitivity, Specificity, Area Under ROC Curve, Cut-Offs, True Positive Rate and False Positive Rate.

**Module 4: Introduction to Time Series**

Nature of Time Series, Components of Time Series, Secular Trend, Seasonal Variations, Cyclical Variations, Irregular Variations, Time Series Decomposition, Smoothing Techniques, Moving Average, Weighted Moving Average, Exponential Smoothing, Double Exponential Smoothing, Regression Trend Analysis, Autocorrelation and Autoregression.

**Module 5: Univariate Time Series Models**

Tests for Stationarity, Graphical Method, Unit Root Test, Augmented Dickey Fuller Test, Phillips–Perron Test, Schmidt–Phillips Test, KPSS Test, Identification Of ARMA Model Parameter Estimation, Testing Significance with Forecasting, Stationary Restriction for ARMA Models, ARIMA Models, Model Parameter Estimation, Testing Parameter Significance.

**Course outcomes:**

CO 1: Understand and Implement Techniques of Multivariate Data Summary, Exploratory Data Analysis and Dimensionality Reduction.

CO 2: Apply different Data Cleansing Methods such as Outlier Removal, Missing Values Treatment involving Multivariate Data.

CO 3: Understand, Apply and Deploy Logistic Regression Models and present the findings using Classification Matrices, ROC Curves.

CO 4: Understand, Discuss and Describe Time Series, its Components, Forecasting based on different Smoothing Techniques.

CO 5: Understand and Implement Univariate Time Series Models, Perform several tests such as AD Fuller, KPSS, Parameter Significance.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M			L			M
CO2		M				M	
CO3	H		H		M		
CO4		M		H	M	M	
CO5	M		H		M	M	M

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Hair, J. F. et al. (2015). *Multivariate Data Analysis*, 6th edition. NJ: Prentice Hall.
2. Enders, W. (2010). *Applied Econometric Time Series*. Hoboken, NJ: John Wiley & Sons.
3. Tabachnick, B. and Fidell, L (2007). *Using Multivariate Statistics*, New York: Allyn & Bacon.

**Reference Books:**

1. Menard, S. (2002). *Applied Logistic Regression Analysis*. Thousand Oaks, CA: Sage.
2. Hamilton, J. D. (1994). *Time Series Analysis*. Princeton University Press.
3. Aiken, L. S., & West, S. G. (1991). *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, CA: Sage.

**Audit and Assurance**

**SUBJECT CODE: BCM 632A**

**CREDITS: 4**

**Course Objective:**

The Objective of the paper is to develop the knowledge and skills required to carry out an audit and assurance assignment. It provides the working knowledge of the audit process and standards of auditing. It also covers the process of testing internal controls.

### **Module 1: Audit framework & regulation**

Concept of audit & assurance, professional ethics of an auditor, scope of internal & external audit, governance & audit, Ethical threats & Safeguards, discuss the importance and purpose of engagement letters and their contents

### **Module 2: Audit planning & risk assessment**

Planning audit assignments, identify and explain the need for, benefits of and importance of planning an audit, understanding the entity & its environment, assessing audit risk, fraud risk, interim audit, audit documentation, working papers and audit evidence

### **Module 3: Internal control & audit tests**

Internal control system assessment, control environment, risk assessment procedures, monitoring of controls, evaluation of internal control system by auditor, test of controls, communication on internal controls, explain how auditors record internal control systems including the use of narrative notes, flowcharts and questionnaires

### **Module 4: Audit evidence & reporting**

Techniques of collecting audit evidence, quality & quantity of audit evidence, audit sampling, explain the use of automated tools and techniques, review procedures including subsequent events, going concern, written representations, auditor's report contents & opinion, discuss the need for auditors to communicate with those charged with governance.

### **Module 5: Audit of specific items**

Audit of receivables, inventory, payables & accruals, bank & cash, tangible & intangible assets, share capital & reserves, directors' remuneration, details of audit checks for these items and reporting thereof, use of management representation

### **Course Outcomes:**

CO1: Explain the concept of audit & assurance, the functions of audit, ethics and professional conduct

CO 2: Demonstrate how the auditor obtains and accepts audit assignments, assesses audit risks

CO 3: Describe and evaluate internal controls, techniques and audit tests, including IT systems to identify and communicate control risks and their potential consequences

CO 4: Describe the way of gathering & managing audit evidence and review and reporting

CO 5: Managing the audit procedure for specific items

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM**

#### **OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							

CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

#### **Textbooks:**

1. ACCA Study Material 2022 of Kaplan, BPP& Beckers
2. Auditing & Attestation – Published by Wiley India Private Ltd

#### **Reference Books:**

1. Saxena, Reddy & Appannaish: A Text of Auditing, Himalayan Publishing House.
2. S.K Basu: Auditing Principles & Techniques, Pearson Education Student's handbook on Advanced Auditing – by Authors CA G. Sekar & CA B. Sarvana Prasath

### **Financial Predictive Analytics**

**SUBJECT CODE: BCM633A**

**CREDITS: 4**

#### **Course Objective:**

The Financial Predictive analysis course blends easy-to-use statistical tools with complex machine learning tools and algorithms to equip the participants with the requisite skill set in analyzing data. By the end of this course, the participants should be able to perform financial analysis using powerful tools like R and Python. Whether it is with respect to stock market prediction or customer profitability, finance analytics provides a direction in predicting all.

#### **Module 1: Introduction for Financial Predictive Analytics)**

Types of Models, Supervised model, semi supervised model, reinforcement learning model, Regression and classification model, Defining the model objective, collecting the data, picking a model, Tidying data, Assessing regression model, assessing classification model, assessing binary classification model.

#### **Module 2: Regression Models**

Standard error of the estimate, Correlation coefficient, ANOVA table for simple linear regression model, Inference in Simple Linear regression model, prediction interval for randomly chosen value of y for given x. The multiple regression analysis equation, Inference in multiple regression, adjusting  $R^2$ , multicollinearity.

#### **Module 3: Classification Models**

Introduction, Binomial logistic regression, multinomial logistic regression, Linear discriminant analysis, Quadratic discriminant analysis, Decision Trees, Growing trees, Building decision trees, CART, C5.0 and CHAID Trees, Prediction by decision trees, Model Over fitting.

#### **Module 4: Dimensionality**

Introduction, Principal component analysis, the eigen value criterion, Profiling the principal component, communalities, Validation of the Principal component, Applying factor analysis, Factor rotation.

## Module 5: Clustering Financial Data

Custer Mechanism, Hierarchical and Non-Hierarchical Clustering, K Means Clustering, Normalizing of Data, Scaling of Data, Distances, Euclidean Distance, Distance Matrix Plot, Centroid, Total Within Sum Squared, Within-group Linkage, Nearest Neighbor, Furthest Neighbor, Centroid Clustering, Ward's Method, Optimum Number of Clusters, Cluster Membership, Agglomeration Schedule, Dendrogram.

### Course outcomes:

CO 1: Understand and Implement Techniques under Financial Predictive Analytics such as Model Requirement Specification, Tidying Data and Performance Benchmarking.

CO 2: Conceptualize and implement Financial Data Regression and its applicability based on ANOVA Testing.

CO 3: Implement and Employ the use of Classification Models such as Decision Trees and Logistic Regression based on Financial Data Prediction.

CO 4: Deploying Dimensionality Reduction Models based on Principal Component Analysis and Factor Analysis.

CO 5: Understand and employ the use of Financial Data Clustering based on Hierarchical and K-Mean Clustering Algorithms.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H			L			M
CO2		M	H			M	
CO3	H		H		M		
CO4		M		M		M	
CO5	M		H	M		M	H

H = Highly Related; M = Medium L = Low

### Textbooks:

1. Ralph Winter, 2017, *Practical Predictive analysis*, Packt.
2. James D Miller & Rui Miguel Forte, 2017, *Mastering Predictive Analytics with R*, Packt.

### Reference Books:

1. Daniel T Larose & Chantal D. Larose, 2016, *Data Mining And Predictive analysis*, Wiley.
2. Charu Aggarwal, *Data Mining: The Textbook*, 2015, Springer.
3. Hair J.F, 2015, *Multivariate data analysis*, Prentice hall.

### E-Accounting

**SUBJECT CODE: BCM 634A**

**CREDITS: 3**



**Course Objective:**

The Objective is to provide the understanding of the digital or computerized accounting system, Students will explore performance, liquid assets, inventories, fixed assets, intangible assets, long-term obligations, investments, equity, and cash flows using different kinds of software. conceptual and practical knowledge of E-Accounting that uses database system resources.

**Module 1: Computerized accounting and accounting database sources**

Understand the digital mode used for data feed, basics of Computerized accounting, Concepts of Accounting groups, Hierarchy of accounts, Codification in accounting. Accounting package - Setting up an accounting entity, Creation of groups and accounts, accounting standards.

**Module 2: Computerized financial accounting**

Understand the role of accountants in Designing and creating vouchers, Data Entry operations using the vouchers, Processing for reports to prepare ledger accounts, trial balance and balance sheet, Preparation of different formats and usage of different file types for report uploading and filing.

**Module 3: Digital accounting methods**

Understand the fundamental functions of Identifying and appreciating the data content in accounting transactions; overview of database concepts, ER model; creating and implementing RDM for Financial Accounting; SQL to retrieve data and generate accounting information, Analyzing forecasts, budgeting & budgetary control.

**Module 4: Reporting Analysis**

Analyzing and maintaining Accounting reports to appreciate reliability of information, Identifying accounting, information and appropriate queries, Forming and executing the SQL, Generating Accounting information for a report, Reports for expenditure analysis, tracking incomes and managing accounts.

**Module 5: Elements of Computerized accounting reporting**

Understanding the Creation of data table defining relationships and constraints, Designing Accounting Vouchers, Designing Accounting Reports, designing accounting reports in the form of Journal book, Cash book, Subsidiary books, Ledger, Trial balance, Profit & Loss account, Balance sheet, fund-flow statements.

**Course Outcomes:**

CO1: This course introduces the students with the understanding about Computerized accounting performed in the real time scenarios.

CO2: The students will learn the accounting process applied in the preparation of the financial reports.

CO3: The students will get a sound understanding of the database system used or maintained in the business for accounting and its procedures of recording.

CO4: The student will get a deep analysis of the various accounting skills that are used by the professional accountants.

CO5: The student will understand the impact of IT systems and financial systems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM****OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. CA Roshan lodha, *Computerized accounting system & e -filing*, Law points, 2021
2. M. Hanif and A. Mukherjee, *Modern Accountancy*, McGraw H.
3. Pankaj Srivastava, *E-Accounting (theory & practice)*
4. Taxman's , *cracker for principles & practice of Accounting*

**Reference Books:**

1. Michael E. Gerber, *The E-myth Accountant*.
2. Dr. Arjun Das and Dr. Vishal Saxena, *Accounting Theory and practice*, Navyug Susan Drake, *Practical guide to Finance & Accounting*.

**Logistics and Supply Chain Management**

**SUBJECT CODE: BCM635A**

**CREDITS: 3**

**Course Objective:**

The course provides knowledge about implementing, controlling, and planning the efficient flow of goods from the supplier to the customers. The course imparts students with an in-depth understanding of the functions and contributions of supply chain management, the concept of logistics management, information systems in logistics, warehousing, and logistics administration.

**Module 1: Overview of logistics and its impact on customer value**

Nature and concepts – the evolution of logistics concept – logistical mission and strategic issues – logistics in India – the growing importance of logistics management – logistical competitive advantage – strategic logistics planning process – components of logistics management – functions of logistics management - The marketing and logistics interface - delivering customer value – customer service and customer retention - the impact of running out-of-stock - market-driven supply chains - defining customer service objectives - setting customer service priorities - setting service standards - going to market- distribution channels are value delivery system - innovation in the distribution channel - the omni-channel revolution - omni-channel retailing.

**Module 2: Overview of supply chain management**

Introduction - value chain - functions and contributions - supply chain effectiveness and Indian infrastructure – the framework for supply chain solution - outsourcing and 3PLs - fourth-party logistics (4PLs) - supply chain relationships - conflict resolution strategies for harmonious relationships – the significance of supply chain in building competitive advantage.

### **Module 3: Elements of logistics & supply chain management**

Introduction - positioning of information in logistics and supply chain management - logistics information system (LIS) - operational logistical information system - emerging technologies in logistics and supply chain management.

### **Module 4: Warehousing and distribution centres**

Introduction - concepts of warehousing - types of warehouse - functions of warehousing - warehousing strategy - warehouse design - operational mechanism of warehouse - the omni-channel revolution - omni-channel retailing.

### **Module 5: Creating a sustainable supply chain & the future**

Introduction - evolutionary trends of logistics and supply chain organization - basic organization principles - factors influencing organizational structure - the triple bottom line, greenhouse gasses, and the supply chain - reducing the transport-intensity of supply chains - peak oil - beyond the carbon footprint - reduce, reuse, recycle - the impact of congestion - the supply chain of the future - emerging mega-trends - shifting centres of gravity - the multi-channel revolution - seeking structural flexibility - latest vision- waste in the supply chain - the new industrial revolution - seven major business transformations - the implications for tomorrow's logistics managers

### **Course Outcomes:**

CO1: To obtain an understanding of the basics of logistics and supply chain management.

CO2: To recognize the impact of logistics on creating customer value..

CO3: To obtain an understanding of the impact of technology in logistics and supply chain management.

CO4: To learn the concepts of warehousing and distribution centers.

CO5: To appreciate the significance of creating a sustainable supply chain.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM**

#### **OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Martin Christopher; Logistics and Supply Chain Management -Fifth edition; Pearson Education Limited, 2016.
2. Saikumari V. – S. Purushothaman; Logistics and Supply Chain Management; Sultan Chand & Sons, 2022.
3. Logistics and Supply Chain Management -A complete guide; The Art of Science, 2021.

**Reference Books:**

1. Paul R. Murphy and A. Michael Knemeyer; Contemporary Logistics -Twelfth edition; Pearson Education, 2019.
2. Kuldeepak Singh; A Handbook on Supply Chain Management -First edition; Notion Press,2021.
3. Logistics and Supply Chain Management ; SIA Publishers & Distributors Private Limited; 2021.

**Life Skills 2 (Aptitude)**  
**Subject Code: DEN004A**  
**Credits: 2**

**Course Objectives:**

1. Students will be able to interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience.
2. Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
3. Students will be able to reason, model, and draw conclusions or make decisions with mathematical, statistical, and quantitative information.
4. Students will be able to critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
5. Students will be able to use appropriate technology in a given context.

**Course Outcomes (CO):** At the end of this course students will have:

CO1: Demonstrate procedural fluency with real number arithmetic operations and use those operations to represent real-world scenarios and to solve stated problems. Demonstrate number sense, including dimensional analysis and conversions between fractions, decimals, and percentages. Determine when approximations are appropriate and when exact calculations are necessary.

CO2: Solve linear equations, graph and interpret linear models, and read and apply formulas. Demonstrate a basic understanding of displays of univariate data such as bar graphs, histograms, dotplots, and circle graphs, including appropriate labeling.

CO3: Take charge of their own learning through good classroom habits, time management, and persistence. Participate in the classroom community through written and oral communication.

**Syllabus: Theory**

UNIT 1	<p>Number System:</p> <ul style="list-style-type: none"> <li>a. Number system</li> <li>b. Power cycle</li> <li>c. Remainder cycle</li> <li>d. Factors, Multiples</li> <li>e. HCF and LCM</li> </ul>
UNIT 2	<p>Data Arrangements and Blood Relations:</p> <ul style="list-style-type: none"> <li>a. Linear Arrangement</li> <li>b. Circular Arrangement</li> <li>c. Multi-dimensional Arrangement</li> <li>d. Blood Relations</li> </ul>
UNIT 3	<p>Time and Work:</p> <ul style="list-style-type: none"> <li>a. Work with different efficiencies</li> <li>b. Pipes and cisterns</li> <li>c. Work equivalence</li> <li>d. Division of wages</li> </ul>
UNIT 4	<p>Coding &amp; Decoding, Series, Analogy, Odd Man Out and Visual Reasoning:</p> <ul style="list-style-type: none"> <li>a. Coding and Decoding</li> <li>b. Series</li> <li>c. Analogy</li> <li>d. Odd Man Out</li> <li>e. Visual Reasoning</li> </ul>

UNIT 5	<p>Percentages, Simple Interest and Compound Interest:</p> <ul style="list-style-type: none"> <li>a. Percentages as Fractions and Decimals</li> <li>b. Percentage Increase / Decrease</li> <li>c. Simple Interest</li> <li>d. Compound Interest</li> <li>e. Relation Between Simple and Compound Interest</li> </ul>
UNIT 6	<p>Permutation, Combination and Probability:</p> <ul style="list-style-type: none"> <li>a. Fundamental Counting Principle</li> <li>b. Permutation and Combination</li> <li>c. Computation of Permutation</li> <li>d. Circular Permutations</li> <li>e. Computation of Combination</li> <li>f. Probability</li> </ul>
UNIT 7	<p>Data Interpretation and Data Sufficiency:</p> <ul style="list-style-type: none"> <li>a. Data Interpretation – Tables</li> <li>b. Data Interpretation - Pie Chart</li> <li>c. Data Interpretation - Bar Graph</li> <li>d. Data Sufficiency</li> </ul>
UNIT 8	<p>Profit and Loss, Partnerships and Averages:</p> <ul style="list-style-type: none"> <li>a. Basic terminologies in profit and loss</li> <li>b. Partnership</li> <li>c. Averages</li> <li>d. Weighted average</li> </ul>

	e. Mixtures and allegations
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### **Methodology for Evaluation**

#### 1. Internal Assessment

a) Class/ Home Assignments (Minimum One from each Unit) : 30 Marks

b) In Semester Tests (Minimum two) : 30 Marks

#### 2. Term End : 40 Marks

\*Note: Minimum one class assignment shall be given in each turn in the Lab which will be attempted by the students in the class itself and evaluated by the end of the day. Balance work shall be completed at home and submitted at the beginning of the next turn in Lab.

### **Suggested Reading:**

1. Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;
2. The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;
3. How to Ace the Brainteaser Interview, by John Kador, Mc Graw Hill Publishers.
4. Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
5. Quicker Maths, by M tyra& K Kundan, BSC Publishing Co. Pvt. Ltd., Delhi;
6. Owl Purdue University online teaching resource

### **Value Education II** **Subject Code: DIN004A** **Credits: 1**

#### **Course Objectives**

1. To give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.
2. Making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

#### **Course Outcomes(CO):**

**At the end of this course students will have:**

CO1: Ability to acknowledge and appreciate the ethical beauty of India

CO2: Ability to incorporate the values of human lives in real life applications

### **Yoga and Meditation**

The objective of the course is to provide practical training in YOGA ASANAS with a sound theoretical base and theory classes on selected verses of Patanjali's Yoga Sutra and Ashtanga Yoga. The coverage also includes the effect of yoga on integrated personality development.

### **Rajasthan Mural Art and Painting**

Mural painting is an offshoot of the devotional tradition in Rajasthan. A mural is any piece of artwork painted or applied directly on a wall, ceiling or other large permanent surface. In the contemporary scenario Mural painting is not restricted to the permanent structures and are being done even on canvas. Rajasthani mural paintings are the frescos depicting mythology and legends, which are drawn on the walls of temples, principally in Rajasthan. Ancient temples and tourists places in different States of Rajasthan, display an abounding tradition of mural paintings mostly dating back between the 9th to 12th centuries when this form of art enjoyed Royal patronage. Learning Mural painting through the theory and practice workshop is the objective of this course.

### **Course on Organic Farming and Sustainability**

Organic farming is emerging as an important segment of human sustainability and healthy life. 'Haritamritam' is an attempt to empower the youth with basic skills in tradition of organic farming and to revive the culture of growing vegetables that one consumes, without using chemicals and pesticides. Growth of Agriculture through such positive initiatives will go a long way in nation development. It is a big step in restoring the lost harmony of nature.

### **Benefits of Indian Medicinal Systems**

Indian medicinal systems are one of the most ancient in the world. Even today society continues to derive enormous benefits from the wealth of knowledge in Ayurveda of which is recognized as a viable and sustainable medicinal tradition. This course will expose students to the fundamental principles and philosophy of Ayurveda and other Indian medicinal traditions.

### **Traditional Fine Arts of India**

India is home to one of the most diverse Art forms world over. The underlying philosophy of Indian life is 'Unity in Diversity' and it has led to the most diverse expressions of culture in India. Most art forms of India are an expression of devotion by the devotee towards the Lord and its influence in Indian life is very pervasive. This course will introduce students to the deeper philosophical basis of Indian Art forms and attempt to provide a practical demonstration of the continuing relevance of the Art.

### **Science of Worship in India**

Indian mode of worship is unique among the world civilisations. Nowhere in the world has the philosophical idea of reverence and worshipfulness for everything in this universe found universal acceptance as it in India. Indian religious life even today is a practical demonstration of the potential for realisation of this profound truth. To see the all-pervading consciousness in everything, including animate and inanimate, and constituting society to realise this truth can be seen as the epitome of civilizational excellence. This course will discuss the principles and rationale behind different modes of worship prevalent in India

### **Insights into Indian Classical Music**

The course introduces the students into the various terminologies used in Indian musicology and their explanations, like Nadam, Sruti, Svaram – svara nomenclature, Stayi, Graha, Nyasa, Amsa, Thala, Saptatalas and their angas, Shadangas, Vadi, Samavadi, Anuvadi. The course takes the students through Carnatic as well as Hindustani classical styles.

### **Insights into Traditional Indian Painting**

The course introduces traditional Indian paintings in the light of ancient Indian wisdom in the fields of aesthetics, the Shadanga (Six limbs of Indian paintings) and the contextual stories from ancient texts from where the paintings originated. The course introduces the painting styles such as Madhubani, Kerala Mural, Pahari, Cheriya, Rajput, Tanjore etc.

### **Insights into Indian Classical Dance**

The course takes the students through the ancient Indian text on aesthetics the Natyasastra and its commentary the Abhinava Bharati. The course introduces various styles of Indian classical dance such as Bharatanatyan, Mohiniyattam, Kuchipudi, Odissi, Katak etc. The course takes the students through both contextual theory as well as practice time.

### **Indian Martial Arts and Self Defense**



The course introduces the students to the ancient Indian system of self-defense and the combat through various martial art forms and focuses more on traditional Kerala's traditional Kalari Payattu. The course introduces the various exercise technique to make the body supple and flexible before going into the steps and techniques of the martial art. The advanced level of this course introduces the technique of weaponry.

#### **Social Awareness Campaign**

The course introduces the students into the concept of public social awareness and how to transmit the messages of social awareness through various media, both traditional and modern. The course goes through the theoretical aspects of campaign planning and execution.

#### **Organic Farming in Practice**

Organic agriculture is the application of a set of cultural, biological, and mechanical practices that support the cycling of farm resources, promote ecological balance, and conserve biodiversity. These include maintaining and enhancing soil and water quality; conserving wetlands, woodlands, and wildlife; and avoiding use of synthetic fertilizers, sewage sludge, irradiation, and genetic engineering. This factsheet provides an overview of some common farming practices that ensure organic integrity and operation sustainability.

#### **Ayurveda for Lifestyle Modification**

Ayurveda aims to integrate and balance the body, mind, and spirit which will ultimately leads to human happiness and health. Ayurveda offers methods for finding out early stages of diseases that are still undetectable by modern medical investigation. Ayurveda understands that health is a reflection of when a person is living in harmony with nature and disease arises when a person is out of harmony with the cycles of nature. All things in the universe (both living and non-living) are joined together in Ayurveda. This leaflet endow with some practical knowledge to rediscover our pre- industrial herbal heritage.

#### **Life Style and Therapy using Yoga**

Yoga therapy is the adaptation of yogic principles, methods, and techniques to specific human ailments. In its ideal application, Yoga therapy is preventive in nature, as is Yoga itself, but it is also restorative in many instances, palliative in others, and curative in many others. The therapeutic effect comes to force when we practice daily and the body starts removing toxins and the rest is done by nature.

\*Each student shall write a detailed Report/ Critique on one topic leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce. Alternatively a Student may undertake a Project on any one of the topics and submit a detail Project Report leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. If the topic is related to Performing Arts including Yoga, Marshal Arts etc. the performance on stage may be given instead of PPT. In case of Fine Arts, an exhibition or a portfolio may be presented in place of PPT.

**On the basis of the above points, a panel of experts from the department will award the credits.**

### **Big data**

**Subject Code: BCM 644A**

**Credits: 4**

#### **Module Overview**

This module forms an introduction as well an in-depth study in the field of Big Data and Hadoop. It comprises of the fundamentals as well as advanced topics needed to progress in this technology. The

students will learn about the applications, usage and several use case scenarios pertaining to Big Data-Hadoop where they can use the knowledge and progress ahead.

### **Learning Objectives**

This course will help students gain knowledge and understanding about Big Data Technology, Hadoop Ecosystem and various tools related to it. The students will learn about the HDFS File System, Map Reduce Framework, analysing data using Hbase and Hive along with the Integration of R with Hadoop.

### **Learning Outcomes**

Upon successful completion of this module, students should be able to:

- Understand the fundamentals of Big Data and its Applications in various Domains.
- Conceptualize and Incorporate the Technologies behind Big Data.
- Understand HDFS File Structure, Map Reduce Framework, the architectures related to them and to use them to solve complex problems.
- Integrate R with Hadoop and solve analytical problems.
- Understand and Use Hive/Hbase shell pertaining to relational data handling under Hadoop.

### **Unit I : Introduction to Big Data**

What Is Big Data? History of Data Management, Evolution of Big Data, Structuring of Big Data, Elements of Big Data, Application of Big Data in the Business Context, Careers in Big Data. Business Applications of Big Data: The Significance of Social Network Data, Financial Fraud and Big Data, Fraud Detection in Insurance, Use of Big Data in the Retail Industry.

### **Unit II : Technologies for Handling Big Data**

Distributed and Parallel Computing for Big Data, Understanding Hadoop, Cloud Computing, Grid Computing and In-Memory Technology for Big Data. VMWare Installation of Hadoop, Linux and its Shell Commands, Different Hadoop Distributions and their advantages, Hortonworks, Cloudera, MapR.

### **Unit III : Understanding the Hadoop Ecosystem**

The Hadoop Ecosystem, Storing Data with HDFS, Design of HDFS, HDFS Concepts, Command Line Interface to HDFS, Hadoop File Systems, Java Interface to Hadoop, Anatomy of a file read, Anatomy of a file write, Replica placement and Coherency Model. Parallel Copying with distcp, keeping an HDFS Cluster Balanced.

### **Unit IV : Map Reduce Fundamentals**

Origins of Map Reduce, How Map Reduce Works, Optimization Techniques for Map Reduce Jobs, Applications of Map Reduce, Java Map Reduce classes (new API), Data flow, combiner functions, running a distributed Map Reduce Job. Configuration API, setting up the development environment, Managing Configuration.

### **Unit V : Hive, Hbase and R-Hadoop**

Understanding R-Hadoop, Integration Procedure, Packages needed for R under Hadoop Ecosystem, Text Mining for Deriving Useful Information using R within Hadoop, Introduction to Hive & Hbase, Hive and Hbase Architecture, Understanding Queries, Mining Big Data with Hive & Hbase.

## References

1. Arshdeep Bahga, 2016, Big Data Science & Analytics: A Hands-On Approach, VPT.
2. Tom White, 2012, Hadoop: The Definitive Guide, O'Reilly.
3. Adam Shook and Donald Miner, 2012, Map Reduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems, O'Reilly.
4. Dean Wampler, Edward Capriolo & Jason Rutherglen, 2012, Programming Hive, O'Reilly.
5. Lars George, 2011, HBase - The Definitive Guide: Random Access to Your Planet-Size Data, O'Reilly.

## Semester V

<b>FIFTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BCM 636A	Machine Learning For Business Analytics	2	1	2	4	S
BCM 637A	Direct Taxation	3	1	-	4	C
BCM 638A	Financial Econometrics	3	1	-	4	S
BCM 639A	Marketing Analytics	3	1	-	4	S
BCM 641A	Logistics And Supply Chain Analytics	3	1	-	4	S
BCM 642A	Accounting And Fraud Analytics	3	1	-	4	S
BCM 644A	Hr Analytics	3		2	4	S
	<b>TOTAL</b>	<b>20</b>	<b>6</b>	<b>4</b>	<b>28</b>	

### **Machine learning for business analytics**

**Subject Code: BCM 636A**

**Credits: 4**

**Learning Objectives:** After this course students will gain critical knowledge and understanding about major Machine Learning procedures like Decision Tree, Cluster Analysis, Neural Networks, Support Vector Machine, Bayesian Networks and Machine Learning fundamentals. Students will be able to apply and practice this gained knowledge in variety of Business Scenarios.

## **Unit 1**

### **Classification and Regression Tree**

Classification & Regression, working of a Decision Tree, Attribute Selection Measures, Information Gain, Gain Ratio, Gini Index, Building Decision Trees, CART, C5.0, and CHAID Trees, Prediction by Decision Tree, Advantages and Disadvantages of Decision Trees, Model Overfitting, Building Decision Trees in R.

## **Unit 2**

### **Clustering**

Cluster Analysis versus Factor Analysis, Overview of Basic Clustering Methods, Agglomerative Hierarchical Clustering, Within-Group Linkage, Nearest Neighbor or Single Linkage, Furthest Neighbor or Complete Linkage, Centroid Clustering, Ward's Method, K-Means Algorithm, Dendrogram, Profiling of Cluster, Cluster Evaluation.

### **Unit 3**

#### **Artificial Neural Networks**

Structure of a Neural Network, Input Layer, Hidden Layer, Output Layer, Nodes, Synaptic Weights, Analogy with Biological Neural Network, Scaling of Data, Activation Functions, Hyperbolic Tangent, Sigmoid, Identity, Softmax, Optimization Algorithms, Scaled Conjugate Gradient, Gradient Descent, Model Accuracy.

### **Unit 4**

#### **Support Vector Machine**

Decision Boundaries for Support Vector Machine, Maximum Margin Hyperplanes, Structural Risk Minimization, Linear SVM-Separable Case, Linear SVM-Non-Separable Case, Kernel Function, Kernel Trick, Kernel Hilbert Space, Model Evaluation.

### **Unit 5**

#### **Market Basket Analysis**

Market Basket Analysis and Association Analysis, Market Basket Data, Stores, Customers, Orders, Items, Order Characteristics, Product Popularity, Tracking Marketing Interventions, Association Rules, Support, Confidence, Lift, Chi-Square Value, Sequential Pattern Analysis.

#### **Reference Books:**

- Tang, P.N., Steinback, M. and Kumar, V. (2014). *Introduction to Data Mining*. Pearson.
- Mitchell (2013). *Machine Learning*. McGraw Hill.
- Han, Jiawei and Kamber, Micheline. (2012). *Data Mining: Concepts and Techniques*. Morgan Kaufman Publishers.
- AnandRajaraman. (2011). *Mining of Massive Datasets*. Cambridge University Press.
- Myatt, Glenn and Johnson, Wayne. (2009). *Making Sense of Data II*. Wiley.

### **Direct Taxation**

#### **Subject Code: BCM 637 A**

#### **Credits: 4**

Generally, a commerce graduate is expected to have knowledge about taxation. After the implementation of GST in India, taxation structure has become quite simple and multiple taxation has substantially reduced. Whether in employment or having own business or profession, an individual has to pay income tax and file his income tax return once he starts earning taxable income. This paper aims at making the students understand and apply the basic provisions related to income tax and be able to compute his own income tax

liability, timely payment of such tax liability and comply with income tax return filing procedure on year-to-year basis

### **Unit 1:Income Tax Act, 1961**

Meaning, concept and definitions

Residential status and taxability of income

### **Unit 2: Computation of Taxable Income under different heads of Income**

- a. Income from Salary ← Salient features, meaning of salary, Allowances and their taxability, Perquisites and their valuation, Deductions from Salary
- b. Income from House Property ← Basis of chargeability, Annual Value, Valuation of Self Occupied, Let out and Deemed Let Out Properties, Deductions allowed
- c. Profits and Gains of Business or Profession ← Definitions, Deductions expressly allowed, Deductions expressly disallowed, disallowance on the basis TDS non-compliance, Block of Assets method of Depreciation
- d. Income from Capital Gains, Chargeability, Cost of Improvement, Short Term Capital Gains, Long Term Capital Gains, Deductions
- d. Income from Other Sources Chargeability, Deductions, Amounts not deductible

**Unit 3: Computation of Total Income** ← Gross Total Income, Deductions under Chapter VIA, Tax slabs for Individuals, New tax regime effective from A.Y.2021 -22, Choice of assessee to switch -over to new regime, Government philosophy behind new tax regime, Numerical sums on total computation under old and new tax regime

**Unit 4: Modes of Tax payment** ← Advance Tax, Tax Deducted at Source, Self Assessment Tax, Tax on Regular Assessment 06, Viewing Form 26AS on Income Tax site

**Unit 5:Income Tax Returns**← Various Income Tax Return Forms and their applicability, Due dates for filing Income Tax Returns, E-filing of Income Tax Returns, E-assessment of Income Tax Returns, Faceless assessment

***Note: Provisions as amended and made applicable to current Assessment Year will be considered to be part of the syllabus. Accordingly, for academic year 2021-2022 provisions relevant to A.Y.2021-2022 will apply and so on***

### **Course Learning Outcomes:**

On successful completion of the module students will be:

CO1. able to understand basic taxation structure in India as per the Constitution of India.

CO2. able to understand basic provisions regarding computation of taxable income of an individual for the current assessment year, whether from Salary or Business/Profession or other sources of Income.

CO3. able to make numerical calculations of taxable income and exempt income as per the method of calculation prescribed under Income Tax Act, and tax payable on the same.

CO4. acquire knowledge about submission of income tax return, payment of due taxes in the form of advance tax, self-assessment tax and tax deducted at source.

CO5. get acquainted with e-processes related to income tax filing and assessment.

**Financial econometrics**  
**Subject Code: BCM638A**  
**Credits: 4**

**Module Overview**

This subject covers the fundamentals of Financial Econometrics. The students will understand and be able to implement different Statistical Algorithms and Concepts based on Econometrics disciplines ranging from Least Squares Method, Multicollinearity, Non-Linear and Responsive Models to Panel Data Regressions.

**Learning Objectives**

This subject is designed to provide a holistic coverage and introducing the student to the field of Financial Econometrics. The students will learn and understand the implementation and usability of Financial Econometrics domain based on different Statistical Models and advanced Regression Algorithms.

**Learning Outcomes**

Upon successful completion of this module, students should be able to understand and implement ANOVA, ANCOVA Models, Regression Models in a deeper level. The students will understand the effects of Heteroscedasticity and Multicollinearity and will be able to detect and provide suitable remedies for the same. The students will gain expertise in Modeling Non-Linear, Responsive Models, Dynamic Models and Simultaneous Equation Models.

**Unit 1 Ordinary Least Square Regression & BLUE Properties**

Methodology of Econometrics. Types of Econometrics. Connection between Econometrics, Statistics and Finance. The Assumptions Underlying The Method of Least Squares. Dummy Variables Regression Models. ANOVA and ANCOVA Models. Problem of Estimation in Regression Models. BLUE property of estimators.

**Unit 2 Multicollinearity & Heteroscedasticity**

Nature of Multicollinearity. Estimation In The Presence of Perfect Multicollinearity. Estimation In The Presence of “High” But “Imperfect” Multicollinearity. Detection and Remedy of Multicollinearity. OLS Estimation In The Presence of Heteroscedasticity. Detection and Remedy of Heteroscedasticity. Detection and Remedy of Autocorrelation.

**Unit 3 Non-Linear & Qualitative Response Models**

Estimation of Linear and Nonlinear Regression Models. The Nature of Qualitative Response Models. Logistic Regression Model. PROBIT and TOBIT Models. Model Specification Error or Model Specification Bias. Model Selection Criteria. Types Of Specification Errors. Detecting the Presence of Overfitted Model. Ramsey’s RESET Test and Lagrange Multiplier (LM) Test for Adding Variables.

**Unit 4 Dynamic Models & Panel Data Regression**

Dynamic Econometric Models. The Role of “Time, ’or “Lag,” in Economics. The Koyck Model- The Adaptive Expectations Model. The Stock Adjustment, or Partial adjustment Model. Combination of Adaptive Expectations And Partial adjustment Models. Panel Data Regression. Fixed Effects Approach. Error Components Approach. Hausman test to decide between FEM and ECM.

### **Unit 5 Simultaneous Equation Models**

Simultaneous Equation Model. Limited Information Methods Versus Full Information Methods. Recursive, Triangular, or Causal Models. Estimation of a Just Identified Equation: The Method of Indirect Least Squares (ILs). Estimation of an Overidentified Equation: The Method Of Two-Stage Least Squares (2sls).

### **Reference Books:**

- Gujarati & Sangeetha (2012). Basic Econometrics. McGraw Hill Publication.
- Chris Brooks (2014). Introductory Econometrics for Finance. Cambridge University Press
- Jeffery M. Woolridge (2009) Introductory Econometrics. Cengage Learning.
- Andrew Bruce, Peter Bruce (2017). Practical Statistics for Data Scientists. O'Reilly Media, Inc.
- Hosmer, Lemeshow & Sturdivant. (2013). Applied Logistic Regression. Wiley.

### **Marketing analytics**

**Subject Code: BCM 639A**

**Credits: 4**

### **Module Overview**

This subject demonstrates the aspects of consumer behaviour through novel analytical techniques like Market Basket Analysis, Multi-Dimensional Scaling, Conjoint Analysis, Cluster Analysis along with ethical dimension of reporting results of analysis. Besides theoretical understanding of concepts application on data sets will be covered in this module.

### **Learning Objectives**

Objectives of this module are around building of strong conceptual understanding of consumer behaviour and consumer preferences. Besides, theoretical understanding of concepts, application of the concepts through software is aimed in this module.

### **Learning Outcomes**

Upon successful completion of this modules, students should be able understand the key issues around consumer behaviour along with practical application of the learned concepts on data sets through popular software.

### **Unit I: Market Basket Analysis**

Association Rule Mining, Item & Item-set, Frequency of Transactions, Causal Transactions, Support, Confidence, Predictive Power & Accuracy, Lift – Measure of Association, Item-Transaction Matrix, Density, Length of Rule, Optimum Number of Rules, Apriori Function, Custom Queries, Saving Association Rules.

## **Unit II: Multi-Dimensional Scaling**

Consumer Preference, Distance- Measure of Dissimilarity/Similarity, Dissimilarity/Similarity Matrix, Square Symmetric Matrix, MDS Versus Factor and Cluster Analysis, Euclidean Distance, Iteration History, Stress and Squared Correlations, Stimulus Coordinates, Subject Weights, Derived Stimulus Configuration, Group Plots.

## **Unit III: Conjoint Analysis**

Products & Services Evaluation, Consumer Buying Behaviour, Attributes and Features, Consumer Preference versus Cost to Company, Values to Attributes, Contribution of Attribute, Ordinary Least Square for Contribution, Full-Profile Rating, Full-Profile Ranking, Choice-Based Conjoint Analysis, Hierarchical Bayes Estimation, Polyhedral Methods.

## **Unit IV: Clustering of Marketing Data**

Custer Mechanism, Hierarchical and Non Hierarchical Clustering, K Means Clustering, Normalising of Data, Scaling of Data, Distances, Euclidean Distance, Distance Matrix Plot, Centroid, Total Within Sum Squared, Within-group Linkage, Nearest Neighbour, Furthest Neighbour, Centroid Clustering, Ward's Method, Optimum Number of Clusters, Cluster Membership, Agglomeration Schedule, Dendrogram.

## **Unit V: Reporting & Ethical Issues**

Importance of Report, Report Preparation, Report Format, Oral Presentation, Research Follow-up, Research Integrity, Misusing Statistics, Falsifying Figures, Withholding Information, Honesty, Accuracy & Completeness in Reporting, Complete Disclosure by Client, American Marketing Association.

## **References**

1. Robert W. Palmatier, Hari Sridhar, 2017, *Marketing Strategy: Based on First Principles and Data Analytics*, Amazon.
2. Mike Grigsby, 2015, *Marketing Analytics: A Practical Guide to Real Marketing*, Kogan Page.
3. Chapman, Christopher N., McDonnell Feit, Elea, 2015, *R for Marketing Research and Analytics*, Springer.
4. Wayne L. Winston, 2014, *Marketing Analytics: Data-Driven Techniques with Microsoft Excel*, Wiley.
5. Stephan Sorger, 2013, *Marketing Analytics*, Amazon.
6. Naresh k. Malhotra, Satya Bhushan Dash, 2010, *Marketing Research*, Pearson.

## **Logistics and supply chain analytics**

**Subject Code: BCM 641A**

**Credits: 4**

## **Module Overview**

This subject focuses on the interlinked processes that compose effective logistics and supply chain planning, demand planning, sales and operations planning, and inventory and supply planning with the help of advanced analytics techniques in effective decision making.

## **Learning objectives**



This subject helps the students in understanding the processes, interconnection, and the practical challenges of implementing the planning and the important ways in which analytical tools and methods can be utilized to make better logistics and supply chain planning decisions

### **Learning outcomes**

On successful completion of this module, the student will be able to implement the planning processes using analytical tools and make effective decisions, which will help a company to achieve its targeted balance between efficiency and responsiveness

### **UNIT I : Introduction**

Define Supply Chain and Logistics Analytics, Supply Chain Management Model and Integration, Key Strategic Matrix for Cycle Time and Response Time, the global Supply Chain, Information Integrated, Risk Management, Supply Chain Segmentation and Analytics.

### **UNIT II : Performance, Measures and Analytics**

The Role and Purpose of Measures and Control Systems, Level of Analytics and Business Intelligence, Analytics Strategy, Analytics and Business Intelligence Application, Analytics and Supply Chain Segmentation, Demand, Inventory and Supply Planning.

### **UNIT III: Supply Chain Segmentation Key Concepts and Change Management**

Forecast Analysis, Statistical Safety Stock (SSS), Optimal Service Level (OSL), Coefficient of Variation (COV), Re-Order Point Cycle (ROP), Economic Order Quantity (EOQ), Optimal Inventory Level (OIL), Min / Max (MM) Planning, Build to Order (BTO) / Manufacture to Order (MTO) Planning, Quality Function Deployment (QFD), Total Quality Management (TQM), Concept Management.

### **UNIT IV: Global Supply Chain Analytics**

Integrating Data into Supply Chain Intelligence, Global Sales, Promotion and Sourcing Analytics, Contract Manufacturing Analytics, Distribution Analytics, Transportation and Logistics Analytics, Integrating Functional Analytics into Global Supply Chain Management.

### **UNIT V: Metrics and KPI's**

Increase Profitability, Forecast Accuracy, Working Capital Improvement, operating Margin Improvement, Positive and Negative Variance, Maturity Models, Reference Models, Benchmarking, Applying Goals to Supply Chain, Demand Forecasting, Invoice Reporting, Inventory Visibility, Procurement Reporting.

### **References**

1. Philip M. Parker, 2019, *The 2020-2025 World Outlook for Supply Chain Analytics*, ICON Group International.
2. Kusum Deep & Madhu Jain, 2018, *Logistics, Supply Chain and Financial Predictive Analytics: Theory and Practice*, Springer.
3. Blokdyk, 2017, *Supply Chain Analytics: Beginner's Guide*, The Art of Service.
4. Hokey Min, 2016, *Global Business Analytics Models: Concepts and Application in Supply Chain, Financial Analytics*, Springer FT Press

5. Muthu Mathirajan, Chandrasekharan Rajendran, 2015, *Analytics in Operations/ Supply Chain Management*, Kindle.
6. Gerharld J. Plenert, 2014, *Supply Chain Optimization through Segmentation and Analytics*, Kindle.

### **Accounting and fraud analytics**

**Subject Code : BCM 642A**

**Credits : 4**

#### **Module Overview**

This subject covers the fundamentals of Accounting and Fraud Analytics, the strategies involved in detecting, identifying and assessing financial frauds, conceptualizing several algorithms which are implemented to detect frauds and assess them along with a Case Study in R Programming to detect frauds using several approaches.

#### **Learning Objectives**

This subject is designed to provide a holistic coverage and introducing the student to the field of Accounting and Fraud Analytics. The students will develop an understanding of its importance, the practical use of analytical algorithms and their analysis to aid in Detecting Frauds.

#### **Learning Outcomes**

Upon successful completion of this module, students should be able to Recognize the types of Data Anomalies and Signs of Fraud, Implement Data Mining Algorithms to Detect, Identify and Assess Frauds within a Financial Statement, Apply numerous fundamental, advanced and non-traditional mining techniques.

#### **Unit I: Introduction**

Accounting Fraud Data Analytics, Fraud Scenarios, Critical Fraud Concepts, Understanding Auditors Fraud related responsibilities, Identifying Corporate Vulnerabilities, Risks and Threats, Financial Fraud Data Analytics Methodology, Critical Considerations for the Fraud Data Analytics, False Positive Conundrum, Axioms of Fraud Analytics.

#### **Unit II : Data Mining Strategies**

Strategies for Financial Fraud Analysis, Pattern Recognition and Frequency Analysis, Using Critical Data Elements, building a Fraud Analytics Plan, Data Issues, Availability, Reliability, Usability, Defining the Scope, Creating Planning Reports, Data Mining for Shell Companies, Building Search Routines, Correlation to Transactional Data.

#### **Unit III : Fraud Detection Algorithms**

Clustering with Financial Data, Clustering Methods- K-Means, Hierarchical, Comparative Study, Dimensionality Reduction, Parametric Approach to Dimension Reduction, Apriori Algorithm, Expectation-Maximization for Knowledge Discovery, Classification and Regression Tree, Adaboost, Naïve Bayes, Understanding Outlier Rankings.

#### **Unit IV : Data Analysis Tests**

Detecting Billing and Checking Tampering Schemes, Finding Frauds within Payroll and Expense Reimbursement Functions, Detecting Theft of Cash Receipts and Inventory, Corruption Scheme Detection, Analysing External Financial Records, Detecting Financial Statement Frauds, Identifying Anomalies, Uncovering Financial Statement Manipulation.

### **Unit V : Detecting Fraudulent Transactions: Case Study**

Problem Description and Objectives, Available Data and Features, Loading the Dataset, Exploring, Data Problems, Defining Data Mining Tasks, Evaluation Criteria, Experimental Methodology, Obtaining Outlier Rankings using Supervised and Unsupervised Approaches, Reporting Summary Statistics.

### **References**

1. Leonard W. Vona, (2017), *Fraud Data Analytics Methodology*, Wiley.
2. William H. Beecken, (2017), *Fraud Examination Case Book with Documents*, Wiley.
3. Luis Torgo, (2017), *Data Mining with R: Learning with Case Studies*, Chapman.
4. S. Christian Albright and Wayne L Winston, (2016), *Business Analytics: Data Analysis & Decision Making*, Cengage Learning.
5. Steven J. Miller, (2015), *Benford's Law: Theory and Applications*, Princeton.
6. Bart Baesens, (2015), *Fraud Analytics Using Descriptive, Predictive and Social Network Techniques*, Wiley.

### **HR analytics**

**Subject Code: BCM 644A**

**Credits: 4**

### **Module Overview**

This subject provides a practical approach of using data to solve real HR challenges in organizations and demystifies analytics with clear guidelines and recommendations for making the business case, HR analytics function, avoiding common pitfalls, presenting data through visualization and storytelling.

### **Learning objectives**

This subject helps in understanding all the key elements of HR including recruitment, employee engagement, performance management, and examines the ways data can contribute to organizational success by optimizing processes, driving performance and improving HR decision making.

### **Learning outcomes**

On Successful Completion, the student will be able to access framework with analytics, advanced statistical technique, key trends and patterns in order to develop effective evidence-based HR strategies and business decisions.

### **UNIT I : Introduction**

Define the Business Challenge, Understand the Analytics Domain, Human Capital Analytics, Forming Hypothesis, Explore Complex Analysis, Using Data for Informed Decision, Evaluating the Intervention and Data, Business Strategy, Competitive Advantage and Integration, Develop Hypothesis, HR Matrix, Various Statistical Test.

## **UNIT II : Articulating Business Value and Analytical Problem Solving**

Analytics Business Model, Analytics Value Chain, Training Value Measurement Model, Structure and Team Building, Analytics Capabilities and Effectiveness, Linkage to Business Outcome, Measuring Analytics Impact on Business Outcome, Research Evidence on Impact HR Program, Deep and Wide Approach, Building the Cube.

## **UNIT III : Workforce Analytics**

Business Levers of Organization Structure, Strategy and Manpower Planning, Traditional Measures of Organization Structure, Competitive Usage of Organization Structure, Organization shaping and Employee Growth, Measuring the Aspect of Organization Structure, Design and Supervisory Ratios, Demographics and Succession Planning.

## **UNIT IV : Acquiring High-Quality Talent and Development**

Effective and Emerging Measures of Talent Acquisition, Opportunity Cost of Cycle Time, Validity of Hiring Specifications, Importance of Quality of Hire, Measuring and Improving Process Capability, Measuring Returns on Investments on Talent Development Initiatives, Right Metrics and Measures for Strategic Alignment.

**UNIT V : Talent Engagement, Measure, Retention and Compensation** Measuring Attrition, LTM (Analytical Problem Solving) or YTD (Year to Date), Employee Retention. Predictive Modelling for Attrition Analysis, Competency Baseline and Usage, Leadership Development, Valuing Benefits using CTC Statement, Portfolio Management of Benefits, Tailoring Variable Pay to Performance Based on Data.

## **References**

1. Mike West, 2019, *People Analytics: Business & Personal Finance*, Dummies.
2. Shonna D. Waters, 2018, *Practical Guide to HR Analytics*, Kindle.
3. Dr Martin R. Edwards and Kirsten Edwards, 2016, *Predictive HR Analytics: Mastering the HR Metric*, Kindle.
4. Bernard Marv, 2018, *Data-Driven: How to use Analytics and Metrics to Drive Performance*, Kindle.
5. Mong shen Ng, 2018, *Predictive HR Analytics*, Kindle.
6. Ramesh Soundarajan, 2016, *Winning on HR Analytics: Leveraging Data for Competitive Advantage*, Kindle.

## **Semester VI**

<b>SIXTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BCM799A	Internship	-	-	32	16	C
	<b>TOTAL</b>	-	-	<b>32</b>	<b>16</b>	





# JECRC<sup>TM</sup> UNIVERSITY

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## School of Management

### Syllabi and Course Structure

#### Bachelor of Commerce

#### Financial Market (IFM)


#### Academic Programmes

#### Batch (2022-2023s)

#### Summary Sheet


Semester	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	Total	Min. Credit req. for degree
Credit	22	27	24	27	24	24	148	*10% relaxation for Mooc, NPTEL & Swayam courses

Type	Foundation	Core	Specialization	Interdisciplinary	General
Total Credit	19	42	50	12	22

  
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<b>FIRST SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BCM615B	Business and Technology	3	-	-	3	F
BCM616A	Financial Accounting	3	1	-	4	C
BCM618A	Introduction to Business Analytics	2	-	1	3	ID
BCM619	Business Mathematics & Statistics	3	1	-	4	F
BCM617	Corporate and Business law	3	-	-	3	ID
DEN001A	Communication Skills	3		-	3	G
DIN001A	Culture Education - 1	-	-	2	2	G
	<b>TOTAL</b>	<b>17</b>	<b>2</b>	<b>3</b>	<b>22</b>	

<b>SECOND SEMESTER</b>						
	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BCM 620A	Organisation Behaviour	4	-	-	4	F
BCM 622A	Management Accounting	3	1	-	4	S
BCM 621A	Marketing Management	3	-	-	3	C
BCM 623A	Corporate Accounting	4	-	-	4	C
BCM 624A	Business Analytics Using Excel	2	-	2	3	ID
DEN002A	Professional Skills	3	-	-	3	G
DIN002A	Culture Education - 2	-	-	4	2	G
DCH001	Environmental Studies (EVS)	3	-	2	4	F
	<b>TOTAL</b>	<b>22</b>	<b>1</b>	<b>8</b>	<b>27</b>	

  
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THIRD SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM 625A	Banking & Financial Services	3	-	-	3	C
BCM 626A	E-Business & Cyber Laws	3	-	-	3	ID
BCM 627A	Research Methodology	4		-	4	F
BCM 647A	Introduction to Securities & Investments	3	1	-	4	S
BCM 648A	Global Securities Operations	3	1	-	4	S
***	Open Elective	3	-	-	3	G
DEN003A	Life Skills - 1 (Aptitude)	2	-	-	2	G
DIN003A	Value Education - 1	1	-	-	1	G
	<b>TOTAL</b>	<b>22</b>	<b>2</b>		<b>24</b>	

FOURTH SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM 649A	Operational Risk	3		-	3	S
BCM 650A	Financial Accounting for Capital Accounts	3	1	-	4	S
BCM 632A	Audit and Assurance	3	1	-	4	C
BCM 651A	MS Excel & Statistics for Capital Markets	4		-	4	S
BCM 634A	E-Accounting	3		-	3	C
BCM 635A	Logistics and Supply Chain Management	3	-	-	3	ID

  
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***	Open Elective	3	-	-	3	G
DEN004A	Life Skills - 2 (Aptitude)	2	-	-	2	G
DIN004A	Value Education - 2	1	-	-	1	G
BCM657A	Commodities & Currency Derivatives	3	1	-	4	S
	<b>TOTAL</b>	<b>28</b>	<b>3</b>		<b>31</b>	

FIFTH SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM 652A	Start -up Eco System & Valuations	3	1	-	4	S
BCM 637A	Direct Taxation	3	1	-	4	C
BCM 653A	Angel, VC & PE Entry and Exit Strategies	3	-	1	4	S
BCM 654A	Primary Market & Public Issue Management	3	1	-	4	S
BCM 655A	Technical Analysis	3	1	-	4	S
BCM 656A	Goods And Service Tax	3	1	-	4	C
BCM 658A	Commercial Banking Operations	3	1	-	4	S
	<b>TOTAL</b>	<b>21</b>	<b>6</b>	<b>1</b>	<b>28</b>	

SIXTH SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM799A	Internship	-	-	32	16	C
	<b>TOTAL</b>			<b>32</b>	<b>16</b>	

**Program Educational Objective (PEO)- Bcom- Financial Marketing (IFM)**

  
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- I To introduce students to the world of financial services
- II To enrich student's understanding of the fundamental concepts and working of financial service institutions
- III To equip students with the knowledge and skills necessary to become employable in the financial service industry.
- IV To develop ethical business professionals with a broad understanding of business from an interdisciplinary perspective
- V To sharpen the students' analytical and decision making skills.

**Program Outcome (PO) – Bcom- Financial Marketing (IFM)**

**PO 1:** Understand the role and function of the financial system in reference to the macro economy

**PO 2:** Understand the concepts of derivatives including the key features of futures, options and swaps and the terminology associated with them.

**PO 3:** Understand the impact of macroeconomics on the behaviour of markets, sectors, companies, and investment themes

**PO 4:** Understand the main types of assets including the range of financial markets that exist for example money markets, property markets and foreign exchange markets.

**PO 5:** Understand different methods for the valuation of asset portfolios and explain their appropriateness in different situations.

**PO 6:** Understand the factors that a company has to consider when deciding its capital structure

**PO 7:** Analyse the process through which trading takes place and the role of clearing, settlement, lending, and custody process

**Semester I**

<b>FIRST SEMESTER</b>						
Sub Code	Sub Name	L	T	P	C	Type
BCM615B	Business and Technology	3	-	-	3	F
BCM616A	Financial Accounting	3	1	-	4	C
BCM618A	Introduction To Business Analytics	2	1	2	3	S
BCM619	Business Mathematics & Statistics	3	1	-	4	F
BCM617	Corporate And Business Law	3	1	-	3	ID
DEN001A	Communication Skills	3	-	-	3	G
DIN001A	Culture Education – 1	-	-	4	2	G
	TOTAL	17	4	6	22	

**Business and Technology**

**SUBJECT CODE: BCM615B**



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## **CREDITS: 3**

### **Unit 1: The business organisation, its stakeholders, and the external environment**

The purpose and types of business organisation -Stakeholders in business organisations -Political and legal factors affecting business -Macroeconomic factors -Micro economic factors -Social and demographic factors -Technological factors -Environmental factors -Competitive factors.

### **Unit 2: Business organisational structure, functions and governance**

The formal and informal business organisation- Business organisational structure and design- Organisational culture in business -Committees in business organisations -Governance and social responsibility in business

### **Unit 3: Accounting and reporting systems, compliance, control, technology and security**

The relationship between accounting and other business functions -Accounting and finance functions within business organisations -Principles of law and regulation governing accounting and auditing -The sources and purpose of internal and external financial information, provided by business -Financial systems, procedures and related IT applications -Internal controls, authorisation, security of data and compliance within business -Fraud and fraudulent behaviour and their prevention in business, including money laundering. -The impact of Financial Technology (Fintech) on accounting systems

### **Unit 4: Leading and managing individuals and teams & Personal effectiveness and communication**

Leadership, management and supervision -Recruitment and selection of employees -Individual and group behaviour in business organisations -Team formation, development and management -Motivating individuals and groups -Learning and training at work -Review and appraisal of individual performance- The application and impact of Financial Technology (FinTech) in accountancy and audit -Personal effectiveness techniques- Consequences of ineffectiveness at work -Competence frameworks and personal development -Sources of conflicts and techniques for conflict resolution and referral -Communicating in business

### **Unit 5: Professional ethics in accounting and business**

Fundamental principles of ethical behaviour -The role of regulatory and professional bodies in promoting ethical and professional standards in the accountancy profession -Corporate codes of ethics- Ethical conflicts and dilemmas

## **Financial Accounting SUBJECT CODE: BCM616A CREDITS: 4**

### **Unit 1: Purpose of financial accounting**

  
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Define financial accounting – purposes of financial statements for the users – main elements of financial reports – conceptual framework – definitions of asset, liability, equity, income & expenses-prudence.

### **Unit 2: Qualitative characteristics of financial statements**

Concepts of relevance, faithful presentation, materiality, substance over form, going concern, business entity, accruals, consistency, comparability, verifiability, understandability and timeliness

### **Unit 3: Accounting records & double entry accounting system**

Main data sources for accounting – different business documents such as sales order, purchase order, goods received note, quotation, goods despatched note, invoice, credit & debit notes, receipt, remittance advice, cash vouchers – understand the double entry accounting & duality concept – types of transactions such as sales, purchases, payments & receipts.

### **Unit 4: Recording transactions**

Recording into journals – ledger accounts – balancing of ledger accounts – accounting for discounts, sales tax – recording cash transactions – accounting & valuation of inventories – accruals & prepayments – tangible & non-tangible assets – depreciation & amortisation accounting – receivables & payables – provisions & contingencies – errors & rectification – bank reconciliation statements

### **Module 5: Trial balance, financial statements**

Statements of profit or loss and other comprehensive income, cash flow statements, balance sheet – events after reporting period – interpretation of financial statements – use of basic ratios related to profitability, liquidity, activity and resource utilisation-Describe the principle of the equity method of accounting for Associate entities

## **Introduction to Business Analytics**

**SUBJECT CODE: BCM618A**

**CREDITS: 3**

### **Module Overview**

This subject covers the complete life cycle of Business Intelligence/Analytics, covering Operational/Transactional Data Sources, Data Transformation, Data Mart/Warehousing design-build, Analytical Reporting and Dashboards. It will also help the students to develop deeper understanding on these concepts using Business Intelligence Tools.

### **Unit 1: Introduction & Data Type**

Overview of Business Analytics, Key Purpose of Using IT in Business, Enterprise Applications (ERP/CRM) and Bespoke IT Applications, Digital Data, Overview of Database, Structured data, Unstructured data, Semi-Structured data, Difference between different types of data.

  
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## **Unit 2 :Introduction to OLTP, OLAP & BI**

OLTP (On-Line Transaction Processing), OLAP (On-Line Analytical Processing), OLAP Architecture, Data Models for OLTP and OLAP, Role of OLAP Tools in the BI Architecture, OLAP Operations on Multidimensional data, Leveraging ERP Data using Analytics, Defining Business Intelligence (BI), Evolution of BI and Roles of DSS, EIS, MIS, and Digital Dashboards, The BI Value Chain, BI component Framework, BI Applications, Roles & Responsibilities, Popular BI Tools.

## **Unit 3 :Basics of Data Integration & Multidimensional Data Modeling**

Data Warehousing, Data Mart, Operational Data Storage, Data Mapping & Data Staging, Data Integration & Technologies, Data Quality & Data Profiling, Data Modeling Basics, Types of Data Model & Data Modeling Techniques, Fact Table & Dimension Table, Typical Dimension Models and Dimension Modeling Life Cycle.

## **Unit 4:Measures, Metrics, KPIs, and Performance Management & BI Road Ahead**

Understanding Measure and Performance, Measurement System Terminology, Navigating a Business Enterprise, Role of Metrics, and Metrics Supply Chain, Fact based Decision Making and KPIs, Measures to Business Decisions and Beyond, Understanding BI and Mobility, BI and Cloud Computing, BI for ERP Systems, Social CRM & BI.

## **Unit 5 :Basics of Enterprise Reporting**

Reporting Perspectives, Report Standardization and Presentation Practices, Enterprise Reporting Characteristics in OLAP World, Balanced Scorecard, Dashboards, Creating Dashboard, Scorecards vs. Dashboards, The Buzz Behind Analysis, Creating Enterprise Reports.

## **Case Studies and Exercises**

### **Business Mathematics & Statistics**

**SUBJECT CODE: BCM619A**

**CREDITS: 4**

## **Unit 1:Set Theory**

Introduction to Sets, Sets and their Representation, Tabular or Roster Method, Rule Method or Set Builder, Empty or Void or Null Set, Finite sets and Infinite sets, Proper Subset, Improper Subset, Power Set, Universal Set, Open Interval, Closed Interval, Semi-Open or Semi Closed intervals, Infinite Intervals, Venn Diagrams, Operations on Sets, Union, Intersection of Sets, Disjoint Sets, Difference of Sets, Symmetric Difference of Sets, Complement of a Set, Laws of Algebra of Sets.

## **Unit 2: Matrices and Determinants**

  
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Definition of a Matrix, Addition & Subtraction of Matrices, Multiplication of Matrices, Transpose of a Matrix. System of linear equations, Gauss elimination method, Inverse of a Matrix, Determinants, Determinants of order one and more, Properties of Determinants, Multiplication of two Determinants, Minors and Cofactors, Cramer's rule for solution of linear equations, Adjoint of a Matrix, Rank of a Matrix.

### **Unit 3: Vector Algebra**

Vectors, Types of Vectors, Operations on Vectors, Addition of Vectors, Properties of Operation of Addition, Subtraction, Properties of Operation of Subtraction, Multiplication by a scalar, Orthonormal Bases, Product of Two Vectors, Scalar Product or Dot Product of Two Vectors, Properties of Scalar Product, Vector Product or Cross Product, Properties of Vector Product.

### **Unit 4: Statistics**

Introduction to Statistics, Scale of Measurement, Nominal, Ordinal, Interval & Ratio. Frequency Distribution, Bar Chart, Pie Chart, Histogram, Frequency Polygon, Ogive, Pareto Chart, Stem-and-leaf Chart, Scatter Plot, Measure of Central Tendency, Properties, Advantages and Disadvantages of Arithmetic Mean, Geometric Mean, Harmonic Mean. Positional Averages, Median, Quartiles, Deciles, Percentiles & Mode. Measure of Dispersion, Range, Interquartile Range, Standard Deviation.

### **Unit 5: Probability**

Introduction to Probability, Experiment, Event, Compound Event, Independent and Dependent Events, Mutually Exclusive Events, Equally Likely Events, Marginal, Union, Joint, Conditional Probability, Basic Probability Rules, General Rule of Addition, General Rule of Multiplication, Concept of Baye's Theorem.

## **Corporate and Business Law**

**SUBJECT CODE: BCM617**

**CREDITS: 3**

### **Unit 1: Nature of the contract and consideration**

The Indian contract act 1872 – Definition of contract - Essential elements of a valid contract – clarification of contracts – offer and acceptance and Communication of offer and Acceptance and Revocation.

Consideration – Capacity to contract – Free consent - Legality of object – void agreement.

Performance of contract – offer to perform contracts which need not be performed – by whom contract must be performed who can demand performance. Discharge of Contract – meaning – methods – by performance – by agreement – impossibility of performance.

### **Unit 2: Breach of contract and the sale of goods act**



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Remedies for Breach of Contract – Introduction Recession – Damages – Specific Performance – injunction  
- Quasi contracts. Contract of Indemnity and guarantee – Contract of bailment and pledge – Contract of Agency – Creation of agency – Rights, duties and liabilities of an agent - Termination of agency.

Sale of Goods Act :

Formation of contract of Sale - caveat emptor - Express and implied conditions and warranties –  
Performance of Contract of Sale – Rights of an unpaid Seller.

### **Unit 3: Companies act and memorandum of association**

Meaning, Definition & Salient Features of Companies Act, 2013 - Kinds of Companies - Promotion, Role of Promoters-Incorporation of a Company.

Memorandum of Association, Contents & Alteration - Articles of Association, Contents & Alteration - Prospectus, Contents & Consequences of misstatement - Doctrine of Ultra Virus & Indoor Management.

### **Unit 4: Directors and corporate governance**

Directors-Appointment, Qualification-Disqualification - Membership in a Company, Modes of acquiring Membership - Rights and Liabilities of Members, Termination of Membership - Corporate Governance-Meaning, benefits of good governance, factors influencing corporate governance.

### **Unit 5: General and Statutory Meeting, Extraordinary Meetings**

General and Statutory Meeting, Extraordinary Meetings -Resolutions, Meaning and Kinds - Role of Company Secretary with respect to meetings. Meaning and modes of winding up - Powers of court in winding up - Consequences and procedures for winding up - Powers, Liabilities and Duties of Liquidators.

## **Communication Skills**

**SUBJECT CODE: DEN001A**

**CREDITS: 3**

### **Course Objectives**

1. To enhance English language competence in reading, writing, listening and speaking.
2. Switch the approach from teacher-centred to student-centred one.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. To link communication skills with the organizational behaviour.
6. To inculcate skills that are very much required for employability and adjust in the professional Environment.

### **Course Outcomes(CO):**

  
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**At the end of this course students will have :**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in different contexts.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

**Syllabus: Theory**

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
<b>UNIT 2</b>	<b>Basic Writing Skills:</b> Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
<b>UNIT 3</b>	<b>Composition:</b> , Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

**Syllabus: Lab**

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time- management, Following Deadlines etc
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<b>UNIT 2</b>	<b>Write Dialogue from the different contexts of corporate culture:</b> Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
<b>UNIT 3</b>	<b>Composition:</b> , Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

## **Methodology for Evaluation**

### **Assessment Theory**

1. Internal Assessment (Theory)
  - a) Home Assignments: One from each Unit: 15 Marks
  - b) In Semester Tests (Minimum two) : 30 Marks
  - c) Attendance : 05 Marks
2. Term End (Theory) : 50 Marks

### **Assessment Lab**

#### Internal Assessment (Lab)

- (a) Daily Performance in the Lab : 50 Marks
- Term End (Lab) : 50 Marks

### **Suggested Reading:**

1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
8. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006

### **Cultural Education-1**

**SUBJECT CODE: DIN001A**

**CREDITS: 2**

### **Course Objectives**

To make the students feel gratitude towards the rich religious and cultural heritage of India.

To understand the role of great personalities and movements in the progress of India.

### **Course Outcomes (CO)**

At the end of this course students will have:

CO1: Ability to acknowledge and appreciate the richness of Indian Culture

CO2: Ability to represent the culture ethics in real life

### **UNIT-I : Holy Scriptures-A**

Introduction to Vedanta and Bhagavad Gita, Goals of Life – Purusharthas, Introduction to different Dharm Granthas (Various religious scriptures from Hindu, Muslim, Christian, Bodh, Jain religions), Introduction to Yoga, Overview of Patanjali's Yoga Sutras

### **UNIT-II : Society and Culture-I**

Introduction to Indian Culture and Major Symbols of Indian Culture; Major Indian Cultural and Ethical Values- Respect, Compassion, Kindness, Forgiveness, Introspection, Honesty, Justice, Loyalty, Devotion, Self Sacrifice, Hospitality, Vasudhev Kutumbkum

### **UNIT-III : India in Progress-I**

Education , Science and Technology in Ancient India; Values from Indian History- War of Mahabharata, War of Kalinga, Freedom Struggle of India, Major Farmer Movements, Major Religious and Social Upliftment Movements

### **UNIT-IV: Great Indian Personalities-I**

Life and works of the Great People of Ancient India- Sushruta, Dadhichi, Ashtvakra, Anusuya, Panini, Charaka, Kalidas, Aryabhatta, Samudragupta, Ashoka, Chandragupt Mourya, Porus, Satyabhama, Dhruv, Prahlad, Chankya, Varahmihira, Bhism, Karan, Dronacharya, Meera Bai, Surdas, Dadudayal, Kabir, Mahatma Buddha, Mahavir, Guru Nanak Dev, Guru Gobind Singh, Mohammad Saheb, Jesus Christ, Veer Shivaji, Maharana Pratap, Maharani Laxmi Bai, Maharani Padmini, Hadi Rani Shaikanwar, Panna Dhai

\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by committee of teachers.

### **Suggested Reading:**

1. Glory of Indian Culture (English) Paperback by Giriraj Shah
2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies by Saroj Bala , Kulbhushan Mishra

### **References**

<https://knowindia.gov.in/culture-and-heritage/lifestyle-values-and-beliefs.php>

  
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## Semester II

SECOND SEMESTER						
Sub Code	Sub Name	L	T	P	C	Type
BCM 620A	Organisation Behaviour	4	-	-	4	F
BCM 622A	Management Accounting	3	1	-	4	C
BCM 621A	Marketing Management	3		-	3	F
BCM 623A	Corporate Accounting	4	-	-	4	C
BCM 624A	Business Analytics Using Excel	2	-	2	3	S
DEN002A	Professional Skills	3	-	-	3	G
DIN002A	Culture Education – 2	-	-	4	2	G
DCH001A	Environmental Studies (EVS)	3	-	2	4	F
	TOTAL	22	1	8	27	

### ORGANISATION BEHAVIOUR

SUBJECT CODE: BCM 620A

CREDITS: 4

#### Course Objective:

Understand how the organisations can be managed effectively considering the behaviour of various stakeholders of an organisation and analysing the skills required for the future advantage of an organisation.

#### Unit 1: Organization behavior – an introduction

Meaning of organizations – Nature of organization behavior – Basics of organization behavior – Scope and evolution of organizational behavior – Organizational arrangements and Organization behavior – Key terminologies in Organization Behavior - Organizational Behavior Model (OB Model)

#### Unit 2: Individual behavior, intelligence and personality

Meaning of individual behavior – personal and environmental factors – Models of individual behavior – nature and types of intelligence – theories and measurement of intelligence – Intelligence factors – intelligence in the context of organizational behavior.

  
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Nature and determinants of personality – Personality traits – Personality in the context of Organization Behavior

### **Unit 3: Motivation and work stress**

Nature and importance of motivation – challenges and theories of motivation – Motivation and organizational culture – quality of work life – rewards and behavior modification – problem employees – employee engagement

Meaning of work stress – work stress model – stress management – Stress and organizational behavior

### **Unit 4: Group and team behavior**

Nature and types of groups – Group dynamics and Organization behavior – determinants of group dynamics – Importance of group dynamics in an organization – group development strategies – Group motivation – Group structuring and decision making.

Meaning of team – differences between group and team – Types and benefits of teams – effective team management – team conflicts and resolution – Team development and Organizational Behavior

### **Unit 5: Organizational culture and leadership**

Meaning of leadership – leadership vs management – leadership styles and theories – formal and informal leadership – Ethics and leadership – leadership and organizational culture – Sustaining culture – changing organizational culture – workplace behaviour – Ethics of power.

### **Course outcomes:**

CO 1: Understand the basic of organizational behaviour in the context of the dynamic environment.

CO 2: Understanding the role of individual behaviour, intelligence and personality in the context of organizational development.

CO 3: Understanding importance of rewarding and motivating the stakeholders and managing the stress to effectively manage the organizational performance

CO 4: Understand the role of group and team dynamics in the current organizational environment

CO 5: Understand the importance of perception into organizational culture, leadership and ethics in an organizational development.

### **Management Accounting**

**SUBJECT CODE: BCM622A**

**CREDITS: 4**

### **Course Objective:**



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To understand the various types of management information and data. To understand the accounting of material labour and overheads. To understand various costing methods. To understand and solve questions of budgeting and its implication. To understand the standard costing concepts in detail and carry out variance analysis. To understand how to measure the performance of the organisation.

### **Unit 1 (Characteristics of Management Information, Data analysis and Statistical Techniques)**

Accounting for Management, Source of Data, Cost Classification, Production and Nonproduction, Presentation of Information, Reports, Tables, Charts, Graphs and Interpretation of Information **Data Analysis & Statistical Techniques** - Sampling Methods. Forecasting Techniques – Equation, Linear Function- High/Low Analysis- Analysis of Cost Data- Historical and Forecasting Data - Index Numbers - Liner Regression-Series Analysis, Summarising and Analysing the Data, Spreadsheet

### **Unit 2 (Accounting For Costs, Material, Labour & Overheads and various methods of Costing)**

Accounting for Material Costs – Ordering, Receiving & Issuing Material ,Methods of Valuing Purchases and Issues (FIFO & Weighted Average Methods Only) – EOQ – Inventory Levels – Accounting for Labour – Direct & Indirect Cost of Labour – Remuneration Methods (Individual & Group) – Labour Turnover – Overtime & Idle Time – Labour Efficiency, Capacity & Volume Ratios

Accounting for Overheads – Allocation of Overheads to Production & Nonproduction Departments – Apportion Service Overheads to Production Departments - Production Overhead Absorption Rates – Entries for Accounting of Material, Labour & Overhead Costs. **Absorption, Marginal Costing & Cost Accounting Methods** - Concept of Contribution, Effects of Absorption and Marginal Costing, Reconcile the Profit – Advantages and Disadvantage of Absorption and Marginal Costing, Job and Batch Costing, Process Costing, Service and Operation Costing, Alternative Costing Principles

### **Unit 3: Budgeting, Capital Budgeting and DCF techniques**

Nature, Purpose, Budget Preparation-Cash Budget – Sale Budget-Master Budget – What If Analysis, Flexible Budgets, Budgetary Control and Reporting, Behavioural Aspect of Budgeting. **Capital Budgeting & Discounted Cash Flows** - Capital Investing- Capital and Revenue Expenditure, Compounding and Discounting, NPV, IRR, Annuity and Perpetuity – Cash Flow

*Learning Outcome: Identifying Importance of Capital Budgeting & Cash Flows.*

### **Unit 4 (Standard Costing)**



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Standard Costing Systems, Variance Calculations and Analysis, Sales Price and Volume, Material Price and Usage, Labour Rate and Efficiency, Fixed Overhead, Reconciliation of Budgeting Profit and Actual Profit

#### **Unit 5 (Performance Measurement and its application)**

Performance Measurement Overview, Cost Reduction and Volume Enhancement, Monitoring Performance and Reporting. **Application of Performance Measurement** - Calculate and Measure of Financial Measurement, Balance Scorecard, Economy, Efficiency and Effectiveness, Unit Costs, Resource's Utilization, Profitability, Quality of Service

#### **Course Outcomes:**

CO1: Discuss the Principles of Cost & Management Accounting.

CO2: Demonstrating to Application of Management Functions.

CO3: Explain the Application of Accounting Methods.

CO4: Describing the role of Decision Making & Control.

CO5: Illustrate techniques to various Business Contexts.

### **Marketing Management** **SUBJECT CODE: BCM621A**

**CREDITS: 3**

#### **Course Objective:**

To provide a holistic orientation of emerging marketing trends with the practical skills required to analyse consumer data, create marketing campaigns, develop digital / social media content and make successful marketing decisions and to equip students to be innovative, technically competent and think critically through experiential and student-centric teaching approach.

#### **Unit 1: Fundamentals of Marketing Management**

Meaning & Definition of marketing -Role of Marketing -Relationship of Marketing with other functional areas -Market Concepts -Product concept -Selling concept -Marketing concept -Societal marketing concept -Approaches to marketing management -Functions of marketing -Scope of marketing: goods, services, events, organizations, etc. -Emerging trends in marketing.

#### **Unit 2: Marketing Plan**

Marketing Environment: Concept -Macro-environmental forces -The changing marketing environment - Analyzing needs and trends in Macro-Environment: Economic Environment, Technical Environment,



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Political, Environment and Socio-cultural Environment. Introduction to The Marketing Plan –Definition – Nature –Objectives -Structure of The Marketing Plan -The Process of marketing plan -Critical elements of external and internal analysis of Marketing Plan -Implementation of Marketing Plan.

### **Unit 3: Marketing Mix**

Introduction to marketing mix -Marketing mix implementation: short term and long term tactics –Product: meaning, elements, product mix -Product mix strategies -Product line -Product lifecycle Product planning -New product development -Failure of new product -Product branding -Branding strategy and packaging – Pricing: Objectives -Factors influencing pricing policy -Methods of pricing -Pricing strategy. Physical Distribution: Meaning -Factors affecting channel selection -Types of marketing channels –Promotion: Meaning and significance of promotion – Personal selling & advertising (meaning only).

### **Unit 4: Buyer behavior**

Market Segmentation: Levels and patterns of market segmentation -Bases for segmenting markets -Market segmentation - Targeting - Product Positioning - Types and bases of positioning - Product Differentiation - Meaning of consumer, customer, consumer behaviour and buying motives -Factors influencing buyer behavior -Factors that influence consumer purchasing decisions -Buying process -Stages of the consumer buying behavior -Business to Business (B2B) buying process -Key factors influencing B2B purchasing decisions -Differences between Consumer goods and Industrial goods

### **Unit 5: Digital Marketing**

Introduction to Digital Marketing –Concept of Digital Marketing -Difference between traditional marketing and digital marketing -Trends and scenarios of the industry -Planning and Creating a Website -Search Engine Optimization (SEO), Search Engine Marketing (SEM), of Social Media Marketing, Blogging, Content Strategy, Email Marketing.

### **Course outcomes:**

CO1: To understand the role and importance of marketing

CO2: Develop a marketing plan to generate better sales and profits

CO3: Formulate the product and price mix based to serve consumer needs.

CO4: Identify the factors influencing consumer behavior and purchase decision

CO5: Outline the digital tools to develop marketing strategies for the new age consumer

### **Corporate Accounting**

**SUBJECT CODE: BCM623A**



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## **CREDITS: 4**

### **Course Objective:**

To understand the advanced concepts that are critical for the finalisation of accounts. Advanced accounting of areas like shares and debentures along with restructuring, amalgamation and group accounting will be few of the topics around which the syllabus will be concentrated around.

### **Unit 1: Accounting for shares & Debentures**

Accounting for Share Capital & Debentures, Issue, forfeiture and reissue of forfeited shares: concept & process of book building; Issue of rights and bonus shares; Buy back of shares; Redemption of preference shares. Issue of Debenture and Its classification. Different terms of issue of debenture. Redemption of debenture.

### **Unit 2: Profit Prior to Incorporation & Company Financial Statements**

Process on incorporation of a company. Difference between incorporation and commencement of a company. Accounting of incomes and expenses during Pre- and Post-Incorporation period. Basis of allocation and apportionment of income and expenses for the Pre and Post-Incorporation period. Meaning – Preparation of Financial Statements of Companies as per Schedule III of the Companies Act, 2013 (excluding Cash Flow statement) - Treatment of special items: Depreciation, Interest on Debentures, Provision for Tax, Dividends, Interim, Proposed, Corporate Dividend Tax, Unclaimed dividend.

### **Unit 3: Preparation and Presentation of Cash flow statement & Accounting for Amalgamation**

Meaning of Cash flow, Types of Cash flow, Estimation of cash flow using Direct and Indirect methods. (Simple problems only). Amalgamation of Companies, Concepts and accounting treatment as per relevant Indian Accounting Standard (excluding intercompany holdings).

### **Unit 4: Reconstruction of a company & Preparing group financial statements**

Internal reconstruction: concepts and accounting treatment excluding scheme of reconstruction. Accounts of Holding Companies/Parent Companies, Preparation of simple consolidated balance sheet and income statement with one subsidiary company

### **Unit 5: Valuation of shares & Accounting for banking companies**

Concept of Valuation. Need for Valuation. Special Factors affecting valuation of Shares. Methods of Valuation – Net Assets Method, Yield Basis Method, Fair Value Method. Accounts of Banking Companies, Difference between balance sheet of banking and non-banking companies; Prudential norms; Asset



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structure of a commercial bank; non-performing assets (NPA), Cash Flow Statement Concept of funds, Preparation of cash flow statement as per Indian Accounting Standard (IndAS)

**Course Outcomes:**

CO1: Illustrate the process of preparation of final accounts of a company as per Schedule III of the Companies Act 2013.

CO2: Develop understanding on the difference between commencement and incorporation of a company and the accounting treatment for transactions during the two phases.

CO3: To enable the students to develop awareness about mergers and acquisition.

CO4: Illustrate the accounting and reporting for group companies.

CO5: Understand and appreciate the need for share valuation and the various methods.

**Business Analytics using Excel**

**Subject Code : BCM 624A**

**CREDITS: 3**

**Course Objective:**

To comprehend and employ the use of MS Excel application for analysing, visualizing and reporting solutions based on business problems and tasks. This module aims at imparting hands-on training towards formulas and functions as well as how to use which formula for which particular problem scenario. The students will be equipped with the knowledge of various analytical procedures and tools which are available in MS Excel.

**Unit 1: Introduction**

Spreadsheet Applications, MS Excel Overview, Advantage and Disadvantages, Introduction to Buzzwords – Dashboards, Reports, Data Visualization, Business Intelligence, Decision Support Systems, Business Analytics, Data Visualization, Storytelling and its importance in Business Analytics, Visual Perception.

**Unit 2: Working with Data**

Excel Workbooks and Worksheets, Worksheet Cells, Selecting and Moving Cells, Excel Add-Ins, Data Formats, Formulas and Functions, Cell References, Range Names, Sorting Data, Querying Data, Importing Data, Data Filtering, Formatting, Highlighting, Aggregating, Operators.

**Unit 3: Data Cleaning**

Editing Imported Workbook, Delete Unnecessary Columns & Rows, Resizing Columns & Rows, Copying, Moving Worksheet Data, Replacing Data in Fields, Text Functions – Clean, Concatenate, Exact, Find, Fixed, Left, Len, Lower, Mid, Proper, Replace, Rept, Right, Search, Substitute, Text, Trim, Upper, Value Functions, Converting Text Function Formulas to Text, Data Validation.

**Unit 4: Excel Data Presentation**

Tables, Line and Bar Charts, Scatter Charts, Scatter Charts vs Line Charts, Correlation Analysis, Bullet Graphs, Pie Charts, Doughnut Charts, Surface Charts, Radar Charts, Interactive Charts and Dashboards, Conditional Formatting, Pivot Table, Customizing Pivot Table, Changing Layout, Renaming Fields,

  
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Formatting Numbers, Hiding or Showing Data, Sorting, Pivot Charts, Conditional Formatting with Pivot Tables.

### Unit 5: Advanced Excel

Counting Items in a Dataset, COUNT, COUNTA, COUNTBLANK, COUNTIFS, PERMUT & COMBIN, Descriptive Statistics, Mean, Mode and Median, AVEDEV, AVERAGE, AVERAGEA, AVERAGEIF & AVERAGEIFS, TRIMMEAN, MEDIAN, MODE, Finding Values, MAX, MAXA, MIN, MINA, LARGE, SMALL, FREQUENCY, PROB, Standard Deviation and Variance, STDEV, STDEV.S, STDEV.A, STDEV.P, VAR.S, VARA, VAR.P, What-If Analysis, Goal Seek & Solver.

#### Course outcomes:

CO 1: Describe and demonstrate the importance of MS Excel and its functionalities.

CO 2: Identify, interpret and explain the fundamentals concepts pertaining to working with data in MS Excel.

CO 3: Employ the use of various text functions and techniques for pre-processing and cleaning the data.

CO 4: Create and demonstrate the working of interactive dashboards and charts using MS Excel application.

CO 5: Classify different techniques and functions for descriptive statistics and advanced-excel.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M		M				M
CO2		M				M	
CO3	M		H				
CO4			H	M		M	
CO5		M					M

H = Highly Related; M = Medium; L = Low

#### References:

1. David Whigham, *Business Data Analysis using Excel*, Oxford.
2. Manisha Nigam, *Advanced Analytics with Excel*, BPB.
3. Alfred P. Rovai, *Statistical Fundamentals Using MS Excel*, Amazon.
4. Danielle Stein Fairhurst, *Using Excel for Business Analysis*, Wiley.
5. Gordon S. Linoff, *Data Analysis using SQL and Excel*, Wiley.
6. Dr. Renjini D., *Data Analysis for Business Decisions using Excel*, Bharti.

#### Professional Skills

Subject code: DEN002A

Credits: 3

#### Course Objectives

1. To enhance Professional competence in reading, writing, listening and speaking.
2. Switch the approach from providing information about the language to use the language.

  
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3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
6. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

**Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in professional scenario.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels as per the demand of the corporate culture

**Syllabus: Theory**

**UNIT 1 Professional Grooming and Professional Culture:**

Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management

**UNIT 2 Advanced Grammar:** Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents

**UNIT 3 Composition:**, Memo, Notice, Circular, Book Review, Research Article, Reports

**UNIT 4 Vocabulary Building:** Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms

**UNIT 5 Reading Comprehension:** Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction

**Syllabus: Lab**

**UNIT 1 Professional Grooming and Professional Culture**

Role plays and Activities on Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management

**UNIT 2 Advanced Grammar:** Exercise Sessions for Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents

**UNIT 3 Composition:**, Memo, Notice, Circular, Book Review, Research Article, Reports – Giving Assignments based on practical applications, Practice sessions on different topics

**UNIT 4 Vocabulary Building:** Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms- Activities related to the appropriate use of words

**UNIT 5 Reading Comprehension:** Practice Reading Unseen Paragraphs- Finding Suitable title, Summarizing, Analyzing, Finding new words etc

**Methodology for Evaluation**

1. Internal Assessment (Theory)

a) Home Assignments: One from each Unit : 15 Marks

b) In Semester Tests (Minimum two) : 30 Marks

c) Attendance : 05 Marks



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2. Term End (Theory) : 50 Marks
3. Internal Assessment (Lab)
- (a) Daily Performance in the Lab : 50 Marks
4. Term End (Lab) : 50 Marks

**Suggested Readings:**

1. Felix Eskey. Tech Talk, University of Michigan. 2005
2. Michael Swan. Practical English Usage, Oxford University Press. 2005
3. Anderson, Paul. Technical Communication: A Reader Centered Approach, V Edition, Harcourt, 2003.
4. Thampi, G. Balamohan. Meeting the World: Writings on Contemporary Issues. Pearson, 2013.
5. Lynch, Tony. Study Listening. New Delhi: CUP, 2008.
6. Kenneth, Anderson, Tony Lynch, Joan Mac Lean. Study Speaking. New Delhi: CUP, 2008.
7. Marks, Jonathan. English Pronunciation in Use. New Delhi: CUP, 2007.
8. Syamala, V. Effective English Communication For You (Functional Grammar, Oral and Written Communication): Emerald, 2002.

**Cultural Education II**  
**Subject Code: DIN002A**  
**Credits: 2**

**Objectives**

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

**Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to acknowledge and appreciate the richness of Indian Culture

CO2: Ability to represent the culture ethics in real life

**UNIT-I Holy Scriptures-II**

1. Bhagavad Gita and Life Management
2. Highlights of Indian Scriptures - Major Incidents and terms from various religious scriptures including Ramayana, Mahabharata, Guru Granth Sahib, Bible, Quran, Jain Scriptures, Bodhi Scriptures
3. Historicity of Ramayana and Mahabharata

**UNIT-II Society and Culture-II**


4. Indian Society: Its Strengths and Weaknesses
5. Health and Lifestyle related issues
6. Conservation of cultural heritage

**UNIT-III India in Progress-II**

7. Role & Position of Women in Indian Society- Rituals like Sati, Dakin, Kanyavadh, Pardah, Devdasi, Child Marriage, Measures of Women Empowerment including Education, Constitutional and other Rights
8. Indian Models of Economy, Business and Management

**UNIT-IV Great Indian Personalities-II**

9. Life and works of the Great People of Modern India- Raja Ram Mohan Roy, Swami Vivekananda, Madan Mohan Malviya, Ishwarchand VidyaSagar, Jyotiba Phule, Homi Bhabha, B.R. Ambedkar, Mahatma Gandhi, Chandra Shekhar Aazad, Abdul Hamid, Badshah Khan, Bhagat Singh, Ashfaqullah, Vir Sawarkar, Vir Banda Bahadur, Vir Haqiqat Rai, Subhash Chandra Bose, Mother Teresa, Jagdish Chandra Basu, JRD Tata, Ratan Tata, Dada Saheb Phalke, Major Dhyan Chand, A.P.J. Abdul Kalam, Kailash Satyarthi, Aruna Roy, Mahasweta Devi, Udaya Kumar, Narayan Murthy, Azim Premji



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\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by a committee of teachers.

**Suggested Reading:**

1. Glory of Indian Culture (English) Paperback by Giriraj Shah
2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies by Saroj Bala , Kulbhushan Mishra

**References**

<https://knowindia.gov.in/culture-and-heritage/lifestyle-values-and-beliefs.php>

**ENVIRONMENTAL STUDIES**

**SUBJECT CODE: DCH001A**

**CREDITS: 4**

**Objectives:**

Environmental studies deals with every issue that affects an organism. It is essentially a multidisciplinary approach that brings about an appreciation of our natural world and human impacts on its integrity. It is an applied science as it seeks practical answers to making human civilization sustainable on the earth's finite resources. Its components include biology, geology, chemistry, physics, engineering, sociology, health, anthropology, economics, statistics, computers and philosophy. As we look around at the area in which we live, we see that our surroundings were originally a natural landscape such as a forest, a river, a mountain, a desert, or a combination of these elements. Most of us live in landscapes that have been heavily modified by human beings, in villages, towns or cities. But even those of us who live in cities get our food supply from surrounding villages and these in turn are dependent on natural landscapes such as forests, grasslands, rivers, seashores, for resources such as water for agriculture, fuel wood, fodder, and fish.

The basic objective of this course is to provide basic understanding to the students with the nature and the environment.

**UNIT I**

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

**UNIT II**

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources. - Equitable use of resources for sustainable lifestyles.

  
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### UNIT III

Concept of an ecosystem- Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

### UNIT IV

Biodiversity and its Conservation

- ☐ Introduction-Definition: genetic, species and ecosystem diversity.
- ☐ Bio-geographical classification of India.
- ☐ Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- ☐ Biodiversity at global, National and local levels.
- ☐ India as a mega-diversity nation.
- ☐ Hot-spots of biodiversity.
- ☐ Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- ☐ Endangered and endemic species of India.
- ☐ Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

### UNIT V

Environmental Pollution:

Definition, Causes, effects and control measures of: -

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides

### UNIT-VI: Social Issues and the Environment

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.



- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act. - Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Public awareness.

#### **UNIT-7: Human Population and the Environment**

- Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare.
- Role of information Technology in Environment and human health.
- Case Studies.

#### **UNIT-8: Field Work (Practical).**

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

#### **Course outcomes(CO)**

- I CO1: It deals with every issue that affects the organization.
- II CO 2: To understand the multidisciplinary nature of environmental studies.
- III CO3: To understand about the renewable and non renewable resources.
- IV CO4: Knowing about the concept of the ecosystem.
- V CO5: To know impact of population on environment.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		H			M	M	
CO2			H		M	M	
CO3			M		H	L	L
CO4		M		H		M	L
CO5			L		M	L	

H = Highly Related; M = Medium L = Low

#### **Reference Books:**

1. Agarwal K.C. 2001 Environmental Biology, Nidi publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Map in Publishing Pvt. Ltd. Ahmedabad-380013, India, E-mail: Mapincenet, net.
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Clanderson Press Oxford.




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5. Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T. 2001, Environmental & Encyclopedia, Jaico Publ. House, Mumbai, 1196p
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press, 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay
10. Heywood, V.H & Watson, R. T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p
12. McKinney, M.L. & Schoeb, R.M. 1996. Environmental Science systems & solutions, Web enhanced edition 639p.
13. Mhaskar A.K. Matter Hazardous. Techno-Science Publications.
14. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co.
15. Odium, E.P. 1971. Fundamentals of Ecology, W.B.Saunders Co. USA. 574p
16. Rao M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
17. Sharma B.K., 2001. Environmental Chemistry Goel Publ. House, Meerut.
18. Townsend C., Harper J., and Michael Begon, Essentials of Ecology, Blackwell Science
19. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and standards, Vol I and II, Enviro Media
20. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications
21. Wagner K.D., 1998. Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p

<b>THIRD SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BCM 625A	Banking & Financial Services	3	-	-	3	C
BCM 626A	E-Business & Cyber Laws	3	-	-	3	ID
BCM 627A	Research Methodology	4		-	4	F
BCM 647A	<b>Introduction to Securities &amp; Investments</b>	3	1	-	4	S
BCM 648A	<b>Global Securities Operations</b>	3	1	-	4	S
***	Open Elective	3	-	-	3	G

  
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DEN003A	Life Skills - 1 (Personality Development)	2	-	-	2	G
DIN003A	Value Education - 1	1	-	-	1	G
	<b>TOTAL</b>	<b>22</b>	<b>2</b>		<b>24</b>	

### **B.Com\_Financial Marketing (IFM)**

#### **III SEMESTER**

#### **Banking & Financial Services**

**SUBJECT CODE: BCM625A**

**CREDITS: 3**

#### **Course Objective:**

Banking & Financial Services module introduces the learners to the world of financial services and facilitates an understanding of the various financial services. The learners will be able to apply financial concepts, theories, and tools and will be in a position to evaluate the environment related to financial services. This module provides insights on the concepts of merchant banking, issue of securities, leasing, factoring, credit rating, etc. Additionally, it equips learners with the knowledge of the financial markets such as money markets and capital markets

#### **Module 1: Indian Banking System**

Introduction to banking: Nature of the Indian banking system, Banking concepts: Retail Banking, Corporate banking, wholesale banking, banking system in India, Relationship between banker and customer, types of Deposit account, Banking Sector reforms.

#### **Module 2: Electronic Banking**

Electronic Banking: Meaning and benefits of E Banking, Innovations in banking due to technology, Automated Teller Machines, Telebanking, Internet Banking, Mobile Banking, Electronic Funds Transfer, ECS, NEFT, RTGS, UPI, Risk Management of E-Banking.

#### **Module 3: Negotiable Instruments and Customer Relationship**


Meaning and characteristics of Negotiable instrument: Cheques, Bills of Exchange and Promissory notes. Legal Framework of Banker-Customer Relationship, Bankers Disclosure, Termination of relationship, Bankers Right of Lien and set-off.

#### **Module 4: Financial Service management**

Introduction to financial services, financial services, concept, objectives, Financial services market, concept and constituents, Financial services sector problems, Financial services environment, forces and players in financial markets. Financial Services: Leasing, Merchant banking, Hire purchase and installment system, Consumer finance, Credit cards, Credit Mutual Fund, Factoring, Securitization of debts, Treasury management, Depositories and Pledge

#### **Module 5: Money market and Stock exchange**

Money market and stock exchange, Money market –characteristics and functions, money market instruments: call money, Treasury bills, certificates of deposits, commercial bills, trade bills, Indian capital market, constituents, New financial institutions and instruments, Investor protection.



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JECRC University, Jaipur-303905

Stock exchange: functions, services, features and role. Stock exchange traders, Regulations of stock exchanges, Depository and SEBI functions and working.

**Course Outcomes:**

CO1: Acquaint the students with the knowledge of various banking concepts specifically, merchant banking and public issue management

CO2: Understand the fundamentals of financial services and financial markets.

CO3: Obtain an overview of money markets and stock exchange functioning.

CO4: Appreciate the relevance of leasing, factoring, and securitization to business

CO5: Understand the fundamentals of venture capital, credit rating, and pension fund.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Desai Vasant Indian Banking –Nature and problems, Sultan Chand and Sons.
2. Khan, M.Y., Financial Services, Tata McGraw Hill, New Delhi.

**Reference Books:**

1. Bhole, L.M., Financial Institutions and Markets: Structure, Growth and Innovations, Tata McGraw Hill, New Delhi
2. Siddaiah, T., Financial Services, Pearson Education, New Delhi

**B.Com\_Financial Marketing (IFM)**

**III SEMESTER**

**E-Business & Cyber Laws**

**SUBJECT CODE: BCM625A**

**CREDITS: 3**

**Course Objective:**

The objective of the course is to equip the students with the emerging trends in business. It further introduces the students with the impact of information technology on various aspects of business and also helps them familiarize with cyber world and cyber regulations

**Module 1: E-Business**



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E-business vs. E-commerce, transformation of business structure, Trends: E-Business Models, E-business Design: Knowledge building, capacity evaluation, design steps.

### **Module 2: E-Marketing**

Traditional Marketing, Identifying Web presence Goals – Browsing Behaviour Model, Online Marketing, E-advertising – Internet Marketing Trends – E branding– E marketing strategies. Concept and Definition of E-Retailing - Different Models of E-Retailing, Model for Web based Information System in E-Retailing; Key Technologies of B2C Model in E-Retailing – EPOS System, Functions of an EPOS system

### **Module 3: E-Business Technologies**

Customer relationship management (CRM) - Organizing around the customer; CRM design and infrastructure - CRM Trends; Selling-chain management - Need for selling-chain management - Order acquisition process – Trends, Enterprise resource planning (ERP) – Integration of information technology systems - Forces influencing ERP – Implementation strategies - ERP trends; Supply chain Management - Internet-enabled SCM - Supply-chain planning and execution - SCM issues and trends; E-procurement - Transformation to web based technology - Cost savings and return of investment - Buyer focus - Seller focus - Trends.

### **Module 4: Cyber World**

Cyber space – cybercrimes – types: cyber stalking, forgery and fraud, crime related to IPR (copyright issues, trademark issues, software patenting issues), cyber terrorism, & computer vandalism.

### **Module 5: Cyber Regulations**

Cyber Law, scope of cyber laws - e-commerce, online contracts, IPRs, E-taxation, e-governance and cybercrimes, issues relating to investigation, cyber forensic, relevant provisions under IT Act 2000

### **Course Outcomes:**

CO1: Understand the concepts and workings of E-Business

CO2: Understand the use and application of E-Marketing in E-Business


CO3: Understand different E-Technologies, their application, and drawbacks

CO4: Understand and learn about the Cyber World – opportunities and threats

CO5: Learn about various Cyber regulations and related laws application to E-business environments.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							

  
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CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. E-business, Dr. Ravi Kalakota, Pearson Education Asia
2. E-Business and Commerce, Brahm Canzer, Dreamtech press, New Delhi
3. E-Business essentials, Rajat Chatterjee, Global India Publication, New Delhi

**Reference Books:**

1. E-Business essentials, Matt Haig, Kojan Page India Ltd
2. IT Act 2000, IT Amendment Bill 2006, IT Amendment Bill 2008
3. Ajit Prakashan's Information Technology Act, 2000 (Cyber Law) (IT Act 2000: Bare Acts with Short Notes)

**B.Com\_Financial Marketing (IFM)**

**III SEMESTER**

**Research Methodology**

**SUBJECT CODE: BCM627A**

**CREDITS: 4**

**Course Objective:**

This module enables learners to develop the basic principles of research methods. The learners focus how to do research, with an emphasis on student-centered activities and problem solving. Learners will develop insights the key concepts as the scientific method; operationalizing constructs; independent and dependent variables, data types and ways of measurement, confounding variables experimental and non-experimental design questionnaire construction; developing and testing hypotheses; descriptive statistics and describing data graphically; and the ethics of research.

**Module 1: Research Formulation and Design**

Motivation and objectives-Research methods and methodology. Types of research Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research. Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

**Module 2: Data Collection and Analysis**



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Accepts of method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis strategies and tools, data analysis with statically package (Sigma STAT, SPSS for student t-test, ANOVA, etc.), hypothesis testing.

### **Module 3: Statistical Softwares**

Computer and its role in research, Use of statistical software SPSS, GRETL etc. in research. Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.

### **Module 4: Research Ethics and Scholarly Publishing**

Ethics-ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing- IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

### **Module 5: Interpretation and Report Writing**

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of writing Research Report Precautions for writing Research Reports, Conclusions.

### **Course Outcomes:**

CO1: Understand and apply the fundamental principles of the research process as they relate to answering research questions.

CO2: Describe the appropriate use of basic research techniques and research design as they apply to answering different question.

CO3: Explain the critically analyses information particularly in relation to identifying causal and spurious relations in research claims.

CO4: Identify appropriate techniques underlying different research approaches

CO5: Understand the effectively interpret and communicate research findings

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low



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**Textbooks:**

1. Kothari, C.R., 2019. Research Methodology: Methods and Techniques. New Age International.
2. Sinha, S.C. and Dhiman, A.K., 2019. Research Methodology, Ess Publications. 2 volumes.

**Reference Books:**

1. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
2. Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing.

**B.Com\_Financial Marketing (IFM)****III SEMESTER****Introduction to Securities & Investment****SUBJECT CODE: BCM647A****CREDITS: 4****Course Objective:**

The course objective is to provide learners with a basic introduction to the financial services industry with a focus on investments. Imparting the knowledge and understanding of financial assets and markets, instruments in the financial markets.

**Module 1: Introduction to Investments and Securities**

Understanding the causes and needs of investments and defining the term interest, understanding of stock exchange and national stock exchange, and explaining the role of retail banks, savings institutions, pension funds, insurance companies, fund managers, and stockbrokers.

**Module 2: Financial Securities and participants in the securities market**

Understanding the function of the securities market, characteristics of fixed-term and instant access deposit accounts, and introduction to crypto-currencies. Understanding the difference between primary market and secondary market, understanding the terms initial public offer and further public offer, prospectus, American Depository Receipts, and Global Depository Receipts.

**Module 3: Equities, Fixed Income securities, and other financial products**

Understanding the difference between a public company and a private company. Features of ordinary and preference shares, understanding of price risk, liquidity risk, and issuer's risk. Understanding of bonus shares, rights shares, and buybacks. Understanding the characteristics and terminology of coupon, redemption, nominal value, and yields. Understanding the difference between government bonds and corporate bonds. Introduction to mutual funds.

**Module 4: Derivatives**

Understanding the uses and application of derivatives, understanding the function and function of futures, understanding the terms exercise price, and option premium, understanding the definition and functions of options, and understanding the call and put options. Understanding the commodity derivatives.

  
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### Module 5: Financial Market Regulators and Depositories

Understanding the need of regulators in the securities market, understanding who regulates the securities market. Understanding the Securities Exchange Board of India and the roles of the Securities Exchange Board of India. Understand the role of the depository and understand the term International Securities Number.

#### Course Outcomes:

CO1: Introduction to financial securities and the basic terminologies.

CO2: Analyzing the nature and scope of the financial assets and participants in financial markets.

CO3: Analyzing the nature and scope of equity, fixed income securities, and other financial instruments.

CO4: Understand the nature and scope of derivatives and basic terminologies.

CO5: Understanding the financial services regulators and introduction to depositories.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

#### Textbooks:

1. Introduction to Securities and Investments by Kevin Rothwell, Chartered Institute for Securities, and Investment.
2. Introduction to Securities and Investments by BPP Learning Media Ltd.
3. Introduction to Investments by Rosemary Cunningham

#### Reference Books:

1. Financial Markets Institutions and Services by Dr. Vinod Kumar, Taxmann Publications
2. Forex Trading for Beginners by Mark Lowe
3. ACCA Financial Management by Kaplan Publications.

#### B.Com\_Financial Marketing (IFM) III SEMESTER

  
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**Global Securities Operations**  
**SUBJECT CODE: BCM648A**  
**CREDITS: 4**

**Course objective:**

The course gives an overview of global securities, with a focus on the key industry participants, settlement features, supplementary investment services, taxes, and risk factors. The purpose of the course is to verify that learners will have a fundamental grasp of global securities services and administration as it relates to the needs of operations.

**Module 1: Securities**

Definition of Securities Investment - Shares (Equities) - Debt Instruments - Warrants - Depositary Receipts (DRs) - Collective Investment Vehicles - Securities Identification Numbers - Issue Methods in the UK Principles of Trading - Exchange-Traded and Over-The-Counter (OTC) Transactions - Order-Driven and Quote-Driven Markets - Programme and Algorithmic Trading - Multi-Listed Shares - Settlement Periods for Equities and Bonds in the Selected Markets.

**Module 2: Main Industry Participants & settlement characteristics**

Definition of participants - Investment Administration and Operations: Custody - Central Securities Depositories (CSDs) and International Central Securities Depositories (ICSDs) - Straight-Through Processing (STP) - Society for Worldwide Interbank Financial Telecommunication (SWIFT)- The Trade Cycle - Pre-Settlement - Settlement - Failed Settlement.

**Module 3: Other Investor Services**

Definition of safekeeping - Substantial Shareholder Reporting - The Nominee Concept - Custodian Fee Schedules Corporate Actions - Cash Management - Securities Lending

**Module 4: Aspects of Taxation**

Definition of tax Credit on Dividends - Tax Treatment of Bond Interest - Calculating Capital Gains and Losses - Tax Treatment of Discount Securities - Withholding Tax (WHT) and Double Taxation Treaties (DTTs)- Transaction Taxes

**Module 5: Risk**

Definition of risk - Risk Reviews of Market Infrastructure and Custodian - Sub-Networks - Global Custody Risks - Reporting on Internal Control Environments - Shareholder Limits and Restrictions on Foreign Investment - Mitigating Risk Through Reconciliation.

**Course outcomes:**

CO1: Know the concept of security markets and its functions.

CO2: Analyse different secondary market operations and risk management practices.

CO3: Develop a practical approach and understanding towards clearing and settlement processes in the security market.

CO4: Learn and Analyse the working of participants and their role in global securities operations.

CO5: Develop an idea of inherent risks in stock market and securities.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Simmons Michael - Securities Operations - published by Michael Simmons publishers
2. Currie Bob - Global Securities Operations – published by Securities & Investment Institute
3. Robert McCrie - Security Operations Management – Ebook
4. Jerry O'Connell - Global Securities Operations - Neale Steiniger Traders
5. Michael Simmon - Securities Operations: A Guide to Trade and Position Management - published by Wiley

**Reference books:**

1. Global Securities Operation – Learning media- Michael john
2. Introduction to Security- Robert Fischer, Edward Halibozek, David Walters- EBook
3. Security Operations Management- Author: Robert McCrie – David

**Life Skills 1 (Personality Development)**

**SUBJECT CODE: DEN003A**

**CREDITS: 2**

**THEORY**

**UNIT 1**



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Basics of Organizational Communication: Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture

## **UNIT 2**

Basic Writing Skills: Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration

## **UNIT 3**

Composition:, Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,

## **UNIT 4**

Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms

## **UNIT 5**

Professional and Technical Communication : Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

## **LAB**

### **UNIT 1**

Basics of Organizational Communication: Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time management, Following Deadlines etc

### **UNIT 2**

Write Dialogue from the different contexts of corporate culture: Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc

### **UNIT 3**

Composition:, Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting Redrafting, Proof Reading, Editing etc

### **UNIT 4**



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Vocabulary Building: Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc

## **UNIT 5**

Professional and Technical Communication: Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making

### **Value Education 1**

**SUBJECT CODE: DIN003A**

**CREDITS: 1**

#### **Lessons from the Ramayana**

Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

#### **Lessons from the Mahabharata**

Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

#### **Lessons from the Upanishads**

Introduction to the Upanishads: Sruti versus Smriti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, Satyakama Jabala, Aruni, Shvetaketu.

#### **Message of the Bhagavad Gita**

Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War – The anguish of Arjuna – Counsel by Sri. Krishna – Key teachings of the Bhagavad Gita – Karma Yoga, Jnana Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

#### **Life and Message of Swami Vivekananda**



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Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji's life.

### **Life and Teachings of Spiritual Masters**

India Sri Rama, Sri Krishna, Sri Buddha, Adi Shankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda.

### **Insights into Indian Arts and Literature**

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

<b>FOURTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BCM 649A	Operational Risk	3		-	3	S
BCM 650A	Financial Accounting for Capital Accounts	3	1	-	4	S
BCM 632A	Audit and Assurance	3	1	-	4	C
BCM 651A	MS Excel & Statistics for Capital Markets	4		-	4	S
BCM 634A	E-Accounting	3		-	3	C
BCM 635A	Logistics and Supply Chain Management	3	-	-	3	ID
***	Open Elective	3	-	-	3	G
DEN004A	Life Skills - 2 (Aptitude)	2	-	-	2	G
DIN004A	Value Education - 2	1	-	-	1	G
BCM657A	<b>Commodities &amp; Currency Derivatives</b>	3	1	-	4	S
	<b>TOTAL</b>	<b>28</b>	<b>3</b>		<b>31</b>	

### **B.Com\_Financial Marketing (IFM)**

#### **IV SEMESTER**

#### **Operational Risk**

**SUBJECT CODE: BCM649A**

**CREDITS: 3**

#### **Course Objective:**

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The aim of this course is to provide students with an introduction to operational risk management, the tools used in the process, and how operational risk management fits into the wider risk management of the firm.

### **Module 1: Fundamentals of operational risk management**

Definition of operational risk – the common types of risk – the relationship between operational risk and other types of risks – the different manifestations of operational risk within a firm – the relationship between cause, event, and impact – the key components of the operational risk framework and governance structures.

### **Module 2: The nature and role of governance in the management of operational risk**

The components of a risk governance framework interact - the roles and responsibilities of the operational risk function - the accountabilities, roles, and responsibilities in the management of operational risk - the needs and expectations of external stakeholders in relation to operational risk - the nature of risk appetite - the elements of an effective operational risk appetite framework - the purpose and content of an operational risk appetite statement - the nature and uses of qualitative and quantitative expressions of operational risk appetite - Differences between risk appetite, risk tolerance and risk capacity in relation to operational risk appetite - the process for setting operational risk appetite - the process for monitoring and reporting operational risk in relation to appetite - the role of operational risk appetite in risk culture.

### **Module 3: The nature and role of risk and control self-assessments in the assessment and management of operational risk**

The nature of risk and control self-assessments in the management of operational risk - the benefits of risk and control self-assessments - the role of risk and control self-assessments in identifying operational risk - the advantages and disadvantages of different methods for undertaking risk and control self-assessments - the concepts of likelihood and impact in assessing operational risk and controls - the nature and role of controls - the roles and relationships between risk owners and control owners - common methods of reporting risk and control self-assessments - role and purpose of different forms of operational risk indicators - the nature and use of operational risk indicators - the challenges surrounding operational risk indicators.

### **Module 4: The role of events and losses in the management of operational risk**

Types of events – the attributes of event data and their use - the importance of root cause analysis - the role and implication of thresholds in relation to reporting event data – the issues, roles and responsibilities in relation to reporting event data - the role and implication of thresholds in relation to reporting event data - the uses and limitations of internal event data - the benefits and limitations of sources of external loss event data - the uses of external loss event data.

### **Module 5: The role of regulation in the development and management of operational risk**

The key regulatory influences on operational risk – the evolving approaches to regulation and supervision - regulatory interest in specific operational risk categories - the capital adequacy implications of operational risk management.

### **Course Outcomes:**

CO1: The students will be able to explain the role of operational risk management.

CO2: The students will be able to understand operational risk governance arrangements.

  
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CO3: The students will be able to understand and know how to use the key operational risk tools.  
CO4: The students will get an understanding of the role of events and losses in the management of operational risk.

CO5: The student will be able to describe the impact of regulation on operational risk.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Philippa X. Girling; Operational Risk Management: A Complete Guide to a Successful Operational Risk Framework; Wiley.
2. Simon Ashby; Fundamentals of Operational Risk Management; Kogan Page.
3. Kannan Subramanian; Process Based Approach to Operational Risk Management; Taxmann.

**Reference Books:**

1. Claudio Franzetti; Operational Risk Modelling and Management; Chapman and Hall.
2. Ariane Chapelle; Operational Risk Management; John Wiley & Sons Inc.
3. F.L.Bascunan; Operational Risk Management; Global Vision Publishing House.

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**IV SEMESTER**

**Financial Accounting for Capital Accounts**

**SUBJECT CODE: BCM650A**

**CREDITS: 4**

**Course Objective:**

The objective is to understand the financial accounting concepts, transactions and to prepare financial statements. Knowledge of shares accounting and regulations governing the listed companies.

**Module 1: Introduction to Financial Accounting and Accounting Transactions**

Meaning and definition, objectives and functions of accounting, users of accounting information, accounting principles, accounting standards, limitations of accounting. Rules of debit and credit,

  
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accounting period / cycle, journal entries, journal and ledgers, rules of posting, sub divisions of journal, trial balance

### **Module 2: Single Entry/Double Entry Accounting System and how to account for business income**

Definitions of single entry and double entry, conversion of single entry into double entry, purpose for conversion, preparing cashbooks, total debtors accounts, total creditors accounts, bills receivable & bills payable accounts. Classification of income / receipts, measurement of business income, concepts of revenue, revenue recognition principles, recognition of expenditure, concept of inventories and accounting inventories, inventory valuation

### **Module 3: Depreciation accounting and Final Accounts**

Depreciation concepts, depreciation accounting, different types of depreciation, purpose of depreciation in accounting, depreciation/depletion/amortization concepts, depreciation accounting as per accounting standards. Concept of final accounts, manufacturing account, trading account, profit and loss account, balance sheet, adjustment entries, concepts of errors, suspense accounts

### **Module 4: Accounting for shares and Listed Companies Accounting procedure along with accounting terminologies**

Different types of issue of shares, forfeiture of shares, reissue of shares, issue of bonus shares, effect of corporate actions – stock split, bonus, rights, buyback of shares, redemption of preference shares. Concepts of unlisted and listed companies, private limited v/s public limited, procedures of listing company accounting, SEBI regulations for listed companies accounting and disclosures. Concepts of EBIT, EBITDA, operating expenses, operating profits, non-operating expenses, interest accounting, profit before taxes, profit after taxes, accounting reserves and surplus, current assets, non-current assets, current liabilities, non-current liabilities, fixed assets, contingent liabilities

### **Module 5: Income Statements, cash flow statement and financial ratios**

Quarterly, half-yearly, annual account statements; items to be accounted and disclosed; consolidated and standalone income statements; concepts of other income; distinguishing other income from regular income. Concepts of cash flow, cash flow from operating activities, cash flow from investing activities, cash flow from financing activities, concepts of basic and diluted EPS, book value, operating profit margins, net profit margins, calculations of return on equity / return on capital employed / return on assets, concepts of price to book, price to cash, price to sales, concepts of liquidity ratios and solvency ratios, concepts of turnover ratios – asset turnover ratio / inventory turnover ratio

### **Course Outcomes:**


CO1: Define and recall the meaning of financial accounting

CO2: Analyse the basic accounting terms and entries important for companies

CO3: Evaluate various methods of entries, adjustments and accounting

CO4: Analyse financial statements

CO5: Evaluate and appraise important accounting procedures for listed companies on stock exchanges



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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Financial Accounting – By S.M Shukla
2. Financial Accounting - By P.C Tulsian
3. Financial Accounting – By R.P Trivedi, Manoj Trivedi

**Reference Books:**

1. Financial accounting – By S.N Maheshwari and S.K Maheshwari
2. Financial accounting - By B.K Goyal
3. Corporate Accounting – By B.S Raman

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**IV SEMESTER**

**Audit and Assurance**

**SUBJECT CODE: BCM632A**

**CREDITS: 4**

**Course Objective:**

The Objective of the paper is to develop the knowledge and skills required to carry out an audit and assurance assignment. It provides the working knowledge of the audit process and standards of auditing. It also covers the process of testing internal controls.

**Module 1: Audit framework & regulation**

Concept of audit & assurance, professional ethics of an auditor, scope of internal & external audit, governance & audit, Ethical threats & Safeguards, discuss the importance and purpose of engagement letters and their contents

**Module 2: Audit planning & risk assessment**

  
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Planning audit assignments, identify and explain the need for, benefits of and importance of planning an audit, understanding the entity & its environment, assessing audit risk, fraud risk, interim audit, audit documentation, working papers and audit evidence

### **Module 3: Internal control & audit tests**

Internal control system assessment, control environment, risk assessment procedures, monitoring of controls, evaluation of internal control system by auditor, test of controls, communication on internal controls, explain how auditors record internal control systems including the use of narrative notes, flowcharts and questionnaires

### **Module 4: Audit evidence & reporting**

Techniques of collecting audit evidence, quality & quantity of audit evidence, audit sampling, explain the use of automated tools and techniques, review procedures including subsequent events, going concern, written representations, auditor's report contents & opinion, discuss the need for auditors to communicate with those charged with governance.

### **Module 5: Audit of specific items**

Audit of receivables, inventory, payables & accruals, bank & cash, tangible & intangible assets, share capital & reserves, directors' remuneration, details of audit checks for these items and reporting thereof, use of management representation

### **Course Outcomes:**

CO1: Explain the concept of audit & assurance, the functions of audit, ethics and professional conduct

CO 2: Demonstrate how the auditor obtains and accepts audit assignments, assesses audit risks

CO 3: Describe and evaluate internal controls, techniques and audit tests, including IT systems to identify and communicate control risks and their potential consequences

CO 4: Describe the way of gathering & managing audit evidence and review and reporting

CO 5: Managing the audit procedure for specific items

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

### **Textbooks:**



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1. ACCA Study Material 2022 of Kaplan, BPP& Beckers
2. Auditing & Attestation – Published by Wiley India Private Ltd

**Reference Books:**

1. Saxena, Reddy & Appannaish: A Text of Auditing, Himalayan Publishing House.
2. S.K Basu: Auditing Principles & Techniques, Pearson Education Student's handbook on Advanced Auditing – by Authors CA G. Sekar & CA B. Sarvana Prasath

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**IV SEMESTER**

**MS Excel & Statistics for Capital Markets**

**SUBJECT CODE: BCM651A**

**CREDITS:4**

**Course objective:**

This course will provide course participants with knowledge of the basics of Microsoft Excel. Participants will learn how to navigate the program, input and format data, write formulas and create charts. Participants will become much more productive by learning to effectively organize data, set up spreadsheets, and copy formulas for efficiency. Many exercises will be provided to help reinforce concepts.

**Module 1: Introduction to MS Excel Functions**

Basics of Excel functions - introduction to shortcuts, formatting, functions, correlations, interface, tabs & ribbons, navigation, buttons and save functions - Entering data, introduction to fonts, fills and alignments, cut & paste and special paste functions- undo and redo functions-replacing a value-cell styles-inserting comments-conditional formatting

**Module 2: Numbers Formatting and Managing Worksheets**

Currency formatting-format painter-date formatting-custom and special formats - Naming & moving worksheets-page breaks-inserting worksheets-adding/deleting/hiding worksheets-grouping worksheets

**Module 3: Formulas and Modifying Functions**

Creating formulas-understanding how to use fx-auto sum, calculation options-common formulas-searching and copying formulas-relative and absolute references-Inserting / deleting columns and rows-inserting and deleting cells-inserting multiple columns and rows, modifying cell width and height-hiding and unhiding functions.

**Module 4: Lookups, Conditional Logics and Graphs, Charts & Financial Functions**

VLOOKUP, VLOOKUP exact match, HLOOKUP, HLOOKUP exact match, sums, averages, max, min, sqrt, sumif, countif, averageif, measure of central tendency, dispersion, correlation, regression functions - PV-FV-PMT-NPER-pivot tables-filters-chart styles-layouts-add labels-axis options-chart titles-legends and data labels.

**Module 5: Referencing Formulas, Data Tools and statistics for Financial Markets**

Multiple sheet referencing, consolidating data, tracing the precedents and dependents, using watch window, data validation methods, text to columns, goal seek, scenario manager, removing duplicates-drop-down list-Statistical averages-arithmetic mean-geometric mean, medians-mean deviation-coefficient of variance-probability theory-sampling-hypothesis testing methods-basics



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of ANOVA-time value of money-CAGR calculations-absolute returns, simple and compounded returns calculations.

### Course Outcomes

CO1: Analyse the elements and process of MS Excel

CO2: Examine various kinds of MS Excel functions

CO3: Evaluate the utility of MS Excel across various research and analysis requirements

CO4: Develop various formats and measure the outcomes

CO5: Effective use of statistical skills required in financial markets across stock market, mutual funds, insurance and personal finance areas.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

### Textbooks:

1. Vijay Gupta - Financial analysis using excel – published by VJ Books Inc. Canada.
2. Timothy Mayes - Financial Analysis with Microsoft Excel – published by South-Western College Publishing.
3. Franke Jurgen - Statistics of Financial Markets – published by Springer Nature Switzerland AG
4. Danielle Stein Fairhurst - Financial Modeling in Excel – published by Wiley India.
5. Pitabas Mohanty - Spreadsheet Skills for Finance Professionals – published by Taxmann's publications.
6. William Rentz - Financial Mathematics with Ms Excel: Time Value of Money – published by Createspace Independent Publishing Platform.

### Reference books:

1. L. Winston Wayne - Data analytics and business model – published by PHI Learning Pvt. Ltd.
2. Shmuel Oluwa - Hands-On Financial Modeling with Microsoft Excel –published by Shulph publications
3. Excel Formulas Bible – published by Career plus academy

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**IV SEMESTER**  
**E-Accounting**  
**SUBJECT CODE: BCM634A**  
**CREDITS: 3**

**Course Objective:**

The Objective is to provide the understanding of the digital or computerized accounting system, Students will explore performance, liquid assets, inventories, fixed assets, intangible assets, long-term obligations, investments, equity, and cash flows using different kind of software. conceptual and practical knowledge of E-Accounting that uses database system resources.

**Module 1: Computerized accounting and accounting database sources**

Understand the digital mode used for data feed, basics of Computerized accounting, Concepts of Accounting groups, Hierarchy of accounts, Codification in accounting. Accounting package - Setting up an accounting entity, Creation of groups and accounts, accounting standards.

**Module 2: Computerized financial accounting**

Understand the role of accountants in Designing and creating vouchers, Data Entry operations using the vouchers, Processing for reports to prepare ledger accounts, trial balance and balance sheet, Preparation of different formats and usage of different file types for report uploading and filing.

**Module 3: Digital accounting methods**

Understand the fundamental functions of Identifying and appreciating the data content in accounting transactions; overview of database concepts, ER model; creating and implementing RDM for Financial Accounting; SQL to retrieve data and generate accounting information, Analyzing forecasts, budgeting & budgetary control.

**Module 4: Reporting Analysis**

Analyzing and maintaining Accounting reports to appreciate reliability of information, Identifying accounting, information and appropriate queries, Forming and executing the SQL, Generating Accounting information for a report, Reports for expenditure analysis, tracking incomes and managing accounts.

**Module 5: Elements of Computerized accounting reporting**

Understanding the Creation of data table defining relationships and constraints, Designing Accounting Vouchers, Designing Accounting Reports, designing accounting reports in the form of Journal book, Cash book, Subsidiary books, Ledger, Trial balance, Profit & Loss account, Balance sheet, fund-flow statements.

**Course Outcomes:**

CO1: This course introduces the students with the understanding about the Computerized accounting performed in the real time scenarios.

CO2: The students will learn the accounting process applied in the preparation of the financial reports.

CO3: The students will get a sound understanding of the data base system used or maintained in the business for accounting and its procedures of recording.

  
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CO4: The student will get a deep analysis of the various accounting skills that is used by the professional accountants.

CO5: The student will understand the impact of IT systems and financial systems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. CA Roshan Iodha, *Computerized accounting system & e -filing*, Law points, 2021
2. M. Hanif and A. Mukherjee, *Modern Accountancy*, McGraw H.
3. Pankaj Srivastava, *E-Accounting (theory & practice)*
4. Taxman's , *cracker for principles & practice of Accounting*

**Reference Books:**

1. Michael E. Gerber, *The E-myth Accountant*.
2. Dr. Arjun Das and Dr. Vishal Saxena, *Accounting Theory and practice*, Navyug Susan Drake, *Practical guide to Finance & Accounting*.

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**IV SEMESTER**

**Logistics and Supply Chain Management**

**SUBJECT CODE: BCM635A**

**CREDITS: 3**

**Course Objective:**

The course provides knowledge about implementing, controlling, and planning the efficient flow of goods from the supplier to the customers. The course imparts students with an in-depth understanding of the functions and contributions of supply chain management, the concept of logistics management, information systems in logistics, warehousing, and logistics administration.

**Module 1: Overview of logistics and its impact on customer value**

Nature and concepts – the evolution of logistics concept – logistical mission and strategic issues – logistics in India – the growing importance of logistics management – logistical competitive advantage – strategic logistics planning process – components of logistics management – functions

  
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of logistics management - The marketing and logistics interface - delivering customer value – customer service and customer retention - the impact of running out-of-stock - market-driven supply chains - defining customer service objectives - setting customer service priorities - setting service standards - going to market- distribution channels are value delivery system - innovation in the distribution channel - the omni-channel revolution - omni-channel retailing.

### **Module 2: Overview of supply chain management**

Introduction - value chain - functions and contributions - supply chain effectiveness and Indian infrastructure – the framework for supply chain solution - outsourcing and 3PLs - fourth-party logistics (4PLs) - supply chain relationships - conflict resolution strategies for harmonious relationships – the significance of supply chain in building competitive advantage.

### **Module 3: Elements of logistics & supply chain management**

Introduction - positioning of information in logistics and supply chain management - logistics information system (LIS) - operational logistical information system - emerging technologies in logistics and supply chain management.

### **Module 4: Warehousing and distribution centres**

Introduction - concepts of warehousing - types of warehouse - functions of warehousing - warehousing strategy - warehouse design - operational mechanism of warehouse - the omni-channel revolution - omni-channel retailing.

### **Module 5: Creating a sustainable supply chain & the future**

Introduction - evolutionary trends of logistics and supply chain organization - basic organization principles - factors influencing organizational structure - the triple bottom line, greenhouse gasses, and the supply chain - reducing the transport-intensity of supply chains - peak oil - beyond the carbon footprint - reduce, reuse, recycle - the impact of congestion - the supply chain of the future - emerging mega-trends - shifting centres of gravity - the multi-channel revolution - seeking structural flexibility - latest vision- waste in the supply chain - the new industrial revolution - seven major business transformations - the implications for tomorrow's logistics managers

### **Course Outcomes:**

CO1: To obtain an understanding of the basics of logistics and supply chain management.

CO2: To recognize the impact of logistics on creating customer value..

CO3: To obtain an understanding of the impact of technology in logistics and supply chain management.

CO4: To learn the concepts of warehousing and distribution centers.

CO5: To appreciate the significance of creating a sustainable supply chain.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							



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CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Martin Christopher; Logistics and Supply Chain Management -Fifth edition; Pearson Education Limited, 2016.
2. Saikumari V. – S. Purushothaman; Logistics and Supply Chain Management; Sultan Chand & Sons, 2022.
3. Logistics and Supply Chain Management -A complete guide; The Art of Science, 2021.

**Reference Books:**

1. Paul R. Murphy and A. Michael Knemeyer; Contemporary Logistics -Twelfth edition; Pearson Education, 2019.
2. Kuldeepak Singh; A Handbook on Supply Chain Management -First edition; Notion Press, 2021.
3. Logistics and Supply Chain Management ; SIA Publishers & Distributors Private Limited; 2021.

**Value Education II**

**Subject Code: DIN004A**

**Credits: 1**

**Course Objectives**

1. To give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.
2. Making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

**Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to acknowledge and appreciate the ethical beauty of India

CO2: Ability to incorporate the values of human lives in real life applications

**Yoga and Meditation**

The objective of the course is to provide practical training in YOGA ASANAS with a sound theoretical base and theory classes on selected verses of Patanjali's Yoga Sutra and Ashtanga Yoga. The coverage also includes the effect of yoga on integrated personality development.

**Rajasthan Mural Art and Painting**

Mural painting is an offshoot of the devotional tradition in Rajasthan. A mural is any piece of artwork painted or applied directly on a wall, ceiling or other large permanent surface. In the contemporary scenario Mural painting is not restricted to the permanent structures and are being done even on canvas. Rajasthani



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mural paintings are the frescos depicting mythology and legends, which are drawn on the walls of temples, principally in Rajasthan. Ancient temples and tourists places in different States of Rajasthan, display an abounding tradition of mural paintings mostly dating back between the 9th to 12th centuries when this form of art enjoyed Royal patronage. Learning Mural painting through the theory and practice workshop is the objective of this course.

#### **Course on Organic Farming and Sustainability**

Organic farming is emerging as an important segment of human sustainability and healthy life. 'Haritamritam' is an attempt to empower the youth with basic skills in tradition of organic farming and to revive the culture of growing vegetables that one consumes, without using chemicals and pesticides. Growth of Agriculture through such positive initiatives will go a long way in nation development. It is a big step in restoring the lost harmony of nature.

#### **Benefits of Indian Medicinal Systems**

Indian medicinal systems are one of the most ancient in the world. Even today society continues to derive enormous benefits from the wealth of knowledge in Ayurveda of which is recognized as a viable and sustainable medicinal tradition. This course will expose students to the fundamental principles and philosophy of Ayurveda and other Indian medicinal traditions.

#### **Traditional Fine Arts of India**

India is home to one of the most diverse Art forms world over. The underlying philosophy of Indian life is 'Unity in Diversity' and it has led to the most diverse expressions of culture in India. Most art forms of India are an expression of devotion by the devotee towards the Lord and its influence in Indian life is very pervasive. This course will introduce students to the deeper philosophical basis of Indian Art forms and attempt to provide a practical demonstration of the continuing relevance of the Art.

#### **Science of Worship in India**

Indian mode of worship is unique among the world civilisations. Nowhere in the world has the philosophical idea of reverence and worshipfulness for everything in this universe found universal acceptance as it in India. Indian religious life even today is a practical demonstration of the potential for realisation of this profound truth. To see the all-pervading consciousness in everything, including animate and inanimate, and constituting society to realise this truth can be seen as the epitome of civilizational excellence. This course will discuss the principles and rationale behind different modes of worship prevalent in India.

#### **Insights into Indian Classical Music**

The course introduces the students into the various terminologies used in Indian musicology and their explanations, like Nadam, Sruti, Svaram – svara nomenclature, Stayi, Graha, Nyasa, Amsa, Thala, Saptatalas and their angas, Shadangas, Vadi, Samavadi, Anuvadi. The course takes the students through Carnatic as well as Hindustani classical styles.

#### **Insights into Traditional Indian Painting**

The course introduces traditional Indian paintings in the light of ancient Indian wisdom in the fields of aesthetics, the Shadanga (Six limbs of Indian paintings) and the contextual stories from ancient texts from where the paintings originated. The course introduces the painting styles such as Madhubani, Kerala Mural, Pahari, Cheriya, Rajput, Tanjore etc.

#### **Insights into Indian Classical Dance**

The course takes the students through the ancient Indian text on aesthetics the Natyasastra and its commentary the Abhinava Bharati. The course introduces various styles of Indian classical dance such as Bharatanatyan, Mohiniyattam, Kuchipudi, Odissi, Katak etc. The course takes the students through both contextual theory as well as practice time.

#### **Indian Martial Arts and Self Defense**



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The course introduces the students to the ancient Indian system of self-defense and the combat through various martial art forms and focuses more on traditional Kerala's traditional Kalari Payattu. The course introduces the various exercise technique to make the body supple and flexible before going into the steps and techniques of the martial art. The advanced level of this course introduces the technique of weaponry.

### **Social Awareness Campaign**

The course introduces the students into the concept of public social awareness and how to transmit the messages of social awareness through various media, both traditional and modern. The course goes through the theoretical aspects of campaign planning and execution.

### **Organic Farming in Practice**

Organic agriculture is the application of a set of cultural, biological, and mechanical practices that support the cycling of farm resources, promote ecological balance, and conserve biodiversity. These include maintaining and enhancing soil and water quality; conserving wetlands, woodlands, and wildlife; and avoiding use of synthetic fertilizers, sewage sludge, irradiation, and genetic engineering. This factsheet provides an overview of some common farming practices that ensure organic integrity and operation sustainability.

### **Ayurveda for Lifestyle Modification**

Ayurveda aims to integrate and balance the body, mind, and spirit which will ultimately leads to human happiness and health. Ayurveda offers methods for finding out early stages of diseases that are still undetectable by modern medical investigation. Ayurveda understands that health is a reflection of when a person is living in harmony with nature and disease arises when a person is out of harmony with the cycles of nature. All things in the universe (both living and non-living) are joined together in Ayurveda. This leaflet endow with some practical knowledge to rediscover our pre- industrial herbal heritage.

### **Life Style and Therapy using Yoga**

Yoga therapy is the adaptation of yogic principles, methods, and techniques to specific human ailments. In its ideal application, Yoga therapy is preventive in nature, as is Yoga itself, but it is also restorative in many instances, palliative in others, and curative in many others. The therapeutic effect comes to force when we practice daily and the body starts removing toxins and the rest is done by nature.

\*Each student shall write a detailed Report/ Critique on one topic leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce. Alternatively a Student may undertake a Project on any one of the topics and submit a detail Project Report leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. If the topic is related to Performing Arts including Yoga, Marshal Arts etc. the performance on stage may be given instead of PPT. In case of Fine Arts, an exhibition or a portfolio may be presented in place of PPT.

**On the basis of the above points, a panel of experts from the department will award the credits.**



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**Life Skills 2 (Aptitude)**  
**Subject Code: DEN004A**  
**Credits: 2**

**Course Objectives:**

1. Students will be able to interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience.
2. Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
3. Students will be able to reason, model, and draw conclusions or make decisions with mathematical, statistical, and quantitative information.
4. Students will be able to critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
5. Students will be able to use appropriate technology in a given context.

**Course Outcomes (CO):** At the end of this course students will have:


CO1: Demonstrate procedural fluency with real number arithmetic operations and use those operations to represent real-world scenarios and to solve stated problems. Demonstrate number sense, including dimensional analysis and conversions between fractions, decimals, and percentages. Determine when approximations are appropriate and when exact calculations are necessary.

CO2: Solve linear equations, graph and interpret linear models, and read and apply formulas. Demonstrate a basic understanding of displays of univariate data such as bar graphs, histograms, dotplots, and circle graphs, including appropriate labeling.

CO3: Take charge of their own learning through good classroom habits, time management, and persistence. Participate in the classroom community through written and oral communication.

**Syllabus: Theory**

UNIT 1	Number System:  a. Number system  b. Power cycle  c. Remainder cycle  d. Factors, Multiples
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	e. HCF and LCM
UNIT 2	<p>Data Arrangements and Blood Relations:</p> <p>a. Linear Arrangement</p> <p>b. Circular Arrangement</p> <p>c. Multi-dimensional Arrangement</p> <p>d. Blood Relations</p>
UNIT 3	<p>Time and Work:</p> <p>a. Work with different efficiencies</p> <p>b. Pipes and cisterns</p> <p>c. Work equivalence</p> <p>d. Division of wages</p>



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UNIT 4	<p>Coding &amp; Decoding, Series, Analogy, Odd Man Out and Visual Reasoning:</p> <ul style="list-style-type: none"> <li>a. Coding and Decoding</li> <li>b. Series</li> <li>c. Analogy</li> <li>d. Odd Man Out</li> <li>e. Visual Reasoning</li> </ul>
UNIT 5	<p>Percentages, Simple Interest and Compound Interest:</p> <ul style="list-style-type: none"> <li>a. Percentages as Fractions and Decimals</li> <li>b. Percentage Increase / Decrease</li> <li>c. Simple Interest</li> <li>d. Compound Interest</li> <li>e. Relation Between Simple and Compound Interest</li> </ul>
UNIT 6	<p>Permutation, Combination and Probability:</p> <ul style="list-style-type: none"> <li>a. Fundamental Counting Principle</li> <li>b. Permutation and Combination</li> <li>c. Computation of Permutation</li> <li>d. Circular Permutations</li> <li>e. Computation of Combination</li> </ul>

	f. Probability
UNIT 7	Data Interpretation and Data Sufficiency: a. Data Interpretation – Tables b. Data Interpretation - Pie Chart c. Data Interpretation - Bar Graph d. Data Sufficiency
UNIT 8	Profit and Loss, Partnerships and Averages: a. Basic terminologies in profit and loss b. Partnership c. Averages d. Weighted average e. Mixtures and allegations

### Methodology for Evaluation

#### 1. Internal Assessment

a) Class/ Home Assignments (Minimum One from each Unit) : 30 Marks

  
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b) In Semester Tests (Minimum two) : 30 Marks

2. Term End : 40 Marks

\*Note: Minimum one class assignment shall be given in each turn in the Lab which will be attempted by the students in the class itself and evaluated by the end of the day. Balance work shall be completed at home and submitted at the beginning of the next turn in Lab.

**Suggested Reading:**

1. Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;
2. The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;
3. How to Ace the Brainteaser Interview, by John Kador, Mc Graw Hill Publishers.
4. Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
5. Quicker Maths, by M tyra& K Kundan, BSC Publishing Co. Pvt. Ltd., Delhi;
6. Owl Purdue University online teaching resource

**Commodities and Currency Derivatives**

**Subject Code: BCM657A**

**Credits: 4**

**Unit 1: Introduction to Commodities and Currency Markets**

Overview of commodities and currency markets: Definition, participants, and key features Understanding the role of commodities and currencies in the global economy Exploring the factors that influence commodity prices and currency exchange rates Introduction to commodity and currency derivatives Analyzing the risks and opportunities associated with commodities and currency trading

**Unit 2: Commodity Market Operations**

Introduction to commodity markets: Spot markets, futures markets, and options markets Understanding the supply and demand dynamics of different commodities (e.g., energy, metals, agriculture) Examining the role of commodity exchanges and regulatory frameworks Analyzing commodity price formation and the impact of geopolitical events Strategies for trading commodities and managing price risk

**Unit 3: Currency Market Operations**

Introduction to currency markets: Spot markets, forward markets, and currency derivatives Understanding currency exchange rates and their determinants (e.g., interest rates, inflation, economic indicators) Examining the role of central banks and monetary policies in currency markets Exploring different currency trading strategies and techniques Analyzing the impact of global economic and political events on currency markets

**Unit 4: Commodity and Currency Market Instruments**

  
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Overview of commodity and currency derivatives: Futures, options, and swaps Understanding the mechanics and pricing of commodity and currency derivatives Evaluating the use of derivatives for hedging and speculation purposes Analyzing case studies of commodity and currency derivative strategies Exploring the regulatory frameworks and risk management practices in derivatives markets

### Unit 5: Commodity and Currency Market Analysis

Fundamental and technical analysis of commodities and currencies Using economic indicators and market trends to assess investment opportunities Analyzing market sentiment and investor behavior in commodities and currencies Introduction to algorithmic trading and automated strategies in commodity and currency markets Ethical considerations and responsible trading practices in commodities and currencies.

<b>FIFTH SEMESTER</b>						
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>
BCM 652A	Start -up Eco System & Valuations	3	1	-	4	S
BCM 637A	Direct Taxation	3	1	-	4	C
BCM 653A	Angel, VC & PE Entry and Exit Strategies	3	-	1	4	S
BCM 654A	Primary Market & Public Issue Management	3	1	-	4	S
BCM 655A	Technical Analysis	3	1	-	4	S
BCM 656A	Goods And Service Tax	3	1	-	4	C
BCM 658A	Commercial Banking Operations	3	1	-	4	S
	<b>TOTAL</b>	<b>21</b>	<b>6</b>	<b>1</b>	<b>28</b>	

**Bcom- Financial Marketing (IFM)**  
**Semester 5**  
**Start -up Eco System & Valuations**  
**Subject Code: BCM652A**  
**Credits: 4**

#### Course Outcomes

CO1: Examine the idea of a start-up

  
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CO2: Analyse different types of start-ups and regulatory approvals required

CO3: Evaluate and dissect the challenges and opportunities of start-ups

CO4: Develop pitch decks for investor presentation for fund raising

CO5: Understand the valuation approaches for start-up companies

### **Unit 1: Introduction to Start-Ups**

Defining a start-up, understanding disruption, understanding incubation, difference between small & new businesses and start-ups, ideation stage, registration process, government regulations

Learning Outcome: Students will be able to clearly understand about a start-up company and how to proceed with commencement of a new company under the start-up opportunity

### **Unit 2: Building Traction**

Brainstorming, bootstrapping, estimating funds required, proof of concept stage, survey and external review of the project, market testing, market mapping, testing

Learning Outcome: Students will be able to evaluate the initial stages of a start-up

### **Unit 3: Building Pitch Deck**

Preparing pitch deck and a business plan, market size, market potential, USP of the idea, peer comparison, estimating penetration potential, market validation

Learning Outcome: Students will be able to build pitch deck and design business plan with required data inputs

### **Unit 4: Technology**

Setting up of technology / digital platform, understanding and evaluating customer perception for digital access, defining app-based functions, hiring tech team

Learning Outcome: Students will be able to analyse the importance of building tech- driven platform essential for start-ups

### **Unit 5: Partnering**

Evaluate about complementary partnerships, pros and cons of collaborations, evaluating future conflicts

Learning Outcome: Students will be able to evaluate and study the advantages and disadvantages of partnering with another business

### **Unit 6: Fund Raising**

Introduction to fund raising activities, evaluating fund raising through debt or equity routes, evaluating angel or VC investing, examining the extent of funds required, sustenance of funding over different horizons of growth, series based funding, pros and cons of each type of funding entities

Learning Outcome: Students will be able to assess the fund raising aspect of a start-up and decide of the type of funds required

### **Unit 7: Understanding Start-up Ecosystem**

Understanding the role of entrepreneurs, financing companies, seed stage investing concepts, growth stage investing concepts, role of angel, VC and PE investors and differentiating each type of investor, choosing mentors and advisors essential for a start-up, understanding the concept of unicorns in start-up

Learning Outcome: Students will be able to understand the role of all stakeholders of a start-up ecosystem

### **Unit 8: Revenue Models**

Understanding the revenue models, customer acquisition, cash burn, promotion & advertisement methods, milestone management

Learning Outcome: Students will be able to develop revenue models and prepare estimations

### **Unit 9: Valuation Concepts**

Is start-up valuation a myth? Promoters' valuation, diluting stake, issuing new shares, seed stage valuations, valuations at growing, flourishing stages, investing rounds and understanding the failures of start-ups

Learning Outcome: Students will be able to analyse how to arrive at valuations of a start-up at different stages of the company

### **Unit 10: Pre-IPO and IPO Preparation**

Decision on IPO, exit strategy for pre-IPO investors, IPO valuations, basis of issue price, appointing merchant bankers and procedures of seeking approvals to go public

Learning Outcome: Students will be able to understand the exit strategy of pre-IPO investors and processes involved in going public

## **Direct Taxation**

**Subject Code: BCM637A**

**Credits: 4**

Generally, a commerce graduate is expected to have knowledge about taxation. After the implementation of GST in India, taxation structure has become quite simple and multiple taxation has substantially reduced. Whether in employment or having own business or profession, an individual has to pay income tax and file his income tax return once he starts earning taxable income. This paper aims at making the students understand and apply the basic provisions related to income tax and be able to compute his own income tax liability, timely payment of such tax liability and comply with income tax return filing procedure on year-to-year basis

### **Unit 1:**

#### **Income Tax Act, 1961**

Meaning, concept and definitions

Residential status and taxability of income

### **Unit 2**

#### **Computation of Taxable Income under different heads of Income**

. Income from Salary

- ← Salient features, meaning of salary
- ← Allowances and their taxability
- ← Perquisites and their valuation



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- ← Deductions from Salary
- b. Income from House Property
  - ← Basis of chargeability
  - ← Annual Value
  - ← Valuation of Self Occupied, Let out and Deemed Let Out Properties
  - ← Deductions allowed
- c. Profits and Gains of Business or Profession
  - ← Definitions
  - ← Deductions expressly allowed
  - ← Deductions expressly disallowed, disallowance on the basis TDS non-compliance
  - ← Block of Assets method of Depreciation
- d. Income from Capital Gains
  - ← Chargeability
  - ← Cost of Improvement
  - ← Short Term Capital Gains
  - ← Long Term Capital Gains
  - ← Deductions
- d. Income from Other Sources Chargeability, Deductions, Amounts not deductible

### **Unit 3:**

#### **Computation of Total Income**

- ← Gross Total Income
- ← Deductions under Chapter VIA
- ← Tax slabs for Individuals
- ← New tax regime effective from A.Y.2021 -22
- ← Choice of assessee to switch -over to new regime
- ← Government philosophy behind new tax regime

- ← Numerical sums on total computation under old and new tax regime

#### **Unit 4:**

##### **Modes of Tax payment**

- ← Advance Tax
- ← Tax Deducted at Source
- ← Self Assessment Tax
- ← Tax on Regular Assessment 06
- ← Viewing Form 26AS on Income Tax site

#### **Unit 5:**

##### **Income Tax Returns**

- ← Various Income Tax Return Forms and their applicability
- ← Due dates for filing Income Tax Returns
- ← E-filing of Income Tax Returns
- ← E-assessment of Income Tax Returns
- ← Faceless assessment

***Note: Provisions as amended and made applicable to current Assessment Year will be considered to be part of the syllabus. Accordingly, for academic year 2021-2022 provisions relevant to A.Y.2021-2022 will apply and so on***

Course Learning Outcomes:

On successful completion of the module students will be:

CO1. able to understand basic taxation structure in India as per the Constitution of India.

CO2. able to understand basic provisions regarding computation of taxable income of an individual for the current assessment year, whether from Salary or Business/Profession or other sources of Income.

CO3. able to make numerical calculations of taxable income and exempt income as per the method of calculation prescribed under Income Tax Act, and tax payable on the same.

CO4. acquire knowledge about submission of income tax return, payment of due taxes in the form of advance tax, self-assessment tax and tax deducted at source.

CO5. get acquainted with e-processes related to income tax filing and assessment.

**Angel, VC & PE Entry and Exit Strategies**

**Subject Code: BCM653A**

**Credits: 4**

  
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## **Course Objectives:**

This module on "Angel, VC & PE Entry and Exit Strategies" is designed to students with the knowledge and skills required to navigate the complex world of angel investing, venture capital (VC), and private equity (PE). Students will gain a deep understanding of how to identify promising investment opportunities, structure deals, and maximize returns through effective entry and exit strategies. This module will help you provide sound advice to aspiring entrepreneur seeking funding or an investor looking to make informed investment decisions, and give insights and tools needed to succeed in the dynamic landscape of early-stage and growth-stage investments.

### **Module 1: Introduction to Venture Capital, Private Equity and Angel Investing**

What Is Private Equity and Venture Capital - Why Companies Need Private Equity and Venture Capital - Difference between private equity and venture Capital – Different functions of Private equity firm - How a Private Equity PE firm works in the age of high-tech digital banking - Different participants of PE firms - Strategies and Product Services offered by PE Firms - How to select a suitable PE firm

Angel investor profiles and motivations - Identifying and evaluating promising startups - Due diligence and risk assessment - Deal structuring and negotiation - Angels vs. Seed funds vs. Traditional VC

### **Module 2: The management of Private Equity and Venture Capital Funds**

Managerial Process for Equity Fund – Fundraising - Investing: The Decision-Making Phase - Investing: The Deal Making Phase - Managing and Monitoring: Supporting the Company - Managing and Monitoring: Covenants Usage – Compare private equity with public equity  
Risk assessment in early-stage and growth-stage investments - Conducting comprehensive due diligence - Legal and regulatory considerations - Post-investment monitoring and support

### **Module 3: Tax aspects of PE investments**


Tax provisions under Income Tax Act 1961 under Section 10(23FB) and Section 10(47) - Income Types - Securities Transaction Tax (STT) - Tax on Distributed Profit (Dividend Distribution Tax) - Taxability of Interest - Taxability of Short-Term Capital Gains on Debt and equity - Taxability of Long-Term Capital Gains on Debt and equity - Taxation of Non-Residents

### **Module 4: Venture Capital and Private Equity Entry and Exit strategies**

Venture capital funding stages and structures - Investment thesis and portfolio management – Type of Exit strategies: IPOs, M&A, and secondary sales - Case studies of successful VC investments  
Private equity investment models (e.g., buyouts, growth equity) - Leveraged buyouts (LBOs) and management buyouts (MBOs) - Exit strategies in the private equity space - Case studies of PE-backed companies

### **Module 5: Company Valuations and deal making in Private Equity Settings**

Company Valuation Fundamentals - Company Valuation: The Pillars of DCF – Case Study on Company Valuation for PE Investment - Applying Company Valuation to Private Equity Settings - Applying Company Valuation to Venture Capital Settings: The Venture Capital Method



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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Course Outcomes:**

CO1: Understand the fundamentals of angel investing, venture capital, and private equity.

CO2: Identify and evaluate investment opportunities in startups and growth-stage companies.

CO3: Develop effective entry strategies, including due diligence and deal structuring.

CO4: Explore various exit strategies, including IPOs, mergers and acquisitions (M&A), and secondary sales.

CO5: Analyze case studies and real-world examples of successful and unsuccessful investments.

**Textbooks:**

1. Venture Capital and the Finance of Innovation, 3rd Edition by Andrew Metrick, Ayako Yasuda

**Reference Books:**

1. Private Equity Operational Due Diligence: Tools to Evaluate Liquidity, Valuation, and Documentation by Jason Scharfman

2. Angel Investing: The Gust Guide to Making Money and Having Fun Investing in Startups by David S. Rose

3. The Art of M&A Valuation and Modeling: A Guide to Corporate Valuation by Elizabeth Martin and Martin A. Schmidt

4. The Art of Startup Fundraising by Alejandro Cremades

**Primary Market & Public Issue Management**

**Subject Code: BCM654A**

**Credits: 4**

  
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**Course objective:**

This course will aid the learners in understanding and familiarize the concepts of financial markets and system and their importance to an effective economy. It encompasses the knowledge about the financial intermediaries and regulatory bodies in the financial market. This module will cover knowledge about various financial instruments, their features and valuations. The course also sheds light on how financial markets in the real world operate and how various financial markets differ from one another in practice. Further, it develops knowledge of rising Foreign Capital, various methods of rising and regulations.

**Module 1: Introduction to Financial Markets**

Indian Financial System – Concept of Investment and Savings - Evolution of Financial System in India - Financial System and Economic Development – Financial System Structure – Credit Creation - Money Markets and their functions - Capital Markets and their functions

**Module 2: Regulatory Bodies and Financial Intermediaries**

The Reserve Bank of India and their Functions - The Securities and Exchange Board of India and their Functions - Stock Exchanges in India and their Objectives, Functions and Significance and its working - Major international stock exchanges – Financial Intermediaries - Commercial Banks – Insurance Companies – Mutual Funds – NBFCs - Developments – Functions of Financial Intermediaries – Role of Intermediaries in a Financial System

**Module 3: Financial Instruments and Stock Market**

Money Market Instruments - Capital Market Instruments – Primary Market and Secondary Market – Over the counter and Exchange Markets - – Features and Valuation of Financial Instruments - Issue of financial instruments - Stock Market – Types and Functions - Primary issue, book building process, private placement, offer for sale, buy back of shares - Various innovative financial instruments Crypto currencies (e.g., Bitcoin) and Distributed ledger technology

**Module 4: Financial Markets – Debt, Commodity, and FOREX Market**

Debt Market and its types – Debt Market Instruments – Bonds – Debentures – Treasury Bills – Yield Curve – Interbank Markets - Operational Mechanism – Difficulties for development of Debt market – Commodity Market and its types – MCX, NCDEX and ICEX - Functions, administration, regulations and general mechanism – International commodity Market - Foreign Exchange Markets and its Instruments – Hedging - FOREX Derivative Markets – FX Futures, Options and FRAs

**Module 5: Foreign Capital**

Forms of foreign capital – FDI and FPI – FIIs - International financial instruments – ADR, GDR, IDR and Euro bonds - Role of foreign capital in Indian financial system – Trends in foreign capital inflows to India – Regulatory framework for foreign capital flows – FERA and FEMA Acts

**Course outcomes:**

CO1: Understand the nature of financial markets, explain the principles by which financial markets operate and their importance to economy



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CO2: Familiarize with participants of Financial Markets, regulatory body governing the financial markets and financial intermediaries

CO3: Explain the features of equity, debt, forex and commodity instruments

CO4: Comprehend the market operation mechanism of equity, debt, forex and commodity markets and current trends affect financial markets

CO5: Evaluate the role of foreign capital inflow, the methods to raise such finance and their regulations.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. Mr. Rajiv Ranjan Singh, Basics of Financial Market, Karvy Publishing, 2017
2. Mr. Frederic S. Mishkin, Financial Markets and Institutions, Pearson Publishing, 2017
3. MR. Bhole, Financial Institutions and Markets: Structure, Growth & Innovation, McGraw Hill Education, 2017
4. M.Y. Khan, Indian Financial System, McGraw Hill Education, 2019

**Reference books:**

1. Marc Levinson, The Economist Guide to Financial Markets, The Economist, 2015
2. Prathak Bharti, Indian Financial System, Pearson Publishing, 2018.
3. Siddhartha Sankar Saha, Indian Financial System: Financial Markets, Institutions and Services, McGraw Hill Education, 2020

**Technical Analysis**

  
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## **Subject Code: BCM655A**

**Credits: 4**

### **Course Outcomes**

CO1: Describe the fundamental concepts and approaches to trading and speculation concepts.

CO2: Identify charts, patterns and indicators that assist in prediction of price direction

CO3: Appreciate the need of analysis for trading in various markets

CO4: Assess the concepts of Candlestick Analysis

CO5: Implement trading techniques using technical analysis

### **Unit- I: Introduction to key financial markets**

Introduction to equity markets, commodities markets and currency markets; explore trading opportunities in these markets; margin requirements; margin management; stockbroker expectations; settlements; margin funding concepts.

Learning outcome: To recognize the opportunities of trading in key financial markets conducive for trading and speculating

### **Unit 2: Introduction to Technical Analysis**

Difference between trading, speculating and gambling; introduction to technical analysis; history of technical analysis practices world over; basic assumptions in technical analysis.

Learning outcome: To distinguish between trading, speculating and gambling.

### **Unit 3: Trading Rules and Behavioral Concepts**

Differentiating between trading and investing; distinguish between fundamental analysis and technical analysis; important trading rules recommended for traders; managing trading psychology; risk-reward ratio analysis; dos and don'ts for traders; discipline trading techniques

Learning outcome: To articulate what it takes to be a successful trader

### **Unit 4: Strengths and Weaknesses of Technical Analysis**

Defining the strengths and weaknesses of technical analysis; what traders have to be aware before following technical analysis to trade?

Learning outcome: To identify strengths and weakness of technical analysis.

### **Unit 5: Dow Theory and Elliott Wave Theory**

Introduction to Dow Theory trading concepts; practical application of Dow Theory; advantages and disadvantages of Dow Theory; introduction to Elliott Wave Theory; practical application of Elliott Wave Theory;

Learning Outcome: To describe the role of Dow's Theory and Elliot Wave Theory as a diagnostic tool to identify trading opportunities.

### **Unit 6: Candlestick Chart**

Introduction to Charts; introduction to candlestick patterns of analysis; different types of candlestick patterns with explanation of each pattern and its utility

Learning outcome: To evaluate different candlestick patterns and utility of candlestick chart patterns

### **Unit 7: Introduction to Support and Resistance**



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Introduction to concepts of Support Price and Resistance Prices; why do such lines occur; identifying support and resistance zones; the importance of support and resistance lines for trading  
Learning outcome: To articulate the importance of following support and resistance lines as part of technical analysis

#### **Unit 8: Introduction to Patterns**

Head and Shoulder Patterns; head and shoulder top reversal; inverted head and shoulder; head and shoulder bottom; Double top and double bottom; rounded top and bottom

Learning outcome: To recognize the utility of head and shoulder and other patterns.

#### **Unit 9: Gap Theory**

Identifying Gaps before trading; common Gaps; breakaway Gaps; runaway Gaps; continuation Gaps; exhaustion Gaps; island Gaps

Learning outcome: To identify Gaps as part of trading opportunities

#### **Unit 10: Introduction to Indicators and Oscillators - I**

Introduction to technical indicator; utility of indicators; types of indicators; simple moving averages and exponential moving averages

Learning Outcome: Identify technical indicators and different types of moving averages

#### **Unit 11: Introduction to Indicators and Oscillators -II**

Concepts of moving averages, Oscillators, Relative Strength Index or RSI identifying momentum; identifying overbought and oversold position

Learning Outcome: Recognize different trends and indicators.

### **Goods And Service Tax SUBJECT CODE: BCM656A CREDITS:4**

#### **Unit 1: Constitutional background of Indirect Taxes in India**

- a) Powers of various Governments to levy and collect taxes.
- b) Constitutional amendment for bringing GST in force,
- c) Schedule 7 of Constitution (List 1,2,3)

#### **Unit 2: Goods and Service Tax**

##### 1) Introduction to Goods and Service Tax Act

- a) Constitutional amendment – GST vis-à-vis earlier tax laws
- b) Important definitions – Consideration, Continuous supply of goods, Continuous supply of services, goods, Central Tax, Integrated Tax, State Tax, Input, Input Service, Input Tax, Input Tax Credit, Intra-state supply of goods, Intra-state supply of services, Output tax, Outward supply, place of supply, place of business

##### 2) Levy and collection of tax

- a) Scope of supply
- b) Levy and collection of tax
- c) Tax liability on composite and mixed supplies

##### 3) Time and Value of supply

  
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- a) Time of supply of goods
- b) Time of supply of services
- c) Value of taxable supply

#### 4) Input Tax Credit

- a) Eligibility and conditions for taking input tax credit
- b) Apportionment of credit and blocked credit
- c) Availability of credit in special circumstances
- d) Input credit in respect of inputs and capital goods sent for job-work
- e) Manner of distribution of credit by input service distributor

#### 5) Registration

- a) Person liable for registration
- b) Persons not liable for registration
- c) Procedure for registration
- d) Deemed registration
- e) Amendment of registration.
- f) Cancellation of registration
- g) Revocation of cancellation of registration

#### 6) Tax Invoice, Credit and Debit Notes

- a) Tax Invoice
- b) Credit and debit notes
- c) Prohibition of unauthorized collection of tax
- d) Amount of tax to be indicated in tax invoice and other documents

#### 7) Returns

- a) Furnishing details of outward supplies
- b) Furnishing details of inward supplies
- c) Returns
- d) Claim of input credit and provisional acceptance thereof
- e) Matching, reversal and reclaim of input tax credit
- f) Matching, reversal and reclaim of reduction in output tax liability
- g) Annual Return
- h) First Return
- i) Levy of late fees

#### 8) Payment of Tax

- a) Payment of tax, interest, penalty and other amounts
- b) Interest on delayed payment of tax
- c) Transfer of input tax credit

#### 9) Numerical sums on calculation of tax

#### 10) Introduction to concept of Advance Rulings, few important rulings and their impact

Note: Amendments relevant to syllabus in GST Act and rules and regulations as incorporated and made effective up to 30th September before the beginning of the 2nd term of the academic year (sixth semester) will be applicable and deemed to be incorporated in the syllabus for that academic year

**Course Outcomes:** On successful completion of the module students will be:

**CO1.** Able to understand taxation structure in India.

**CO2.** Able to understand basic provisions regarding two major acts contributing to Government Funds .

**CO3.** acquire knowledge about valuation of goods under Customs Act and clarity about the concept of “ One Nation One Tax “. Availability of Input tax credit

**CO4.** get acquainted with basic knowledge of registration and e-filing process under GST Act.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

Suggested Reference

Books:

1. <https://www.gst.gov.in> for relevant provisions of Act and Rules applicable to concerned assessment year.
2. Indirect Taxes – Law and Practice by V. S. Datey
3. All about GST by V S Datey
4. Study materials on GST by ICAI, ICSI

**Commercial Banking Operations**

**Subject Code: BCM658A**

**Credits: 4**



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## **Unit 1: Introduction to the Business of Banking**

Meaning, Origin and necessity of bank and financial institutions, an overview of Indian financial system, Distinguish between banking and other business, Role of RBI vis-à-vis other commercial banks.

Meaning and nature of financial risk, Types of major risk in banking business, Credit risk, Operational risk, Market risk, Liquidity risk, For-ex risk, Country risk, Risk identification, Risk measurement and Risk mitigation.

## **Unit 2: Deposit Mobilization**

Meaning and nature of bank's deposit, Types of deposit: Current, saving, Fixed call, Demand/notice Deposit product, Procedure of account opening, eligibility, Type and structure of charge, Know Your Customer, Client account maintenance, account closing, Card services: debit card, credit card, prepaid card, Deposit marketing and customer care services, KYC norms, Banking Ombudsman

## **Unit 3: Bank Investments (Loans)**

Concept and nature of bank credit, Types of credit: Term loan, Revolving loan, Corporate loan, Consumer loan, Credit process, Credit appraisal, Approval, Documentation, Disbursement, Credit monitoring and supervision, Credit recovery, Credit marketing, Credit administration, Security, Valuation, Loan classification and provisioning, Non-performing loan and performing loan, Credit risk and its management, Investment Policy, Statutory Reserve Requirements, Non-SLR Requirements, Banks' Investment Classification and Valuation Norms.

## **Unit 4:**

Cash management, Security of vault, Cash insurance, Cash counter, Roles and responsibilities of cashier, Clearing system, Electronic clearing, Internal and external fund transfer.

Payment of cheques — protection to the paying banker — return of cheques — liability of drawer—rights and duties of drawee —banker and drawer —endorsement of cheques- types of endorsements — forged endorsements — protection to banker-bills of exchange —types — discounting of bills — due date of bills — dishonor of bills — noting and protesting— commercial paper.

## **Unit 5: Commercial banking services**

Agency Services - Fund transfer, Remittance services, Utility payment services, Advisory services, Standing order from customer.

Trade Finance - Funded/non funded, letter of credit/ guarantee, advance payment types of L/C, major parties, roles and responsibilities of different parties, essential documents, risk associates.

Foreign Exchange Service - Meaning and concept, convertible and non-convertible currency, exchange rate determination, FEDAN, composition, function and responsibilities, meaning of Nostro and Vostro accounts.

Treasury Function - Introduction, scope of treasury, Back office, Front office back office, Asset liability management, Roles and responsibilities of (ALCO).

Electronic Banking Services - Meaning and concept of e-banking, Internet banking, Branch less banking, Tele/mobile banking, ABBS, ATM. Challenges from innovation.

**Course outcomes:**

CO1. Understand the various significant concepts in the field of commercial banking sector.

CO2. Examine the role of Banking and Finance in economic development.

CO3. Understand the most common sources of funds for commercial banks and uses of funds for commercial banks

CO4. Evaluate and understand the aspects related to deposit mobilization and loans given by banks

CO5. Evaluate and understand the various services provided by a commercial bank

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							
CO2							
CO3							
CO4							
CO5							

**Suggested Reading**

**Semester VI**

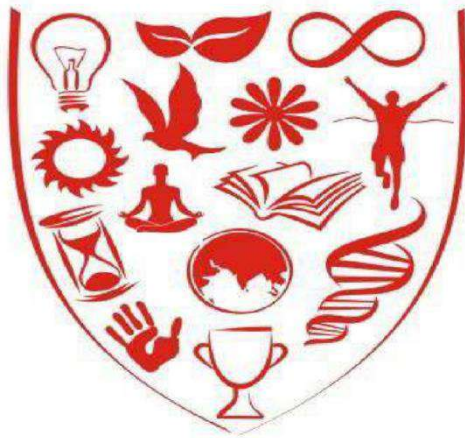
<b>SIXTH SEMESTER</b>							
<b>Sub Code</b>	<b>Sub Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Type</b>	
BCM799A	Internship	-	-	32	16	C	
	<b>TOTAL</b>	-	-	<b>32</b>	<b>16</b>		



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**DEPARTMENT OF ECONOMICS**

**BOARD OF STUDY: B.A. ECONOMICS  
HONOURS**

**FOR ACADEMIC SESSION: 2022-23**

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## **Programme Description**

The principle aims and objectives of the BA Economics programme are:

- To give students a thorough understanding of Economic concepts added with analytical methods of Economics.
- To provide and adapt curricula that prepares our graduates for employment and further study as economists.
- To provide the students with the opportunity to pursue courses that emphasise quantitative and theoretical aspects of Economics.
- To give the students an exposure of corporate functioning/professional world through summer internship programme and term papers.

## **Vision of the Department of Economics**

The Department of Economics aims at imparting theoretical and applied knowledge of economics, conducting research on socio-economic problems at regional and national level for inclusive development as well as to develop critical and behavioral skills.

## **The Mission of the Department of Economics**

- To offer innovative and analytical knowledge and skills to students by training them in the ideas of modern economics.
- To conduct both basic and applied research in economics that pushes forward the frontier of knowledge in the field.



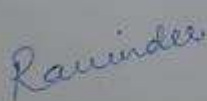
<b>FIRST SEMESTER</b>								
<b>Course Code</b>	<b>Course Name</b>	<b>L (Hrs)</b>	<b>T (Hrs)</b>	<b>P (Hrs)</b>	<b>L (Credit)</b>	<b>T (Credit)</b>	<b>P (Credit)</b>	<b>Total Credit</b>
<b>CORE COURSES</b>								
<b>BEC001C</b>	INTRODUCTORY MICROECONOMICS	4	1	0	4	1	0	5
<b>BEC002C</b>	INTRODUCTORY MACROECONOMICS	4	1	0	4	1	0	5
<b>BEC003C</b>	MATHEMATICAL METHODS FOR ECONOMICS	4	1	0	4	1	0	5
<b>FOUNDATION COURSES</b>								
<b>DCA001A</b>	WEB DEVELOPMENT	2	0	0	2	0	0	2
<b>DCA002A</b>	WEB DEVELOPMENT LAB	0	0	2	0	0	1	1
<b>DEN001A</b>	COMMUNICATION SKILLS	2	0	0	2	0	0	2
<b>DEN001B</b>	COMMUNICATION SKILLS LAB	0	0	2	0	0	1	1
<b>DIN001A</b>	CULTURAL EDUCATION-I	2	0	0	2	0	0	2
<b>DCH001A</b>	ENVIRONMENTAL STUDIES	3	1	0	3	1	0	4
	<b>Total</b>							<b>27</b>

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SECOND SEMESTER								
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L (Credit)	T (Credit)	P (Credit)	C
CORE COURSES								
<b>BEC004D</b>	INTERMEDIATE MICROECONOMICS	4	1	0	4	1	0	5
<b>BEC005D</b>	INTERMEDIATE MACROECONOMICS	4	1	0	4	1	0	5
<b>BEC006C</b>	STATISTICAL METHODS FOR ECONOMICS	4	1	0	4	1	0	5
DISCIPLINE SPECIFIC ELECTIVE (DSE)								
<b>BEC017B</b>	DISCIPLINE SPECIFIC ELECTIVE-I (DSE-I) ENVIRONMENTAL ECONOMICS	4	1	0	4	1	0	5
<b>DCO011A</b>	PRESENTATION SKILL USING CANVA	0	0	4	0	0	2	2
<b>DEN002A</b>	PROFESSIONAL SKILLS	2	0	0	2	0	0	2
<b>DEN002B</b>	PROFESSIONAL SKILLS LAB	0	0	2	0	0	1	1
<b>DIN002A</b>	CULTURE EDUCATION-II	2	0	0	2	0	0	2
	<b>Total</b>							<b>27</b>

  
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THIRD SEMESTER								
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L(Credit)	T(Credit)	P(Credit)	C
CORE COURSES								
BEC007C	ANALYSIS OF INDIAN ECONOMY I	4	1	0	4	1	0	5
BEC008C	DEVELOPMENT ECONOMICS	4	1	0	4	1	0	5
DISCIPLINE SPECIFIC ELECTIVE (DSE)								
	DISCIPLINE SPECIFIC ELECTIVE (DSE-II)	4	1	0	4	1	0	5
FOUNDATION COURSES								
DCA004A	COMPUTER APPLICATION-III (ADVANCE EXCEL)	0	0	4	0	0	2	2
DEN003A	LIFE SKILLS-I (PERSONALITY DEVELOPMENT)	1	0	2	1	0	1	2
BEC016C	OPEN ELECTIVE-I	3	0	0	3	0	0	3
BEC038C	RESEARCH METHODOLOGY	2	1	0	2	1	0	3
DIN003A	VALUE EDUCATION-I	1	0	0	1	0	0	1
	<b>Total</b>							<b>26</b>

  
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FOURTH SEMESTER								
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L (Credit)	T (Credit)	P (Credit)	C
CORE COURSES								
BEC009C	ANALYSIS OF INDIAN ECONOMY II	4	1	0	4	1	0	5
BEC010C	BASIC ECONOMETRICS	4	1	0	4	1	0	5
DISCIPLINE SPECIFIC ELECTIVE (DSE)								
	DISCIPLINE SPECIFIC ELECTIVE (DSE-III)	4	1	0	4	1	0	5
FOUNDATION COURSES								
DCA012A	BLOGGING, VLOGGING AND PODCASTING	0	0	2	0	0	1	1
DMA011A	LIFE SKILLS-II(APTITUDE)	1	0	2	1	0	1	2
DIN004A	VALUE EDUCATION-II	1	0	0	1	0	0	1
BEC015B	OPEN ELECTIVE-II	3	3	0	0	0	0	3
	<b>Total</b>							<b>22</b>

  
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<b>FIFTH SEMESTER</b>								
<b>Course Code</b>	<b>Course Name</b>	<b>L (Hrs )</b>	<b>T (Hrs )</b>	<b>P (Hrs )</b>	<b>L (Credit)</b>	<b>T (Credit)</b>	<b>P (Credit)</b>	<b>C</b>
<b>CORE COURSES</b>								
<b>BEC011C</b>	ADVANCED ECONOMETRICS	4	1	0	4	1	0	5
<b>BEC012B</b>	INTERNATIONAL ECONOMICS-I	4	1	0	4	1	0	5
<b>DISCIPLINE SPECIFIC ELECTIVE (DSE)</b>								
	DISCIPLINE SPECIFIC ELECTIVE (DSE-IV) (T1:Pg No.77) and (T3: Pg No. 109)	4	1	0	4	1	0	5
	DISCIPLINE SPECIFIC ELECTIVE (DSE-V) (T1:Pg No.79) and (T3: Pg No. 113)	4	1	0	4	1	0	5
<b>OPEN ELECTIVE (OE)</b>								
<b>DEC002A</b>	OPEN ELECTIVE III*	3	3	0	0	0	0	3
	<b>Total</b>							<b>23</b>

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SIXTH SEMESTER								
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L (Credit)	T (Credit)	P (Credit)	C
CORE COURSES								
BEC014 B	INTERNATIONAL ECONOMICS II	5	0	0	5	0	0	5
BEC031 B	DISSERTATION/PROJECT/p	0	0	0	0	0	0	10
DISCIPLINE SPECIFIC ELECTIVE (DSE)								
	DISCIPLINE SPECIFIC ELECTIVE (DSE-VI) (T1:Pg No.83) and (T3: Pg No. 115)	4	1	0	4	1	0	5
OPEN ELECTIVE (OE)								
BEC037C	OPEN ELECTIVE-IV*	3	0	0	3	0	0	3
	<b>Total</b>							<b>23</b>

  
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Note: The topic of the project has to be selected before the end of fifth semester.

L	Number of Lecture hrs/week
P	Number of Practical hrs/week
T	Number of Tutorial hrs/week
C	Number of Credits.
*	These courses are offered by Department of Economics, School of Humanities and Social Sciences as Open Elective.

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## **CORE PAPERS**

1. INTRODUCTORY MICROECONOMICS
2. INTRODUCTORY MACROECONOMICS
3. MATHEMATICAL METHODS FOR ECONOMICS
4. INTERMEDIATE MICROECONOMICS
5. INTERMEDIATE MACROECONOMICS
6. STATISTICAL METHODS FOR ECONOMICS
7. ANALYSIS OF INDIAN ECONOMY I
8. DEVELOPMENT ECONOMICS
9. ANALYSIS OF INDIAN ECONOMY II
10. BASIC ECONOMETRICS
11. ADVANCED ECONOMETRICS
12. INTERNATIONAL ECONOMICS I
13. INTERNATIONAL ECONOMICS II

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## **DISCIPLINE SPECIFIC ELECTIVE (DSE) PAPERS**

### **TRACK 1- FINANCIAL ECONOMICS**

1. ECONOMICS OF MONEY AND BANKING
2. BEHAVIOURAL FINANCE
3. FINANCIAL MARKETS AND INSTRUMENTS
4. INTERNATIONAL FINANCE
5. PUBLIC FINANCE
6. ANATOMY OF FINANCIAL CRISIS, RISK MANAGEMENT AND REGULATION



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## **TRACK 2- AGRICULRAL ECONOMICS**

1. INTRODUCTION TO AGRICULTURAL ECONOMICS
2. AGRICULTURAL POLICY FRAMEWORK IN INDIA
3. AGRICULTURAL FINANCE
4. AGRICULTURAL RISK MANAGEMENT AND INSURANCE
5. INTERNATIONAL TRADE IN AGRICULTURE
6. AGRO-PROCESSING INDUSTRIES

## **TRACK 3- ECONOMICS AND PUBLIC POLICY**

1. INTRODUCTORY PUBLIC POLICY
2. MARKET FAILURES AND POLICY INTERVENTIONS
3. BIG DATA AND PUBLIC POLICY
4. PUBLIC POLICY ANALYSIS
5. IMPACT EVALUATION
6. PUBLIC POLICY CAPSTONE

## **TRACK 4 - MISCELLANEOUS**

1. ECONOMICS OF INFRASTRUCTURE
2. DEMOGRAPHY
3. ENVIRONMENTAL ECONOMICS
4. ECONOMY OF RAJASTHAN
5. HEALTH ECONOMICS
6. INDUSTRIAL ECONOMICS



## **OPEN ELECTIVE PAPERS**

1. BEHAVIOURAL FINANCE
2. ECONOMICS OF HEALTH AND EDUCATION
3. ECONOMICS FOR ENGINEERS
4. SUSTAINABLE DEVELOPMENT
5. MANAGERIAL ECONOMICS

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**CREDIT SUMMARY**

<b>Semester I</b>	<b>Semester II</b>	<b>Semester III</b>	<b>Semester IV</b>	<b>Semester V</b>	<b>Semester VI</b>	<b>Total Credits</b>
27	27	26	22	23	23	148

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### **Programme Outcomes (POs):**

**PO1 Domain knowledge:** Apply the knowledge of domain subjects, science, computer fundamentals, and humanities & social science specialization to the solution of complex individual & social problems.

**PO2 Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

**PO3 Problem Analysis:** Stimulate into adopting an enquiring attitude towards the problems encountered, developing solutions & appreciation of the different contexts

**PO4 Design/development of solutions:** Design solutions for complex psychological, economical, political & social problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO5 Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO6 Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex activities with an understanding of the limitations.

**PO7 Environment and sustainability:** Understand the impact of the professional solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8 Ethics:** Recognize the diversity and complexity of ethical dilemmas in the real world, and educate oneself to base one's actions on responsibility, and respect for human rights

**PO9 Multidisciplinary approach:** To develop multidisciplinary perspective in reference to historical, social, psychological, economical, political & cultural context.

**PO10 Effective Communication:** Articulate ideas and perspectives, by developing and enhancing the communicative skills of listening, speaking, reading, and writing in interpersonal and interactive contexts, in print and in electronic media, for various audiences and purposes.

**PO11 Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.



**PO12 Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological change.

### **PROGRAMME SPECIFIC OUTCOMES FOR B.A. (HONS) ECONOMICS**

**PSO-1:** Develops strong competencies in under graduate level students in broad fields of Economics and its interactive environment.

**PSO-2:** Acquainting with collection, organization, tabulation and analysis of empirical data and ability to use basic mathematical and statistical tools to solve realistic economic problems

**PSO-3:** Develops ability to deal with basic and applied econometric tools and methods used in economics. Acquainting with statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models.

**PSO-4:** Develops the ability to analyze, synthesize and disseminate large amount of complex and disparate information.

**PSO-5:** Acquainting with basic issues and prospective suggestions relating to the Indian economy and learn the basic concept of monetary analysis and financial marketing in Indian financial markets.



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# SEMESTER I

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## Core Papers

### **PAPER 1** **BEC001C: INTRODUCTORY MICROECONOMICS**

#### Course Objectives

1. To understand the basic concepts and principles related to micro economics.
2. To understand that about the allocation of scarce resources and their trade-offs.
3. To lay emphasis and follow on the microeconomic concepts that can be applied to real life situations.

<b>UNIT I</b>	Introduction , Basic Economic Problems; Micro & Macro Economics; Equilibrium – Partial & General, Stable & Unstable; Static, Comparative static & Dynamic analysis.
<b>UNIT II</b>	Cardinal Utility Analysis Demand – Meaning, Demand schedule & Demand curve, Law of Demand, Changes in demand, Market demand; Total and Marginal utility; Law of diminishing marginal utility; Consumer's equilibrium – law of equi-marginal utility.
<b>UNIT III</b>	Ordinal Utility Analysis, Indifference curves; Budget line; Consumer's equilibrium.
<b>UNIT IV</b>	Topics on Consumer Behavior, Price, substitution and income effect: Normal, Inferior and Giffen Goods (Hicksian Approach); Engel's Curve; Elasticity of demand: Price, Income and Cross – meaning & measurement; Consumer's surplus – Marshallian Concept.
<b>UNIT V</b>	Theory of Production, Production with one variable input: Total, average and marginal product curves; Law of returns to variable factor-Stages of Production; Production with two variable inputs: Isoquants and Iso-cost; Producer's equilibrium; Expansion Path; Ridge Lines; Law of Returns to scale.

#### Course Outcomes

Student will

1. Be acquainted with the methodology and approach of Microeconomics.
2. Learn the principles of micro economic theory.
3. Understand the behaviour of an economic agent, namely a consumer and a producer.
4. Develop insights for the application of micro-economic analysis to economic and social problems.



Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2												3				
CO2		1		1													
CO3				1						2	1		1				
CO4			2											1			

3 = Highly Related; 2 = Medium; 1 = Low

### Essential Readings:

1. H.L. Ahuja, Micro Economic Theory, S. Chand & Company, New Delhi.
2. Seth, M.L., Micro Economics, Laxmi Narayan Agarwal, Agra.

### Reference Books:

1. Gould J.P. and C.F. Ferguson, Micro Economic Theory, All India Traveler Book Sellers, Delhi.
2. N. Gregory Mankiw, Principles of Microeconomics (5th ed.), 2009, South-Western (Cengage Learning).
3. Koutsoyiannis, A. (1999), Modern Microeconomics, Macmillan.
4. Varian, H.R. (2000), Intermediate Microeconomics: A Modern Approach, East west Press, New Delhi.
5. Lipsey, R.G. (Latest edition), An Introduction to positive Economics.
6. Stonier, A.W. and D.C. Hague (1972), A Textbook of Economics Theory, ELBS and Longman Group, London.



**PAPER 2**  
**BEC002C: INTRODUCTORY MACROECONOMICS**

**Course Objective**

1. To introduce to the students the basic principles of macroeconomic theory.
2. To enable the students to understand the characteristics of major macroeconomic variables.
3. To make the students aware of the basic theoretical framework underlying the field of Macroeconomics.
4. To equip students to analyse the dynamic interactions between the major macroeconomic variables.

<b>UNIT I</b>	National Income ,Circular flow of Income, Concepts and methods of measuring the National Income; Concept of Real and Nominal income; Problems in measuring National Income; National Income and welfare.
<b>UNIT II</b>	Classical Economics :Say's Law; Determination of Equilibrium output and employment in simple Classical Model; Classical model involving Savings and Investment; Keynes' attack on the Classical Model.
<b>UNIT III</b>	Keynesian Economics, Consumption Function; Investment Function; Determination of equilibrium income and output in a three sector model
<b>UNIT IV</b>	Multiplier & Accelerator, Multiplier – Meaning & Working; Static & Dynamic Multiplier; Concept of Tax Multiplier, Government Expenditure Multiplier & Balanced, Budget Multiplier; Accelerator – Meaning & Operation; Super Multiplier.
<b>UNIT V</b>	Trade Cycles, Trade Cycles – Definition & Phases; Theories of Trade Cycles – Hicks, Samuelson and Kaldor; Measures to control trade cycles.

**Course Outcomes**

Student will

1. Be aware with the mainstream approaches to the study of macroeconomics.
2. Be able to distinguish between the various approaches and the merits and critiques of each of them.
3. Acquire the ability to understand the dynamic interactions between the macroeconomic variables and their impact on the economy.
4. Demonstrate the knowledge of different concepts in contemporary macro issues.



Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2												3				
CO2		3		2													
CO3								1		2	1			2			
CO4			2											1			

3 = Highly Related; 2 = Medium; 1 = Low

### Essential Readings:

1. Shapiro, E. (1996), Macroeconomic Analysis, Galgotia Publications, New Delhi.
2. Vaish, M.C., Macro Economics, Wishwa Prakashan.
3. Ahuja, H.L., Macro Economic Analysis, S. Chand.

### Reference Books:

1. Ackley, G. (1976), Macroeconomics: Theory and Policy, Macmillan Publishing Company, New York.
2. Keynes, J.M. (1936), The General Theory of Employment, Interest and Money, Macmillan, London.
3. Rastogi, S. and S. Aiyar (1997), National Income and Accounting, Lotus Books.
4. Froyen R., Macro Economics, Pearson Education.
5. Fatianni M., Salvatore D., and Hagen JU (1997), "Macro Economic Policies in Open Economy", Green Wood press.



### **PAPER 3**

#### **BEC003C: MATHEMATICAL METHODS FOR ECONOMICS**

##### **Course Objective**

1. To introduce the students to mathematical methods required to analyse economic problems.
2. To enable the students to understand various concepts of set theory, matrix algebra and calculus.
3. To make the students aware of integration of mathematical methods with other courses of microeconomics as well as macroeconomics.

<b>UNIT I</b>	Logic and proof techniques. Basic set operations, convex sets. Real numbers, lowest upper bound, greatest lower bound, maximum, minimum. Functions and correspondences, into and onto functions, inverse functions, composition of functions, one to one correspondence between sets, convex, concave, quasi concave, homogeneous and homothetic functions
<b>UNIT II</b>	Vector spaces: algebraic and geometric properties, scalar products, norms, orthogonality. Linear transformations: properties, matrix representations and elementary operations. Systems of linear equations and Cramer's Rule. Determinants: characterization, properties and applications.
<b>UNIT III</b>	Continuous functions of different types and their graphs- quadratic, polynomial, power, exponential, and logarithmic. Derivatives of first and second order and their properties.
<b>UNIT IV</b>	Differentiable functions: characterizations, properties with respect to various operations and applications Second order derivatives: properties and applications The implicit function theorem, and application to comparative statics problems Homogeneous and homothetic functions
<b>UNIT V</b>	Implicit functions and their derivatives. Unconstrained optimization, necessary and sufficient conditions, global optima of convex and concave functions. Constrained optimization, equality constraints: Lagrange's method, the meaning of Lagrange multiplier, maximum value function and Envelope Theorem.

##### **Course Outcomes**

Students will

1. Use mathematical techniques to analyse economic problems
2. Model economic questions in mathematical framework
3. Evaluate range of problems using mathematical techniques
4. Acquire mathematical skills used in economic analysis.



Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1			3										3				
CO2		1				2											
CO3				2							1				2		
CO4			2											2			

**3 = Highly Related; 2 = Medium; 1 = Low**

### Essential Readings:

1. K. Sydsaeter and P. Hammond, Mathematics for Economic Analysis, Pearson Educational Asia: Delhi, 2002.
2. A. Chiang & K. Wainwright: Fundamental Methods of Mathematical Economics, McGrawHill.
3. E. Silberberg & Suen: The Structure of Economics, McGrawHill.
4. Simon & Blume, Mathematics for Economists, VivaBooks.
5. Rudin W.: Principles of Mathematical Analysis, McGraw-Hill





## SEMESTER II

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## **PAPER 4**

### **BEC004D: INTERMEDIATE MICROECONOMICS**

#### **Course Objectives:**

1. To understand the over view of microeconomic concepts and theory.
2. To illustrate the process of determination of equilibrium price and output in different market situations.
3. To understand and recognize the concepts used in factor pricing.
4. To understand the application of the macroeconomic theory to analyse the implication of the macroeconomic policies

<b>UNIT I</b>	Cost and Revenue, Short- run cost curves and their relationship; Cost in the long- run: LAC and LMC; Economies and diseconomies of scale; Revenue: Total, average and marginal revenue and their relationships; Relationship between TR, MR, AR and elasticity.
<b>UNIT II</b>	Theory of Firm I ,Equilibrium of the firm: TR - TC approach and MR - MC approach; Perfect competition: Determination of price and output in the short and long run; Monopoly: Determination of price and output in the short and long run.
<b>UNIT III</b>	Theory of Firm II, Monopoly: Price discrimination, measure of monopoly power; Monopolistic competition: determination of price and output in the short- and long-run, excess capacity; Oligopoly: Basic concept of non-collusive and collusive oligopoly, Paul M. Sweezy model.
<b>UNIT IV</b>	Factor Pricing I, Marginal Productivity Theory of Distribution: Factor pricing in perfectly competitive markets; Factor pricing in imperfectly competitive markets. Interest: Classical & Keynesian Theories.
<b>UNIT V</b>	Factor Pricing II, Rent: Ricardian theory of rent; Modern theory of rent; quasi rent. Profit: Innovation, risk and uncertainty theories. Theories of Interest.



## Course Outcomes

Student will

1. Be able to recognize the microeconomic concepts like cost and revenue concepts.
2. Learn the determination of equilibrium price and output in various market situations.
3. Be able to state marginal productivity theory of distribution, different theories of interest, profits and rent.
4. Apply the microeconomic concepts to analyze the various issues at macro level.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2		3										3				
CO2		2												2			
CO3				2	1						1						
CO4						1										2	

3 = Highly Related; 2 = Medium; 1 = Low

## Essential Readings:

1. H.L. Ahuja, Micro Economic Theory, S. Chand & Company, New Delhi.
2. Seth, M.L., Micro Economics, Laxmi Narayan Agarwal, Agra.

## Reference Books:

3. Gould J.P. and C.F. Ferguson, Micro Economic Theory, All India Traveler Book Sellers, Delhi.
4. Koutsoyiannis, A. (1999), Modern Microeconomics, Macmillan.
5. Varian, H.R. (2000), Intermediate Microeconomics: A Modern Approach, Eastwest Press, New Delhi.
6. Lipsey, R.G. (Latest edition), An Introduction to positive Economics.



## **PAPER 5**

### **BEC005D: INTERMEDIATE MACROECONOMICS**

#### **Course Objectives**

1. To learn and understand the formal modelling of macroeconomic theory in terms of analytical tools.
2. To recognise the various alternative theories of output and employment.
3. To introduce the students to various theoretical issues related to an open economy.
4. To understand and learn the macroeconomic policies.
- 5.

<b>UNIT I</b>	Aggregate Demand and Aggregate Supply Curves Derivation of aggregate demand and aggregate and supply curves; interaction of aggregate demand and supply.
<b>UNIT II</b>	Inflation, Unemployment and Expectations Phillips curve; adaptive and rational expectations; policy ineffectiveness debate.
<b>UNIT III</b>	Macroeconomic Policy, Active or Passive Policy Debate; Fiscal Policy: Public-Choice and Partisan Theories, Automatic Fiscal Stabilizers, Pros and Cons of Balanced Budget Rules, Traditional and Ricardian View of Public debt, crowding in and crowding out effect, Ricardian equivalence; Monetary Policy: Goals of Monetary Policy and Intermediate Targets, Choosing Intermediate Targets in the case of Supply and Demand Shocks, Targeting Monetary Aggregates and its Implications, Targeting Interest Rates and its Implications; Recent International Experience: Discretion versus Policy Rules Debate, Taylor's Rule and Monetary Policy – Inflation Targeting – Issues Relating to Inflation Targeting – Country Experiences with Inflation Targeting
<b>UNIT IV</b>	Open Economy Models Short-run open economy models; Mundell-Fleming model; exchange rate determination; purchasing power parity; asset market approach; Dornbusch's overshooting model; monetary approach to balance of payments; international financial markets.
<b>UNIT V</b>	Economic Growth Harrod-Domar model; Solow model; golden rule; technological progress and elements of endogenous growth.

#### **Course Outcomes**

Student will

1. Learn the formal modelling of macroeconomic theory.
2. Be acquainted with various theories of output and employment.
3. Be able to relate various theoretical issues to open economy.
4. Recognize and relate to the implications of macroeconomic policies.



Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2		3										3				
CO2									2								
CO3				2							1	1					
CO4									2							1	2

3 = Highly Related; 2 = Medium; 1 = Low

### Essential Readings:

1. Shapiro, E. (1996), Macroeconomic Analysis, Galgotia Publications, New Delhi.
2. Vaish, M.C., Macro Economics, Wishwa Prakashan.
3. Ahuja, H.L., Macro Economic Analysis, S. Chand.

### Reference Books:

1. Dornbusch, R., Fischer, S., & Startz, R. (2015). Macroeconomics. (11th ed.). McGraw Hill Education. Froyen, R. (2014).
2. Macroeconomics: Theories and Policies (10th ed.). Pearson Education. Mankiw, N. G. (2015).
3. Macroeconomics (9th ed.). USA: Worth Publishers. McConnell, C. R., & Brue, S. L. (2011).
4. Macroeconomics, Principles, Problems and Policies. New York: McGraw Hill Inc. Snowden, B. & Vane, H. R. (2005). Modern Macroeconomics: Its Origins, Development and Current State. United Kingdom: Edward Elgar Publishing.



**PAPER 6**  
**BEC006C: STATISTICAL METHODS FOR ECONOMICS**

**Course Objectives**

1. To acquire basic skills in applied statistics.
2. To develop skills in the field of economic analysis and reasoning.
3. To develop skills in the analysis and presentation of data.
4. To understand and apply the various statistical methods to problems.

<b>UNIT I</b>	Scope of statistics; Importance and limitation of statistics Collection of Data: Planning and organizing a statistical enquiry; Methods of collecting primary data; Sources of secondary data; Sampling: Census method vs. sample method; Classification of data: Meaning, methods of classification; Tabulation of data: meaning, role, parts of a table; General rules of tabulation; Presentation of data; Diagrams and graphs: General rules for construction a diagram; Types of diagrams; Types of graphs; Software Applications.
<b>UNIT II</b>	Measures of Central Tendency and Dispersion, Measures of Central Tendency: Mean, median and mode; Geometric and Harmonic means; Partition Values: Quartiles; deciles; percentiles; Measures of Dispersion: Range, inter-quartile range and quartile deviation, mean deviation, standard deviation and Lorenz curve, coefficient of dispersion; Software applications.
<b>UNIT III</b>	Moments, Skewness and Kurtosis; Correlation and Linear Regression Model , Correlation Analysis: Meaning, types of correlation; Methods of studying correlation: Scatter diagram method, Karl Pearson's co-efficient of correlation, Spearman's rank method, concurrent deviation method; Testing the significance of the correlation coefficient.
<b>UNIT IV</b>	Time Series Statistics, Measurement of Secular trend: Free hand curve method or eye inspection method - Semi average method, Moving Average Method.
<b>UNIT V</b>	Meaning and importance; problems in the construction of index numbers; Types of index numbers: price index; quantity index; value index; construction of price index numbers: unweighted and weighted indices (Laspeyre's index, Paasche's index, Fishers ideal index); construction of quantity and value indices; tests of index numbers: Time reversal test; Factor reversal test; Splicing: Deflating process; Consumer Price Index (CPI): meaning and uses; problems in the construction of cost of living index; Methods of constructing cost of living index: Aggregate expenditure and family budget methods; Limitations of index numbers; Software applications.



## Course Outcomes

Student will

1. Understand the concepts and methods of Statistics, for application in data analysis.
2. Acquire statistical skill required for the analysis of socio-economic data.
3. Be able to handle on training in data analysis (along with computer applications)
4. Be able to interpret the results and conclusions of statistical analysis.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2												1		2		
CO2			2		2										3		
CO3						3					1						
CO4				2		1										1	

3 = Highly Related; 2 = Medium; 1 = Low

## Essential Readings

1. Anderson, D. R., Sweeney, D. J., Williams, T. A., Camm, J. D., & Cochran, J. J. (2014).
2. Essentials of Statistics for Business and Economics. Boston: Cengage Learning. Lind, D. A., Waite, C. A., Marchal, W. G., & Wathen, S. A. (2005).
3. Basic Statistics for Business & Economics. New York: McGraw-Hill. Sharma, J. K. (2010). Fundamentals of Business Statistics. (2nd ed.). New Delhi: Vikas Publishing House.
4. Croxton, F. E., & Cowden, D. J. (1964). Applied General Statistics. (2nd ed.). New Delhi: Prentice Hall of India Private Limited. Freund, J. E., & Perles, B. M. (2007).
5. Modern Elementary Statistics. (12th ed.). New Jersey: Prentice Hall.
6. Gupta, S. C., & Kapoor, V. K. (2007). Fundamentals of Applied Statistics. (4th ed.). New Delhi: Sultan Chand & Sons. Larsen, R. J., & Marx, M. L. (2012).
7. GS Monga (2003), Mathematics and statistics for economics, (2<sup>nd</sup> rev. ed.), Vikas Publication House (New Delhi).



8. An Introduction to Mathematical Statistics and its Applications. (5th ed.). New Jersey: Prentice Hall.





## SEMESTER III

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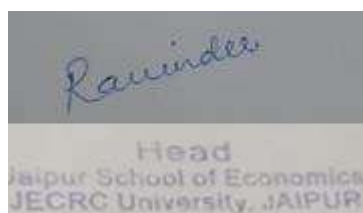
## **PAPER 7**

### **BEC007C: ANALYSIS OF INDIAN ECONOMY -I**

#### **Course Objectives**

1. To provide an overall understanding of major challenges faced by Indian economy.
2. To understand the features and structural changes of Indian economy and compare with the growth pattern and challenges of other economies.
3. The course enables the student to apply the theoretical knowledge in the actual working of Indian economy.

<b>UNIT I</b>	Economic Development since Independence; Major features of Indian Economy at independence and characteristics of economic underdevelopment of India (with reference to colonial rule of India); Trend in National Income and Per capita income; Sectoral composition (output and employment) - Primary, Secondary and Tertiary. Development under different policy regimes—goals, constraints, institutions and policy framework Economic Development since Independence. Major features of the economy, role of agriculture in Indian Economy- causes of low productivity, measures to increase productivity.
<b>UNIT II</b>	Industrialization- role, industrial policies, public sector and private sector, small scale industries- importance and problems.
<b>UNIT III</b>	Population and Human Development; Broad demographic features — Population size and growth rates, Sex and age composition, occupational distribution. Density of population, Urbanization and economic growth in India. Population growth as a factor of economic development, National Population Policy, Progress of human development in India. Development of education in India, health and family welfare and the development of health infrastructure. Population and Human Development, Demographic trends and issues; education, causes of rapid population, development of human resources.
<b>UNIT IV</b>	Structural Change of Post Independent Indian Economy; Growth, Distribution and Trends of national income, sectoral distribution. An assessment of performance— sustainability and regional contrasts; structural change, savings and investment. Trends, measurement and policies in poverty; Inequality-measurement, causes and effects, Unemployment-Types, Causes and Employment policies in India.
<b>UNIT V</b>	Economy in Post Reform Period ; Background of Indian Economic Reforms – New Economic Policy; Redefining India's development strategy; Changing Role of State and Market Industrial Policy, Disinvestment policy and Privatization; Financial sector reforms including banking reform. External sector reforms: Foreign Exchange market, Balance of Payments, reform, convertibility, export-import policy, foreign direct investment; Post-reform Agricultural Performance and its



	Crisis; Appraisal of Indian Economic Reform Growth and Distribution, Trends and policies in poverty; inequality, alleviation programs and unemployment.
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### Course Outcomes

Student will

1. Be able to understand the various sectors and features of Indian economy.
2. Be able to understand the various policy debates and economic indicators in the post-independence era with special emphasis on paradigms shifts and turning points.
3. Be able to recognise the structural changes before and after economic reforms in 1991.
4. Be able to critically evaluate various industrial policies in India.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2												3				
CO2			1											2			3
CO3				2	2		1					1					
CO4		3															2

3 = Highly Related; 2 = Medium; 1 = Low

### Essential Readings:

1. Misra and Puri, Indian Economy, Himalaya publication
2. Rudra Dutt and Sundram, Indian Economy, S. Chand

### Reference Books

1. Jean Dreze and Amartya Sen, *India: Development and Participation*, Oxford University Press, 2nd edition, 2002.
2. Pulapre Balakrishnan, 2007, "The Recovery of India: Economic Growth in the Nehru Era", *Economic and Political Weekly*, November.
3. Rakesh Mohan, 2008, "Growth Record of Indian Economy: 1950-2008. A Story of Sustained Savings and Investment", *Economic and Political Weekly*, May.
4. S.L. Shetty, 2007, "India's Savings Performance since the Advent of Planning", in K.L. Krishna and A. Vaidyanathan, editors, *Institutions and Markets in India's Development*.



5. J.B.G. Tilak, 2007, "Post Elementary Education, Poverty and Development in India", *International Journal of Educational Development*.



## **PAPER 8**

### **BEC008C: DEVELOPMENT ECONOMICS**

#### **Course Objectives**

1. To give an understanding of the theoretical perceptions of economic growth and development together with the forces bringing about them.
2. To broaden the awareness of the challenges in the developmental process and thus motivate the students towards the thinking of alternative solutions.
3. To understand the concept and measurement of Poverty.
4. To demonstrate the knowledge of various concepts of development and growth while solving the problems of developing economy.

<b>UNIT I</b>	Meaning of Development and Relevant Concepts; Economic growth and development -Meaning, differences and Measures – PQLI- Physical Quality of Life Index, HDI - Human Development Index, GDI- Gender Development Index, GII- Gender Inequality Index, MDPI- Multidimensional Poverty Index, GNHI – Gross National Happiness Index, Sen’s Capabilities Approach; Environmental Sustainability and Sustainable Development- Concept and strategy; Market and State as agencies of development; Common characteristics of developing nations.
<b>UNIT II</b>	Classical Theories of Development; Contributions of Adam Smith, Ricardo, Karl Marx, Schumpeter, and Rostow.
<b>UNIT III</b>	Important Growth Models; Harrod and Domar: Instability of equilibrium; Neo-Classical Growth Model: Solow; Theories of Endogenous Growth with special reference to Romer’s model.
<b>UNIT IV</b>	Theories of Development; Balanced and Unbalanced Growth; Nelson’s Low Income Equilibrium Trap; Underdevelopment as Coordination failure, multiple Equilibria: A Diagrammatic Approach; the Big Push theory and Leibenstein’s Theory of Critical Minimum Efforts, Dual Economy model of Lewis.
<b>UNIT V</b>	Poverty, Inequality and Development; Concept of Poverty and Poverty Line; Measurement of poverty – absolute and relative, Head-Count Index and Poverty Gap Indices, recent measures of Poverty; Recent Poverty Alleviation Schemes; Concept of inequality and recent measures; Economic growth and income inequality – Kuznets’ inverted Hypothesis, the impact of inequality on development.



## Course Outcome

Student will

1. Recognize and examine the role of theories of the economics of development in a number of existing development issues.
2. Be able to reflect on the links between various development economic theories and approaches
3. Explore the prospects of the course to improve the quality of life in developing countries.
4. Recognize important role of macroeconomic policies for economic development.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1			3		1									1			
CO2		2	1		2							1		2			
CO3									2						2		
CO4					1								3				

3 = Highly Related; 2 = Medium; 1 = Low

## Essential Readings:

1. Debraj Ray, Development Economics, Oxford University Press, 2009.
2. Partha Dasgupta, Economics, A Very Short Introduction, Oxford University Press, 2007.
3. Abhijit Banerjee, Roland Benabou and Dilip Mookerjee, Understanding Poverty, Oxford University Press, 2006.
4. Kaushik Basu, The Oxford Companion to Economics in India, OUP, 2007.
5. Amartya Sen, Development as Freedom, OUP, 2000.

## BEC038C RESEARCH METHODOLOGY

### Course Objectives:

1. To understand the importance of research in creating and extending the knowledge base in their area of research interest;



2. To develop their ability to distinguish between the strengths and limitations of different research approaches in general and in their research area specifically
3. To gain skills required to work independently, so that they can plan and carry out a small- scale research project.

<b>UNIT I</b>	Meaning and Definition of Research, Meaning and definition of research; criteria for good research; objectives of research; difficulties in social research; utility of research; ;literature review, sources of literatures. Philosophy and Methods of Social Research.
<b>UNIT II</b>	Research Design and Ethics, Research design: Meaning, types and evaluation of research design; Research Ethics in designing, data collection and analysis; Deductive and inductive methods; classification of research.
<b>UNIT III</b>	Selection of Research Problem, Steps involved in selection of research problem; evaluation of the problem; Calculating sample size, Sampling and Sample Design , Meaning of sampling; Sampling process; Methods of sampling; Sampling errors

### .Course Outcomes

CO 1 Students will be able to analyze and evaluate the concepts critically underpinning different research methodologies suitable for

use within the economics and social sciences.

CO2 Students will be able to demonstrate in-depth knowledge of a range of research methods applicable to economics discipline and

decide how to choose a method guided by their research question.

CO3.Students will gain a clear understanding of the ethical considerations and the need for rigour in conducting research in social sciences.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2		3										3				
CO2		2												2			
CO3					2						1						
CO4																	

3 = Highly Related; 2 = Medium; 1 = Low



**Essential Readings:**

- 1 Cargan, L. (2007). Doing Social Research. Lanham, MD: Rowman & Littlefield Publishers.
- 2 Kothari, C. R. (2014). Research Methodology: Methods and Techniques (2nd ed.). New Delhi: New Age International Publishers.
- 3 Walliman, N. (2016). Social Research Method: The Essentials. London: SAGE Publications.
- 4 Wellington, J. & Szczerbiński, M. (2007). Research Methods for the Social Sciences. New York: Continuum International Publishing Group.

**Syllabus for Open Elective-I**

**(Offered by Department of Economics, School of Humanities and Social Sciences)**

**BEC016C BEHAVIOURAL FINANCE****Course Objectives**

1. To provide students with in-depth understanding of Behavioural Finance and Bounded rationality concept.
2. To understand the key behavioral biases of individual and professional investors.
3. To analyze the theoretical and empirical foundations and challenges to the efficient market hypothesis.

<b>Module 1:</b>	Introduction to Behavioral finance – Nature, scope, objectives and application Psychology and market people. Investors, portfolio managers, analysts: are they rational? Bounded rationality in real market conditions. Decision-making process and behavioral biases. Simple experiments on anchoring.
<b>Module 2:</b>	Utility/ Preference Functions: Expected Utility Theory [EUT] and Rational Thought: Decision making under risk and uncertainty - Expected utility as a basis for decision-making – Theories based on Expected Utility Concept - Investor rationality and market efficiency
<b>Module 3:</b>	Behavioral Corporate Finance: Behavioral factors and Corporate Decisions on Capital Structure and Dividend Policy - Capital Structure dependence on Market Timing -. Systematic approach to using behavioral factors in corporate decision making.
<b>Module 4:</b>	Behavioral Factors and Financial Markets: The Efficient Markets Hypothesis – Fundamental Information and Financial Markets - Information available for Market Participants and Market Efficiency -Market Predictability





## Course Outcome

Student will

1. Identify and apply psychological concepts to financial markets and financial decision – making.
2. Understand the concepts to help promote more efficient financial decisions.
3. Explore behavioral corporate finance, considering financial, investment and dividend policy decisions.
4. Acquire knowledge to infer about human decisions influencing their financial decisions in domestic and global markets.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2								2				3				
CO2			1													1	
CO3					2				3								1
CO4						1						3					

3 = Highly Related; 2 = Medium; 1 = Low

## Essential Readings:

1. Behavioral Finance: Psychology, Decision-Making, and Markets", by Ackert and Deaves.
2. Understanding Behavioral Finance by Ackert, The Psychology of Investing by John R.
3. Nofsinger, Pearson Prentice Hall, (4th Edition)
4. What Investors Really Want - Learn the lessons of behavioral Finance, Meir Statman, McGraw-Hill
5. Handbook of Behavioral Finance – Brian R. Bruce
6. Behavioral finance - Wiley Finance - Joachim Goldberg, Rüdiger von Nitzsch
7. Plous, Scott, 1993, The Psychology of Judgment and Decision Making, Ch 10-15
8. Shleifer, Andrei, 2000, Are Financial Markets Efficient?, Chapter 1 in Inefficient Markets, Oxford University Press.
9. Ackert, L., and R. Deaves, 2010, Behavioral Finance: Psychology, Decision-



Making and

10. Markets, South-Western Cengage Learning, Mason, Ohio.
11. Nofsinger, J. R., 2001, Investment Madness, Prentice Hall.
12. Mitchell, O. S., and S. P. Utkus, eds., 2004. Pension Design and Structure: New Lessons from Behavioral Finance (Oxford University Press, New York, New York).
13. Shleifer, Andrei (2000): Inefficient Markets: An Introduction to Behavioral
14. Finance, Oxford University Press, Oxford.



## SEMESTER IV

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## **PAPER 9**

### **BEC009C: ANALYSIS OF INDIAN ECONOMY II**

#### **Course Objectives:**

1. To understand the basic structure and sector-specific policies of Indian Economy.
2. To analyze various policies and their impact in shaping trends in key economic indicators in India. It highlights major policy debates and evaluates the Indian empirical evidence.
3. Students will be able to identify the determinants of various macroeconomic aggregates such as output, unemployment, inflation, productivity and the major challenges associated with the measurement of these aggregates.

<b>UNIT I</b>	Macroeconomic Policies and Their Impact Fiscal Policy; trade and investment policy; financial and monetary policies; labour regulation.
<b>UNIT II</b>	Policies and Performance in Agriculture Growth; productivity; agrarian structure and technology; capital formation; trade; pricing and procurement.
<b>UNIT III</b>	Policies and Performance in Industry Growth; productivity; diversification; small scale industries; public sector; competition policy; foreign investment.
<b>UNIT IV</b>	Trends and Performance in Services.
<b>UNIT V</b>	Foreign investment and foreign technology. Foreign direct investment in India: Policy, trend and impact, Labour relations and labour policy. Labour reforms since 1991.

#### **Course Outcomes**

Student will

1. Understand the structure of Indian Economy.
2. Be able to recognise the growth and contribution of service sector in India.
3. Be able to apply their knowledge of macroeconomic concepts in measuring various aggregates.
4. Understand the importance of agriculture as the foundation of economic growth and development in India.



Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2												3				
CO2														2			3
CO3			1	2	2						1						
CO4		3															2

**3 = Highly Related; 2 = Medium; 1 = Low**

### Essential Readings:

1. Shankar Acharya, 2010, "Macroeconomic Performance and Policies 2000-8", in Shankar Acharya and Rakesh Mohan, editors, India's Economy: Performances and Challenges: Development and Participation, Oxford University Press.
2. Rakesh Mohan, 2010, "India's Financial Sector and Monetary Policy Reforms", in Shankar Acharya and Rakesh Mohan, editors, India's Economy: Performances and Challenges: Development and Participation, Oxford University Press.
3. Pulapre Balakrishnan, Ramesh Golait and Pankaj Kumar, 2008, "Agricultural Growth in India Since 1991", RBI DEAP Study no. 27.
4. B.N. Goldar and S.C. Aggarwal, 2005, "Trade Liberalisation and Price-Cost Margin in Indian Industries", The Developing Economics, September.
5. P. Goldberg, A. Khandelwal, N. Pavcnik and P. Topalova, 2009, "Trade Liberalisation and New Imported Inputs", American Economic Review, Papers and Proceedings, May.



## **PAPER 10**

### **BEC0010C: BASIC ECONOMETRICS**

#### **Course Objectives**

1. To understand basic econometric concepts and techniques.
2. To have the ability to apply econometric techniques in the investigation of economic relationships and processes.
3. To understand and learn data analysis and to the specific econometric problems associated with economic statistics.

<b>UNIT I</b>	Definition and scope of econometrics; Methodology of econometric research; Historical origin of the term regression and its modern interpretation; Statistical vs. deterministic relationship; regression vs. causation, regression vs. correlation; Terminology and notation; The nature and sources of data for econometric analysis.
<b>UNIT II</b>	Simple Linear Regression Model, Two Variable Case Estimation of model by OLS method: Assumptions; Properties of Least Square Estimators: Gauss-Markov Theorem; Testing of regression coefficient; Test for regression as a whole: Coefficient of determination.
<b>UNIT III</b>	Multiple Linear Regression Model, Multiple Regression Analysis: The problem of estimation, notation and assumptions; meaning of partial regression coefficients; the multiple coefficient of determination: $R^2$ and the multiple coefficient of correlation; $R^2$ and adjusted $R^2$ ; partial correlation coefficients; interpretation of multiple regression equation.
<b>UNIT IV</b>	Relaxing the Assumptions of CLRM, Introduction to Multicollinearity, Heteroscedasticity & Autocorrelation: the nature of the problem; its detection and corrective measures.
<b>UNIT V</b>	Dummy Variable Regression Models., Dummy Variable technique: The Nature of Dummy Variables; Dummy Variable Trap; ANOVA; Use of Dummy variables: Structural Break; Seasonal Adjustment; and Interaction effects; Nature of Qualitative response models: Linear Probability Model; Logit Model; Probit Model.



## Course Outcomes

Student will

1. Have the knowledge and skills required for the construction and estimation of simple and multiple regression models.
2. Be able to perform econometric analysis and estimation, by understanding their application in economics.
3. Be able to analyse each economic problem in depth and also able to do testing of the hypotheses.
4. Understand the concept and types of theoretical and applied econometrics.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PP 12	PSO 1	PS O2	PS O3	PS O4	PS O5
CO1	2		3\										2				
CO2				1		3								1	3		
CO3			3		1												
CO4												1					

**3 = Highly Related; 2 = Medium; 1 = Low**

## Essential Readings

1. Gujarati, D. N. (2016). Econometrics by Example (2nd ed.). New Delhi: Palgrave. Gujarati, D. N., Porter, D.C., &Gunasekar, S. (2017).
2. Basic Econometrics. (5th ed.). New Delhi: McGrawHill. Studenmund, A. H. (2016). Using Econometrics: A Practical Guide. (7th ed.). New Delhi: Pearson.



## **Syllabus for Open Elective-II**

(Offered by Department of Economics, School of Humanities and Social Sciences)

### **BEC015B ECONOMICS OF HEALTH AND EDUCATION**

#### **Course Objectives**

1. To provide students with ability to understand the implications of market and government failures in the context of health care.
2. To understand how many institutions and regulatory arrangements observed in the sector can be linked to different types of markets.
3. To give an introduction to health economics theory and methods and how they could be applied to analyse the functioning of health system and the determinants of health and use of health services.

<b>Module 1:</b>	Role of Health and Education in Human Development Importance in poverty alleviation; health and education outcomes and their relationship with macroeconomic performance.
<b>Module 2:</b>	Microeconomic Foundations of Health Economics Demand for health; uncertainty and health insurance market; alternative insurance mechanisms; market failure and rationale for public intervention; equity and inequality.
<b>Module 3:</b>	Evaluation of Health Programs Costing, cost effectiveness and cost-benefit analysis; burden of disease.
<b>Module 4:</b>	Health Sector in India: An Overview Health outcomes; health systems; health financing. Education: Investment in Human Capital Rate of return to education: private and social; quality of education; signalling or human capital; theories of discrimination; gender and caste discrimination in India.





## Course Outcomes

Student will

1. Have knowledge and understanding of the major theories and frameworks for core areas of health economics in terms of main issues, methods, results and unresolved problems.
2. Have a good understanding of how economic theory and methods are applied in the health care sector.
3. Understand the efficiency and equity considerations in health and health care.
4. Be aware of the advantages and problems of working across disciplines.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PP 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2					1							3				
CO2		2							3								
CO3			1	2													2
CO4												1					

3 = Highly Related; 2 = Medium; 1 = Low

## Essential Readings:

1. William, Jack, Principles of Health Economics for Developing Countries, World Bank Institute Development Studies, 1999.
2. World Development Report, Investing in Health, The World Bank, 1993.
3. Ronald G., Ehrenberg and Robert S., Smith, Modern Labor Economics: Theory and Public Policy, Addison Wesley, 2005.



## SEMESTER V

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## **PAPER 11**

### **BEC011C: ADVANCED ECONOMETRICS**

#### **Course Objectives**

1. To provide a comprehensive introduction to the advanced econometric concepts and techniques.
2. To discuss and analyze the application advanced econometric techniques in the investigation of complex economic relationships using time series and panel data.
3. To develop the skills to make economic forecasting.

<b>UNIT I</b>	Dynamic Econometric Models , Lags in econometric models; Distributed lag model; Autoregressive lag model; Reasons for lags; Estimation of distributed-lag model, The Koyck Approach to distributed-lag model; Rationalisation of koyck model: The adaptive expectations model, partial adjustment model; Estimation of autoregressive models; The method of instrument variable (IV); Causality in economics: The granger causality test.
<b>UNIT II</b>	Simultaneous-Equation Models ,Nature of simultaneous equations models; Simultaneous equation bias; Structural models; Reduced form models; Identification problem; Rules of identification; Tests for simultaneity and exogeneity; Method of indirect least squares (ILS); Method of two-stage least squares
<b>UNIT III</b>	Time Series Econometrics: Basic Concepts, Introduction to time series; Stationary and nonstationary time series; Spurious regression; Unit root tests: Dickey fuller and Augmented dickey fuller tests; Transforming nonstationary time series; Cointegration: Testing for cointegration, error correction mechanism.
<b>UNIT IV</b>	Time Series Econometrics: Forecasting , Approaches to economic forecasting; ARIMA models; The Box-Jenkins methodology; Vector autoregression; Forecasting with VAR; Testing causality using VAR.
<b>UNIT V</b>	Panel Data Regression Model Introduction to panel data; Constant coefficient model; Fixed effect LSDV model; Fixed effect WG model; Random effects model, Properties of estimators.

#### **Course Outcomes**

Student will

1. Learn the advanced econometric concepts and techniques.
2. Be able to apply economic techniques to study various economic relationships and models.
3. Develop skills to make economic forecasting.
4. Be able to apply econometric techniques for the analysis of time series and panel data.



Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2		3														
CO2				2	1									2	3		
CO3					1												
CO4						1									2		

3 = Highly Related; 2 = Medium; 1 = Low

### Essential Readings

1. Gujarati, D. N. (2016). Econometrics by Example (2nd ed.). New Delhi: Palgrave.
1. Gujarati, D. N., Porter, D.C., & Gunasekar, S. (2017). Basic Econometrics. (5th ed.). New Delhi: McGraw Hill.
2. Studenmund, A. H. (2016). Using Econometrics: A Practical Guide. (7th ed.). New Delhi: Pearson.
2. Enders, W. (2013). Applied Econometric Time Series (3rd ed.). New York: John Wiley & Sons.
3. Greene, W. H. (2003). Econometric Analysis (5th ed.). New Delhi: Pearson Education.
4. Hamilton, J. D. (1994). Time Series Analysis. Princeton: Princeton University Press.
5. Koutsoyiannis, A. (1973). Theory of Econometrics. New York: Koutsoyiannis, A.



## **PAPER 12**

### **BEC012C: INTERNATIONAL ECONOMICS-I**

#### **Course Objectives:**

1. To understand the theories governing international trade.
2. To study the various concepts and issues related to international economics.
3. To know and analyze the meaning and role of Economic Integration.

<b>UNIT I</b>	Inter-regional and international trade; Theories of absolute advantage, comparative advantage and opportunity cost; Empirical tests of Ricardian Model.
<b>UNIT II</b>	The Standard Theory of International Trade and Terms of Trade The Basis for and the Gains from Trade with Increasing Costs; Trade Based on Differences in Tastes; The Equilibrium Relative Commodity Price with Trade; Partial Equilibrium Analysis & General Equilibrium Analysis; Terms of trade.
<b>UNIT III</b>	The Heckscher - Ohlin Theory, Economies of Scale, Imperfect Competition and International Trade, Heckscher-Ohlin Theory; Factor-Price Equalization, Effect of Trade on Income Distribution; The Leontief Paradox; Empirical relevance of the H-O theory in the current period; Economies of Scale and International Trade; Imperfect Competition and International Trade-Intra industry trade; Technological gap and Product Cycle models.
<b>UNIT IV</b>	Trade Restrictions: Tariffs and Nontariff Trade Barriers. Partial Equilibrium Analysis of a Tariff; General Equilibrium Analysis of a Tariff in a Small Country; Import Quotas; Other Non-tariff Barriers; Neo- Protectionism
<b>UNIT V</b>	Economic Integration: Meaning of Economic Integration, Trade-Creating Customs Unions; Trade-Diverting Customs Unions; The Theory of the Second Best and Other Static Welfare Effects of Customs Unions; ASEAN, SAARC; Multilateralism; WTO; New outlook towards a global trading system.

#### **Course Outcomes**

Student will

1. Understand and learn various theories of International Trade.
2. Be able to analyze and discuss the issues related to International Economics.
3. Know the meaning and role of Economic Integration and International Institutions for International Trade.
4. Be able to analyse and understand various trade agreements.



Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2		3										3				
CO2																	
CO3	2											1					2
CO4			2				2										2

3 = Highly Related; 2 = Medium; 1 = Low

### Essential Readings:

1. Salvatore, D.L., 1997, International Economics, Prentice Hall, Upper Saddle River, N.J.
2. Vaish, M.C. & S. Singh, 1995, International Economics.

### Reference Books:

1. Mithani, D.M., Money, Banking, International Trade & Public Finance, Himalaya Publisher.
2. Sundaram, K.P.M., Money, Banking, & International Trade, Sultan Chand.
3. Kindleberger, C.P., 1973, International Economics, R.D. Irwin, Homewood.
4. Sodersten, B.O. 1991, International Economics, McMillan Press Ltd. London.
5. Lindert, International Economics, All India Traveller Book Seller.



### **Syllabus for Open Elective-III**

**(Offered by Department of Economics, School of Humanities and Social Sciences)**

#### **(DEC002A) ECONOMICS FOR ENGINEERS**

##### **Course Objectives**

4. To learn about the dimensions of evaluating economic alternatives
5. To make fundamentally strong base for decision making skills by applying the concepts of economics.
6. Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
7. Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

<b>Module 1:</b>	Introduction to Economics- Flow in an economy, Law of supply and demand, Concept of Engineering Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics
<b>Module 2:</b>	Element of costs, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-even analysis- V ratio, Elementary economic Analysis – Material selection for product Design selection for a product, Process planning.
<b>Module 3:</b>	. Inflation And Price Change – Definition, Effects, Causes, Price Change With Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes In Engineering Economic Analysis National Income: Circular Flow of Income, Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income -Production Method, Income Method, Expenditure Method.
<b>Module 4:</b>	Economic Stabilization: Monetary Policy- Meaning, Objectives, Tools; Fiscal Policy Meaning, Objectives, Tools.

##### **Course Outcome**

Student will

5. Understand major principles of economic analysis for decision making among alternative courses of action in engineering.
6. Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.
7. Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.



8. Describe the principles of economics that govern the operation of any organization under diverse market conditions

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Course Outcome	Program Outcome												Program Specific Outcome				
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PP 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	2								2				3				
CO2			1													1	
CO3					2				3								1
CO4						1						3					

**3 = Highly Related; 2 = Medium; 1 = Low**

### Essential Readings:

- [1] C S Park, "Contemporary Engineering Economics", Pearson Education, 2002.
- [2] J S Chandan, "Statistics for Business and Economics", Vikas Publishing.
- [3] H. L. Ahuja, "Principles of Microeconomics", S. Chand (G/L) & Company Ltd, 2002.
- [4] D. N. Dwivedi, "Macroeconomics Theory and Policy", Tata McGraw-Hill Publishing Company, 2010.
- [5] S Damodaran, "Managerial Economics", Oxford University Press, 2010.

# SEMESTER VI

## PAPER 13

### BEC014C: INTERNATIONAL ECONOMICS –II

#### Course Objectives

- 1 To understand the major concepts and theories of International trade.
- 2 To analyze and discuss all the institutions which are responsible for the smooth operation of International trade.
3. To learn and analyze the various contemporary issues pertaining to International trade.

<b>UNIT I</b>	An overview of world trade, Basis for and Gains from trade - Arbitrage and basis of trade; Comparative (price) advantage; different sources of Comparative Advantage; Absolute versus comparative Advantage; Gains from Trade - Trade as a positive-sum game - Gains from Trade theorem, illustration and its meaning; GFT theorem and Pareto optimality; Decomposition of GFT; substitution possibilities in production and consumption and magnitudes of GFT; Necessary and sufficient conditions of GFT: Tangency and convexity conditions International Equilibrium - Offer curve under increasing opportunity costs: Derivation and Elasticity; International Equilibrium and determination of terms of trade; Offer curve under constant opportunity cost and distribution of GFT between large and small countries; Stability of International Equilibrium: Marshal-Lerner Condition
<b>UNIT II</b>	International Equilibrium - Offer curve under increasing opportunity costs: Derivation and Elasticity; International Equilibrium and determination of terms of trade; Offer curve under constant opportunity cost and distribution of GFT between large and small countries; Stability of International Equilibrium: Marshal-Lerner Condition, Effect of Growth on Trade. Factor growth and production possibility; trade and growth induced by technical progress; Growth, terms-of-trade and welfare
<b>UNIT III</b>	The Balance of Payments, Foreign Exchange Rates, Balance of Payments: Principles; Disequilibrium in BOP, BOP Crisis in India in 1991 Functions of the Foreign Exchange Markets; Foreign Exchange Rates; Purchasing Power Parity Theory; Stable and Unstable Foreign Exchange Markets. Currency Convertibility
<b>UNIT IV</b>	The International Monetary System and Macroeconomic Policy Coordination



	The Evolution of the Bretton Woods System; The IMF; Policy Coordination with Floating Exchange Rates; The Single Currency and Economic Integration; The European Monetary Union.
<b>UNIT V</b>	International Economic Issues, Financial liberalization, capital movements and economic crises. Sustainable trade; Issues in emerging markets, international trade and ethics.

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## Course Outcomes

Student will

1. Be able to discuss the major economic theories of international trade, and to analyze the economic implications of alternative trade policies.
2. Be able to trace the development of the international financial architecture and of the international monetary system, and to evaluate the implications of different exchange rate regimes for domestic macroeconomic policy.
3. Be able to identify major economic characteristics of selected world's regions.
4. Be able to trace the origins of various processes of international (global or regional) economic integration, and to discuss their implications for the international patterns of productive specialization.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2		3										3				
CO2		2												2			
CO3				2	1						1						
CO4						1										2	

3 = Highly Related; 2 = Medium; 1 = Low

## Essential Readings:

1. Salvatore, D.L., 1997, International Economics, Prentice Hall, Upper Saddle River, N.J.
2. Vaish, M.C. & S. Singh, 1995, International Economics.
3. Mithani, D.M., Money, Banking, International Trade & Public Finance, Himalaya Publisher.
4. Sundaram, K.P.M., Money, Banking, & International Trade, Sultan Chand.
5. Kindleberger, C.P., 1973, International Economics, R.D. Irwin, Homewood.
6. Sodersten, B.O. 1991, International Economics, McMillan Press Ltd. London.
7. Lindert, International Economics, All India Traveller Book Seller.



## **DISSERTATIONS/PROJECT**

### **Course Objectives**

1. To inculcate in students the rigour of research work.
2. To imbibe in students the spirit of inquiry.
3. To encourage students to do academic reading of journal articles
4. To be informed about new developments in the field of economics research.

### **Dissertation Description**

One of the requirements of Economics Honours students is the ability to conduct independent research under the guidance of a faculty. This course enables students to demonstrate an understanding of how to apply theoretical knowledge to practice by investigating and careful evaluation of real life problems.

The dissertation should be a minimum of 10,000 words in length (or approximately 35 pages). The word count includes the text, table, quotations, footnotes, title, table of content, and appendices. Abstract is excluded from the word count.

### **Course Outcome**

Student will

1. Identify research topics/areas and design and conduct an original and ethical research.
2. Be able to formulate a research problem statement and identify the sources and types of reference materials
3. Learn about researches that are empirical data based (qualitative, quantitative, or mixed methods)
4. Be able to critically review research and theory. Students will suggest recommendations and policies for solving the problems studied.



5.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PP 12	PSO 1	PS O2	PS O3	PS O4	PS O5
CO1			2			1											
CO2																2	
CO3				2	1									1	3		
CO4		2		2													

**3 = Highly Related; 2 = Medium; 1 = Low**

### Text Books and Reference Books:

The references are the research studies and the books that the students find relevant to their research.

### Essential Reading / Recommended Reading

The references are the research studies and the books that the students find relevant to their research.



## **Syllabus for Open Elective-IV**

**(Offered by Department of Economics, School of Humanities and Social Sciences)**

### **BEC037C SUSTAINABLE DEVELOPMENT**

#### **About the course**

The Sustainable Development Goals (SDGs) of the United Nations, which were adopted in 2015, will determine the course of the global social, ecological and economic agenda until 2030.

Information about the different SDGs is abundantly available but a comprehensive framework that brings them all together coherently is often lacking. This course provides a general and accessible academic introduction to SDGs in all its facets.

#### **Course Objectives**

1. To understand the emergence and development of the SDGs
2. To understand the interlinkages of SDGs and the importance of triple bottom line.
3. To understand the structure of the SDGs in the United Nations context
4. To acquire an understanding of how the SDGs relate to addressing global challenges such as inequality, climate change, poverty, unsustainable consumption and production, and peace and security

<b>Module 1:</b>	<b>The origin, development and idea of the SDGs</b> History and origins of the Sustainable Development Goals. What are the SDGs : Aim, Methodology and Perspectives. Dimensions of Sustainable Development, 5 Ps of Sustainable Development.
<b>Module 2:</b>	<b>Sustainability as Knowledge Domain</b> Human, Economic, Social and Environmental Sustainability. Relationship between Increasing Population, Life Expectancy, Infant Mortality and Sustainable Development. GDP Ratings, Failure of Global Capitalism and Sustainability Crisis on Earth. Triple Bottom Line: Profit, People, Planet
<b>Module 3:</b>	<b>SDGs and Society: Ensuring resilience and primary needs in society</b> The SDG 2030 Agenda: 17 Sustainable Development Goals (No Poverty; Zero Hunger; Good Health and Well Being; Quality Education; Gender Equality; Clean Water and Sanitation; Affordable Clean Energy; Decent Work and Economic Growth; Industry, Innovation and Infrastructure; Reducing Inequality; Sustainable Cities and Communities; Responsible Consumption and Production; Climate Action; Life Below Water; Life on Land; Peace, Justice and Strong Institutions; Partnerships for the Goals )



<b>Module 4:</b>	<b>Realizing the SDGs: Implementation through Global Partnerships</b> Analysis of SDG 2030 which aims to implement the SDGs through partnerships, finance, technology and the development of coherence between policies.
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### Course Outcomes

Student will

1. Understand the emergence and development of the SDGs
2. Understand the interlinkages of SDGs and the importance of triple bottom line.
3. Understand the structure of the SDGs in the United Nations context
4. Acquire an understanding of how the SDGs relate to addressing global challenges such as inequality, climate change, poverty, unsustainable consumption and production, and peace and security.

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2												3				
CO2	1																
CO3	2						2					1					2
CO4							2	1						2			

3 = Highly Related; 2 = Medium; 1 = Low

### References:

- Erach Bharucha; Textbook of Environmental Studies for Undergraduate Courses, Orient Blackswan, (2013)
- Stephan Smith; Environmental Economics: A Very Short Introduction, Oxford University Press 2011
- Draft Framework for Sustainable Development Sustainable Development Solutions Network.
- Mark Mastin; Climate Change: A Very Short Introduction, Oxford University Press 2014





- Our Common Future; The Brundtland Report from The UN World Commission on Environment and Development, Oxford, 1987
- Presentation on Realising the Future we want for all. UN system task team on the post 2015 Development Agenda.



## **Syllabus for Open Elective-V**

(Offered by Department of Economics, School of Humanities and Social Sciences)

### **BEC025B: MANAGERIAL ECONOMICS**

#### **Course Objectives**

1. To understand the various concepts related to managerial economics.
2. To integrate the basic concepts of economics with the tools of mathematics and statistics in order to analyze and make optimal business decisions.
3. To acquire knowledge of Capital budgeting and its methods.

<b>Module 1:</b>	Demand, Cost and Profit Analysis, Demand for durable and non-durable products, demand forecasting techniques, Cost estimation, Cost-volume-profit analysis (break even analysis)- objectives and assumptions; determination of breakeven point, limitations of c-v-p analysis
<b>Module 2:</b>	Pricing Policies and practices, Factors governing prices, price discounts and differentials, price forecasting.
<b>Module 3:</b>	Capital Budgeting, meaning, need for capital budgeting, different steps in capital budgeting, Capital budgeting appraisal methods – payback method, accounting rate of return method, net present value method, interest rate of return method, benefit cost ratio method. Capital rationing, alternative methods of financing investments
<b>Module 4:</b>	Cost of capital, Cost of debt capital, cost of share capital, cost of equity capital, cost of retained earnings. Inventory Management, Inventory costs, concepts of average inventory, various inventory models- economic order quantity, optimum number of orders per year, optimum number of days' supply per order.

#### **Course Outcomes**

Student will

1. Understand the roles of managers in firms.
2. Be able to make the internal and external decisions to be made by managers.
3. Be able to analyse the demand and supply conditions and assess the position of a company in terms of money, cost, inventory management etc.
4. Acquire knowledge regarding capital budgeting techniques and its methods.



Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2												3				
CO2			3											2			
CO3			2						1			1					
CO4	3															2	

**3 = Highly Related; 2 = Medium; 1 = Low**

### Essential Readings

1. Varshney R.L., and Maheshwari K.L. – Managerial Economics, Sulatn Chand, New Delhi
2. Keat P. G. and Young P.K.Y – Manegerial Economics, Pearson Education, N Delhi]
3. Mehta P.L - – Managerial Economics, Sulatn Chand, N Delhi
4. Samuelson W.F and Marks S,G - – Managerial Economics, Wiley Student Education
5. Clarke T. International Corporate Governance, Routledge.

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**TRACK-1**  
**FINANCIAL ECONOMICS**

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## **BEC015C: ECONOMICS OF MONEY AND BANKING**

### **Course Objectives**

1. To study the role played by banks in modern monetary economies and financial markets, including issues arising from bank regulation, the role of banks in financial intermediation, and the significance of bank behaviour in monetary policy.
2. To provide knowledge of the theory and functioning of the monetary and financial sectors of the economy.
3. To highlight the organization, structure and role of financial markets and institutions.
4. To discuss interest rates, monetary management and instruments of monetary control. Financial and banking sector reforms and monetary policy with special reference to India are also covered.

<b>UNIT I</b>	Money Concept, functions, measurement; theories of money supply determination.
<b>UNIT II</b>	Central Banking and Monetary Policy Functions, balance sheet; goals, targets, indicators and instruments of monetary control; monetary management in an open economy;
<b>UNIT III</b>	Interest Rate Determination; sources of interest rate differentials, interest rates in India.
<b>UNIT IV</b>	Balance sheet and Indian banking system: Changing role and structure; banking sector reforms. current monetary policy of India

### **Course Outcomes**

Students will

1. Understand the several key models and concepts of monetary economics and banking theory.
2. Understand articles concerned with monetary economics and banking theory.
3. Apply to current events key models and concepts of monetary economics and banking theory.
4. Appreciate the potential importance of monetary phenomenon in the economy.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1							2									M	
CO2		2						M			M	L					
CO3	3		2						H								
CO4				1	2	3				L							H

H = Highly Related; M = Medium; L = Low

**Essential Readings**

1. F. S. Mishkin and S. G. Eakins, Financial Markets and Institutions, Pearson Education, 6th edition, 2009.
2. F. J. Fabozzi, F. Modigliani, F. J. Jones, M. G. Ferri, Foundations of Financial Markets and Institutions, Pearson Education, 3rd edition, 2009.
3. L. M. Bhole and J. Mahukud, Financial Institutions and Markets, Tata McGraw Hill, 5th edition, 2011.
4. M. Y. Khan, Indian Financial System, Tata McGraw Hill, 7th edition, 2011.
5. Various latest issues of R.B.I. Bulletins, Annual Reports, Reports on Currency Group, IMF Staff Papers.



## **BEC016C: BEHAVIOURAL FINANCE**

### **Course Objectives**

1. To provide students with in-depth understanding of Behavioural Finance and Bounded rationality concept.
2. To understand the key behavioral biases of individual and professional investors.
3. To analyze the theoretical and empirical foundations and challenges to the efficient market hypothesis.

<b>UNIT I</b>	Introduction to Behavioral finance – Nature, scope, objectives and application Psychology and market people. Investors, portfolio managers, analysts: are they rational? Bounded rationality in real market conditions. Decision-making process and behavioral biases. Simple experiments on anchoring.
<b>UNIT II</b>	Utility/ Preference Functions: Expected Utility Theory [EUT] and Rational Thought: Decision making under risk and uncertainty - Expected utility as a basis for decision-making – Theories based on Expected Utility Concept - Investor rationality and market efficiency
<b>UNIT III</b>	Behavioral Corporate Finance: Behavioral factors and Corporate Decisions on Capital Structure and Dividend Policy - Capital Structure dependence on Market Timing -. Systematic approach to using behavioral factors in corporate decision making.
<b>UNIT IV</b>	Behavioral Factors and Financial Markets: The Efficient Markets Hypothesis – Fundamental Information and Financial Markets - Information available for Market Participants and Market Efficiency -Market Predictability

### **Course Outcome**

Students will

1. Be able to identify and apply psychological concepts to financial markets and financial decision – making...
2. Be able to apply the understanding of the concepts to help promote more efficient financial decisions.
3. Be able to explore behavioral corporate finance, considering financial, investment and dividend policy decisions.
4. Be acquiring knowledge to infer about human decisions influencing their financial decisions in domestic and global markets.



5.

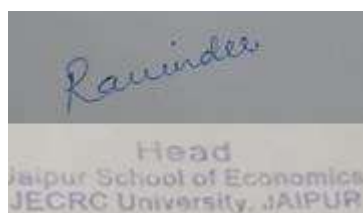
**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M		H				M		H							M	
CO2		M		M				M			M						
CO3										M				L			
CO4				L	M	H						L	H				

H = Highly Related; M = Medium: L = Low

**Essential Readings:**

15. Behavioral Finance: Psychology, Decision-Making, and Markets", by Ackert and Deaves.
16. Understanding Behavioral Finance by Ackert □ The Psychology of Investing by John R.
17. Nofsinger, Pearson Prentice Hall, (4th Edition)
18. What Investors Really Want - Learn the lessons of behavioral Finance, Meir Statman, McGraw-Hill
19. Handbook of Behavioral Finance – Brian R. Bruce
20. Behavioral finance - Wiley Finance - Joachim Goldberg, Rüdiger von Nitzsch
21. Plous, Scott, 1993, The Psychology of Judgment and Decision Making, Ch 10-15
22. Shleifer, Andrei, 2000, Are Financial Markets Efficient?, Chapter 1 in Inefficient Markets, Oxford University Press.
23. Ackert, L., and R. Deaves, 2010, Behavioral Finance: Psychology, Decision-Making and
24. Markets, South-Western Cengage Learning, Mason, Ohio.
25. Nofsinger, J. R., 2001, Investment Madness, Prentice Hall.
26. Mitchell, O. S., and S. P. Utkus, eds., 2004. Pension Design and Structure: New Lessons from Behavioral Finance (Oxford University Press, New York, New York).
27. Shleifer, Andrei (2000): Inefficient Markets: An Introduction to Behavioral
28. Finance, Oxford University Press, Oxford.





## **BEC017C: FINANCIAL MARKETS AND INSTRUMENTS**

### **Course Objectives**

1. To provide students with in-depth understanding of the operational issues of capital market and money market with its regulatory framework.
2. To understand the various regulations related to financial sector.
3. To analyze the various instruments of financial markets.

<b>UNIT I</b>	Introduction to Financial markets - Money vs. capital markets - Primary vs. secondary markets - Instruments in the money market - Instruments in the capital markets - Financial institutions; Banking and credit.
<b>UNIT II</b>	Financial Regulations and Financial Sector Reforms , Money Market regulations – Banking sector reforms – quarterly credit policy of RBI - Capital market regulations of SEBI- Legal issues in security trading - FERA & FEMA
<b>UNIT III</b>	Equity Market , IPO dematerialization, depositories, credit rating of financial instruments, financial institutions: development financial institutions, non-banking financial intermediaries, LIC of India and UTI, mutual funds, venture capital, bank-assurance
<b>UNIT IV</b>	Structure of banking industry, major developments in India, and in international capital markets 1975-1997: legal basis of corporate finance and investment banking

### **Course Outcome**

Students will

1. Be able to understand the various concepts and practical operations of the financial markets and apply them in real life.
2. Be able to recognize the various financial instruments and laws related to financial sector.
3. Be able to learn the topics of financial regulations, equity market and financial intermediaries.
4. Be acquiring knowledge of major development of investment banking in India.



## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					H		M									M	
CO2		M						M									
CO3	H		M						H								
CO4				L		H				L							H

H = Highly Related; M = Medium: L = Low

### Essential readings:

1. Madura, Jeff. (2015). *Financial Institutions and Markets* (11th ed.), Cengage Learning, USA.
2. Bailey, R. E. (2005). *The economics of financial markets*. Cambridge University Press.
3. Copeland, T. E., Weston, J. F., & Shastri, K. (2005). *Financial theory and corporate policy*. (4th ed.), Pearson.
4. Farrell, J. L., & Reinhart, W. J. (1997). *Portfolio management: theory and application*. McGraw- Hill.
5. Fisher, E. Donald., & Jordan, J. Roland. (1995). *Security Analysis and Portfolio management* (6th ed.), Pearson India.
6. Hearsh, D., & Zaima, J. K. (2001). *Contemporary investments: security and portfolio analysis*. Harcourt College Publ. Hull, J. C., (2016). *Futures, Options and other Derivatives* (9th ed.), Pearson.
7. L. M. Bhole., & J. Mahakud. (2009). *Financial Institutions and Markets* (5th ed.), McGraw-Hill.
8. Machiraju, H. R. (2010). *Indian financial system*. Vikas Publishing House. Palat, R. (2010).
9. *Fundamental Analysis* (4th ed.), Vision Books Pvt. Ltd. Radcliffe, R. C. (1997).
10. *Investment Concepts, Analysis and Strategies* (5th ed.), Addison Wesley.
11. Subramanyam, P. *Investment Banking*, TATA McGraw-Hill, 2005



## **BEC018C: INTERNATIONAL FINANCE**

### **Course Objectives**

1. To provide students with in-depth understanding of the Institutional Structure of International Finance
2. To understand the various exchange rate system.
3. To analyse the Balance of Payments mechanism.
4. To acquire in depth understanding of investment and movements.

<b>UNIT I</b>	Institutional Structure of International Finance The eurodollar, euro currency markets, multinational banking, international trader with letters of credit, financing international trade, institutions regulating international trade GATT, WTO, free – trade areas, customs union, NAFTA, ASEAN
<b>UNIT II</b>	Classical gold-standard system, Bretton woods, European money market, hybrid system of exchange rates. purchasing power parity principle, interest parity combination of PPP and covered interest parity
<b>UNIT III</b>	The principles of balance of payments, implications of the bop accounting identity balance of payments theory: different approaches and synthesis, imports, exports and deriving currency supply and demand curve
<b>UNIT IV</b>	Investment and borrowing with transaction costs, international dimension of cash management, portfolio investment international capital asset pricing, capital budgeting for foreign direct investment

### **Course Outcome**

Students will

1. Be able to understand the various concepts of institutional structure of International Finance.
2. Be able to analyze the various exchange rate systems and its implications.
3. Be able to learn the balance of payments mechanisms.
4. Acquire knowledge of international dynamics of investment and capital movements.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H												M				
CO2			M					M									
CO3												L					
CO4		L			M				H								M

H = Highly Related; M = Medium: L = Low

**Essential Readings:**

1. Levi, M.D. International Finance: The Markets and Financial Management of Multinational Business, 3rd Edition, McGraw Hill International Editions, Finance Series, 1996.
2. Pilbeam, K. International Finance, Macmillan, 1994



## **BEC019C: PUBLIC FINANCE**

### **Course Objectives**

1. To provide students with in-depth understanding of the Public Finance
2. To understand the classification and the basic principles of public expenditure.
3. To analyze the various sources of public revenue and its implications.

<b>UNIT I</b>	Meaning and Scope of Public Finance; Distinction between Private and Public Finance, Public goods and Private goods. Principle of Maximum Social Advantage.
<b>UNIT II</b>	Meaning, Classification and Principle of Public Expenditure; Effects of Public Expenditure on production and distribution; Trends in Public Expenditure and Causes of Growth of Public Expenditure in India
<b>UNIT III</b>	Sources of Public Revenue; Taxation: Meaning and Classification of Taxes; Principles of Taxation: Benefit and Ability to Pay Approaches; Impact and Incidence of Taxes; Effects of Taxation on production and distribution
<b>UNIT IV</b>	Public Budget: Economic and Functional Classification of Budget; Preparation of Budget in India; Centre-State Financial Relations in India; Fiscal Federalism

### **Course Outcome**

Students will

1. Be able to understand the various concepts of Public Finance.
2. Be able to analyze the Public Expenditure, its effects and trends.
3. Be able to know the various approaches to taxation as a source of public revenue.
4. Acquire knowledge of Budget formulation with reference to India and its pre-requisites.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M																
CO2					L											M	
CO3			M					M									
CO4				L		H											H

H = Highly Related; M = Medium: L = Low

**Essential Readings:**

1. J. Hindriks, G. Myles: Intermediate Public Economics, MIT Press, 2006.
2. H. Rosen, T. Gayer: Public Finance, 9th ed., McGraw-Hill/Irwin, 2009.
3. Joseph E. Stiglitz, Economics of the Public Sector, W.W. Norton & Company, 3rd edition, 2000.
4. R.A. Musgrave and P.B. Musgrave, Public Finance in Theory & Practice, McGraw Hill Publications, 5th edition, 1989. Bagchi, Amaresh (ed) Readings in Public Finance, OUP.
5. Report of the Finance Commission (Latest).
6. Economic Survey, Government of India (Latest).



## **BEC020C:ANATOMY OF FINANCIAL CRISIS, RISK MANAGEMENT AND REGULATION**

### **Course Objectives**

1. To describe the major U.S. financial crises over the last 100 years and their relationship to domestic and world economies.
2. To understand the various types financial risks associated and relevant management to the same.
3. To analyze the various regulatory mechanisms for the risk and market discipline.

<b>UNIT I</b>	Introduction: Financial Crisis-1929 Crash, Great Depression; The Mortgage Bubble and the Great Recession; Fall of Lehman, Bailout of everyone else: Money market funds
<b>UNIT II</b>	Introduction to Risk Management: Sources of risk, currency risk, fixed income risk, equity risk, commodity risk, market risk measurement; Hedging liner risk, optimal hedging; Settlement risk, introduction to credit risk, measuring credit risk, credit exposure,
<b>UNIT III</b>	Capital adequacy regulations Basel accord I & II. accounting standard, disclosure and relationship banking mark-to-market accounting, liquidity risk and contagion market discipline: issues and evidence market discipline in emerging economies: beyond bank fundamentals
<b>UNIT IV</b>	The ethics of finance and the economic function of financial markets – The purpose of regulation – levels of regulation – Securities Contract Regulation Act – Securities and Exchange Board of India (SEBI)

### **Course Outcome**

Students will

1. Understand the reasons of how the crises happened, grew out of one another, and apply that information to the nation's regulatory system.
2. Be able to analyze the various financial risk and their implications on the stability and sustainability.
3. Be able to know the various risk mitigating mechanisms for the financial discipline.
4. Acquire knowledge of regulatory framework for financial management and ethical functioning.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					H												M
CO2			M				M									M	
CO3	M																
CO4				L				H									

H = Highly Related; M = Medium: L = Low

**Essential Readings:**

1. Aliber, Robert & Kindleberger, Charles. (2015). Manias, Panics, and Crashes: A History of Financial Crises. 10.1007/978-1-137-52574-1.
2. Herring, R. and Litan, R.E. Financial Regulation in the Global Economy, Brookings Institution Press, 1995
3. Jorion, P. Financial Risk Manager Handbook, Wiley, 2002
4. Holton, G.A. Value-at-Risk- Theory and Practice, Academic Press, 2003
5. Herring, R. and Litan, R.E. Financial Regulation in the Global Economy, Brookings Institution Press, 1995.





**TRACK 2**  
**AGRICULTURAL ECONOMICS**

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## **BEC021C: INTRODUCTION TO AGRICULTURAL ECONOMICS**

### **Course Objectives**

1. To introduce the learner with Agricultural Economics.
2. To introduce the learner with the development of agriculture in India.
3. To make the learner familiar with use of yield increasing inputs, marketing and prices.
4. To introduce the learner with the credit system of Indian Agriculture.

<b>UNIT I</b>	Scope and Subject matter of Agricultural Economics, Nature and Utility of Agricultural Economics, Role and Importance of Agriculture in National Economy: share in National income, Source of livelihood, Employment, Industrial development and trade. Agricultural Growth in India during pre and post-Independence period
<b>UNIT II</b>	Factors responsible for agricultural development in India, Growth in use of technological factors in production such as irrigation, seed, fertilisers, capital during last five decades.
<b>UNIT III</b>	Land Utilization Pattern, Changes in agrarian structure in India, Patterns of Cropping in different regions, Shift in Cropping Pattern and its Implications on Food Security
<b>UNIT IV</b>	Credit in Indian agriculture: purposes of loans, Sources of finance and changes over the plan period. Factors determining demand for credit. Recent policy changes in regard to farm credit and their implications and critical points.

### **Course Outcomes**

Student will

1. Develop ideas of the basic characteristics of Indian Agriculture and its potential.
2. Understand agriculture as the foundation of economic growth and development.
3. Analyse the progress and changing nature of agricultural sector and its contribution to the economy.
4. Critically examine the change in cropping patterns and the availability of credit in India.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	M						L						M				
CO2				M					M								
CO3			L														
CO4		H				L											H

H = Highly Related; M = Medium; L = Low

**Suggested Readings:**

- Acharya and Agarwal, 1987, Agricultural Marketing in India, Oxford & IBH Publishing Company.
- Agricultural Research Data Book 2009, Indian Agricultural Statistics Research Institute, Pusa, New Delhi 110 012
- Agricultural Statistics at a Glance 2010, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, New Delhi.
- Bhalla, G. S. and Singh G., 2001, Indian Agriculture: Four Decades of Development, Sage Publications.
- Bhalla, G.S., 2007, Indian Agriculture since Independence, National Book Trust, India.
- Chadha, G.K.; S. Sen and H.R. Sharma, 2004, Land Resources, State of the Indian Farmer, Vol.2, Academic Foundation, New Delhi.
- Dantwala, M. L. and Others, 1991, Indian Agricultural Development since Independence: A Collection of Essays, Oxford & IBH Publishing Co., New Delhi.



## **BEC022C: AGRICULTURAL POLICY FRAMEWORK IN INDIA**

### **COURSE OBJECTIVES:**

1. To provide orientation to the learners regarding the agricultural policies and its effect on sustainable agricultural development.
2. To make the learners understand the concept of globalization and its impact on Indian Agricultural Development.
3. To make the learners acquaint with the various theories of Agricultural Development.
4. To introduce the learner with the recent and past policy framework of Indian Agriculture.

<b>UNIT I</b>	Agricultural and Economic Development, Role of Agriculture in Economic/ Rural Development, Theories of Agricultural Development: Resource Exploitation Model, Conservation Model, Location Model.
<b>UNIT II</b>	Need for sound Agricultural Policies. Planning for Agricultural Growth-Agricultural Policy and Programmes under Planning Periods.
<b>UNIT III</b>	Policy on Agrarian Reforms: Abolition of intermediaries, Tenancy Reform, Ceiling of Agricultural Land holdings, Impact of Land Reforms on Farming Community, Fragmentation of Land holdings
<b>UNIT IV</b>	Attainment of Self Sufficiency in Food grains: Policy initiatives in respect of Agricultural Inputs (Water, Seed, and Fertilizer Policy), Promotion of Plant nutrients, Fertiliser subsidy, Enforcement of Minimum Wage in Agriculture, policy options for sustainable agricultural development.

### **Course Outcomes**

Students will

1. Be well versed with theories of agricultural development
2. Understand the need for sound agricultural policies and the planning needed for agricultural growth.
3. Know the agrarian reforms and their impacts.
4. Have an insight into self-sufficiency in food grain production.



## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	M												H				
CO2		M			L	H			M								
CO3							M									M	
CO4											M						H

H = Highly Related; M = Medium; L = Low

### Essential Readings:

- Bhalla, G.S. (2007), Indian Agriculture since Independence, National Book Trust, India.
- Chakaravathi, R. M. (1986), Under Development and Choices in Agriculture, Heritage Publication, New Delhi.
- Eicher K.C. and J. M. Staatz (1998), International Agricultural Development, Johns Hopkins Univ. Press.
- Frank E. (1992), Agricultural Policies in Developing Countries, Cambridge Univ. Press.
- Ghatak, S and K Ingersent (1984) Agriculture and Economic Development, Select Book Service Syndicate, New Delhi.
- Jhingan, M. L. (1998), The Economics of Development and Planning, Vrinda Publ.
- Jules, P. N. (1995), Regenerating Agriculture – Policies and Practice for Sustainability and Self Reliance, Vikas Publ. House.
- Report of the Expert Group to Review the Methodology for Estimation of Poverty, Government of India, Planning Commission, 2009
- Sharma, V. P. and Thaker, H. (2011), Economic Policy Reforms and Indian Fertilizer Industry, Allied Publishers, 2011
- Singh, G. (2009), Performance of Formal Rural Credit in India, Gurdev Singh, Allied Publishers
- Singh, S. (2010), Agricultural machinery Industry in India, Allied Publishers



- Thimmaiah, G. and K. Rajan (2004), Policy and Organizational Support, State of the Indian Farmer, Vol. 26, Academic Foundation, New Delhi.

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## **BEC023C: AGRICULTURAL FINANCE**

### **COURSE OBJECTIVES**

1. To impart knowledge and expertise in the field of agricultural finance.
2. To acquaint with the business planning and financial management of an agri-business.
3. To create awareness about the role of institutions involved in the agricultural financing.
4. To impart knowledge relating to disbursement of institutional finance to priority sector.

<b>UNIT I</b>	Agricultural Finance: Concepts and Scope, Importance of Agricultural Finance, Characteristics of farm financial decisions, Steps in the process of farm financial management, classification of loans or credit, role of credit in agriculture and rural development.
<b>UNIT II</b>	Agencies of Agricultural Finance: Cooperative, Nationalized Banks, RRBs, NABARD, ARDC, AFC, Regional and All India Financial Institutions, Microfinance, outlines of recommendation of various committees, Programs of Rural development (SFA, MFAL), Comprehensive Crop Insurance Scheme.
<b>UNIT III</b>	Business Financing System in India, Money and Capital Markets, venture capital financing and its stages, and International financial management.
<b>UNIT IV</b>	Project Appraisal- B:C Ratio, Internal Rate of Return(IRR), Net Present Value (NPV), Pay Back period.

### **COURSE OUTCOMES**

Students will

1. Understand the concepts of the agricultural finance.
2. Have an insight into significance and limitations of Crop insurance.
3. Be acquainted with the types and roles of institutions involved in the agricultural financing.
4. Know the methods used to assess the feasibility of the projects.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	H												M				
CO2		M															L
CO3									L		M						
CO4				M												M	

H = Highly Related; M = Medium; L = Low

**Suggested Readings**

- Chandra, P. (2000), Financial Management, Tata McGraw Hill.
- Khan, M.Y. and P. K. Jain (2004), Financial Management: Text, Problems and Cases, Tata McGraw Hill.
- Pandey, I. M. (1997), Financial Management. Vikas Publication
- Ramachandran, N and R.K. Kakani (2005), Financial Accounting for Management, Tata McGraw Hill.
- Reddy, Subba S. and R. Raghu Ram (1996), Agricultural Finance and Management, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- Singh, Surjit and Vidya Sagar (2004), Agricultural Credit in India, State of the Indian Framers, Vol. 7, Academic Foundation, New Delhi.
- Van Horne J C. (1997), Financial Management and Policy, Prentice Hall.





## **BEC024C: AGRICULTURAL RISK MANAGEMENT AND INSURANCE**

### **COURSE OBJECTIVES**

1. To expose the students to the various kinds of risk in farming.
2. To make the students aware about laws or solutions relating to the risks.
3. To acquaint with risk management methods in agriculture.
4. To familiarise with the government introduced support measures.

<b>UNIT I</b>	Risks in Agriculture: Overview, Types of Risk, Risk Management Strategies and Mechanisms, decision making process in farm business management under risks and uncertainty.
<b>UNIT II</b>	Climatic Variability & Change: Climate Risks, Challenges in Climate Variability, Drought Risk, Floods & Cyclones, Catastrophe Protection for Non-Borrowing Farmers, Bankruptcy Law Production Risks, Technological Change -Improved Varieties and Fertiliser Use/Moisture Stress/Pests/Riskiness of Net Returns, Evidence on Aggregate Instability, Output Stability
<b>UNIT III</b>	Risk Management through Agricultural Insurance: Introduction, National Agricultural Insurance Scheme (NAIS), Crop Insurance as Risk Mitigation Tool, Impact of Crop Insurance on Farmers, Suicides by Farmers
<b>UNIT IV</b>	Price Support Measures: Introduction, Minimum Support Price (MSP), Market Intervention Scheme (MIS), Price Stabilization Fund Trust (PSFT), Credit Risk Fund

### **COURSE OUTCOMES**

Students will

1. Know about various risk management strategies.
2. Have an insight into various types of risks involved in farming.
3. Analyse the risks related insurance measures to be taken.
4. Understand the government introduced support measures.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	H																
CO2							L							M			
CO3			H														
CO4				M													H

H = Highly Related; M = Medium; L = Low

**Suggested Readings:**

- Acharya and Agrawal (1992), *Agricultural Marketing in India*, oxford and IBH Publishing Co. Pvt. Ltd.
- GOI (2007), *Report of The Working Group on Risk Management in Agriculture for the Eleventh Five Year Plan (2007-2012)* , GOI, New Delhi
- Ramaswami, Bharat ; Shamika Ravi And S.D. Chopra (2004), *Risk Management, State of the Indian Farmer- A Millennium Study*, Volume 22, Academic Foundation, New Delhi.



## **BEC025C: INTERNATIONAL TRADE IN AGRICULTURE**

### **COURSE OBJECTIVES**

1. To provide insight into theoretical aspects and policy related issues in international trade in agricultural commodities.
2. To acquaint with various principles and theories of international trade and trade patterns.
3. To provide insights of AoA under WTO and its impact on agricultural trade.
4. To introduce issues relating to Indian agricultural trade and export import procedures.

<b>UNIT I</b>	Importance of Agriculture in development, trade and agriculture, Inter-regional verses international trade- importance of trade, case for free trade and for protectionism- globalization and agriculture –case of free trade and for protectionism in case of agriculture.
<b>UNIT II</b>	<p>Mercantilist doctrine of balance of trade - Adam Smith and absolute advantage theory of trade -Ricardo and comparative advantage, its limitations; Comparative advantage in Heckscher Ohlin Model - Factor price equalization theorem - Factor intensity reversal - the empirical evidence on Heckscher Ohlin theory - the Leontief Paradox. Stolper-Samuelson Theorem – Rybczynski Theorem- Trade theories and empirical evidence relating to trade patterns, applicability to India.</p> <p>Recent explanations of the basis of trade in terms of technological lead, domestic market size and product cycle approach–Linder’s hypothesis-Gravity models-empirical evidence.</p>
<b>UNIT III</b>	Brief history of GATT- provisions relating to agri trade- factors leading to establishment of WTO basic principles- functions and organization -Agreement on Agriculture - main provisions – market access- domestic support - export subsidies- special and differential treatment, sanitary and phyto-sanitary provisions, export standards, TRIPS, various rounds and Doha impasse - emergence of various country groups /alliances and their participation in negotiations -Issues for further negotiations- implications of WTO provisions on Indian Agriculture - reduction commitments for India.
<b>UNIT IV</b>	Formation of regional trade blocks- reasons, types and performance – impact on trade.Competitiveness of Indian Agriculture, measures of competitiveness, competitiveness of various crops, domestic and international prices, competitiveness and commodity trade flows, measures for improving competitiveness of Indian exports- policy recommendations.



## COURSE OUTCOMES

Students will

1. Know about the inter-regional and international trade and their importance.
2. Analyse various theories of International Trade and their relevance to the Agricultural sector.
3. Have insights of AoA under WTO and its impact on agricultural trade.
4. Develop insight for issues relating to Indian agricultural trade and export import procedures.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1								M			L						
CO2			M										M				
CO3	H				L												
CO4				H													H

H = Highly Related; M = Medium; L = Low

### Suggested Readings

- Bhalla, G.S. (2004), Globalisation and Indian Agriculture, State of the Indian Farmers, Vol.19, Academic Foundation, New Delhi.
- Chadha G. K. (2003), *WTO and Indian Economy*. Deep and Deep Publications.
- Datta Samar K. and Satish Y. Deodhar (2001), *Implications of WTO Agreements for Indian Agriculture*, Oxford and IBH Pub. Co., New Delhi
- Hooda and Gulati (2007), *WTO Negotiations on Agriculture and Developing Countries*, Oxford University Press, New Delhi
- Gulati, Ashok and Tim Kelley (1999), *Trade liberalization and Indian Agriculture: Cropping Pattern Changes and Efficiency Gains in Semi-Arid Tropics*, Oxford University Press in New Delhi, New York.
- Vashisht A. K. and Singh Alka (2003), *WTO and New International Trade Regime- Implication for Indian Agriculture*. Advance Publishing Concept.
- Krugman and Obstfield (2009), *International Economics; Theory and Practice*, Pearson Publications, New Delhi.



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## **BEC026C: AGRO-PROCESSING INDUSTRIES**

### **COURSE OBJECTIVES**

1. To acquaint the students with structure and features of Agro processing industries in India.
2. To introduce different food processing techniques and their management.
3. To analyse various issues relating to food safety.

<b>UNIT I</b>	Case for Agro processing Industries-importance, farm -industry linkages, International perspective, Agro industries and developing countries-trends, impact of agro industrialization on markets and environment, challenges faced, various other issues..
<b>UNIT II</b>	India- Importance of Food Processing Industries, Women empowerment and food processing, Drivers of growth - supply, domestic demand, international demand, trade and policy support, emerging segments in food processing Problems and Opportunities
<b>UNIT III</b>	Organization in food industry; Introduction to operations of food industry; Deteriorative factors and hazards during processing, storage, handling and distribution.
<b>UNIT IV</b>	Basic principles and methods of food processing and food preservation by manipulation of parameters and factors and application of energy, radiations, chemicals and biotechnological agents; Food packaging materials and methods, labelling of food products.

### **COURSE OUTCOMES**

Students will

1. Develop an insight for the Agro Processing Industries.
2. Know the importance of Food Processing Industries.
3. Hold views on different food processing techniques and their management.
4. Analyse the facts about packaging materials and methods.



## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	M																
CO2					M				M				M				H
CO3							L					M					
CO4			H													M	

H = Highly Related; M = Medium; L = Low

### Suggested Readings

- Early R. (1995), Guide to Quality Management Systems for Food Industries. Blackie.
- Jelen P. (1985), Introduction to Food Processing. Reston Publishing.
- Potly, V.H. and M. J. Mulky (1993), Food Processing. Oxford & IBH.
- Journal of Indian Food Industries, various issues
- Beverages and Food World, various issues
- Journal of Food Marketing and Technology, various issues.
- Da Silva Carlos A. et al (Edt) , Agro-Industries for Development, The Food and Agriculture Organization of the United Nations and The United Nations Industrial Development Organization by arrangement with CAB International.
- Export-Import Bank of India, International Trade in Processed Foods: An Indian Perspective, Working Paper No. 61, March 2017.
- India Brand Equity Foundation- IBEF, Food Processing, January 2017, <https://www.ibef.org/download/Food-Processing-January-2017.pdf>
- GoI, Annual Reports, Ministry of Food Processing Industries, <http://www.mofpi.nic.in/>



**TRACK-3**  
**ECONOMICS AND PUBLIC POLICY**

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## **BEC027C: INTRODUCTORY PUBLIC POLICY**

### **Course Description**

Public policy making constitutes the core of politics and government in any nation. As the governments are called upon to perform a wide array of functions, the policy making process has acquired considerable complexity. Policy analysis finds an important place in other social science disciplines. This course aims at familiarizing the students with the key concepts and theories of public policy.

### **Objectives of the Course:**

1. To understand why certain issues emerge as policy issues for the government to act upon.
2. To understand the different ideas and process of public policy-making.
3. To discuss how different actors play their role in shaping and influencing the policy process.
4. To examine how policy problems and issues are defined, formulated and implemented.

<b>Unit 1</b>	Public Policy: Meaning and Scope, Rise of Public Policy as a Discipline, Meta and Meso Analysis of Public Policy, Putting Policy as Public Agenda, Policy-makers and their environment, Policy formation: problems, agendas and formation, Policy impact, evaluation and change.
<b>Unit 2</b>	Analytical Framework: Classical, Neo-Classical, Marxist, Neo-Marxists, Keynesian Perspective, Welfare Economics, Institutional Economics, Behavioral Economics, Stages Approach to Policy process: Theoretical Narratives of Policy Cycle, General Systems Analysis, Social Fabric Matrix
<b>Unit 3</b>	Rationality in policy-making. Contributions of Weber, Simon and Public Choice theorists: Rationale Choice Theory, Public Choice Theory, Maslow's Theory, Cost-Benefit Analysis
<b>Unit 4</b>	Pluralist approach and role of institutions: Pluralism, Institutionalism, New Institutionalism, Complexity, Policy paradox- determining policy objectives equity and justice: Ideologies and institutional constraint, Translating Theory into practice, Exclusion and inclusion in public policy

### **Course Outcomes:**

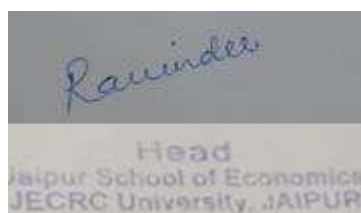
Students will



1. Identify and explain the relationship between interests, ideas, and institutions in a policy-process.
2. Clearly articulate and frame a policy issue in a way that calls attention to it and mobilizes action.
3. Develop the competence to identify the key stakeholders on an issue.
4. Develop the capacity to evaluate and recommend a policy response to a specific policy problem.

### **Suggested Readings:**

- Amy, Douglas J. (1984). "Why Policy Analysis and Ethics are Incompatible." *Journal of Policy Analysis and Management*. Vol. 3, No. 4 (Summer). Pp. 573-591.
- Anderson, James E (2004) Public Policy making, Houghton, New York.
- Bochel, Hugh and Duncan, Sue 2007 Making Policy in Theory and Practice, The policy Press, Great Britain
- Brewer, G., and deLeon, P. (1983). The Foundations of Policy Analysis. Monterey, Cal.: Brooks.
- Cochran, Charles and Malone, Eloise, 2007 Public Policy: Perspectives and Choice, Viva Books Pvt Ltd. , New Delhi
- Dani, Anis A and Haan Arjan de (ed) 2008 Inclusive States: Social Policy and Structural Inequalities.
- deLeon, P. (1999). The Stages Approach to the Policy Process. In P.A. Sabatier (ed.), Theories of the Policy Process, pp. 19–32. Boulder, CO: Westview Press.
- Fischer, F. (1993). Policy Discourse and the Politics of Washington Think Tanks. In F. Fischer and J. Forrester (eds.), The Argumentative Turn in Policy Analysis and Planning. Durham and London: Duke University Press, 21–24.
- Fischer, F. (2003). Reframing Public Policy: Discursive Politics and Deliberative Practices. Oxford: Oxford University Press.
- Frank Fischer and Gerald Muller (eds) 2007 Handbook of Public Policy Analysis Theory, Politics and Methods.
- Geyer, Rober and Rihani, samir (2010) Complexity and Public Policy, Routledge, London.
- Guy Peters, 2015, Advanced Introduction to Public Policy, Edward Elgar Publishing House. Cheltenham, U.K.
- Guy Peters, B and Pierre, Jon (2007) Institutionalism Volume.1, vol.2, vol.3, vol.4, Sage Publications.
- Hajer, Maarten A and Wagenaar, Hendrik (2003) Deliberative Policy Analysis, Cambridge, University Press.
- Hayden, F Gregory (2006) Policy making for a good society: The social Fabric Matrix approach to Policy analysis and programme Evaluation.
- Hogwood, B.W., and Gunn, L.A. (1984). Policy-analysis for the real world. Oxford: Oxford University Press.



- Howlett, M., and Ramesh, M. (2003). Studying Public Policy. Policy Cycles and Policy Subsystems 2nd Edition. Oxford: Oxford University Press.
- Jenkins, W.I., (1978). Policy-Analysis. A Political and Organisational Perspective. London: Martin Robertsen.
- Mathur, K. (2001). Governance and Alternative Sources of Policy Advice: The Case of India. In K.
- Mathur, Navdeep & Mathur, Kuldeep, 2007 Policy analysis in India: Research Bases and Discursive practices in handbook of Policy Analysis : Theory, politics and methods, edited by Fisher Etal., CRC Press, Taylor and Francis Pp. 603 – 617.
- Parsons, Wayne, 2005, Public Policy: An Introduction to the Theory and Practice of Policy Analysis, Edward Elgar Publishing Ltd. Cheltenham, U.K.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M								H								L
CO2		H															
CO3			H								M						
CO4										H		M		M			

H = Highly Related; M = Medium; L = Low



## **BEC028C: MARKET FAILURES AND POLICY INTERVENTIONS**

Applies economic reasoning to public issues, policies and programs. It considers incentives and organizations; models of economic behavior, including markets, the absence of markets and interventions; the price system; policy objectives and instruments.

### **Objectives of the course:**

1. To enhance the understanding of micro-economic concepts for the larger understanding of the policy problems.
2. To develop the case-study methods through the application of economic data and analysis to gauge the gravity of policy problems.
3. To enhance discipline specific competencies relevant to academia, industry, and generic skills.
4. Recognize and apply the special features of externalities & public goods and their implications on the efficiencies of markets and government activities.

<b>Unit-1</b>	Scope and Methods of Public Economics, Economic Analysis of Public Policy, Market Economy and Mixed Economy, Ways of Government Intervention
<b>Unit-2</b>	Alternative Classifications of Public Goods, Optimal Provision of Public Goods, Private Provision of Public Goods, Nash-Cournot Solution, Preference Revelation, Samuelson and Lindahl Equilibrium, Club Goods Model
<b>Unit-3</b>	Positive and Negative Externalities, Negative Externalities and Social Cost, Choice of Policy Instruments, Pigouvian Tax, Coase Theorem and Private Negotiation (Private Property Solution) Tradable Permits, Subsidy Solution, externality Solutions and their Problems
<b>Unit-4</b>	Economic Rationale of Regulation, Concerns of Regulation like Environment, Health and Safety, Network Economies, Regulating Rate Structure, Public Utility Pricing, Marginal Cost Pricing and Two-Part tariff, Private Provision of Public Goods

### **Course Outcomes:**

Students will

1. Be able to define the concepts and conditions of resources allocation between different stakeholders.
2. Be able to interpret the main differences between public and private goods, and services, and recognize the economics of externalities.
3. Develop the case studies specific to the public policy problems.
4. Understand the concept and the use of various economic data in achieving society goals.



### Suggested Readings:

- Arora, Rashmi Umesh (2009), “Globalization and Stages of Development: An Exploratory Analysis”, Review of Urban and Regional Development Studies.
- Bhattacharya, B.B., S. Sakthivel, “Regional Growth and Disparity in India: A Comparison of pre and post reform decades”, Institute of Economic Growth: Delhi, Available at <http://ieginia.org/workpap/wp244.pdf>
- Bradhan, Pranab (2002), “Decentralization of Governance and Development”, Journal of Economic Perspective, vol. 16, No.4, pp. 185-205.
- Charles Wheelan and Burton G. Malkiel, Naked Economics: Undressing the Dismal Science (Norton, 2003).
- David A. Starrett (1988), *Foundations of Public Economics*, Chambridge University Press.
- Dennes C. Muller (2003); *Public Choice III*, Cambridge University Press.
- Jean Hindriks and Gareth D. Myles (2006), *Intermediate Public Economics*, MIT Press.
- John Leach (2004); *A course in Public Economics*, Cambridge University Press.
- Jonathan Gruber, *Public Finance and Public Policy* (Worth Publishers, 2009).
- Kahn Alfred Edward (1988); *Economics of Regulations: Principles and Institution*, MIT Press.
- Kapur, Devesh (2010) “Political Economy of the State”, in Niraja Gopal Jayal and PratapBhanu Mehta (2010), *The Oxford Companion to Politics in India*, Oxford University Press: New Delhi.
- Kenneth A. Shepsle, *Analyzing Politics: Rationality, Behavior, and Institutions* (W.W. Norton, 2010), chap. 9.
- Kniesner T.J. (2005); *Economics of Regulation: Principle and Regulations*, MIT Press.
- Kohli, Atul and R. D. Mullen (2003), “Democracy, Growth and Poverty in India”, in AtulKohli, Chung-in Moon and Georg Serenson (2003), *State, Markets and Just Growth: Development in the 21st Century*, United Nations University Press: Japan.
- Kundu, Amitabh, K.Varghese (2010), “Regional Inequality and Inclusive Growth in India under Globalization: Identification of Lagging States for Strategic Intervention”, Oxfam India working papers.
- Learmonth, ATA (January, 1960), “Regional Planning in India: Now or Never?”, *The Economic Weekly Annual*.
- M.H. Suryanarayana, Ankush Agrawal and K. SeetaPrabhu (2011), *Inequality-adjusted Human Development Index for India’s States*, UNDP: New Delhi.
- Peter Abelson (2008); *Public Economics: Principles and Practices*, Oxford University Press.
- Purfield, Catriona (2006), “Mind the Gap- Is Economic Growth in India Leaving Some StatesBehind?”, IMF working paper WP/06/103.



- State Action Plan on Climate Change in India: Framing, Processes and Drivers, 2013. (Report on the Round Table Dialogue organized by The Centre for Policy Research).
- Topalova, Petia (2008), “India: Is the rising tide lifting all boats?” IMF working Papers WP/08/54.
- Viscuss WK (2009); Economics of Regulations and Anti-Trust, Joseph Harrington Press.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1				L									M				
CO2		M													L		
CO3			H						H								
CO4															H		

H = Highly Related; M = Medium; L = Low



## **BEC029C: BIG DATA AND PUBLIC POLICY**

### **Course Description:**

The objective of the course is to familiarize students with big data analysis as a tool for addressing substantive research questions. The course begins with a basic introduction to big data and discusses what the analysis of these data entails, as well as associated technical, conceptual and ethical challenges. Strength and limitations of big data research are discussed in depth using real-world examples. Students then engage in case study exercises in which small groups of students develop and present a big data concept for a specific real-world case. This includes practical exercises to familiarize students with the format of big data. It also provides a first hands-on experience in handling and analysing large, complex data structures.

### **Objectives of the Course:**

1. To enhance interdisciplinary understanding with Big-Data.
2. To understand the use of Big-Data in policy making process.
3. To recognize and appreciate the importance of Big-Data and their application in academic, industrial, social, economic and environmental context.
4. Evaluate which data are appropriate to a given research question and statistical need.

### **Syllabus:**

<b>Unit 1</b>	Introduction – What is Big Data? Handling and Processing Big Data, Methodological Challenges and Problems, Ethics and Big Data, The Big Data and Public Policy: Inter-relationship and Challenges
<b>Unit 2</b>	Policy, Politics and Governance in Digital Era: Digital Government, Development of E-Governance, E-Democracy, Digital Citizenship, E-Parliament, E-Rulemaking, Digital Nation State.
<b>Unit 3</b>	Biases, Fairness, and Inference, Privacy, Confidentiality, and Ethics
<b>Unit 4</b>	Case Study Analysis: The Analysis of CMIE, Census, NFHS, NSS, Employment Data and other Economic Data Sets like RBI Data, India Public Finance Statistics.

### **Course Outcomes:**

Students will

1. Identify the different data quality frameworks and apply them to public policy problems.
2. Use a broad array of basic computational skills required for data analytics, typically not taught in social science, economics, statistics or survey courses.
3. Identify compelling uses of big data to solve social and economic problems.



4. Develop case studies related to big data and sustainable communities, and gain experience in presenting and defending research.

### Suggested Readings:

- Bollier, David (2010). The Promise and Peril of Big Data. The Aspen Institute Communications and Society Program.
- Cate, Fred H. (2014). The Big Data Debate. Science 346(6211): 818-818.
- Cathy O’Neil. (2016). Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy. Penguin Books.
- Dutcher, Jenna. (2014). What is Big Data? UC Berkeley Data Science Blog.
- Lazer, David, Alex Pentland, Lada Adamic, Sinan Aral, Albert-László Barabási, Devon Brewer, Nicholas Christakis, Noshir Contractor, James Fowler, Myron Gutmann, Tony Jebara, Gary King, Michael Macy, Deb Roy, and Marshall Van Alstyne. (2009). Computational Social Science. Science 323(5915): 721-723.
- Lazer, David, Ryan Kennedy, Gary King, and Alessandro Vespignani. (2014). The Parable of Google Flu: Traps in Big Data Analysis. Science 343(6176): 1203-1205.
- Lazer, David. (2015). The Rise of the Social Algorithm. Science 348(6239): 1090-1091.
- Manovich, Lev. (2012). Trending: The Promises and the Challenges of Big Social Data. Debates in the Digital Humanities, edited by Matthew K. Gold. The University of Minnesota Press.
- Matthew J. Salganik. (2017). Bit by Bit: Social Research in the Digital Age. Princeton University Press.
- Press, Gil. (2014). 12 Big Data Definitions: What’s Yours? Forbes Blog.
- Rob Kitchin. (2014). The Data Revolution: Big Data, Open Data, Data Infrastructures and Their Consequences. SAGE Publications.
- Ulfelder, Jay. (2015). The Myth of Comprehensive Data. Blog Post.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1												M			L		
CO2					L									M			
CO3									H								
CO4								H									

H = Highly Related; M = Medium; L = Low





## **BEC030C: PUBLIC POLICY ANALYSIS**

### **Objectives of the Course:**

1. Understand the purpose and value of policy analysis, for both stakeholders and policymakers.
2. Cultivate a policy analysis toolkit while simultaneously critiquing the conventional assumptions that underlie how public policy is analyzed in India.
3. Complete a thorough, professional policy analysis project.
4. To develop the skill of writing policy memos, briefs along with academic writing.

### **Syllabus:**

<b>Unit 1</b>	Introduction to Policy Analysis: Basic Understanding of the Concepts and Skills required for policy analysis, Identifying and diagnosing policy problems along with their symptoms, stakeholders, and decision makers, Documenting policy problems; defining the problem and collecting evidence, Conceptualizing policy tools, designing policy options/alternatives, and considering appropriate criteria
<b>Unit 2</b>	Decision making under uncertainty, Tradeoffs: Analyzing costs and benefits, Analyzing Equity, Behavioral policy tools: From neoclassical to the nudge.
<b>Unit 3</b>	Policy Writing: Reasons for writing effective policy documents, Significance, Tools of Writings, Lessons and objectives achieved
<b>Unit 4</b>	Writing Policy Briefs, Writings Legislative Briefs, Policy Memos, Case Study for the Students: Writing Workshop

### **Course Outcomes:**

Students will

1. Recognize and articulate the promise and limitations of policy analysis.
2. Critically assess the use of evidence and data in policy analysis practices.
3. Select and apply the appropriate policy analysis techniques, with consideration of given policy problems, contexts, and goals.
4. Effectively communicate, in written and spoken formats, policy analysis procedures and their conclusions.



### Suggested Readings:

- “What Are Policy Briefs?” FAO Corporate Document Repository. United Nations.
- Bardach, Eugene. *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem-Solving*. 4th edition. Thousand Oaks, CA: Sage, 2012.
- Behavioural Insights Team. (2016). *Update report*. London: Author. [Please read both forewords, the executive summary, the sections on Health and Wellbeing, Education and Skills, Growth, Employment and Productivity, and two additional sections of your choice.]
- Bemelmans-Videc, M. L., Rist, R. C., & Vedung, E. O. (Eds.). (2011). *Carrots, sticks, and sermons: Policy instruments and their evaluation*. New Brunswick, NJ: Transaction Publishers. [Chapter 5, skim briefly Chapters 2, 3 and 4.]
- Bertrand, M., Mullainathan, S., & Shafir, E. (2004). A behavioral economics view of poverty. *The American Economics Review*, 94(2), 419-423.
- Dunn, W. (2008). *Public policy analysis: An introduction*. Upper Saddle River, N.J.: Pearson Prentice Hall. Chapter 3: Structuring policy problems.
- Gooden, S. (2015). Chapter 2: The saturation of racial inequities in the United States. *Race and Social Equity: A Nervous Area of Government* (pp. 21-44). New York: M.E. Sharpe.
- Hammond, J., Keeney, R., & Raiffa, H. (2002). *Smart choices: A practical guide to making better life decisions*. New York: Random House. Chapter 7: Uncertainty.
- Head, B. & Alford, J. (2015). Wicked problems: Implications for public policy and management. *Administration & Society*, 47(6), 711-739.
- Herman, Luciana. Policy Memos. John F. Kennedy School of Government. Harvard University.
- How to Write a Public Policy Memo. Student Learning Center. University of California, Berkeley.
- Le Grand, J. (1990). Equity vs. efficiency: The elusive tradeoff. *Ethics*, 100(3).554-568.
- Manski, C. (2013). *Public policy in an uncertain world: Analysis and decisions*. Cambridge, MA: Harvard University Press. Chapter 1: Policy Analysis with Incredible Certitude.
- Memo: Audience and Purpose. The Writing Lab and The OWL. Purdue University.
- Mintrom, M. (2012). *Contemporary policy analysis*. New York: Oxford University Press. Chapter 15: Race Analysis.
- Pennock, Andrew. “The Case for Using Policy Writing in Undergraduate Political Science Courses.” *PS: Political Science and Politics* 44 (January 2011): 141-146.
- Policy Memo Guidelines. Cornell Fellows Program. Cornell University.
- Policy Memo Requirements and Guidelines, 2012-2013 edition. Institute for Public Policy Studies. University of Denver.
- Race and Social Justice Initiative. *Racial equity in Seattle* (2014) and *Racial equity toolkit to assess policies, initiatives, and budget issues* (2012). City of Seattle.
- Salamon, L. (2001). The New Governance and the Tools of Public Action. In Salamon (Ed.). *The Tools of Government: A Guide to the New Governance*, pp. 1-47. New York: Oxford University Press.



- Stone, D. (2011). *Policy paradox: The art of political decision making*. New York: W. W. Norton & Company. Chapters 1: The Market and the Polis, Chapter 7: Symbols, and Chapter 8: Numbers.
- Thaler, R., Sunstein, C., & Balz, J. (2013). Choice architecture. In E. Sharif (Ed.), *The Behavioral Foundations of Public Policy* (pp. 428-439). Princeton, NJ: Princeton University Press.
- Thrall, A. Trevor. How to Write a Policy Memo. University of Michigan--Dearborn, 2006.
- Washington State Institute for Public Policy. (2016). *Interventions to promote postsecondary attainment*. Olympia: Author. [Read report; skim appendix.].
- Weimer, D. & Vining, A. (2011). *Policy analysis* (5<sup>th</sup> edition). Upper Saddle River, N.J.: Pearson Prentice Hall. Chapter 14: Gathering information for policy analysis.
- Wheelen, C. (2011). *Introduction to Public Policy*. New York: W. W. Norton & Company. Chapter 1: Public Decision Making. Chapter 12: Cost-Benefit Analysis.
- Winter, H. (2013). *Trade-Offs: An introduction to economic thinking and social issues*. Chicago: University of Chicago Press. Preface to the First Edition, Chapter 1: Approaching Social Issues, and Chapter 5: Eat, Drink, Smoke, and Be Unhappy. Chapter 8: There are No Solutions.
- Writing Effective Memos. Electronic Hallway. Daniel J. Evans School of Public Affairs. University of Washington.
- Writing Effective Policy Memos. Water & Sanitation Infrastructure Planning syllabus. Spring 2004. Massachusetts Institute of Technology.



**Suggested Case Studies:**

- Michelle Rhee and the Washington DC Public Schools.
- Parking in San Francisco.
- The challenge of adapting to climate change: King County brings local action to a global threat.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M																
CO2								L									L
CO3			H														
CO4											L		M				

H = Highly Related; M = Medium; L = Low



## **BEC031C: IMPACT EVALUATION**

### **Course Description:**

Through the course, the student will be able to build understanding of knowledge about the fields of policy evaluation, how government programmes are evaluated, programme monitoring strategies adopted by official and non-governmental evaluators, and what are various evaluation units and their domains of evaluation in various programmes citing varied practices from India and the world.

### **Objectives of the Course:**

1. To understand the meaning and concept of impact assessment.
2. To enhance the understanding of evaluation process policy/programme implementation.
3. To apply qualitative and quantitative research in evaluation of policy/programme in India.
4. To enhance the knowledge application that would create different type of evaluation professionals.

### **Syllabus:**

<b>Unit 1</b>	Fundamentals of Evaluation: Meaning, Brief History, Characteristics, Significance, Nature and Types of Evaluation
<b>Unit 2</b>	Approaches of Evaluation: Goal Based, Goal Free, Theory Based/Logic Model, Utilization, Collaborative, Balanced Score Card, Appreciative Inquiry, External, Kirkpatrick and CIPP Model, Cost-Benefit Analysis, Cost-Effective Analysis.
<b>Unit 3</b>	Impact Evaluation: Key Concepts, Theory of Change, Evaluation Designs and Methods, Experimental Design- Randomized Controlled Trials (RCTs), Quasi-Experimental Designs – Judgemental Matching, Propensity Score Matching, Propensity Score Matching (PSM), Good Practices.
<b>Unit 4</b>	Phases of Program Evaluation and Tools, Program Monitoring Meaning, Types of Program Monitoring: Process Monitoring, Outcome Monitoring and uses. Process Monitoring versus Process Evaluation. Phases of Outcome Monitoring, Outcome monitoring versus outcome evaluation, Strengths and limitations of outcome monitoring.

### **Course Outcomes:**

Students will

1. Be able to plan an impact assessment of various policies.
2. Be able to describe the various levels of impact assessment.
3. Identify and/or develop various indicators for impact assessment.



4. Identify how to measure the impact of public policies or programme.

### Suggested Readings:

- Bringham, Richard D and Claire L. Felbinger (2002), Evaluation in Practice: A Methodological Approach, New York: Chattam House Publishers.
- Carol H. Weiss, Evaluation: Methods for Studying Programs and Policies, 2nd Edition, Prentice Hall; 2nd edition (December 18, 1997).
- Ian Graham Ronald Shaw, Jennifer Greene, Melvin M Mark. (2006), The SAGE Handbook of Evaluation, SAGE Publications Ltd.
- Nagel, Stuary S. (ed) (2002), Handbook of Public Policy Evaluation, New Delhi: Sage Publication.
- Peter H. Rossi, Mark W. Lipsey, Howard E Freeman, Evaluation: A Systematic Approach, Edition 7, SAGE, 2004.
- The World Bank (2010), Handbook on Impact Evaluation: Quantitative Methods and Practices, Washington DC.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1		M											L				
CO2						H									H		
CO3												L					
CO4									L								L

H = Highly Related; M = Medium; L = Low



## **BEC032C: PUBLIC POLICY CAPSTONE**

The capstone is designed to test the hard skills of policy design and evaluation by using them in the analysis of a real-world problem. The course requires a research project that examines an existing public or nonprofit sector policy or managerial problem.

### **Objectives of the Course:**

1. To apply the knowledge acquired by learning.
2. To understand the policy analysis.
3. To analyze, synthesize, think critically, solve problems, and make decisions.
4. To communicate and interact productively with a diverse and changing workforce in contributing to the public policy process

### **Course Outcomes:**

Students will

1. Identify an organizational, program, or policy issue, problem, or concern, and present relevant contextual and background material.
2. Be able to articulate a research question regarding this issue; and can review relevant public policy literature, including theoretical frameworks and best practices.
3. Be able to select appropriate data sources, data collection methods, and analytical methods; Analyze data and interpret these results.
4. Develop conclusions and recommendations derived from the analytical findings; and complete a final written report and oral presentation, which effectively communicates this capstone research project.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1		M															L
CO2					M											M	
CO3						L					M			M			
CO4												H					

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**TRACK-4**  
**MISCELLANEOUS**

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## **BEC033C: ECONOMICS OF INFRASTRUCTURE**

### **Course Objectives**

1. To provide students with a thorough grounding in the key concepts of Infrastructure economics.
2. To study the necessity of infrastructure & its management
3. To illustrate how these concepts and standard economic tools can be used to analyse Infrastructure-related Theory and policy issues.
4. To be able to apply this knowledge to the analysis of specific infrastructure economics issues in India

<b>UNIT-I</b>	Infrastructure and Economic Development. Infrastructure as a public good. Social and Physical Infrastructure. Special Characteristics of Infrastructural Facilities. Green Infrastructures. Economics of scale of Joint Supply.
<b>UNIT-II</b>	Marginal Cost Pricing vs Other Methods of Pricing in Public Utilities. Cross Subsidization-Free Prices, Equity and Efficiency. Modal Cost of Transportation. Principle of Pricing. Public Transportation for Sustainable Development. Transport Management in India. Future Development in Transport Sector.
<b>UNIT-III</b>	Six Modern Transport System- Metro, Air Connectivity, Green Buses, Railways. Marine and River and Delivery by Drones.
<b>UNIT-IV</b>	Problems of Different Modes of Transport. Infrastructure Development and Reforms in Transport Sector in India. Structure of Telecommunication Sector. Price Determination. Infrastructure Development and Reforms in Communication. Characteristics and Problems of Postal Services. Fixation of Postal Rates in India. Significance of Telephone and Postal Services in India. Growth of Digital Communication Networks

### **Course Outcomes**

Students will

1. Be exposed to the concepts and models related to Infrastructure.
2. Understand basic Economics theories and models required for infrastructure sector understanding.
3. Be able to demonstrate clear understanding of concepts Infrastructure economics and policy.
4. Exhibit the ability to integrate technical, economic, social and regulatory frameworks for Infrastructure sector planning and resource management.



## Essential Readings

1. Dash L.N., Infrastructure Development and the Indian Economy. Atlantic Publisher, New Delhi.
2. Samanta P.K., Mohanty A.K., Ports Infrastructure and Economic Development.
3. India Infrastructure Report, OUP India Co. (Oxford)
4. Report of Ministry of Human Resources and Development.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1																	
CO2																	
CO3																	
CO4																	

H = Highly Related; M = Medium; L = Low



## **BEC034C: DEMOGRAPHY**

### **Course Objectives**

1. Identify and compare the advantages and disadvantages of the different sources of demographic data.
2. Describe basic demographic indicators and elaborate on their computation and interpretation.
3. Introduce population projection calculations and analysis.
4. Describe the distribution of a population using various demographic characteristics.

<b>UNIT-I</b>	Introduction to Population Study: Its Nature and Scope; Relationship with other disciplines; Sources of Demographic Data: Census of India; Vital Registration System, Sample Surveys; Dual report system; Population registers; International Publications. Population growth in India. Recent census findings on demographic characteristics.
<b>UNIT-II</b>	Population theories: Malthus; Optimum population theory; Theory of Demographic Transition; Fertility: Basic Terms; sources of Data; Basic Measures: Crude Birth Rate, General Fertility Rate, Age specific fertility rate, Total Fertility Rate; Measures of Reproduction: Gross Reproduction Rate, Net Reproduction Rate.
<b>UNIT-III</b>	Bongaarts Proximate Determinants of Fertility; Social theories of fertility: Social Capillarity; Theory of diffusion, Theory of change and response, Liebenstein theory; Becker's theory, Caldwell wealth flows theory, UN Threshold hypothesis.
<b>UNIT-IV</b>	Mortality: Basic Concepts and terms; Measures: Crude Death rate, Age specific death rate, Infant mortality rate; Maternal mortality; Causes of death; Reasons for mortality decline in developing countries. Mosley and Chen's Framework for Child Survival. Morbidity: Concept and need; Measures: Incidence rate, Attack rate, Secondary Attack rate, Prevalence rate, Case fatality rate. Comparison of Demographic and epidemiological transition.

### **Course Outcomes**

Students will

1. Understand the basics of demography.
2. Understand the core social demographic variables, and how these variables influence population growth, composition, and structure
3. Use demographic tools in understanding public health issues Knowledge attitude and practices.
4. Identify appropriate sources of data, perform basic demographic analyses using various techniques and ensure their comparability across populations.



## Essential Readings

1. Bhende, Asha A. and Tara Kanitkar (2004) Principles of Population Studies, Mumbai: Himalaya Publishing House, Chapter8, Pp.241-288.
2. Jacob 8S. Siegel and David a. Swanson (2004): The Methods and Materials of Demography, Second Edition, Chapters 1, 2, 3, 7, 9,10, Elsevier Science, USA.
3. John Weeks (2005): Population: An Introduction to Concepts and Issues, Wordsworth Learning. Singapore 9" edition.
4. Pathak, K.B. and F.Ram (1998) Techniques of Demographic Analysis, Mumbai: Himalaya Publishing House, Chapter 4 Pp.108-153 and Chapter8, Pp.339-372.
5. National Family Health Surveys.
6. Srinivasan K. (1998) Basic Demographic Techniques and Applications. New Delhi: Sage Publications. Chapter IV, Pp.59-85
7. United Nations, (1973): The Determinants and Consequences of Population Trends, Vol. I, Population Studies, No. 50, Chapter VII, New York. United Nations, World Population Ageing, 1950-2050

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1																	
CO2																	
CO3																	
CO4																	

H = Highly Related; M = Medium; L = Low



## **BEC017B: ENVIRONMENTAL ECONOMICS**

### **Course Objectives**

1. To introduce the students to concepts, methods and policy options in managing the environment using tools of economic analysis.
2. To enable the students to understand the economic implications of environmental policies and environmental issues.
3. To understand the economic implications of environmental policies through practical applications.

<b>UNIT I</b>	Introduction to environmental economics; Definition, Nature and Scope; Tragedy of commons, common pooled resources,; Pareto optimality and market failure in the presence of externalities.
<b>UNIT II</b>	Pigovian taxes and effluent fees, tradable permits; Pollution control Boards; Legislative measures of environmental protection in India. Economics of climate change.
<b>UNIT III</b>	Valuation of non-market goods and services; measurement methods; Revealed preference methods – travel cost, hedonic pricing; Stated preference methods – Contingent valuation.
<b>UNIT IV</b>	Sustainable Development Concepts; Measurement; Indicators of sustainable development; Trade-off between environmental protection and economic growth; Environmental Kuznets' curve. Measuring the Benefits of Environmental Improvements Non-Market values and measurement methods; risk assessment and perception.

### **Course Outcomes**

Students will

1. Understand and acquire skills for identifying and solving environmental problems.
2. Learn about the environmental problems concerning with human activities and developmental processes.
3. Understand the strategies for conservation of nature and natural resources and to solve the emerging problems related to environment degradation.
4. Understand the environmental issues in relation to socio-economic growth and human development.

### **Essential Readings**

1. Bhattacharya, R. N. (2001). *Environmental Economics*. (1st ed.). New Delhi: Oxford India Paperbacks.
2. IPCC (Intergovernmental Panel on Climate Change), Fifth Assessment Report (2014).



3. Kenneth Arrow et al., (2004). Are We Consuming Too Much. *Journal of Economic Perspectives*, 18(3), 147-172.
4. Millennium Ecosystem Assessment Report. (2005). *Ecosystem Services and Human Well-being: Synthesis*. Washington DC: Island Press.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1																	
CO2																	
CO3																	
CO4																	

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## **BEC035C: ECONOMY OF RAJASTHAN**

### **Course Objectives**

1. To know and understand the population and occupational structure of Rajasthan Economy.
2. To recognize and discuss the importance of natural resources of Rajasthan.
3. To understand and discuss the rural development in India.
4. To analyze the role of Panchayats and NGOs in rural development.

<b>UNIT I</b>	Introduction to Economy of Rajasthan, Position of Rajasthan in Indian Economy: Population, Area, Agriculture, Industry and Infrastructure. Demographic features, Occupational structure, and human resource development.
<b>UNIT II</b>	Natural Resources Endowments: land, Water, Livestock and Wild Life, Minerals, Mineral Policy of the state. State Domestic Product: Trends and Composition, Importance of Livestock and Animal husbandry, Dairy Development Programmes.
<b>UNIT III</b>	Infrastructure in the State (Irrigation, Power, Road), Industrial Development of the State, Growth centres and Development of industrial areas. Role of different corporations in Industrial Development, (RIICO, RFC and RAJISCO), Tourism.
<b>UNIT IV</b>	Panchayats and Rural Development; Rural Credit and Self Help Groups (SHGs), Role National Bank for Agriculture and Rural Development (NABARD).
<b>UNIT V</b>	Critical Evaluation of Selected Government Programmes and Rural Development Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and Rural Development. Woman Empowerment and Child Development. Problems of Poverty and Unemployment in Rajasthan.

### **Course Outcomes**

Students will

1. Understand the occupational structure of Rajasthan.
2. Recognize the importance of natural resources.
3. Understand the various concepts related to rural development.
4. Critically evaluate the various employment generation programmes and analyze the effectiveness of it.

### **Essential Reading**

1. Economic Review, Directorate of Economics and Statistics, Department of Planning, Rajasthan Jaipur.
2. Statistical Abstract Directorate of Economics and Statistics. Department of Planning, Rajasthan Jaipur.



3. Katar Singh , Rural Development : Principles, Policies and Management, Sage Publications, New Delhi
4. K.G. Karmakar, Rural Credit and Self-Help Groups, Sage Publications, New Delhi
4. S.Sau, Rural Industrialization –Development Trajectory in India, Farma K.L.M., Kolkata
5. Misra D. and Puri K. Indian Economy, Himalaya Publishing House
6. Datt and Sundharam (Revised by G.Datt and A. Mahajan), Indian Economy, 70th edition, S. Chand

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1																	
CO2																	
CO3																	
CO4																	

H = Highly Related; M = Medium; L = Low





## **BEC024B: HEALTH ECONOMICS**

### **Course Objectives**

- 1 To provide students an introduction to the various concepts regarding health care, cost and insurance
- 2 To enable students to do Cost Benefit analysis, Cost Effectiveness analysis and Cost Utility analysis on the various issues concerning health in India.
- 3 Students will learn various concepts related to health, insurance and cost analysis.

<b>UNIT I</b>	Definition and Scope; Health, good Health (Health as a good) and Quality of Life; Determinants of Good Health; Measurement of Health Status; Mortality, Morbidity and QUALY, HALY: Family of Summary measures.
<b>UNIT II</b>	Demand for Health and Demand for Medical Care; Supplier Induced Demand; Production of Health Care Providers: Physicians, Hospitals and Pharmaceuticals; Role of Technological Change in Health Care; Sustainability: Equity and Efficiency trade off
<b>UNIT III</b>	Health Cost Concepts; Opportunity cost. Fixed and variable costs; Incremental and Marginal cost; Direct and Indirect Medical costs: Time costs and Travel cost
<b>UNIT IV</b>	Economics of Health Insurance; Information Asymmetry: Adverse Selection; Risk Aversion; Moral Hazard; Health Insurance: Concepts and Challenges, Concepts: Co-insurance rates, Deductibles, Group Insurance, Co-payments.

### **Course outcomes**

Students will

1. Gain knowledge about the basics of health economics, distinguish between the demand for and supply of health and will be able to measure the quality of health.
2. Be able to apply the cost-benefit/cost-effective/cost-utility methods to measure health outcomes.
3. Be able to compare different cost concepts and interpret the functioning of economics of health insurance and manpower planning.
4. Be able to suggest measures for the problems in health sector.

### **Essential Readings:**

1. William, Jack, Principles of Health Economics for Developing Countries, World 24 Bank Institute Development Studies, 1999.
2. World Development Report, Investing in Health, The World Bank, 1993.
3. Ronald G., Ehrenberg and Robert S., Smith, Modern Labor Economics: Theory and Public Policy, Addison Wesley, 2005.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1																	
CO2																	
CO3																	
CO4																	

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## **BEC036C: INDUSTRIAL ECONOMICS**

### **Course Objective**

1. To develop the students' comprehension of both industrial models and their links in practice, with a special accent on government policy.
2. To provide the various concepts and scope of Industrial Economics in Indian context.
3. To discuss the various stages of development in Industrial Sector.

<b>UNIT I</b>	Industrial Organisation and Ownership Structure Nature and scope of Industrial Economics; Concepts in industrial Economics; industry, market, market structure, market conduct and Market Power; Organisational Structure of a Firm; Objectives of firms.
<b>UNIT II</b>	Market Structure and Market Concentration , An overview of standard forms of market structure: Concept of Workable Competition; Definition of market concentration; Concentration indices; Market power measures; Concentration and market performance; Vertical integration: Types of vertical integration ; Incentives to vertical integration; Effects of vertical integration for the economy; Merger: types; Motives for merger and implication for public policies.
<b>UNIT III</b>	Industrial Finance and Location Analysis, Need of finance; Types of finance; sources of finance; Choice of funding; Development Banking: IDBI, IFCI and SFCs; Factors Influencing Location of Industries; Theories of Industrial Location: Weber, Sargent Florence; Industrial location trends in India.
<b>UNIT IV</b>	Industrial Productivity, Concept and measurement of productivity; Empirical evidence of productivity in Indian industries; Industrial sickness; Under-utilization of capacity; factors accounting for it and consequences.

### **Course Outcomes**

Student will

1. Have a vivid idea about the issues and policies pertaining to the industries environment.
2. Gain familiarity in productivity concepts and measurements.
3. Learn various industrial policies and impact of globalization.
4. Be able to analyse the pattern of industrial investment and government regulation.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1																	
CO2																	
CO3																	
CO4																	
CO5																	

H = Highly Related; M = Medium; L = Low

**Essential Readings**

1. Ahluwalia, I. J. (1985). Industrial Growth in India: Stagnation since the Mid-Sixties. , New Delhi: Oxford University Press.
2. Cable, J. R. (1994). Current Issues in Industrial Economics. London: Macmillan.
3. Ferguson, P. R., & Ferguson, G. (1994). Industrial Economics: Issues and Perspectives. New York: NYU Press.
4. Hay, D. A., & Morris, D. J. (1991). Industrial Economics and Organization: Theory and Evidence. Oxford: Oxford University Press.
5. Howe, W. S. (1978). Industrial Economics: An Applied Approach. London: Macmillan.
6. Martin, S. (1994). Industrial Economics: Economic Analysis and Public Policy. New Jersey: Prentice Hall.
7. Narayan, B. N. (1997). Industrial Economics: A Special Study for Students of MBA, M. Com., and MA. Bengaluru: Anmol Publications.



# **JECRC UNIVERSITY**

**School of Allied Health Sciences**

**B.Sc. Radiography and Imaging  
Technology (BRIT)**

**Course Duration: - 4 years (3+1 Year Internship)**

**JECRC UNIVERSITY**  
**SCHOOL OF ALLIED HEALTH SCIENCES**  
**DEPARTMENT OF RADIATION AND IMAGING TECHNOLOGY**

**PROGRAM OUTCOMES (PO's) and its Attributes: BRIT Graduates will be able to-**

- **PO 1:** Apply the knowledge of clinical, diagnostic and Medical physics, Imaging technology, clinical sciences, as well as an understanding of health care delivery diagnostic imaging system.
- **PO 2:** Emphasizes the following key areas Human Anatomy, Human Physiology, Radiation Physics, Pathology, Radio Diagnosis, Medical Microbiology, Medical Biochemistry, Specialised Diagnostic Techniques, Radiological Technology, and Radiotherapy
- **PO 3:** Find, analyze, evaluate and apply the information systematically and shall make a appropriate diagnosis to provide quality of image along with patient care.
- **PO 4:** Demonstrate effective planning abilities including the prevention, detection, radiation protection, diagnosis, and management of patient without compromising image quality.
- **PO 5:** Apply ethical principles like radiation protection and commit to professional ethics and responsibilities and norms of the Imaging techniques practice.
- **PO 6:** Conduct and present research and clinical studies which will contribute to the advancement of Imaging techniques, quality, diagnosis and health sciences.
- **PO 7:** Explain theory of technology, instrumentation and physics in Medical Imaging using discipline specific terminology. Provide sufficient information effectively to the patient about the imaging options available, purpose of the procedure, benefits, possible adverse consequences, and limitations.
- **PO 8:** Demonstrate knowledge of specified imaging modalities, relevant anatomy, image quality assurance and diagnostic decision making.
- **PO 9:** Engage oneself in self-assessment and structure their continuing professional education to refine existing skills and acquire new skills for patient care and professional advancement. Practice professional and ethical responsibilities with high degree of credibility, integrity and social concern.
- **PO 10:** Communication Skills, Indian culture, Environment studies and basics and advance computer knowledge: Apply the communication and collaboration skills, values, ethics and attitudes that will enable them to effectively deal with patients, families and medical team.

- **PO 11:** Life Long Learning: An appreciation of responsibility to maintain standards of physiotherapy practice gives life learning process enables every individual to address problem solving and judgment in efficient manner.

#### **PROGRAMME SPECIFIC OUTCOME: PSO's**

**PSO1** The student will learn principles of tomographic imaging with different modalities such as xray, PET and SPECT, NMR/MRI, ultra sound and optical with non-diffracting and diffracting energy sources.

**PSO2** Learn principles of non-invasive medical imaging techniques and non destructive techniques for industrial imaging.

**PSO3** Various types of data acquisition in tomography and learn transform domain non-iterative 2D and 3D reconstruction techniques for non diffracting radiation sources

**School of Allied Health Sciences**  
**Scheme**  
**B.Sc. Radiography and Imaging Technology (BRIT)**

Se me ste r	Cours e Code	Course	Lectu re Hours	Tuto rials Hou rs	Practi cal Hours	Total Hours	Lecture Credits	Tuto rial Cred its	Prac tical Cred its	Total Credit s	Course Category
1	BRA001A	Human Anatomy-1 Theory	3	0	0	3	3	0	0	3	Core
1	BRA002A	Human Anatomy-1 Practical	0	0	2	2	0	0	1	1	Core
1	BRA003A	Human Physiology-1 Theory	3	0	0	3	3	0	0	3	Core
1	BRA004A	Human Physiology-1 Practical	0	0	2	2	0	0	1	1	Core
1	BRA005A	Biochemistry-1 Theory	3	0	0	3	3	0	0	3	Core
1	BRA006A	Fundamentals of Computer-Theory	2	0	0	2	2	0	0	2	Foundation
1	BRA007A	Fundamentals of Computer-Practical	0	0	2	2	0	0	1	1	Foundation
1	DCH001	EVS	3	1	0	4	3	1	1	4	Value added course
1	DEN001A	Communication Skills	2	0	2	4	2	0	1	3	Ability Enhancement
1	DEN001A	Communication Skills-practical	0	0	2	2	0	0	1	1	Ability Enhancement
1	DIN001A	Cultural Education- 1	2	0	0	2	2	0	0	2	Value added course
1		<b>Total</b>	<b>18</b>	<b>0</b>	<b>9</b>	<b>27</b>	<b>18</b>	<b>0</b>	<b>5</b>	<b>23</b>	



**School of Allied Health Sciences**  
**Scheme**  
**B.Sc. Radiography and Imaging Technology (BRIT)**

Semes ter	Course Code	Course	Lectu re Hour s	Tutori als Hours	Practi cal Hours	Tot al Hou rs	Lectu re Credi ts	Tutor ial Credi ts	Practi cal Cred its	Total Cred its	Course Category
2	BRA008A	Human Anatomy-2 Theory	3	0	0	3	3	0	0	3	Core
2	BRA009A	Human Anatomy-2 Practical	0	0	2	2	0	0	1	1	Core
2	BRA010A	Human Physiology-2 Theory	3	0	0	3	3	0	0	3	Core
2	BRA011A	Biochemistry-2 Theory	3	0	0	3	3	0	0	3	Core
2	BRA012A	Conventional Radiological Equipment Theory	3	0	0	3	3	0	0	3	Core
2	BRA013A	Psychology Theory	3	0	0	3	3	0	0	3	Core
2	DEN002A	Professional Skills	2	0	0	2	2	0	0	2	Ability Enhancement
2	DEN002B	Professional Skills-practical	0	0	2	2	0	0	1	1	Ability Enhancement
2	DIN002A	Culture Education - 2	2	0	0	2	2	0	0	2	Value Added course
2		<b>Total</b>	<b>19</b>	<b>0</b>	<b>4</b>	<b>23</b>	<b>19</b>	<b>0</b>	<b>2</b>	<b>21</b>	

**School of Allied Health Sciences**  
**Scheme**  
**B.Sc. Radiography and Imaging Technology (BRIT)**

Semes ter	Course Code	Course	Lectu re Hour s	Tutori als Hours	Practi cal Hours	Tota l Hou rs	Lectu re Credi ts	Tutor ial Credi ts	Practi cal Credit s	Total Cred its	Course Category
3	BRA01 4A	Basic Physics Including Radiological Physics Theory	3	0	0	3	3	0	0	3	Core
3	BRA01 5A	Radiographic and Image Processing Techniques Theory	3	0	0	3	3	0	0	3	Core
3	BRA01 6A	Clinical Radiography- Positioning Part 1 Theory	3	0	0	3	3	0	0	3	Core
3	BRA01 7A	Clinical Radiography- Positioning Part 1 Practical	0	0	4	4	0	0	2	2	Core
3	BRA01 8A	Law & Ethics	3	0	0	3	3	0	0	3	Core
3	BRA01 9A	Professional values	3	0	0	3	3	0	0	3	Core
3	DEN00 3A	Life Skills1(Perso nality Development)	1	0	2	3	1	0	1	2	Ability Enhance ment
3	DIN00 3A	Value Education and Ethics -1	1	0	0	1	1	0	0	1	Value added course
		<b>Total</b>	<b>18</b>	<b>0</b>	<b>6</b>	<b>24</b>	<b>18</b>	<b>0</b>	<b>3</b>	<b>21</b>	

**School of Allied Health Sciences**  
**Scheme**  
**B.Sc. Radiography and Imaging Technology (BRIT)**

Semester	Course Code	Course	Lecture Hours	Tutorials Hours	Practical Hours	Total Hours	Lecture Credits	Tutorial Credits	Practical Credits	Total Credits	Course Category
4	BRA020 A	Modern Radiological Equipment including Physics Theory	3	0	0	3	3	0	0	3	Core
4	BRA021 A	Contrast & Special Radiography Procedures Theory	3	0	0	3	3	0	0	3	Core
4	BRA022 A	Contrast & Special Radiography Procedures- Practical	0	0	2	2	0	0	1	1	Core
4	BRA023 A	Clinical Radiography Positioning Part 2 Theory	3	0	0	3	3	0	0	3	Core
4	BRA024 A	Clinical Radiography Positioning Part 2 Practical	0	0	2	2	0	0	1	1	Core
4	BRA025 A	Physics of Newer Imaging Modalities Theory	3	0	0	3	3	0	0	3	Core
4	DMA003 A	Life Skills - 2 (Aptitude)	1	0	2	3	1	0	1	2	Ability Enhancement
4	DIN004 A	Value Education and Ethics – 2	1	0	0	1	1	0	0	1	Value Added course
		<b>Total</b>	<b>14</b>	<b>0</b>	<b>6</b>	<b>20</b>	<b>14</b>	<b>0</b>	<b>3</b>	<b>17</b>	
4		Supervised Clinical Training	0	0	6	6	0	0	3	3	Core, Non University Exam

**School of Allied Health Sciences**  
**Scheme**  
**B.Sc. Radiography and Imaging Technology (BRIT)**

Semester	Course Code	Course	Lecture Hours	Tutorials Hours	Practical Hours	Total Hours	Lecture Credits	Tutorial Credits	Practical Credits	Total Credits	Course Category
5	BRA026 A	Newer Imaging Techniques including Patient Care Theory	4	0	0	4	4	0	0	4	Core
5	BRA027 A	Newer Imaging Techniques including Patient Care- Practical	0	0	2	2	0	0	1	1	Core
5	BRA028 A	Quality Control in Radiology and Radiation Safety-1 Theory	4	0	0	4	4	0	0	4	Core
5	BRA029 A	Quality Control in Radiology and Radiation Safety-1 Practical	0	0	2	2	0	0	1	1	Core
5	BRA030 A	Cross Sectional Anatomy and Physiology. Theory	4	0	0	4	4	0	0	4	Core
5	BRA031 A	Cross Sectional Anatomy and Physiology. Practical	0	0	2	2	0	0	1	1	Core
5	BRA032 A	Physics of Advanced Imaging Technology Theory	4	0	0	4	4	0	0	4	Core
		<b>Total</b>	<b>16</b>	<b>0</b>	<b>6</b>	<b>22</b>	<b>16</b>	<b>0</b>	<b>3</b>	<b>19</b>	
5		Supervised Clinical Training	0	0	6	6	0	0	3	3	Core, Non University Exam

**B.Sc. Radiography and Imaging Technology (BRIT)**  
**School of Allied Health Sciences**  
**Scheme**

Semester	Course Code	Course	Lecture Hours	Tutorials Hours	Practical Hours	Total Hours	Lecture Credits	Tutorial Credits	Practical Credits	Total Credits	Course Category
6	BRA033 A	Quality Control in Radiology and Radiation Safety-2 Theory	4	0	0	4	4	0	0	4	Core
6	BRA034 A	Quality Control in Radiology and Radiation Safety-2 Practical	0	0	2	2	0	0	1	1	Core
6	BRA035 A	Radiographic Techniques in Advanced Imaging Technology Theory	4	0	0	4	4	0	0	4	Core
6	BRA036 A	Radiographic Techniques in Advanced Imaging Technology Practical	0	0	2	2	0	0	1	1	Core
6	BRA037 A	Regulatory Requirements in Diagnostic Radiology Theory	4	0	0	4	4	0	0	4	Core
6	BRA038 A	Hospital Practice and Care of Patients Theory	3	0	0	3	3	0	0	3	Core
6	BRA039 A	Research Methodology Theory	3	0	0	3	3	0	0	3	Core
		<b>Total</b>	<b>18</b>	<b>0</b>	<b>4</b>	<b>22</b>	<b>18</b>	<b>0</b>	<b>2</b>	<b>20</b>	
6		Supervised Clinical Training	0	0	6	6	0	0	3	3	

JECRC UNIVERSITY School of Allied Health Sciences	Program <b>B.Sc. Radiography and Imaging Technology (BRIT)</b>			Semester: 1
Course Human Anatomy-I Theory	Course Description Core	Credit per Semester 3 credits	Hours per Semester 3 hours	Subject Code BRA001A

### COURSE OBJECTIVES -

To provide an opportunity for radiographers who distinguish themselves in Human Anatomy -Dissection consistency, theoretical knowledge and knowledge application, to undertake research based training in Anatomy. To capture distinguished medical students and offer them such training as would enable them to sub-specialize in anatomy at an early stage of their career. To develop as research scientists and research based teachers for schools of allied health sciences both locally and externally. It also strengthens the research foundation of the students with broad.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

CO 1	To understand the importance of Basics of anatomy and joints
CO 2	Detail about muscles, lymphatic and cardiovascular system
CO 3	Knows the anatomical aspect of Nervous System, Skin and Fasciae, Connective Tissue, Ligaments
CO 4	Anatomical knowledge of Gastro-intestinal system
CO 5	Approach of Respiratory system

**Unit-1** 1. Introduction  
2. Skeleton  
3. Joints

**Unit-2** 1. Muscles  
2. General Cardiovascular System  
3. Lymphatic System

**Unit-3** 1. General Nervous System  
2. Skin and Fasciae  
3. Connective Tissue, Ligaments and Raphe

**Unit-4** **Gastro-intestinal system-** Parts of GIT (Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas )

**Unit-5** **Respiratory system-** Nose, nasal cavity, larynx, trachea, lungs, broncho-pulmonary segments, pleura and Names of paranasal air sinuses

JECRC UNIVERSITY School of Allied Health Sciences	Program <b>B.Sc. Radiography and Imaging Technology (BRIT)</b>			Semester: 1
Course Human Anatomy-I Practical	Course Description Core	Credit per Semester 1 credits	Hours per Semester 2 hours	Subject Code BRA002A

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

To understand the importance of Basics of anatomy and joints, Identification of bones, joints and soft parts

### PRACTICAL

Identification and demonstration of bones, joints and soft parts

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiography and Imaging Technology (BRIT)</u></b>			<b>Semester: 1</b>
<b>Course</b> <b>Human Physiology-I Theory</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Subject Code</b> <b>BRA003A</b>

**COURSE OBJECTIVE-** To learn and understand the fundamental scientific concepts relating to a broad range of topics in human physiology. To make the students familiar with the basic factual information concerning the mechanisms and functioning of humans body system. To develop investigative skills and to become familiar with standard techniques of measurement. To help the students to gain practice and confidence in applying this knowledge, in a quantitative manner where appropriate, to actual experiments.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Understand the importance cell and nerve physiological functions
<b>CO 2</b>	Understand the important aspect of blood
<b>CO 3</b>	Get the knowledge of cardiovascular system
<b>CO 4</b>	Physiological functions of respiration and its neural control
<b>CO 5</b>	To know about Digestive system of the body

- Unit-1**
1. Cell and cell organelle Structure & function , transport across cell membrane, homeostasis, membrane potential.
  2. Structure & functions of nerve tissues, physiological properties of nerve fibres, nerve fibre types & functions.
  3. Neuromuscular junction, Difference between skeletal muscle, smooth muscle & cardiac muscle.
- Unit-2**
1. Composition & functions of blood, plasma proteins & hemoglobin.
  2. Erythrocytes, leucocytes & platelets.
  3. Blood coagulation, blood groups & immunity
- Unit-3**
1. Heart Rate, Cardiac Output, Blood Pressure & Pulse
  2. Conducting system of heart, Heart sounds & ECG.
  3. Cardiac Muscle and cardiac cycle.
- Unit-4**
1. Functions of respiratory system, airways, dead space, graph of lung volume
  2. Transport of gases
  3. Regulation of respiration & Hypoxia
- Unit-5**
1. GIT, Saliva , Mouth & Oesophagus
  2. Stomach, Pancreas, Liver & Gall Bladder
  3. Small Intestine, Large Intestine, Digestion and Absorption in GIT.

JECRC UNIVERSITY School of Allied Health Sciences	Program <b>B.Sc. Radiography and Imaging Technology (BRIT)</b>			Semester: 1
Course Human Physiology-I Practical	Course Description Core	Credit per Semester 1 credits	Hours per Semester 2 hours	Subject Code BRA004A

**COURSE OBJECTIVES:** The course in Physiology is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate procedures to determine hematology findings.
<b>CO 2</b>	Recognize the abnormalities in the hematology findings

#### Unit-1 Hematology:

- a) Study of Microscope and its uses
- b) Determination of Red Blood Corpuscle count
- c) Determination of White Blood Corpuscle count
- d) Differential leukocyte count
- e) Estimation of hemoglobin
- f) Estimation of platelets
- g) Absolute eosinophil count
- h) Reticulocyte count
- i) Determination of blood groups and Rh typing
- j) Determination of bleeding time
- k) Determination of clotting time

#### Unit-2 Demonstrations only

- a) Determination of Erythrocyte Sedimentation Rate
- b) Determination of Packed Cell Volume



JECRC UNIVERSITY School of Allied Health Sciences	Program <u>B.Sc. Radiography and Imaging Technology (BRIT)</u>			Semester: 1
Course Biochemistry-I Theory	Course Description Core	Credit per Semester 3 credits	Hours per Semester 3 hours	Course Code BRA005A

**COURSE OBJECTIVE-** This course provides the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It covers basic biochemical, cellular, biological and microbiological processes, basic chemical reactions in the prokaryotic and eukaryotic cells, the structure of biological molecules, introduction to the nutrients i.e. carbohydrates, fats, enzymes, nucleic acids and amino acids.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Nutrition and its importance and requirement
<b>CO 2</b>	Functions and biochemistry of carbohydrate
<b>CO 3</b>	Functions and biochemistry of Lipid
<b>CO 4</b>	Functions and biochemistry of amino acid
<b>CO 5</b>	General characteristics of digestion and absorption carbohydrate, lipids and proteins

#### Unit-1 Nutrition

- Introduction, Importance of nutrition. Calorific values, Respiratory quotient – Definition, and its significance. BMR: Definition, factor affecting BMR. Special dynamic action of food.
- Physical activities - Energy expenditure for various activities. Calculation of energy requirement of a person.
- Concept of Balanced diet and Recommended dietary allowances
- Role of carbohydrates, lipids and protein in diet
- Nutritional disorders.

#### Unit-2 Carbohydrate Chemistry

- Definition, general classification of carbohydrates
- Composition, sources, properties and functions of carbohydrates

##### Carbohydrate Metabolism

- Glycolysis, gluconeogenesis, Krebs cycle and Cori cycle – General outline of cycle and introduction to enzymes involved
- Glycogenesis, Glycogenolysis (glycogen metabolism): General outline of cycle and introduction to enzymes involved

#### Unit-3 Lipid Chemistry

- Definition, general classification and functions of lipids and fatty acids
- Lipoproteins: Definition, classification, properties, Sources and function
- Introduction to ketone bodies

##### Lipid Metabolism

- Introduction to lipid metabolism, Lipolysis and lipogenesis general outline and enzymes involved
- General outline of beta oxidation of fatty acids

#### Unit-4 Amino-acid Chemistry

- Amino acid chemistry: Definition, Classification, Peptide bonds and Biologically important peptides
- Protein chemistry: Definition, Classification, Functions of proteins

##### Amino acid and Protein Metabolism

- Transamination and deamination general introduction
- Introduction to Urea cycle

#### Unit-5 Digestion and Absorption - General characteristics of digestion and absorption, Digestion and absorption of carbohydrates, proteins and lipids. Disorders of digestion and absorption

JECRC UNIVERSITY School of Allied Health Sciences	Program <u>B.Sc. Radiography and Imaging Technology (BRIT)</u>			Semester: 1
Course Environmental Sciences- Theory	Course Description Value added course	Credit per Semester 3 credits	Hours per Semester 3 hours	Course Code DCH001

**COURSE OBJECTIVES** -To impart knowledge of fundamentals of Environmental sciences. To educate the students to make them confident and to develop the skills of Environmental protection and to increase awareness in society through education. (Problem-Solving Skills). To train the student's with appropriate combinations of old and new emerging concepts in new technologies, techniques and latest developments for their current and potential uses in their profession (Successful Career and Entrepreneurship)

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Recognize the history, structure, function, interactions and trends of key socio-environmental systems on personal, organizational and intellectual level regarding our surroundings through different media.
<b>CO 2</b>	Examine the generation of scientific knowledge and how that knowledge is presented, evaluated, framed and applied for environmental protection by conservation of Natural resources.
<b>CO 3</b>	Articulate a coherent philosophy of the environment and consider ethical bases for responding to environmental questions.
<b>CO 4</b>	Understand the role of conservation of resources and public awareness in prevention of pollution and ultimately for the sustainable development of society.
<b>CO 5</b>	Understand the social responsibility towards protection of environment and society

**Unit-1** The Multidisciplinary Nature of Environmental Studies Definition, scope and importance need for public awareness.

**Unit-2** **Natural Resources Renewable and Non-renewable Resources**

- Natural resources and associated problems.

(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, Case studies. (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

### Unit-3 Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem. Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem: (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

#### **Biodiversity and Its Conservation**

- Introduction, definition: genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.

- Biodiversity at global, National and local levels.
- India as a mega-diversity nation. Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

#### **Unit-4 Environmental Pollution**

- Definition
- Causes, effects and control measures of
  - (a) Air pollution                      (b) Water pollution                      (c) Soil pollution                      (d) Marine pollution
  - (e) Noise pollution                      (f) Thermal pollution                      (g) Nuclear hazards
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution. •Pollution case studies.
- Disaster management: Floods, earthquake, cyclone and landslides.

#### **Unit-5 Social Issues and the Environment**

- From unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.      • Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.                                      •Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Public awareness.

#### **Human Population and the Environment**

- Population growth, variation among nations.
- Population explosion—Family Welfare Programme.
- Environment and human health.
- Human rights.
- Value education.

HIV/AIDS.

- Women and Child Welfare. •Role of Information Technology in environment and human health.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiography and Imaging Technology (BRIT)</u></b>			<b>Semester: 1</b>
<b>Course</b> <b>Environmental Sciences- Practical</b>	<b>Course</b> <b>Description</b> <b>Value added</b> <b>course</b>	<b>Credit per</b> <b>Semester</b> <b>1credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DCH001</b>

Interactive sessions by experts of the field, case studies, field visit and projects.

### **Field Work**

- Visit to a local area to document environmental assets—river/forest/grassland/hill/ mountain.
- Visit to a local polluted site—Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems—pond, river, hill slopes, etc.
- Case Studies.

JECRC UNIVERSITY School of Allied Health Sciences	<b>Program</b> <u><a href="#">B.Sc. Radiography and Imaging Technology (BRIT)</a></u>			<b>Semester: 1</b>
<b>Course</b> Communication Skills-Theory	<b>Course Description</b> Ability Enhancement	<b>Credit per Semester</b> 3 credits	<b>Hours per Semester</b> 3 hours	<b>Course Code</b> DEN001A

## COURSE OBJECTIVES

1	To enhance English language competence in reading, writing, listening and speaking.
2	Switch the approach from teacher-centred to student-centred one.
3	Minimize the Grammar Translation Method of ELT while trying to replace it with direct method.
4	Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centered learning rather than on the teacher-centered learning.
5	To link communication skills with the organizational behaviour
6	To inculcate skills that are very much required for employability and adjust in the professional Environment

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
<b>CO 2</b>	Ability to analyze the usage of English words in different contexts.
<b>CO 3</b>	An understanding of technical and academic articles' comprehension.
<b>CO 4</b>	The ability to present oneself at multinational levels knowing the type of different standards of English

**Unit-1 Basics of Organizational Communication:** Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture

**Unit-2 Writing Skills:** Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration

**Unit-3 Composition:** Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,

**Unit-4 Vocabulary Building:** Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms

**Unit-5 Professional and Technical Communication :** Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

<b>JECRC UNIVERSITY</b>	<b>Program</b>			<b>Semester: 1</b>
<b>School of Allied Health Sciences</b>	<b><u>B.Sc. Radiation and Imaging Technology (BRIT)</u></b>			
<b>Course</b>	<b>Course Description</b>	<b>Credit per Semester</b>	<b>Hours per Semester</b>	<b>Course Code</b>
<b>Communication Skills-Practical</b>	<b>Ability Enhancement</b>	<b>1 credits</b>	<b>2 hours</b>	<b>DEN001A</b>

<b>Unit-1</b>	<b>Basics of Organizational Communication:</b> Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time- management, Following Deadlines etc
<b>Unit-2</b>	<b>Write Dialogue from the different contexts of corporate culture:</b> Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
<b>Unit-3</b>	<b>Composition:</b> Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc
<b>Unit-4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>Unit-5</b>	<b>Professional and Technical Communication :</b> Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

JECRC UNIVERSITY School of Allied Health Sciences	Program <b>B.Sc. Radiation and Imaging Technology (BRIT)</b>			Semester: 1
Course <b>Fundamentals of Computer-Theory</b>	Course Description <b>Foundation</b>	Credit per Semester <b>2 credits</b>	Hours per Semester <b>2 hours</b>	Course Code <b>BRA006A</b>

The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Introduction to computer and Input output devices
<b>CO 2</b>	Processor and memory and Storage Devices
<b>CO 3</b>	Introduction of windows and Introduction to MS
<b>CO 4</b>	Introduction to Excel and Introduction to power-point
<b>CO-5</b>	Introduction of Operating System, Computer networks and Internet and its Applications

### Unit-1

- **Introduction to computer:** Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
- **Input output devices:** Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).

### Unit-2

- **Processor and memory:** The Central Processing Unit (CPU), main memory.
- **Storage Devices:** Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

### Unit-3

- **Introduction of windows:** History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
- **Introduction to MS-Word:** introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.

### Unit-4

- **Introduction to Excel:** introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
- **Introduction to power-point:** introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.

### Unit-5



- **Introduction of Operating System:** introduction, operating system concepts, types of operating system.

- **Computer networks:** introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
- **Internet and its Applications:** definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet. Application of Computers in clinical settings.

JECRC UNIVERSITY School of Allied Health Sciences	Program <b><u>B.Sc. Radiation and Imaging Technology (BRIT)</u></b>			Semester: 1
Course Fundamentals of Computer- Practical	Course Description Core Practical	Credit per Semester 1 credits	Hours per Semester 2 hours	Course Code BRA007A

## COURSE OBJECTIVES

The students will be able to learn all practical aspects of fundamental of computer

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Practical learning to use MS office: MS word, MS PowerPoint, MS Excel
<b>CO 2</b>	Practically To install different software
<b>CO 3</b>	How to do Data entry efficiency
<b>CO 4</b>	Practical related to all theory units of Fundamentals of Computer syllabus

**Unit 1-** Learning to use MS office: MS word, MS PowerPoint, MS Excel.

**Unit 2-** To install different software

**Unit 3-** Data entry efficiency

**Unit 4-** Practical related to all theory units of Fundamentals of Computer syllabus

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiography and Imaging Technology (BRIT)</u></b>			<b>Semester: 1</b>
<b>Course</b> <b>Cultural Education- I</b>	<b>Course</b> <b>Description</b> <b>Project</b>	<b>Credit per</b> <b>Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DIN001A</b>

### **COURSE OBJECTIVES**

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to acknowledge and appreciate the richness of Indian Culture
<b>CO 2</b>	Ability to represent the culture ethics in real life

### **UNIT-I**

#### **Holy Scriptures-A**

1. Introduction to Vedanta and Bhagavad Gita, Goals of Life – Purusharthas, Introduction to different Dharm Granthas (Various religious scriptures from Hindu, Muslim, Christian, Bodh, Jain religions)
2. Introduction to Yoga, Overview of Patanjali's Yoga Sutras

### **UNIT-II**

#### **Society and Culture-I**

3. Introduction to Indian Culture and Major Symbols of Indian Culture
4. Major Indian Cultural and Ethical Values- Respect, Compassion, Kindness, Forgiveness, Introspection, Honesty, Justice, Loyalty, Devotion, Self Sacrifice, Hospitality, Vasudhev Kutumbkum

### **UNIT-III**

#### **India in Progress-I**

5. Education, Science and Technology in Ancient India
6. Values from Indian History- War of Mahabharata, War of Kalinga, Freedom Struggle of India, Major Farmer Movements, Major Religious and Social Upliftment Movements

### **UNIT-IV**

#### **Great Indian Personalities-I**

7. Life and works of the Great People of India- Sushruta, Dadhichi, Ashtvakra, Anusuya, Panini, Charaka, Kalidas, Aryabhatta, Samudragupta, Ashoka, Chandragupt Mourya, Porus, Satyabhama, Dhruv, Prahlad, Chankya, Varahmihira, Bhism, Karan, Dronacharya, Meera Bai, Surdas, Dadudayal, Kabir, Mahatma Budhha, Mahavir, Guru Nanak Dev, Guru Gobind Singh, Mohammad Saheb, Jesus Christ, Veer Shivaji, Maharana Pratap, Maharani Laxmi Bai, Maharani Padmini, Hadi Rani Shal Kanwar, Panna Dhai

**\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to she/he will be required to make a Power Point Presentation on the learning and face Viva-voce by committee of teachers.**

<b>JECRC UNIVERSITY</b>	<b>Program</b>			<b>Semester:</b>
<b>School of Allied Health Sciences</b>	<b><u>B.Sc. Radiography and Imaging Technology (BRIT)</u></b>			<b>2nd</b>
<b>Course</b>	<b>Course</b>	<b>Credit per</b>	<b>Hours per Semester</b>	<b>Course Code</b>
<b>Human Anatomy-2 Theory</b>	<b>Description</b>	<b>Semester</b>	<b>3 hours</b>	<b>BRA008A</b>
	<b>core</b>	<b>3 credits</b>		

## COURSE OBJECTIVE

To provide an opportunity for radiation and imaging technologists who distinguish themselves in Human Anatomy - practical, theoretical knowledge and knowledge application, to undertake research based training in Anatomy. To capture distinguished medical students and offer them such training as would enable them to sub-specialize in anatomy at an early stage of their career. To develop as research scientists and research based teachers for schools of allied health sciences both locally and externally. It also strengthens the research foundation of the students with broad vision of leading in research based teaching of anatomy and stimulates the research attitudes and aptitudes of students.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the anatomy of Peritoneum
<b>CO 2</b>	To understand the anatomy of Urinary system
<b>CO 3</b>	To understand the anatomy of Reproductive system
<b>CO 4</b>	To understand the anatomy of Endocrine glands
<b>CO 5</b>	To understand the anatomy of Nervous system

### Unit-1 Peritoneum

- Description in brief

### Unit-2 Urinary system

- Kidney, ureter, urinary bladder, male and female urethra
- Histology of kidney, ureter and urinary bladder

### Unit-3 Reproductive system

- Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology)
- Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)
- Mammary gland

### Unit-4 Endocrine glands

- Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal gland – (gross & histology)

**Unit-5 Nervous system**

- i. Neuron
- ii. Classification of NS
- iii. Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve
- iv. (gross & histology)
- v. Meninges, Ventricles & cerebrospinal fluid
- vi. Names of basal nuclei
- vii. Blood supply of brain
- viii. Cranial nerves
- ix. Sympathetic trunk & names of parasympathetic ganglia
- x. Skin: Skin-histology
- xi. Appendages of skin
- xii. Eye: Parts of eye & lacrimal apparatus
- xiii. Extra-ocular muscles & nerve supply
- xiv. Ear: parts of ear- external, middle and inner ear and contents
- xv. Spermatogenesis & oogenesis
- xvi. Ovulation, fertilization
- xvii. Fetal circulation
- xviii. Placenta

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HUMAN anatomy-2 practical

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Course code – BRA09A

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Unit-1 identification of bones and organs

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <a href="#"><b>B.Sc. Radiography and Imaging Technology (BRIT)</b></a>			<b>Semester:</b> <b>2nd</b>
	<b>Course</b> <b>Human Physiology-2</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>
				<b>Course Code</b> <b>BRA010A</b>

**COURSE OBJECTIVES:** The course in Physiology is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –\

<b>CO 1</b>	Physiology of Excretory system
<b>CO 2</b>	Physiological functions of Endocrine system
<b>CO 3</b>	Physiological functions of Reproductive system
<b>CO 4</b>	Physiological functions of Nervous system
<b>CO 5</b>	Physiological functions of Nervous system

## Unit-1 Excretory system

- i. Physiological anatomy of kidney, structure and functions of excretory system, structure of nephron.
- ii. Mechanism of formation of Urine. & mechanism of concentration and dilution of urine.

- iii. The Counter Current System: Physiology of micturition and Regulation of Body temperature in Humans.

## **Unit-2 Endocrine system**

- i. General principles of endocrinology
- ii. The pituitary Gland.
- iii. The Thyroid Gland, The parathyroid, calcitonin and VitaminD.
- iv. The Adrenal Cortex & Pancreas.

## **Unit-3 Reproductive system**

- i. Changes during Puberty, Classification of Male sex hormones and their functions, Spermatogenesis & semen.
- ii. Changes during Puberty, Classification and Functions of female sex hormones, menstruation, ovulation and contraception.
- iii. Physiological changes during pregnancy, functions of placenta and physiology of lactation.

## **Unit-4 Nervous system**

- i. Organization of Nervous system, The Synapse , Physiology of receptor organs for special and general sensation, physiology of reflex action, classification and properties of reflexes.
- ii. Intro to Sensory and motor system. Functions of hypothalamus, thalamus, basal ganglia, cerebrum & cerebellum.
- iii. Autonomic nervous system, Cerebrospinal Fluid and Blood Brain Barrier.

## **Unit-5 Special Senses**

- i. Taste and Olfaction.
- ii. Vision—structure and function of eye, errors of refraction & their correction. Color blindness.
- iii. Hearing—structure and function of ear, general outline of mechanism of hearing and perception of sound.



JECRC UNIVERSITY School of Allied Health Sciences	Program <a href="#">B.Sc. Radiography and Imaging Technology (BRIT)</a>			Semester: 2nd
Course Biochemistry-2 Theory	Course Description Core	Credit per Semester 3 credits	Hours per Semester 3 hours	Course Code BRA011A

**COURSE OBJECTIVES:** This course provides the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It covers basic biochemical, cellular, biological and microbiological processes, basic chemical reactions in the prokaryotic and eukaryotic cells, the structure of biological molecules, introduction to the nutrients.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

CO 1	Functions and biochemistry of Enzymes, Nucleotide and Nucleic acid
CO 2	Functions and biochemistry of Vitamins and Mineral Metabolism
CO 3	Functions and biochemistry of Connective tissue
CO 4	Functions and biochemistry of Hormone, Acid-Base balance and water balance
CO 5	Functions and biochemistry of Electrolyte balance and clinical aspect of biochemistry

**Unit-1 Enzymes** – Classification, definition, Active site, Cofactor (Coenzyme, Activator), Isoenzymes, Proenzyme. Factors effecting enzyme activity, Enzyme inhibition and significance.

**Nucleic Acids-** DNA and RNA chemistry and functions, Difference between DNA and RNA, Structure of DNA (Watson and Crick model) and tRNA, rRNA, mRNA.

**Unit-2 Vitamins** – general classification, sources of vitamin and functions, RDA and common deficiency symptoms

**Mineral Metabolism-** Definition, Sources, RDA, Digestion, absorption, transport, excretion, functions, common disorders associated with mineral metabolism.

**Unit-3 Water balance** - Water distribution in the body, Body water, water turnover and its regulation in brief.

**Electrolyte balance – Basic concept of** Osmolarity and distribution of electrolytes in brief.

Introduction to role of aldosterone, rennin angiotensin system and ANF in brief

**Unit-4 Hormone Action** - Definition, classification, Mechanism of hormone action. Receptors, signal transduction, second messengers and cell function.

**Unit-5 Acid-Base balance** - Acids, bases and buffers, pH. Buffer systems of the body, bicarbonate buffer system. Osmosis, dialysis, surface tension.

JECRC UNIVERSITY School of Allied Health Sciences	Program <u>B.Sc. Radiography and Imaging Technology (BRIT)</u>			Semester: 2nd
Course Conventional Radiological Equipment Theory	Course Description Core	Credit per Semester 3 credits	Hours per Semester 3 hours	Course Code BRA012A

**COURSE OBJECTIVES:** This course provides the knowledge and skills in Conventional Radiological Equipment to make the students understand about working of equipments

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

CO 1	The students understand about Production of x-rays
CO 2	The students understand about Meters and exposure timers
CO 3	The students understand about High tension circuits
CO 4	The students understand about Interlocking circuits and Control of scattered radiation
CO 5	The students understand about Fluorescence and phosphorescence and Care and Maintenance of X-ray equipment

### Unit-1

**Production of x-rays:** X-ray tube, gas filled x-ray tube, construction working and limitations; stationary anode x - ray tube; construction, working, methods of cooling the anode, rating chart and cooling chart; rotating anode x - ray tube: construction, working rating chart, speed of anode rotation, angle of anode inclination, dual focus and practical consideration in choice of focus, anode heel effect, grid controlled x - ray tube; effect of variation of anode voltage and filament temperature; continuous and characteristics spectrum of x - rays, inherent filter and added filter, their effect on quality of the spectrum.

### Unit-2

**Meters and exposure timers:** Moving coil galvanometer: construction and working/conversion to millimeter, ammeter and voltmeter, meters commonly used in diagnostic x-ray machines, pre reading kV meter and millimeter, digital panel meters. Clockwork timers, synchronous motor timer, electronic timers, photo metric timers (fluorescent and photoelectric effect as applied in timers), ion chamber based timers, integrated timer.

### Unit-3

**High tension circuits:** H.T. generator for x-ray machines, three phase half wave rectifier, three phase full wave rectifier, three phase six rectifier circuit, three phase 12 rectifier circuit, high and medium frequency circuits; capacitance filter control and stabilizing equipment; mains voltage compensator, mains resistance compensator, compensation for frequency variation, control of tube voltage, kV compensator; high tension selector switch, filament circuit, control of tube current, space charge compensation.

### Unit-4

**Interlocking circuits:** Relays: description and working, use of relays in diagnostic machines for over load protection, circuit diagram; simplified circuit and block diagrams illustrating sequence of events from mains supply to controlled emission of x-rays.

**Control of scattered radiation:** Beam limiting devices: cones, diaphragms, light beam collimator, beam centering device, methods to verify beam centering and field alignment; grids; design and

control of scattered radiation, grid ratio, grid cut-off, parallel grid, focused grid, crossed grid, grided cassettes, stationary and moving grid potter bucky

diaphragms, various types of grid movements; single stroke movement, oscillatory movement and reciprocatory movement.

## Unit-5

**Fluoroscopy: Fluorescence and phosphorescence-** description, fluorescent materials used in fluoroscopic screens, construction of fluoroscopic screen and related accessories, tilting table, dark adaptation. Image intensifier - Construction and working, advantages over fluoroscopic device, principles and methods of visualising intensified image, basic principles of closed circuit television camera and picture tube. Vidicon camera, CCD. Automatic brightness control, manual cassette changer, rapid automatic film changer, basic principles of cine fluoroscopy and angiography use of grid controlled x-ray tube.

**Care and Maintenance of X-ray equipment-**General care; functional tests; testing the performance of exposure timers, assessing the MA settings, testing the available KV, measurement of focal spot of an x-ray tube, testing the light beam diaphragm, practical precautions pertaining to Brakes and locks, H.T. cables, meters and controls, tube stands and tracks as well as accessory equipment.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiography and Imaging Technology (BRIT)</u></b>			<b>Semester:</b> <b>2nd</b>
<b>Course</b> <b>General &amp; Clinical Psychology</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BRA013A</b>

**COURSE OBJECTIVES** -Human Psychology involves the study of various behavioral patterns of individuals, theories of development, normal and abnormal aspects of motor, social, emotional and language development, communication and interaction skills appropriate to various age groups. The study of these subjects will help the student to understand their clients while assessment and while planning appropriate treatment methods.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Basics and Introduction of Psychology and growth and development of humans on psychological aspects.
<b>CO 2</b>	Sensation, attention, perception motivational psychology
<b>CO 3</b>	Psychology of humans related to frustration, conflict, emotions and intelligence
<b>CO 4</b>	Thinking and learning on psychological basis and how to improve
<b>CO 5</b>	Improve personality by psychological aspect, social and clinical psychology for patient perspective

## • THEORY

### Unit-1 Introduction to Psychology

- Schools: Structuralism, functionalism, behaviorism, Psychoanalysis.
- Methods: Introspection, observation, inventory and experimental method.
- Branches: psychology and applied psychology
- Psychology and physiotherapy

#### **Growth and Development**

- Life span: Different stages of development (Infancy, childhood, adolescence, adulthood, middle age, old age).
- Heredity and environment: role of heredity and environment in physical and psychological development, “Nature v/s Nurture controversy”.

## **Unit-2    Sensation, attention and perception**

- a) Sensation: Vision, Hearing, Olfactory, Gustatory and Cutaneous sensation, movement, equilibrium and visceral sense.
- b) Attention: Types of attention, Determinants of attention (subjective determinants and objective determinants).
- c) Perception: Gestalt principles of organization of perception (principle of figure ground and principles of grouping), factors influencing perception (past experience and context).
- d) Illusion and hallucination: different types.

### **Motivation**

- a) Motivation cycle (need, drive, incentive, reward).
- b) Classification of motives.
- c) Abraham Maslow's theory of need hierarchy

**Unit-3 Frustration and conflict**

- a) Frustration: sources of frustration.
- b) Conflict: types of conflict.
- c) Management of frustration and conflict

**Emotions**

- a) Three levels of analysis of emotion (physiological level, subjective state, and overt behavior).
- b) Theories of emotion
- c) Stress and management of stress.

**Intelligence**

- a) Theories of intelligence.
- b) Distribution of intelligence.
- c) Assessment of intelligence

**Unit-4 Thinking**

- a) Reasoning: deductive and inductive reasoning
- b) Problem solving: rules in problem solving (algorithm and heuristic)
- c) Creative thinking: steps in creative thinking, traits of creative people

**Learning**

- a) Factors effecting learning.
- b) Theories of learning: trial and error learning, classical conditioning, Operant conditioning, insight learning, social learning theory.
- c) The effective ways to learn: Massed/Spaced, Whole/Part, Recitation/Reading, Serial/Free recall, Incidental/Intentional learning, Knowledge of results, association, organization, and mnemonic methods.

**Unit-5 Personality**

- a) Approaches to personality: type & trait, behavioristic, psychoanalytic and humanistic approach.
- b) Personality assessment: observation, situational test, questionnaire, rating scale, interview, and projective techniques.
- c) Defense Mechanisms: denial of reality, rationalization, projection, reaction formation, identification, repression, regression, intellectualization, undoing, introjection, acting out.

**Social psychology**

- a) Leadership: Different types of leaders. Different theoretical approaches to leadership.
- b) Attitude: development of attitude. Change of attitude.

**Clinical psychology**

Models of training, abnormal behavior assessment, clinical judgement, psychotherapy, self-management methods, physiotherapist patient interaction, aggression, self- imaging, stress management, assertive training, Group therapy, Body awareness, Pediatric, child and geriatric clinical psychology.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Radiation and Imaging Technology (BRIT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Professional Skills-Theory</b>	<b>Course Description</b> <b>Ability</b> <b>Enhancement</b>	<b>Credit per</b> <b>Semester</b> <b>2 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN002A</b>

## COURSE OBJECTIVES

<b>1.</b>	To enhance Professional competence in reading, writing, listening and speaking.
<b>2.</b>	Switch the approach from providing information about the language to use the language.
<b>3.</b>	Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
<b>4.</b>	Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
<b>5.</b>	Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
<b>6.</b>	Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to design a language component or process to meet desired need within realistic, Constraints such as environmental, social, political, ethical, scenario
<b>CO 2</b>	Ability to analyze the usage of English words in professional scenario.
<b>CO 3</b>	An understanding of technical and academic articles' comprehension.
<b>CO 4</b>	The ability to present oneself at multinational levels as per the demand of the corporate culture

**Unit-1** Professional Grooming and Professional Culture: Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management

**Unit-2** Advanced Grammar: Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents

**Unit-3** Composition:, Memo, Notice, Circular, Book Review, Research Article, Reports

**Unit-4** Vocabulary Building: Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms

**Unit-5** Reading Comprehension: Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Radiation and Imaging Technology (BRIT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Professional Skills-Practical</b>	<b>Course Description</b> <b>Ability Enhancement</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN002B</b>

**Unit-1** Professional Grooming and Professional Culture: Role plays and Activities on Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management

**Unit-2** Advanced Grammar: Exercise Sessions for Common errors related to prepositions, articles, models , Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents

**Unit-3** Composition:, Memo, Notice, Circular, Book Review, Research Article, Reports – Giving Assignments based on practical applications, Practice sessions on different topics

**Unit-4** Vocabulary Building: Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms- Activities related to the appropriate use of words

**Unit-5** Reading Comprehension: Practice Reading Unseen Paragraphs- Finding Suitable title, Summarizing, Analyzing, Finding new words etc.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>B.Sc. Radiation and Imaging Technology (BRIT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Culture Education - 2</b>	<b>Course Description</b> <b>Value Added course</b>	<b>Credit per Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DIN002A</b>

## OBJECTIVES

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

**COURSE OUTCOMES (CO):** At the end of this course students will have:

<b>CO 1</b>	Ability to acknowledge and appreciate the richness of Indian Culture
<b>CO 2</b>	Ability to represent the culture ethics in real life

## Unit-1 Holy Scriptures-II

1. Bhagavad Gita and Life Management
2. Highlights of Indian Scriptures - Major Incidents and terms from various religious scriptures including Ramayana, Mahabharata, Guru Granth Saheb, Bible, Quran, Jain Scriptures, Bodh Scriptures
3. Historicity of Ramayana and Mahabharata

## Unit-2 Society and Culture-II

4. Indian Society: Its Strengths and Weaknesses
5. Health and Lifestyle related issues
6. Conservation of cultural heritage

## Unit-3 India in Progress-II

7. Role & Position of Women in Indian Society- Rituals like Sati, Dakin, Kanyavadh, Pardah, Devdasi, Child Marriage, Measures of Women Empowerment including Education, Constitutional and other Rights
8. Indian Models of Economy, Business and Management

## Unit-4 Great Indian Personalities-II

9. Life and works of the Great People of India- Raja Ram Mohan Roy, Swami Vivekananad, Madan Mohan Malviya, Ishwarchand VidyaSagar, JyotibaPhule, HomiBhabha, B.R. Ambedkar, Mahatma Gandhi, Chandra Shekhar Aazad, Abdul Hamid, Badshah Khan, Bhagat Singh, Ashfaqullah, Vir Sawarkar, Vir Banda Bahadur, Vir Haqiqat Rai, Subhash Chandra Bose, Mother Teresa, Jagdish Chandra Basu, JRD Tata, Ratan Tata, Dada Saheb Phalke, Major Dhayan Chand, A P J Abdul Kalam, Kailash Satyarthi, Aruna Roy, Mahasweta Devi, Udaya Kumar, Narayan Murthy, Azim Premji

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiation and Imaging Technology (BRIT)</u></b>			<b>Semester: 3</b>
<b>Course</b> <b>Basic Physics including Radiological Physics</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BRA014A</b>

**COURSE OBJECTIVE-** To make students understand about basics physics concept related to imaging instruments.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand Electricity and magnetism and Electromagnetic waves
<b>CO 2</b>	Learn concept of sound and heat physics
<b>CO 3</b>	Learn concept of semiconductors and diodes
<b>CO 4</b>	To understand basic physics of x-ray
<b>CO 5</b>	Understand X-ray generator circuits and Radiation quantities and units

### Unit-1

**Basic concepts :** Units and measurements-Force, work, power and energy-Temperature and heat-SI units of above parameters. Atomic structure-atom model-Nucleus-electronic configuration-periodic table-Isotopes-Ionization excitation- Binding energy-electron volt-Electromagnetic radiation-Quantum nature of radiation-mass energy equivalence- Fluorescence-electromagnetic spectrum.

**Electricity and magnetism:** Electric charges, Coulomb's law-Unit of charge-Electric potential, unit of potential-Electric induction, capacitance and Capacitors, series and parallel connection-electric current, unit, resistance, ohm's law, electric power, Joule's law. Varying currents-Growth and decay of current in LR circuit time constant, charge and discharge of a Capacitor through a resistance and inductance. Oscillations in an LC circuit. Alternating currents: Peak and RMS values and current and voltage, circuit containing LR, CR and LCR-Power factor, series and parallel LCR circuits, DC circuit, Ohm's law, resistivity, series and parallel combination, EMF, Kirchhoff's law, heating effect of current.

**Electromagnetic waves :** Introduction, Maxwell's equation, electromagnetic waves, energy density and intensity, momentum, electromagnetic spectrum and radiation in Atmosphere.

### Unit 2:-

#### Sound

a. The nature and propagation of sound wave (the characteristics of sound, wave theory), speed of sound in a material

medium, intensity of sound, the decibel, Interference of sound waves, beats, diffraction.

b. Doppler's effect, Ultrasonic wave, production of ultrasonic waves (piezo-electric effect) in ultrasonography.

c. Use of principle of Doppler's effect in Diagnostic Radiology (e.g. Echo, blood flow measurement).

#### Heat

Definition of heat, temperature, Heat capacity, specific heat capacity, Heat transfer-conduction, convection, radiation, thermal conductivity, equation for thermal conductivity (k), the value of k of various material of interest in radiology, thermal expansion, Newton's law of cooling, Heat radiation, perfect black body, Stefan law, application in Diagnostic Radiology (Heat dissipation in both stationary and rotating X-ray tubes).

### Unit-3

#### Electronics

a. Semiconductors; Conduction in crystals, Energy bands. Intrinsic and Extrinsic semiconductors n-type and p-type semiconductors, majority and minority carriers.

b. Semiconductor diodes: p-n junction-properties forward and reverse bias, characteristics of p-n junction Rectifiers-Half- wave and full wave, ripple factor, Efficiency of HW and FW rectifiers.

Filter circuits; Zenerdiode, regulated power supply.

c. Transistors-Symbols, Transistor connections and characteristics, Transistor as an amplifier, load line analysis, operating point, types of amplifiers-voltage and power amplifiers. Feedback-negative feedback in amplifiers.

#### Unit-4

- a. X-rays: Discovery of x-rays-X-ray production and properties: Bremsstrahlung radiations-Characteristics X-Rays, factors affecting X-ray emission spectra, X-ray quality and quantity, HVL measurements, heel effect, soft and hard X-Rays, added and inherent filtration, reflection and transmission targets.
- b. Interaction of ionizing radiation with matter-Types of interactions of X-and gamma radiation, Photoelectric & Compton, Pair production, annihilation radiation.
- c. Interaction of X and gamma rays: Transmission through matter, law of exponential attenuation, half value layer, and linear attenuation coefficient-coherent scattering-photonuclear disintegration-Particle interactions. Interactions of X rays and Gamma rays in the body; fat-soft tissue-bone-contrast media-total attenuation coefficient-relative clinical importance.
- d. Exponential attenuation (linear/mass attenuation coefficients), Half Value Thickness (HVT), Tenth Value Thickness (TVT), dependence on energy and atomic number.
- e. Radiation intensity and exposure, photon flux and energy flux density.
- f. LET, range of energy relationship for alpha, beta particles with X-Rays.
- g. X-ray tube: historical aspects, construction of X-ray tubes, requirements for X-ray production(Electron source, target and anode material), tube voltage, current, space charge, early X-ray tubes(Coolidge tubes, tube envelop and housing) cathode assembly, X-ray production efficiency, advances in X-ray tubes, anode angulation and rotating tubes-line focus principle-space charge effect, tube cooling-Modern X-ray tubes-stationary anode, rotating anode, grid controlled X-ray tubes, heel effect, off focus radiation, tube insert and housing-Tube rating-Quality and intensity of x-rays-factors influencing them.

#### Unit-5

- a) Grid controlled and high speed tubes, focal spot size, speed of anode rotation, target angle, inherent filtration, radiation leakage and scattered radiation). Interlocking and X-ray tube overload protection.
- b) Heat dissipation methods, tube rating, heat units, operating conditions and maintenance and Q.A procedures.
- c) Filament current and voltage, X-ray circuits (primary circuit, auto transformer), types of exposure switch and timers, principle of automatic exposure control (AEC) and practical operation, filament circuit, high voltage circuits, half wave, full wave rectification, three phase circuits. Types of generators, 3 phase, 6 and 12 pulse circuits-high frequency generators-falling load generators, Capacitors discharge and grid control systems.
- d) X-ray generator circuits: Vacuum tube diodes-semi-conductor diodes-transistor-Rectification-half and full wave- self rectification-X-ray generator; filament circuit-kilo Voltage circuit-single phase generator-three phase generator-constant potential generator-Fuses, switches and interlocks-Exposure switching and timers-HT cables- earthing.
- e) Physical quantity, its unit and measurement: Fundamental and derived quantity, SI unit, various physical/radiation quantity used in Diagnostic Radiology and its unit (for example, KVp, mA, mAS, Heat unit (HU).
- f) Radiation quantities and units: Radiation intensity-exposure, roentgen, its limitations-kerma and absorbed dose- electronic equilibrium-rad, gray, conversion factor for roentgen to rad-quality factor-dose equivalent-rem, Sievert. Quality factor, dose equivalent, relationship between absorbed dose and equivalent dose.
- g) Radiation detection and measurements: Principle of radiation detection-Basic principles of ionization chambers, proportional counters, G.M counters and scintillation detectors. Measuring system: free ionization chamber- thimble ion chamber-condenser chamber-

secondary standard dosimeter-film dosimeter-chemical dosimeter- Thermo Luminescent Dosimeter-  
Pocket dosimeter.

<b>JECRC UNIVERSITY</b> School of Allied Health Sciences	<b>Program</b> <u><b>B.Sc. Radiation and Imaging Technology</b></u> <u><b>(BRIT)</b></u>			<b>Semester: 3</b>
<b>Course</b> <b>Radiographic and Image</b> <b>Processing Techniques</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BRA015A</b>

**COURSE OBJECTIVE-** Student should learn how the Radiographic and Image Processing Techniques are using in investigation purpose.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Learn about Radiographic Film, Sensitometer and Control of scattered radiation
<b>CO 2</b>	Learn about Intensifying screens, Cassettes and Photochemistry
<b>CO 3</b>	Students able to learn Automatic and manual Film Processor
<b>CO 4</b>	Factors affecting Image Quality, Presentation of radiographs-opaque and Monitor images
<b>CO 5</b>	Learn about processing room and dark room planning

#### Unit-1

1. Appreciation and application of all the factors listed below will enable the student/technologist to produce X-ray films of good quality and diagnostic value. The lectures to be linked with practical demonstration to illustrate the importance of all that goes to make up correct exposure conditions.
2. Radiographic Film: Structure of film emulsion-film characteristics (speed, base + fog, gamma, latitude)-effect of grain size on film response to exposure, interpretation of characteristics curve-Grain technology-Gelatin-Basic film types-Film formats and packing-Direct exposure duplitised films-Single coated emulsions-Films for specialized use-manufacturing process. Structure, properties of different parts, handling, film wrappings. Handling of exposed and unexposed films. Types, applications, advantages/limitations of different types, safe light requirements.

#### Unit-2

1. Intensifying screens: Structure and functions, common phosphors used-types, screen mounting, care and maintenance of film screen contact. Intensifying factor-speed and detail-cross-over effect-resolution-mottle- reciprocity-screen asymmetry-cleaning. New phosphor technology-influence of kilo voltage. Photo-stimulable phosphor Imaging.
2. Cassettes: Structure and function-Types-single, gridded, film holder-Design features and consideration with loading/unloading-Care and maintenance (cleaning).

#### Unit-3

1. Processing: manual processing-care of processing equipment-automatic processor-manual VS automatic processing-principles and typical equipment Microprocessor controlled-Cine processing-Daylight systems- Processing faults-maintenance.
2. Radiographic image-components of image quality-unsharpness in radiographic image-contrast of the radiographic image-distinctness of the radiographic image-size, shape and spatial relationships.

#### Unit-4

1. Factors affecting Image Quality: Meaning of radiographic image contrast, density, resolution, sharpness, magnification and distortion of image, noise and blur. Radiographic illuminators and viewing conditions, visual acuity and resolution.
2. Presentation of radiographs-opaque letters and markers-Identification of dental films-preparation of stereo radiographs-viewing conditions.
3. Monitor images-Characteristics of the video image-television camera-imaging camera. Laser-light and laser-laser imaging-laser imagers-imaging plates-Dry cameras.

## Unit-5

1. Photochemistry: Principles: Acidity, alkalinity, pH, the processing cycle, development, developer solution. Fixing, fixer solution, washing, drying replenishment, checking and adjusting-latent image formation--nature of development-constitution of developer-development time-factors in the use of developer. Fixers-constitution of fixing solution-factors affecting the fixer-replenishment of fixer-silver conservation-Drying-developer and fixer for automatic film processor-rinsing-washing and drying. Replenishment rates in manual and automatic processing-Silver recovery-Auto and manual chemicals.
2. Sensitometer: Photographic density-characteristic curve-information from the characteristic curve-speed Vs definition. Storage of X-ray film



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiation and Imaging Technology</u></b> <b><u>(BRIT)</u></b>			<b>Semester: 3</b>
<b>Course</b> <b>Clinical Radiography-</b> <b>Positioning Part-1</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BRA016A</b>

**COURSE OBJECTIVE-** Student should learn Clinical Radiography Positioning of various musculoskeletal parts

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Clinical Radiography Position of upper limb, lower limb, scoliosis and kyphosis and other disorders and deformities
<b>CO 2</b>	Clinical Radiography Position of metabolic bone diseases, skull and congenital deformities
<b>CO 3</b>	Learn about Dental Radiography and upper respiratory system
<b>CO 4</b>	Lungs, Mediastinum and Abdominal viscera
<b>CO 5</b>	Learn Radiography using mobile X-ray equipment at bed side

### Unit-1

- Upper limb: Technique for hand, fingers, thumb, wrist joint carpal bones, forearm, elbow joint, radio ulnar joints and humerus supplementary techniques for the above. E.g. Carpal tunnel view, ulnar groove, head of the radius, supracondylar projections.
- Lower limb: Technique for foot, toes, great toe, tarsal bones, calcaneum, ankle joint, lower leg, knee, patella & femur. Supplementary techniques: Stress view for torn ligaments,
- Subtalar joint and talo calcaneal joint.
- Inter condylar projection of the knee.
- Tibial tubercle.
- Length measurement technique.
- Shoulder girdle and thorax: Technique for shoulder joint, scapular, clavicle, acromio clavicular joints, sternum, ribs, sterno-clavicular joint. Supplementary projections and techniques
- Recurrent dislocation of shoulder.
- Traumatic dislocation of shoulder.
- Cervical ribs.
- Vertebral column: Technique for atlanto-occipital joint, cervical spine, cervico thoracic spine, thoracic spine, thoraco-lumbar spine, lumbo sacral spine, sacrum and coccyx. Supplementary techniques to demonstrate:
  - Scoliosis
  - Kyphosis
  - Spondylolisthesis
  - Disc lesion
  - Union of spinal graft

### Unit-2

- Pelvic girdle and hip region: Technique for whole pelvis. Ilium, ischium, pubic bones, sacro iliac joint, symphysis pubis, hip joint, acetabulum neck of femur, greater and lesser trochanter. Supplementary techniques-
- Congenital dislocation of hips
- Epiphysis of femur
- Lateral projections for hip joints to show femoral head and neck relationship.
- Skeletal survey: Skeletal survey for metabolic bone disease, metastases, hormonal disorder, renal disorders.

f) Skull: Basic projections for cranium, facial bones, nasal bones and mandible. Technique for

- g) Petrous temporal for mastoids. Internal auditory canal. - Accessory nasal sinuses.
- h) Temporo - mandibular joint. - Orbits and optic foramen.- Zygomatic arches.
- i) Styloid process. - Pituitary fossa. - Jugular foramen.

### Unit-3

- a) Dental Radiography- Technique for intra oral full mouth.- Occlusal projections.- Extra oral projections including orthopantomography.- Supplementary techniques.
- b) Upper respiratory system- Technique for post nasal airways, larynx, trachea, thoracic inlet, Valsalva manoeuvre. -Phonation.

### Unit-4

- a) Lungs and Mediastinum: Technique for routine projections- Supplementary projections: Antero-posterior, obliques, lordotic, apical projection, use of penetrated postero-anterior projection. - Expiration technique. - Technique for pleural fluid levels and adhesions.
- b) Abdominal viscera- Technique for plain film examination. - Projection for acute abdomen patients. - Technique to demonstrate: Foreign bodies, Imperforate anus.

### Unit-5

Radiography using mobile X-ray equipment- Radiography in the ward: Radiography in the specialized unit, such as: Intensive care unit, Coronary care, Neonatal unit.- Radiography in the operating theatre.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiation and Imaging Technology</u></b> <b><u>(BRIT)</u></b>			<b>Semester: 3</b>
<b>Course</b> <b>Clinical Radiography-</b> <b>Positioning Part-1 Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>2 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BRA017A</b>

**COURSE OBJECTIVE-** Student should learn practical positioning of different body parts to enrich clinical practice. Radiographic positioning of all parts of the body as mentioned theory syllabus with course code BRA016A

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiation and Imaging Technology</u></b> <b><u>(BRIT)</u></b>			<b>Semester: 3</b>
<b>Course</b> <b>Law &amp; Ethics</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BRA018A</b>

**COURSE OBJECTIVE-** Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Radiation and Imaging technicians are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows:

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Students able to learn Introduction and Code of conduct Medical ethics
<b>CO 2</b>	Learn about Basic principles and Malpractice and negligence
<b>CO 3</b>	Learn about consent and right of patient
<b>CO 4</b>	Learn about organ transplant and Medico legal aspects of medical record
<b>CO 5</b>	Professional Indemnity insurance policy and informed consent

#### **Unit-1**

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct

#### **Unit-2**

1. Basic principles of medical ethics – Confidentiality
2. Malpractice and negligence - Rational and irrational drug therapy

#### **Unit-3**

1. Autonomy and informed consent - Right of patients
2. Care of the terminally ill- Euthanasia

#### **Unit-4**

1. Organ transplantation
2. Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.

#### **Unit-5**

1. Professional Indemnity insurance policy
2. Development of standardized protocol to avoid near miss or sentinel events
3. Obtaining an informed consent.

#### 4. Ethics in the profession of Radiation and Imaging Technology

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiation and Imaging Technology</u></b> <b><u>(BRIT)</u></b>			<b>Semester: 3</b>
<b>Course</b> <b>Professional values</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BRA019A</b>

**COURSE OBJECTIVE-** The module on professionalism will deliver the concept of what it means to be a professional and how a specialized profession is different from a usual vocation. It also explains how relevant is professionalism in terms of healthcare system and how it affects the overall patient environment.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Learn Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
<b>CO 2</b>	Learn ethical or moral values
<b>CO 3</b>	Learn professional behavior
<b>CO 4</b>	Learn professional accountability and responsibility
<b>CO 5</b>	Learn Cultural issues in the healthcare environment and team efforts

#### **Unit-1**

Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality

#### **Unit-2**

Personal values- ethical or moral values

#### **Unit-3**

Attitude and behavior- professional behavior, treating people equally

#### **Unit-4**

Code of conduct, professional accountability and responsibility, misconduct

#### **Unit-5**

Differences between professions and importance of team efforts  
Cultural issues in the healthcare environment

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiation and Imaging Technology</u></b> <b><u>(BRIT)</u></b>			<b>Semester: 3</b>
<b>Course</b> <b>Life Skills – 1 (Personality</b> <b>Development)</b>	<b>Course</b> <b>Description</b> <b>Ability</b> <b>Enhancement</b>	<b>Credit per</b> <b>Semester</b> <b>1credits</b>	<b>Hours per</b> <b>Semester</b> <b>1 hours</b>	<b>Course</b> <b>Code</b> <b>DEN003A</b>

**COURSE OBJECTIVE-** To prepare the students as per the industry demands. Switching to Activity and Task based Teaching modules. To focus on the linguistic aspects in relation to life situations. Facilitating the aspects of behavioral skills in language. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields
<b>CO 2</b>	Ability to learn by doing it practically in the classroom
<b>CO 3</b>	Ability to learn by creating an environment and adapting to the environment.
<b>CO 4</b>	The ability to prepare the students as per the need of the Multi-cultural scenario around.

- |               |  |
|---------------|--|
| <b>UNIT 1</b> | <ul style="list-style-type: none"> <li>Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion</li> <li>Basics of Narrating and describing things</li> </ul>   |
| <b>UNIT 2</b> | <ul style="list-style-type: none"> <li>Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview</li> <li>CV/Resume Drafting and HR Interview advance theory</li> <li>Basics of Video Interviews and Video Profiles for Job</li> </ul>  |
| <b>UNIT 3</b> | <ul style="list-style-type: none"> <li>Types of listening, advantages and disadvantages</li> </ul>   |
| <b>UNIT 4</b> | <ul style="list-style-type: none"> <li>Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report</li> </ul>  |
| <b>UNIT 5</b> | Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc |

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiation and Imaging Technology</u></b> <b><u>(BRIT)</u></b>			<b>Semester: 3</b>
<b>Course</b> <b>Life Skills – 1 (Personality</b> <b>Development) Practical</b>	<b>Course</b> <b>Description</b> <b>Foundation</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>DEN003A</b>

- UNIT 1**
- Debates / Speeches / Addressing the public / Extempore/Group Discussion
  - Describing a hypothetical situation / theme / surroundings / appearance/personality traits/company/ a professional Concept/New Idea, / New Project through PPT and video aids
- UNIT 2**
- Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview
  - CV/Resume Drafting and HR Interview practice sessions elaborating the points as per the CV and industry demand
  - Video Interviews and Video Profiles for Job-Practice session for Online Interviews
- UNIT 3**
- Listening to variety of audio/video conversations including interviews, news, reports, reports, GDs, dialogues from body language, logic, wit and vocabulary perspectives
- UNIT 4**
- Group Discussion-Practice sessions, Presenting New Idea/Concept/Proposal/ Project/ Report
- UNIT 5**
- Activities on how to be a strong Personality, Motivation, Case studies for Resourcefulness and out of the box thinking, Role plays and Case studies on Risk taking, Self confidence and Self-esteem, Decision Making, Emotion Management, Cultural Adaptability, Multicultural Perspective towards things, ideas, views, codes etc



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiation and Imaging Technology</u></b> <b><u>(BRIT)</u></b>			<b>Semester: 3</b>
<b>Course</b> <b>Value Education and Ethics - 1</b>	<b>Course Description</b> <b>Value added course</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>1 hours</b>	<b>Course Code</b> <b>DIN003A</b>

### **COURSE OBJECTIVES**

1. To give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.
2. Making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to acknowledge and appreciate the ethical beauty of India
<b>CO 2</b>	Ability to incorporate the values of human lives in real life applications

### **Lessons from the Ramayana**

Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

### **Lessons from the Mahabharata**

Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

### **Lessons from the Upanishads**

Introduction to the Upanishads: Sruti versus Smriti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, Satyakama Jabala, Aruni, Shvetaketu.

### **Message of the Bhagavad Gita**

Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War – The anguish of Arjuna – Counsel by Sri. Krishna – Key teachings of the Bhagavad Gita – Karma Yoga, Jnana Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

### **Life and Message of Swami Vivekananda**

Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception in India – Message from Swamiji's life.

### **Life and Teachings of Spiritual Masters India**

Sri Rama, Sri Krishna, Sri Buddha, Adi Shankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda.

### **Insights into Indian Arts and Literature**

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian

Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Thea

#### IV-

#### SEMESTER

##### **Subjects:**

- |  |            |
|--|------------|
| 1. Modern Radiological Equipment including Physics     | 3- credit  |
| 2. Contrast & Special Radiography Procedures           | 3- credit  |
| 3. Contrast & Special Radiography Procedures-Practical | 1 - credit |
| 4. Clinical Radiography Positioning Part 2             | 3- credit  |
| 5. Clinical Radiography Positioning Part 2 Practical   | 1- credit  |
| 6. Physics of Newer Imaging Modalities                 | 3- credit  |

##### **Extra:**

- |  |           |
|--|-----------|
| 1. Life Skills - 2 (Aptitude)            | 1-credit  |
| 2. Life Skills - 2 (Aptitude)- Practical | 1- credit |
| 3. Value Education and Ethics – 2        | 1-credit  |

<b>JECRC UNIVERSITY</b> School of Allied Health Sciences	<b>Program</b> <u><b>B.Sc. Radiation and Imaging Technology</b></u> <u><b>(BRIT)</b></u>			<b>Semester:</b> <b>4th</b>
<b>Course</b> <b>Modern Radiological</b> <b>Equipment including Physics</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BRA020A</b>

### **Modern Radiological Equipment including Physics**

**3- credit**

- CO-1** : Special radiological equipment  
**CO-2** : Concept of tomography, stich radiography and DEXA  
**CO-3** : Concepts of computed and digital radiography  
**CO-4** : Vascular imaging equipment  
**CO-5** : Picture Archiving and Communication System.

#### **Unit-1**

**Special Radiological Equipment:** Portable and mobile x-ray units, dental x-ray machine, skull table mammographic device - Technical aspects of Mammography; High Tension Generators, x-ray tubes-their types and advancements; Accessories; Resolution; Quality control; Application and role in medicine, digital radiography equipment, digital subtraction techniques

#### **Unit-2**

**Tomography:** Body section radiography, basic principle and equipment, multi section tomography, various types of tomographic movements, Tomosynthesis, Stich radiography, Dual energy x-ray absorptionmetry (DEXA) scan.

#### **Unit-3**

**Computed radiography:** its principle, physics & equipment. Digital Radiography. Flat panel digital fluoroscopy and radiography system, Direct and indirect digital radiography and fluoroscopy systems. Digital radiography and Computed radiography its advantages, disadvantages and applications.

#### **Unit-4**

**Vascular Imaging Equipment:** Introduction, historical developments, Principle, scanned projection radiography, digital subtraction angiography, applications and definition of terms.

#### **Unit-5**

**Picture archiving and communication system (PACS);** components of PACS, HIS system, RIS System, DICOM, Application and importance.

<b>JECRC UNIVERSITY</b> School of Allied Health Sciences	<b>Program</b> <u><b>B.Sc. Radiation and Imaging Technology</b></u> <u><b>(BRIT)</b></u>			<b>Semester:</b> <b>4th</b>
<b>Course</b> <b>Contrast &amp; Special</b> <b>Radiography Procedures-</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BRA021A</b>

### **Contrast & Special Radiography Procedures- Theory                      3- credit**

<b>CO-1</b> : Special radiography, Responsibilities of radiographer, contrast media
<b>CO-2</b> : Gastro-intestinal tract contrast and special procedures
<b>CO-3</b> : Salivary gland, Biliary system contrast and special procedures
<b>CO-4</b> : Urinary system contrast and special procedures
<b>CO-5</b> : Soft tissue radiography, High Kv, Respiratory system.

**Note:** For each examination/Procedure; Anatomy of the region, patient preparation, clinical indication, contraindication, Contrast type must be included with detailed explanation of the procedure.

#### **Unit-1**

Introduction to the special radiography procedure, Responsibility of Radiographer during Radiological Procedures. Preparation of Patient for Different Procedures.

**Contrast Media:** Definition, classification, Adverse Reactions to Contrast Media and Patient Management, Brief introduction to Emergency Drugs in the Radiology Department

#### **Unit-2**

Gastrointestinal Tract: Fluoroscopy, general considerations, responsibility of radiographers, Barium swallow, pharynx and oesophagus, Barium meal and follow through, Barium Enema routine projections for colon and rectum, colonic activators; double contrast studies; colostomy. Special techniques for specific disease to be examined.

#### **Unit-3**

Salivary glands: – sialography, Biliary system: Plain film radiography, Intravenous cholangiography, Percutaneous cholangiography, Endoscopic retrograde cholangio-pancreatography (ERCP), Operative cholangiography, post-Operative cholangiography (T - tube Cholangiography).

#### **Unit-4**

Urinary system: Intravenous urography, Retrograde pyelography, Antegrade pyelography, Cystography and micturating cystourethrography, Urethrography (ascending), Female reproductive system: Hysterosalpingography. Microradiography.

#### **Unit-5**

Soft Tissue Radiography: High and low kilo voltage technique; differential filtration. Uses of soft tissue radiography.

Respiratory system: Bronchography

High kV Radiography: General principles, Relation to patient dose, Change in radiographic contrast. Scatter elimination; beam collimation; grid ratio. Speed and type of grid movement. Radiographic factor; application and uses.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiation and Imaging Technology</u></b> <b><u>(BRIT)</u></b>			<b>Semester:</b> <b>4th</b>
<b>Course</b> Contrast & Special Radiography Procedures- Practical	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BRA022A</b>

**Contrast & Special Radiography Procedures- Practical      1- credit**

#### **Course Outcome**

- Student will be able to understand All the procedure mentioned in the theory.



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>4th</b>
<b>Course</b> <b>Clinical Radiography</b> <b>Positioning Part 2 – Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BRA024A</b>

**Clinical Radiography Positioning Part 2 – Practical                      1- credit**

**Course Outcome**

- Student will be able to understand All the procedure mentioned in the theory.



<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester: 4th</b>
<b>Course</b> <b>Physics of Newer Imaging Modalities</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BRA025A</b>

### Physics of Newer Imaging Modalities

**3- credit**

<b>CO-1</b> : Computed Tomography
<b>CO-2</b> : Magnetic Resonance Imaging
<b>CO-3</b> : Ultrasonography, Digital Radiography
<b>CO-4</b> : Fusion Imaging.
<b>CO-5</b> : Digital Mammography

#### Unit-1

Computed Tomography its principle, various generations and advancements

#### Unit-2

Magnetic Resonance Imaging- its principle, advancements and applications.

#### Unit-3

Ultrasonography, Color Doppler- its principle, advancements and applications. Digital Radiography and Digital subtraction angiography equipment- principle, advancements and applications.

#### Unit-4

Fusion Imaging including PET-CT, PET- MRI.

#### Unit-5

Digital Mammography: CR mammography, DR mammography, Tomosynthesis, COMPUTED TOMOGRAPHY LASERMAMMOGRAPHY (CTLM)

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Radiation and Imaging Technology</u></b> <b><u>(BRIT)</u></b>			<b>Semester:</b> <b>4th</b>
<b>Course</b> <b>Value Education and Ethics -</b> <b>2</b>	<b>Course</b> <b>Description</b> Value Added course	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>1 hours</b>	<b>Course</b> <b>Code</b> <b>DIN004A</b>

### Course Objectives

1. To give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.
2. Making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

### Course Outcomes (CO):

**At the end of this course students will have:**

- CO1: Ability to acknowledge and appreciate the ethical beauty of India  
CO2: Ability to incorporate the values of human lives in real life applications

### Yoga and Meditation

The objective of the course is to provide practical training in YOGA ASANAS with a sound theoretical base and theory classes on selected verses of Patanjali's Yoga Sutra and Ashtanga Yoga. The coverage also includes the effect of yoga on integrated personality development. **Rajasthan Mural Arts and Paintings**

Mural painting is an offshoot of the devotional tradition in Rajasthan. A mural is any piece of artwork painted or applied directly on a wall, ceiling or other large permanent surface. In the contemporary scenario Mural painting is not restricted to the permanent structures and are being done even on canvas. Rajasthani mural paintings are the frescos depicting mythology and legends, which are drawn on the walls of temples, principally in Rajasthan. Ancient temples and tourists places in different States of Rajasthan, display an abounding tradition of mural paintings mostly dating back between the 9th to 12th centuries when this form of art enjoyed Royal patronage. Learning Mural painting through the theory and practice workshop is the objective of this course.

### Course on Organic Farming and Sustainability

Organic farming is emerging as an important segment of human sustainability and healthy life. 'Haritamritam' is an attempt to empower the youth with basic skills in tradition of organic farming and to revive the culture of growing vegetables that one consumes, without using chemicals and pesticides. Growth of Agriculture through such positive initiatives will go a long way in nation development. It is a big step in restoring the lost harmony of nature.

### Benefits of Indian Medicinal Systems

Indian medicinal systems are one of the most ancient in the world. Even today society continues to derive enormous benefits from the wealth of knowledge in Ayurveda of which is recognised as a viable and sustainable medicinal tradition. This course will expose students to the fundamental principles and philosophy of Ayurveda and other Indian medicinal traditions.

### Traditional Fine Arts of India

India is home to one of the most diverse Art forms world over. The underlying philosophy of Indian life is ‘Únity in Diversity” and it has led to the most diverse expressions of culture in India. Most art forms of India are an expression of devotion by the devotee towards the Lord and its influence in Indian life is very pervasive. This course will introduce students to the deeper philosophical basis of Indian Art forms and attempt to provide a practical demonstration of the continuing relevance of the Art.

### **Science of Worship in India**

Indian mode of worship is unique among the world civilisations. Nowhere in the world has the philosophical idea of reverence and worshipfulness for everything in this universe found universal acceptance as it in India. Indian religious life even today is a practical demonstration of the potential for realisation of this profound truth. To see the all-pervading consciousness in everything, including animate and inanimate, and constituting society to realise this truth can be seen as the epitome of civilizational excellence. This course will discuss the principles and rationale behind different modes of worship prevalent in India

### **Insights into Indian Classical Music**

The course introduces the students into the various terminologies used in Indian musicology and their explanations, like Nadam, Sruti, Svaram – svara nomenclature, Stayi, Graha, Nyasa, Amsa, Thala,- Saptatalas and their angas, Shadangas, Vadi, Samavadi, Anuvadi. The course takes the students through Carnatic as well as Hindustani classical styles.

### **Insights into Traditional Indian Painting**

The course introduces traditional Indian paintings in the light of ancient Indian wisdom in the fields of aesthetics, the Shadanga (Six limbs of Indian paintings) and the contextual stories from ancient texts from where the paintings originated. The course introduces the painting styles such as Madhubani, Kerala Mural, Pahari, Cheriya, Rajput, Tanjore etc.

### **Insights into Indian Classical Dance**

The course takes the students through the ancient Indian text on aesthetics the Natyasastra and its commentary the Abhinava Bharati. The course introduces various styles of Indian classical dance such as Bharatanatyan, Mohiniyattom, Kuchipudi, Odissi, Katak etc. The course takes the students through both contextual theory as well as practice time.

### **Indian Martial Arts and Self Defense**

The course introduces the students to the ancient Indian system of self-defense and the combat through various martial art forms and focuses more on traditional Kerala’s traditional Kalari Payattu. The course introduces the various exercise technique to make the body supple and flexible before going into the steps and techniques of the martial art. The advanced level of this course introduces the technique of weaponry.

### **Social Awareness Campaign**

The course introduces the students into the concept of public social awareness and how to transmit the messages of social awareness through various media, both traditional and modern. The course goes through the theoretical aspects of campaign planning and execution.

### **Organic Farming in Practice**

Organic agriculture is the application of a set of cultural, biological, and mechanical practices that support the cycling of farm resources, promote ecological balance, and conserve biodiversity. These include maintaining and enhancing soil and water quality; conserving wetlands, woodlands, and

wildlife; and avoiding use of synthetic fertilizers, sewage

sludge, irradiation, and genetic engineering. This factsheet provides an overview of some common farming practices that ensure organic integrity and operation sustainability.

### **Ayurveda for Lifestyle Modification**

Ayurveda aims to integrate and balance the body, mind, and spirit which will ultimately leads to human happiness and health. Ayurveda offers methods for finding out early stages of diseases that are still undetectable by modern medical investigation. Ayurveda understands that health is a reflection of when a person is living in harmony with nature and disease arises when a person is out of harmony with the cycles of nature. All things in the universe (both living and non-living) are joined together in Ayurveda. This leaflet endow with some practical knowledge to rediscover our pre-industrial herbal heritage.

### **Life Style and Therapy using Yoga**

Yoga therapy is the adaptation of yogic principles, methods, and techniques to specific human ailments. In its ideal application, Yoga therapy is preventive in nature, as is Yoga itself, but it is also restorative in many instances, palliative in others, and curative in many others. The therapeutic effect comes to force when we practice daily and the body starts removing toxins and the rest is done by nature.

\*Each student shall write a detailed Report/ Critique on one topic leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce. Alternatively a Student may undertake a Project on any one of the topics and submit a detail Project Report leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. If the topic is related to Performing Arts including Yoga, Marshal Arts etc. the performance on stage may be given instead of PPT. In case of Fine Arts, an exhibition or a portfolio may be presented in place of PPT.

**On the basis of the above points, a panel of experts from the department will award the credit**

### **Course Objectives**

1. Students will be able to interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience.
2. Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
3. Students will be able to reason, model, and draw conclusions or make decisions with mathematical, statistical, and quantitative information.
4. Students will be able to critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
5. Students will be able to use appropriate technology in a given context.

### **Course Outcomes (CO):**

**At the end of this course students will have:**

- CO1: Demonstrate procedural fluency with real number arithmetic operations and use those operations to represent real-world scenarios and to solve stated problems. Demonstrate number sense, including dimensional analysis and conversions between fractions, decimals, and percentages. Determine when approximations are appropriate and when exact calculations are necessary.
- CO2: Solve linear equations, graph and interpret linear models, and read and apply formulas. Demonstrate a basic understanding of displays of univariate data such as bar graphs, histograms, dotplots, and circle graphs, including appropriate labeling.
- CO3: Take charge of their own learning through good classroom habits, time management, and persistence. Participate in the classroom community through written and oral communication.

## Syllabus: Theory

<b>UNIT 1</b>	<b>Number System:</b> a. Number system b. Power cycle c. Remainder cycle d. Factors, Multiples e. HCF and LCM
<b>UNIT 2</b>	<b>Data Arrangements and Blood Relations:</b> a. Linear Arrangement b. Circular Arrangement c. Multi-dimensional Arrangement d. Blood Relations
<b>UNIT 3</b>	<b>Time and Work:</b> a. Work with different efficiencies b. Pipes and cisterns c. Work equivalence d. Division of wages
<b>UNIT 4</b>	<b>Coding &amp; Decoding, Series, Analogy, Odd Man Out and Visual Reasoning:</b> a. Coding and Decoding b. Series c. Analogy d. Odd Man Out e. Visual Reasoning
<b>UNIT 5</b>	<b>Percentages, Simple Interest and Compound Interest:</b> a. Percentages as Fractions and Decimals b. Percentage Increase / Decrease c. Simple Interest d. Compound Interest e. Relation Between Simple and Compound Interest
<b>UNIT 6</b>	<b>Permutation, Combination and Probability:</b> a. Fundamental Counting Principle b. Permutation and Combination c. Computation of Permutation d. Circular Permutations e. Computation of Combination f. Probability
<b>UNIT 7</b>	<b>Data Interpretation and Data Sufficiency:</b> a. Data Interpretation – Tables b. Data Interpretation - Pie Chart c. Data Interpretation - Bar Graph d. Data Sufficiency

<b>UNIT 8</b>	<b>Profit and Loss, Partnerships and Averages:</b> <ul style="list-style-type: none"> <li>a. Basic terminologies in profit and loss</li> <li>b. Partnership</li> <li>c. Averages</li> <li>d. Weighted average</li> <li>e. Mixtures and allegations</li> </ul>
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**SEMESTER**

**Subjects:**

- |  |           |
|--|-----------|
| 1. Newer Imaging Techniques including Patient Care-Theory              | 4- credit |
| 2. Newer Imaging Techniques including Patient Care-Practical           | 1- credit |
| 3. Quality Control in Radiology and Radiation Safety: Part-1           | 4- credit |
| 4. Quality Control in Radiology and Radiation Safety: Part-1 Practical | 1- credit |
| 5. Cross Sectional Anatomy and Physiology.                             | 4- credit |
| 6. Cross Sectional Anatomy and Physiology. Practical                   | 1- credit |
| 7. Physics of Advanced Imaging Technology                              | 4- credit |

- Directed clinical education – I (Clinical Posting/Studentship)

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Radiography and Imaging Technology (BRIT)</b>			<b>Semester:</b> <b>5th</b>
<b>Course</b> <b>Newer Imaging Techniques</b> <b>including Patient Care-</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BRA026A</b>

### **Newer Imaging Techniques including Patient Care- Theory 4- credit**

<b>CO-1</b> : Introduction to Interventional Radiography
<b>CO-2</b> : Interventional radiological procedures of Angiography and CNS
<b>CO-3</b> : Interventional radiological procedures of Venography
<b>CO-4</b> : Hospital organisation procedure, infection
<b>CO-5</b> : Care of patient, first aid.

#### **UNIT-1**

Interventional Radiography: Basic angiography and DSA: History, technique, patient care, Percutaneous catheterisation, catheterization sites, Asepsis, Guidewire, catheters, pressure injectors, accessories, Use of digital subtraction- single plane and bi-plane.

#### **UNIT-2**

Angiography: Carotid Angiography (4 Vessel angiography), Thoracic and Arch Aortography, Selective studies: Renal, SMA, Coeliac axis, Vertebral angiography, Femoral arteriography, Angiocardiography  
Central Nervous System: Myelography. Ventriculography. Arthrography.

#### **UNIT-3**

Venography: Peripheral venography, Cerebral venography, Inferior and superior vena-cavography, Relevant visceral phlebography

Cardiac catheterization procedures: PTCA, BMV, CAG, Pacemaker, Electrophysiology

#### **UNIT-4**

Hospital procedure: Hospital staffing and organization; records relating to patients and departmental statistics; professional attitude of the technologist to patients and other members of the staff; medico- legal aspects; accidents in the departments, appointments.

Infection: Universal precautions, hospital acquired infections- HIV, Hepatitis B, C, and MRSA etc.  
Principles of asepsis: Sterilization - methods of sterilization; use of central sterile supply department;

#### **UNIT-5**

Care of the patient : FIRST contact with patients in the department; management of chair and stretcher patients and aids for this, management of the unconscious patient; elementary hygiene; personal cleanliness; hygiene in relation to patients (for example clean linen and receptacles , nursing care; temperature pulse and respiration; essential care of the patient who has a tracheostomy; essential care of the patient who has a colostomy; bedpans and urinals; simple application of a sterile dressing.

First aid: Aims and objectives of first aid; wounds and bleeding, dressing and bandages; pressure and splints, supports etc. Shock; insensibility; asphyxia; convulsions; resuscitation, use of suction apparatus, drug reactions; prophylactic measures; administration of oxygen; electric shock; burns; scalds; hemorrhage; pressure points; compression band. Fractures; splints, bandaging; dressing, foreign bodies; poisons

Drugs in the department: Storage: classification; labelling and checking, regulations regarding dangerous and other drugs; units of measurement, special drugs, anti-depressive, anti-hypertensive

etc.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Radiography and Imaging Technology (BRIT)</b>			<b>Semester: 5h</b>
<b>Course</b> <b>Newer Imaging Techniques</b> <b>including Patient Care-</b> <b>Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BRA027A</b>

**Newer Imaging Techniques including Patient Care-Practical 1- credit**

#### **Course Outcome**

- Student will be able to understand All the procedure mentioned in the theory.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Radiography and Imaging Technology (BRIT)</b>			<b>Semester:</b> <b>5th</b>
<b>Course</b> <b>Quality Control in Radiology</b> <b>and Radiation Safety: Part-1</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BRA028A</b>

### **Quality Control in Radiology and Radiation Safety: Part-1 4- credit**

<b>CO-1</b> : Quality control and assurance; objectives and program
<b>CO-2</b> : QA tests, maintenance and care of equipment
<b>CO-3</b> : Radiation quantities, units and measurements and Radiation detection and Measurements
<b>CO-4</b> : Biological effects of radiation.
<b>CO-5</b> : Radiation protection, ALARA concepts and awareness.

### **UNIT-1**

Objectives of quality Control: Improve the quality of imaging thereby increasing the diagnostic value; to reduce the radiation exposure; Reduction of film wastage and repeat examination; to maintain the various diagnostic and imaging units at their optimal performance.

Quality assurance activities: Equipment selection phase; Equipment installation and acceptance phase; Operational phase; Preventive maintenance.

Quality assurance programme at the radiological faculty level: Responsibility; Purchase; Specifications; Acceptance; Routine testing; Evaluation of results of routine testing; Quality assurance practical exercise in the X ray generator and tube; Image receptors from processing; Radiographic equipment; Fluoroscopic equipment; Mammographic equipment; Conventional tomography; Computed tomography; Film processing, manual and automatic; Consideration for storage of film and chemicals; Faults tracing; Accuracy of imaging- image distortion for digital imaging devices. LASER printer calibration

### **UNIT-2**

Quality assurance programme tests: General principles and preventive maintenance for routine, daily, weekly, monthly, quarterly, annually – machine calibration. Basic concepts of quality assurance – LASER printer - Light beam alignment; X-ray out-put and beam quality check; KVp check; Focal spot size and angle measurement; Timer check; mAs test; Grid alignment test; High and low contrast resolutions; Mechanical and electrical checks; Cassette leak check; Proper screen-film contact test; Safe light test; Radiation proof test; Field alignment test for fluoroscopic device; Resolution test; Phantom measurements - CT, US and MRI.

Maintenance and care of equipment: Safe operation of equipment; Routine cleaning of equipment and instruments; Cassette, screen maintenance; Maintenance of automatic processor and manual processing units; Routine maintenance of equipment; Record keeping and log book maintenance; Reject analysis and objectives of reject analysis programme.

### **UNIT-3**

Radiation Quantities and Units: Radiation- Radioactivity- Sources of radiation – natural radioactive sources -cosmic rays' terrestrial radiation - - man made radiation sources. Units of radiation - Quality factor - Flux- Fluence-Kerma- Exposure- Absorbed dose- Equivalent Dose- Weighting Factors-Effective Dose - Occupational Exposure Limits - Dose limits to public.

Radiation detection and Measurements: Advantages & disadvantages of various detectors & its appropriateness of different detectors for different type of radiation measurement. Dose and Dosimetry, CT Dose Index (CTDI, etc.), Multiple Scan Average Dose (MSAD), Dose Length Product (DLP), Dose Profile, Effective Dose, Phantom Measurement Methods, Dose for Different Application Protocols, Technique Optimization. Dose area.

#### UNIT-4

Biological Effects of radiation: Ionization, excitation and free radical formation, hydrolysis of water, action of radiation on cell-Chromosomal aberration and its application for the biological dosimetry- Effects of whole body and acute irradiation, dose fractionation, effects of ionizing radiation on each of major organ system including foetus -Somatic effects and hereditary effects- stochastic and deterministic effects-Acute exposure and chronic exposure-LD50 - factors affecting radio sensitivity. Biological effects of non-ionizing radiation like ultrasound, lasers, IR, UV and magnetic fields.

#### UNIT-5

Radiation protection: Radiation protection of self and patient- Principles of radiation protection, time - distance and shielding, shielding - calculation and radiation survey

ALARA- personnel dosimeters (TLD and film batches) - occupational exposure.

Radiation Hazard evaluation and control: Philosophy of Radiation protection, effects of time, Distance & Shielding. Calculation of Work load, weekly calculated dose to radiation worker & General public good work practice in Diagnostic Radiology. Planning consideration for radiology, including Use factor, occupancy factors, and different shielding material.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Radiography and Imaging Technology (BRIT)</b>			<b>Semester:</b> <b>5th</b>
<b>Couse</b> <b>Quality Control in Radiology</b> <b>and Radiation Safety: Part-</b> <b>Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BRA029A</b>

**Quality Control in Radiology and Radiation Safety: Part-Practical      1-credit**

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>5th</b>
<b>Course</b> <b>Cross Sectional Anatomy and</b> <b>Physiology</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BRA030A</b>

#### Course Outcome

- Student will be able to understand All the procedure mentioned in the theory.

#### Cross Sectional Anatomy and Physiology.

4- credit

<b>CO-1</b> : Introduction to sectional anatomy.
<b>CO-2</b> : Sectional Anatomy of upper thorax, mid thorax, heart and oesophagus.
<b>CO-3</b> : CT/MRI Images of the Thorax
<b>CO-4</b> : Sectional anatomy of reproduction system.
<b>CO-5</b> : Neuro anatomy CT/MR

#### UNIT-1

Introduction to Sectional Anatomy & Terminology- Sectional planes, Anatomical relationships/terminology. Brief introduction to subdivisions of anatomy. Somatic and visceral parts and systems.

#### UNIT-2

Sectional Anatomy of the upper thorax- Surface anatomy relationships, Bony structures and muscles, vessels. Divisions of the mid-thorax, heart and great vessels- Lungs, heart and great vessels, Oesophagus.

#### UNIT-3

CT/MRI Images of the Thorax - Normal and pathologic Anatomy of the Abdomen- Major organs and their accessories, Abdominal blood vessels. CT/MR Images of Abdomen - Normal and pathologic. Anatomy of the Pelvis- Bony structures and associated muscles, Digestive and urinary systems

#### UNIT-4

Reproductive Organs CT/MR Images of the Male/Female Pelvis- Normal and pathological anatomy.

#### UNIT-5

Neuro Anatomy- Scan planes Brain - Cerebral hemispheres, Sinuses, Ventricles, Brainstem and associated parts, Arterial/venous systems, Basal ganglia, Cranial nerves. Spine- Vertebra and disc, Spinal cord and meninges. Neck- Arterial/venous systems, Muscles, Glands and pharynx.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>5th</b>
<b>Course</b> <b>Cross Sectional Anatomy and</b> <b>Physiology. Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BRA031A</b>

#### Cross Sectional Anatomy and Physiology. Practical

1- credit

#### Course Outcome

- Student will be able to understand All the procedure mentioned in the theory.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>5th</b>
<b>Course</b> <b>Physics of Advanced Imaging</b> <b>Technology</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BRA032A</b>

### Physics of Advanced Imaging Technology

4- credit

<b>CO-1</b> : Basic Computed tomography, instrumentation and image formation
<b>CO-2</b> : Advanced computed tomography
<b>CO-3</b> : Advance MRI principle and sequences
<b>CO-4</b> : MRI instrumentation, image formation and contrast
<b>CO-5</b> : Ultrasound

#### UNIT-1

Basic Computed Tomography- Basic principles of CT, generations of CT, CT instrumentation, image formation in CT, CT image reconstruction, Hounsfield unit, CT image quality, CT image display

#### UNIT-2

Advanced Computed Tomography, Helical CT scan: Slip ring technology, advantages, multi detector array helical CT, cone – beam geometry, reconstruction of helical CT images, CT artifact, CT angiography, CT fluoroscopy, HRCT, post processing techniques: MPR, MIP, Min IP, 3D rendering: SSD and VR, CT Dose, patient preparation, Imaging techniques and protocols for various parts of body.

#### UNIT-3

Introduction to Advanced technique of MRI, Basic Principles: Spin precession – relaxation time – pulse cycle – T1 weighted image – T2 weighted image – proton density image.

Pulse sequence: Spin echo pulse sequence – turbo spin echo pulse sequence - Gradient echo sequence – Turbo gradient echo pulse sequence – Inversion recovery sequence – STIR sequence – SPIR sequence – FLAIR sequence – Echo planar imaging – Advanced pulse sequences.

#### UNIT-4

MR Instrumentation: Types of magnets – RF transmitter – RF receiver – Gradient coils – shim coils – RF shielding – computers. Image formation: 2D Fourier transformation method – K-space representation – 3D Fourier imaging – MIP.

MR contrast media – MR angiography – TOF & PCA – MR Spectroscopy – functional MRI

#### UNIT-5

Ultrasonography Basic Acoustics, Ultrasound terminologies: acoustic pressure, power, intensity, impedance, speed, frequency, dB notation: relative acoustic pressure and relative acoustic intensity. Interaction of US with matter: reflection, transmission, scattering, refraction and absorption, attenuation and attenuation coefficients, US machine controls, US focusing.

Production of ultrasound: Piezoelectricity, Medical ultrasound transducer: Principle, construction and working, characteristics of US beam. Ultrasound display modes: A, B, M

Real-time ultrasound: Line density and frame rate, Real-time ultrasound transducers: mechanical and



electronic arrays,ultrasound artifacts, ultrasound recording devices, and Distance, area & volume measurements.

Techniques for imaging different anatomic areas, ultrasound artifacts, biological effects and safety. Doppler Ultrasound- Patient preparation for Doppler, Doppler artifacts, vascular sonography

**Directed clinical education – I (Clinical Posting/Studentship)**

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a radiologist or senior technologist Students are tested on intermediate clinical radiological skills

**Subjects:**

- |  |           |
|--|-----------|
| 1. Radiographic Techniques in Advanced Imaging Technology-Theory     | 4- credit |
| 2. Radiographic Techniques in Advanced Imaging Technology -Practical | 1- credit |
| 3. Regulatory Requirements in Diagnostic Radiology                   | 4- credit |
| 4. Quality Control in Radiology and Radiation Safety: Part-2         | 4- credit |
| 5. Quality Control in Radiology and Radiation Safety-2 Practical     | 1- credit |
| 6. Hospital Practice and Care of Patient                             | 3- credit |
| 7. Research Methodology  | 3- credit |
| 8. Seminars, Journal Clubs and Group Discussions                     | 3- credit |
- 
- Directed clinical education – II (Clinical Posting/Studentship)

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>6th</b>
<b>Course</b> <b>Radiographic Techniques in</b> <b>Advanced Imaging</b> <b>Technology-Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BRA035A</b>

### **Radiographic Techniques in Advanced Imaging Technology-Theory 3- credit**

<b>CO-1</b> : CT scan studies
<b>CO-2</b> : Ultrasonography, Doppler studies
<b>CO-3</b> : MR imaging methods
<b>CO-4</b> : <b>MRI for</b> Musculoskeletal imaging
<b>CO-5</b> : Additional MR techniques, advances and special procedures

#### **UNIT-1**

CT scan studies acquisition/ protocols /techniques: CT of head and neck – thorax – abdomen – pelvis – Musculo skeletal system – spine – PNS. Anatomy – clinical indications and contraindications – patient preparation – technique.

CT contrast enhanced protocols – CT angiography – (Aortogram, selective angiogram head, neck and peripheral) image documentation and Filing, maintenance of equipment and accessories.

contrast media-types, dose, injection technique; timing, sequence - image display – patient care – utilization of available techniques & image processing facilities to guide the clinician- CT anatomy and pathology of different organ systems.

#### **UNIT-2**

Ultrasonography/ Doppler studies: Techniques of sonography-selection- Preparations - instructions and positioning of patient for TAS, TVS, TRUS, neck USG and extremities.

patient care and maintenance protocols clinical applications display methods –quality image reproducible extend – biopsy procedures, assurance to patients.

#### **UNIT-3**

MRI Scanners: Methods of MRI imaging methods – Head and Neck, Thorax, Abdomen.

#### **UNIT-4**

MRI-Musculoskeletal System imaging - Clinical indications and contraindications- types of common sequences effects of sequence on imaging - Protocols for various studies- slice section- patient preparation-positioning of the patient -patient care-calibration. paramagnetic agents and dose,

#### **UNIT-5**

Additional techniques and recent advances in MRI - image acquisition-modification of procedures in an unconscious or un co-operative patient - plain studies- contrast studies,

special procedures- reconstructions- 3D images- MRS blood flow imaging,

diffusion/perfusion scans - strength and limitations of MRI- role of radiograph

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>6th</b>
<b>Course</b> <b>Radiographic Techniques in</b> <b>Advanced Imaging</b> <b>Technology-Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BRA036A</b>

### **Radiographic Techniques in Advanced Imaging Technology-Practical 1- credit**

#### **Course Outcome**

- Student will be able to understand All the procedure mentioned in the theory.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>6th</b>
<b>Course</b> <b>Regulatory Requirements in</b> <b>Diagnostic Radiology</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BRA037A</b>

**Regulatory Requirements in Diagnostic Radiology                      3- credit**

<b>CO-1</b> : Radiation Regulatory Bodies
<b>CO-2</b> : Responsibilities and safety standards
<b>CO-3</b> : Role of Radiographer in QA
<b>CO-4</b> : Specification for site planning-AERB
<b>CO-5</b> : International and domestic guidelines for radiation protection

**UNIT-1**

Regulatory Bodies & regulatory Requirements: International Commission on Radiation Protection (ICRP) / National Regulatory body (AERB - Atomic Energy Regulatory Board).

**UNIT-2**

Responsibilities, organization, Safety Standard, Codes and Guides, Responsibilities of licenses, registrants & employers and Enforcement of Regulatory requirements.

**UNIT-3**

Role of Radiographer in Planning, QA & Radiation Protection: Role of technologist in radiology department - Personnel and area monitoring. Setting up of a new X-Ray unit, staff requirement.

**UNIT-4**

AERB specifications for site planning and mandatory guidelines – Planning of X-ray rooms, dark rooms – Inspection of X-Ray installations - Registration of X-Ray equipment installation- Certification. -Evaluation of workload versus radiation factors – Occupational exposure and protection Tools/devices.

**UNIT-5**

ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy and radiation protection. NABH guidelines, AERB guidelines, PNDDT Act and guideline

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>6th</b>
<b>Course</b> <b>Quality Control in Radiology</b> <b>and Radiation Safety: Part-2</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BRA033A</b>

### Quality Control in Radiology and Radiation Safety: Part-2

4- credit

<b>CO-1</b> : QA for computed and digital radiography
<b>CO-2</b> : QA for computed tomography
<b>CO-3</b> : QA for MRI
<b>CO-4</b> : Ultrasound quality assurance
<b>CO-5</b> : QA and image artefact, remedies for newer imaging modalities

### UNIT-1

Quality assurance for Digital Radiography and Computed Radiography including tests and protocols.

### UNIT-2

Quality control and quality assurance for Computed Tomography, including tests and calibration protocols with maintenances.

### UNIT-3

MRI Scan; Quality assurance and quality control and safety protocol in case of emergency. Patient handling.

### UNIT-4

Ultrasonography quality assurance and maintenances. Cleanliness and PACS related.

### UNIT-5

Image artifacts in different modalities, their different types, causes and remedies, Newer Radiation safety protocols and recent advances in radiation safety including AERB guidelines.

Student should collect all the latest and updated guidelines from domestic and international radiation safety agencies.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>6th</b>
<b>Course</b> <b>Quality Control in Radiology</b> <b>and Radiation Safety</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BRA034A</b>

### Quality Control in Radiology and Radiation Safety -Practical 1- credit

#### Course Outcome

Student will be able to understand All the procedure mentioned in the theory



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>6th</b>
<b>Course</b> <b>Hospital Practice and Care of Patient</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BRA038A</b>

### **Hospital Practice and Care of Patient**

**3- credit**

<b>CO-1</b> : Hospital staff and administration
<b>CO-2</b> : Understanding the patient needs
<b>CO-3</b> : Vital signs and patient homeostasis
<b>CO-4</b> : Patient management in emergency
<b>CO-5</b> : Aseptic and sterile procedures

#### **UNIT-1**

Hospital staffing and administration, records, professional, ethics, co-operation with other staff and departments.

Handling of the patients, seriously ill and traumatized patients, visually impaired, speech and hearing impaired, mentally impaired, drug addicts and non-English speaking patients.

#### **UNIT-2**

Understanding patient needs - patient dignity of inpatient and out patients. Interaction with the patient's relatives and visitors. Methods of effective communication - verbal skills, body language, professional appearance, visual contact etc

#### **UNIT-3**

Vital signs and oxygen - patient's Homeostasis status. Body temp, respiratory rate, pulse, blood pressure, oxygen therapy, oxygen devices, Chest tubes and lines. First aid - shock, electrical shock, haemorrhage, burns, Asphyxia, fractures, loss of consciousness.

#### **UNIT-4**

Emergency treatment to the collapsed patient. Artificial respiration and resuscitation. Preparation of patient for general and special radiological examinations.

Supervision of patients undergoing special examination. Administration of drugs and contrast media.

#### **UNIT-5**

Aseptic and sterile procedures. Handling of infections patients in the department or in the ward. Regulation of dangerous drugs. Trolley set up for special x-ray examinations, Radiation hazardous and protective measures.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> B.Sc. Radiation and Imaging Technology (BRIT)			<b>Semester:</b> <b>6th</b>
<b>Course</b> <b>Research Methodology</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BRA039A</b>

## Research Methodology

**3- credit**

- CO-1** : Accessing research literature  
**CO-2** : Understanding research design  
**CO-3** : Analysis  
**CO-4** : Clinical audit  
**CO-5** : Research Skills and Management

### UNIT-1

Accessing research literature: Use of databases and other sources

### UNIT-2

Understanding research design: Qualitative and quantitative methodologies - their differences and potential integration. Evaluating research and its potential for informing practice. Developing research questions and devising methods for their investigation. Ethical issues in research

### UNIT-3

Analysis: Analysis of qualitative and quantitative data. Utilisation of appropriate software to assist in the retrieval of information and data analysis

### UNIT-4

Clinical audit: Distinctiveness of research and audit processes and their function

### UNIT-5

Research Skills and Management: The role of evidence-based practice within health and welfare

# **JECRC University**

## **School of Allied Health Sciences**

### **Department of Medical Laboratory Technology**

### **Undergraduate Syllabus (2020)**

### **B.Sc. Medical Laboratory Technology**

**Duration: 4 Years (3 Years Classroom teaching + 1 Year Internship)**

## **PROGRAM EDUCATIONAL OBJECTIVES (PEO's)**

- **PEO 1:** Acquire comprehensive knowledge of structure and functions of human body, physiological and biochemical mechanisms involved in normal and abnormal health condition, knowledge of light microscopic and ultra structure of human specimen. Knowledge of structure and functional correlation of blood constituents with disease process and be able to communicate the same clearly and with precision. The program broadly emphasizes the following key areas Human Anatomy, Human Physiology
- **PEO 2:** Be aware of contemporary advances and developments in the field of medical laboratory sciences.
- **PEO 3:** Acquire knowledge of modern research techniques and be familiar with the recent advances in medical laboratory tests.
- **PEO 4:** Inculcate habit of scientific enquiry and be able to identify lacunae in the existing knowledge in a given area.
- **PEO 5:** Have acquired skills in interpreting the results to medical and paramedical professionals as Laboratory manager/ supervisor or health care administrator.
- **PEO 6:** Have acquired skills in effectively communicating with the students and colleagues from various medical and paramedical fields as educational consultant or laboratory coordinator etc.
- **PEO 7:** Have acquired skills of integrating laboratory tests with other disciplines of medical sciences as and when needed.

## **PROGRAM OUTCOMES (PO's) and its Attributes**

**At the end of the program, BMLT graduates will be able to...**

- **PO 1:** Apply knowledge and technical skills associated with medical laboratory technology for delivering quality clinical investigations support. Knowledge of laboratory tests: Posses theoretical and practical knowledge of the laboratory test associated with diagnosis of diseases including biochemical, pathological and microbiological test in the laboratory.
- **PO 2:** Perform routine clinical laboratory procedures within acceptable quality control parameters in hematology, biochemistry, immunochemistry and microbiology. Sample Handling: Demonstrate proper technique in the collection, handling, testing, storage and reporting of all biological specimens in the laboratory. Diagnosis: Interpret laboratory test



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data for clinical significance Quality

**Dr. Vishal Jain**  
Dean & Professor  
School of Allied Health Sciences  
JECRC University, Jaipur-302003

Assurance: Calibrate, perform quality control testing on instruments and diagnostic analyzers. Data Maintenance : Maintain the records of diagnostic lab. Ethics: Demonstrate ethical standards of the laboratory profession in relation to medical information and patient care

- **PO 3:** Demonstrate technical skills, social behavior and professional awareness for functioning effectively as a laboratory technician.
- **PO 4:** Apply problem solving techniques in identification and correction of pre analytical, post analytical & analytical variables. Thinking abilities: Utilize the principles of scientific test, thinking analytically, clearly and critically, while solving laboratory problems and making patient reports after sample
- **PO 5:** Operate and maintain laboratory equipments utilizing appropriate quality control and safety procedures. Planning abilities: Demonstrate effective planning abilities including laboratory tests timing management, resource management, delegation skills and organizational skills. Develop
- **PO 6:** Recognize the impact of laboratory tests in a global and environmental context.
- **PO 7:** Communication Skills, Indian culture, Environment studies and basics and advance computer knowledge: Apply the communication and collaboration skills, values, ethics and attitudes that will enable them to effectively deal with patients, families and medical team. Communicate effectively by oral, written and graphical means.
- **PO 8:** Function as a leader / team member in diverse professional and industrial research areas.
- **PO 9:** Apply the fundamentals of research process to complete and present research studies that enrich the field of physical therapy.
- **PO 10:** Function in an ethical and professional manner without bias against any ethnicity, race, religion, caste or gender. Professional identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, laboratory supervisors and managers). Practice professional and ethical responsibilities with high degree of credibility, integrity and social concern.
- **PO 11:** Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of medical laboratory change.

**PSO 1:** Student will be able to demonstrate the theoretical knowledge and technical skills to ensure the accuracy of laboratory test result.

**PSO 2:** Student will be able to communicate courteously and effectively with laboratory personnel, other health care professionals, patients and the public.

**PSO 3:** Student will be able to demonstrate laboratory practice standards in safety, professional behavior and ethical conduct.



## BSc. Medical Lab Technology

### Semester-I

Course Code	Course	Lecture Hours	Tutorials Hours	Practical Hours	Total Hours	Lecture Credits	Tutorial Credits	Practical Credits	Total Credits	Course Category
BML001A	Human Anatomy-1 Theory	3	0	0	3	3	0	0	3	Core
BML002A	Human Anatomy-1 Practical	0	0	2	2	0	0	1	1	Core
BML003A	Human Physiology-1 Theory	3	0	0	3	3	0	0	3	Core
BML004A	Human Physiology-1 Practical	0	0	2	2	0	0	1	1	Core
BML005A	Biochemistry-1	3	0	0	3	3	0	0	3	Core
BML006A	Fundamentals of Computer-Theory	2	0	0	2	2	0	0	2	Foundation
BML007A	Fundamentals of Computer-Practical	0	0	2	2	0	0	1	1	Foundation
DCH001A	EVS	3	0	1	4	3	0	1	4	Value added course
DEN001A	Communication Skills	2	0	0	2	2	0	0	2	Ability Enhancement
DEN001B	Communication Skills - Practical	0	0	2	0	0	0	1	1	Ability Enhancement
DIN001A	Cultural Education- I	2	0	0	2	2	0	0	2	Value added course
	<b>Total</b>	<b>18</b>	<b>0</b>	<b>9</b>	<b>25</b>	<b>18</b>	<b>0</b>	<b>5</b>	<b>23</b>	



**Scheme**  
**BSc. Medical Lab Technology**

**Semester-II**

Course Code	Course	Lecture Hours	Tutorials Hours	Practical Hours	Total Hours	Lecture Credits	Tutorial Credits	Practical Credits	Total Credits	Course Category
BML008A	Human Anatomy-2 Theory	3	0	0	3	3	0	0	3	Core
BML009A	Human Anatomy-2 Practical	0	0	2	2	0	0	1	1	Core
BML010A	Human Physiology-2 Theory	3	0	0	3	3	0	0	3	Core
BML011A	Biochemistry-2	3	0	0	3	3	0	0	3	Core
BML012A	Basic Haematology Theory	3	0	0	3	3	0	0	3	Core
BML013A	Basic Haematology – Practical	0	0	4	2	0	0	2	2	Core
BML014A	Psychology	3	0	0	3	3	0	0	3	Core
DEN002A	Professional Skills	2	0	0	2	2	0	0	2	Ability Enhancement
DEN002B	Professional Skills - Practical	0	0	2	0	0	0	1	1	Ability Enhancement
DIN002A	Culture Education - 2	2	0	0	2	2	0	0	2	Value added course
	<b>Total</b>	<b>19</b>	<b>0</b>	<b>8</b>	<b>23</b>	<b>19</b>	<b>0</b>	<b>4</b>	<b>23</b>	

## School of Allied Health Sciences

### Scheme

### BSc. Medical Lab Technology

### Semester-III

Course Code	Course	Lecture Hours	Tutorials Hours	Practical Hours	Total Hours	Lecture Credits	Tutorial Credits	Practical Credits	Total Credits	Course Category
BML015A	General Clinical Microbiology Theory	3	0	0	3	3	0	0	3	Core
BML016A	General Clinical Microbiology – Practical	0	0	4	4	0	0	2	2	Core
BML017A	Basic Clinical Biochemistry Theory	3	0	0	3	3	0	0	3	Core
BML018A	Basic Clinical Biochemistry – Practical	0	0	4	4	0	0	2	2	Core
BML019A	Law & Ethics	3	0	0	3	3	0	0	3	Core
BML020A	Professional values	3	0	0	3	3	0	0	3	Core
DEN003A	Life Skills-1(Personality Development)	1	0	2	3	1	0	1	2	Ability Enhancement
DIN003A	Value Education and Ethics -1	1	0	0	1	1	0	0	1	Value added course
	<b>Total</b>	<b>14</b>	<b>0</b>	<b>10</b>	<b>24</b>	<b>14</b>	<b>0</b>	<b>5</b>	<b>19</b>	

## Scheme

## BSc. Medical Lab Technology

### Semester-IV

Course Code	Course	Lecture Hours	Tutorials Hours	Practical Hours	Total Hours	Lecture Credits	Tutorial Credits	Practical Credits	Total Credits	Course Category
BML021A	Systematic Bacteriology Theory	3	0	0	3	3	0	0	3	Core
BML022A	Systematic Bacteriology- Practical	0	0	2	2	0	0	1	1	Core
BML023A	Applied Bacteriology Theory	3	0	0	3	3	0	0	3	Core
BML024A	Applied Bacteriology- Practical	0	0	2	2	0	0	1	1	Core
BML025A	Applied Haematology-1 Theory	3	0	0	3	3	0	0	3	Core
BML026A	Applied Haematology-1- Practical	0	0	2	2	0	0	1	1	Core
BML027A	Analytical Clinical Biochemistry Theory	3	0	0	3	3	0	0	3	Core
BML028A	Analytical Clinical Biochemistry- Practical	0	0	2	2	0	0	1	1	Core
BML029A	Basic & Applied Histopathology Theory	3	0	0	3	3	0	0	3	Core
BML030A	Basic & Applied Histopathology-I Practical	0	0	2	2	0	0	1	1	Foundation
DMA011A	Life Skills - 2 (Aptitude)	1	0	2	3	1	0	1	2	Ability Enhancement
DIN004A	Value Education and Ethics – 2	1	0	0	1	1	0	0	1	Value added course
	<b>Total</b>	<b>17</b>	<b>0</b>	<b>12</b>	<b>29</b>	<b>17</b>	<b>0</b>	<b>6</b>	<b>23</b>	
	<b>Clinical Training - 270 Hours</b>									

**Scheme**  
**BSc. Medical Lab Technology**

**Semester-V**

Course Code	Course	Lecture Hours	Tutorials Hours	Practical Hours	Total Hours	Lecture Credits	Tutorial Credits	Practical Credits	Total Credits	Course Category
BML031A	Applied Clinical Biochemistry-I Theory	3	0	0	3	3	0	0	3	Core
BML032A	Applied Clinical Biochemistry-I Practical	0	0	2	2	0	0	1	1	Core
BML033A	Applied Histopathology-II Theory	3	0	0	3	3	0	0	3	Core
BML034A	Applied Histopathology-II Practical	0	0	2	2	0	0	1	1	Core
BML035A	Applied Hematology-II Theory	3	0	0	3	3	0	0	3	Core
BML036A	Applied Haematology-II Practical	0	0	2	2	0	0	1	1	Core
BML037A	Blood Banking & Genetics	3	0	0	3	3	0	0	3	Core
BML038A	Immunology & Bacterial Serology Theory	3	0	0	3	3	0	0	3	Core
BML039A	Immunology & Bacterial Serology Practical	0	0	2	2	0	0	1	1	Core
	<b>Total</b>	<b>15</b>	<b>0</b>	<b>8</b>	<b>23</b>	<b>15</b>	<b>0</b>	<b>4</b>	<b>19</b>	
	<b>Clinical Training - 270 Hours</b>									



## BSc. Medical Lab Technology

### Semester-VI

Course Code	Course	Lecture Hours	Tutorials Hours	Practical Hours	Total Hours	Lecture Credits	Tutorial Credits	Practical Credits	Total Credits	Course Category
BML040A	Applied Clinical Biochemistry-II Theory	3	0	0	3	3	0	0	3	Core
BML041A	Applied Clinical Biochemistry-II Practical	0	0	2	2	0	0	1	1	Core
BML042A	Research Methodology, Biostatistics and Record Keeping	3	0	0	3	3	0	0	3	Core
BML043A	Cytology and Cytotechniques Theory	3	0	0	3	3	0	0	3	Core
BML044A	Cytology and Cytotechniques - Practical	0	0	2	2	0	0	1	1	Core
BML045A	Medical Parasitology and Virology Theory	3	0	0	3	3	0	0	3	Core
BML046A	Medical Parasitology and Virology - Practical	0	0	2	2	0	0	1	1	Core
BML047A	Immunology & Molecular Biology Theory	3	0	0	3	3	0	0	3	Core
BML048A	Immunology & Molecular Biology Practical	0	0	2	2	0	0	1	1	Core
	<b>Total</b>	<b>15</b>	<b>0</b>	<b>8</b>	<b>23</b>	<b>15</b>	<b>0</b>	<b>4</b>	<b>19</b>	
	<b>Clinical Training - 270 Hours</b>									

**Compulsory 6 Months Rotatory Clinical Internship (8 Hours per Day)**

**Compulsory 6 Months Rotatory Clinical Internship (8 Hours per Day)**



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JECRC UNIVERSITY	Program	Semester: 1
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<b>School of Allied Health Sciences</b>	<b>B.Sc. Medical Lab Technology (BMLT)</b>			
<b>Course</b> <b>Human Anatomy-I</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BML001A</b>

**COURSE OBJECTIVE-** To provide an opportunity for lab technologists who distinguish themselves in Human Anatomy - consistency, theoretical knowledge and knowledge application, to undertake research based training in Anatomy. To capture distinguished medical students and offer them such training as would enable them to sub-specialize in anatomy at an early stage of their career. To develop as research scientists and research based teachers for schools of allied health sciences both locally and externally. It also strengthens the research foundation of the students with broad vision of leading in research based teaching of anatomy and stimulates the research attitudes and aptitudes of students.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the importance of Basics of anatomy and joints
<b>CO 2</b>	Detail about muscles, lymphatic and cardiovascular system
<b>CO 3</b>	Knows the anatomical aspect of Nervous System, Skin and Fasciae, Connective Tissue, Ligaments
<b>CO 4</b>	Anatomical knowledge of Gastro-intestinal system
<b>CO 5</b>	Approach of Respiratory system





**Unit-1**

1. Introduction
2. Skeleton
3. Joints

**Unit-2**

1. Muscles
2. General Cardiovascular System
3. Lymphatic System

**Unit-3**

1. General Nervous System
2. Skin and Fasciae
3. Connective Tissue, Ligaments and Raphe

**Unit-4**

**Gastro-intestinal system-** Parts of GIT (Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas )

**Unit-5**

**Respiratory system-** Nose, nasal cavity, larynx, trachea, lungs, broncho-pulmonary segments, pleura and Names of paranasal air sinuses

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Human Anatomy-I</b> <b>Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Subject Code</b> <b>BML002A</b>

**COURSE OBJECTIVES** - It is designed to provide students with the working knowledge of the structure of the human body which is essential foundation for their clinical studies.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

To understand the importance of Basics of anatomy and joints, Identification of bones, joints and soft parts

### **PRACTICAL**

Identification and demonstration of bones, joints and soft parts

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Human Physiology-I</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BML003A</b>

**COURSE OBJECTIVE-** To learn and understand the fundamental scientific concepts relating to a broad range of topics in human physiology. To make the students familiar with the basic factual information concerning the mechanisms and functioning of humans body system. To develop investigative skills and to become familiar with standard techniques of measurement. To help the students to gain practice and confidence in applying this knowledge, in a quantitative manner where appropriate, to actual experiments.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Understand the importance cell and nerve physiological functions
<b>CO 2</b>	Understand the important aspect of blood
<b>CO 3</b>	Get the knowledge of cardiovascular system
<b>CO 4</b>	Physiological functions of respiration and its neural control
<b>CO 5</b>	To know about Digestive system of the body



- Unit-1**
1. Cell and cell organelle Structure & function, transport across cell membrane, homeostasis, membrane potential.
  2. Structure & functions of nerve tissues, physiological properties of nerve fibres, nerve fibre types & functions.
  3. Neuromuscular junction, Difference between skeletal muscle, smooth muscle & cardiac muscle.
- Unit-2**
1. Composition & functions of blood, plasma proteins & hemoglobin.
  2. Erythrocytes, leucocytes & platelets.
  3. Blood coagulation, blood groups & immunity
- Unit-3**
1. Heart Rate, Cardiac Output, Blood Pressure & Pulse
  2. Conducting system of heart, Heart sounds & ECG.
  3. Cardiac Muscle and cardiac cycle.
- Unit-4**
1. Functions of respiratory system, airways, dead space, graph of lung volume
  2. Transport of gases
  3. Regulation of respiration & Hypoxia
- Unit-5**
1. GIT, Saliva, Mouth & Oesophagus
  2. Stomach, Pancreas, Liver & Gall Bladder
  3. Small Intestine, Large Intestine, Digestion and Absorption in GIT.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Human Physiology-I</b> <b>Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BML004A</b>

**COURSE OBJECTIVES:** The course in Physiology is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate procedures to determine hematology findings.
<b>CO 2</b>	Recognize the abnormalities in the hematology findings

## **PRACTICAL**

### **Unit-1 Hematology:**

#### **CO-1**

- Study of Microscope and its uses
- Determination of Red Blood Corpuscle count
- Determination of White Blood Corpuscle count
- Differential leukocyte count
- Estimation of hemoglobin
- Estimation of platelets
- Absolute eosinophil count
- Reticulocyte count
- Determination of blood groups and Rh typing
- Determination of bleeding time
- Determination of clotting time

### **Unit-2 Demonstrations only**

#### **CO-2**

- Determination of Erythrocyte Sedimentation Rate
- Determination of Packed Cell Volume

JECRC UNIVERSITY	Program	Semester: 1
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<b>School of Allied Health Sciences</b>	<b>B.Sc. Medical Lab Technology (BMLT)</b>			
<b>Course</b> <b>Biochemistry-I Theory</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BML005A</b>

**COURSE OBJECTIVE-** This course provides the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It covers basic biochemical, cellular, biological and microbiological processes, basic chemical reactions in the prokaryotic and eukaryotic cells, the structure of biological molecules, introduction to the nutrients i.e. carbohydrates, fats, enzymes, nucleic acids and amino acids.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Nutrition and its importance and requirement
<b>CO 2</b>	Functions and biochemistry of carbohydrate
<b>CO 3</b>	Functions and biochemistry of Lipid
<b>CO 4</b>	Functions and biochemistry of amino acid
<b>CO 5</b>	General characteristics of digestion and absorption carbohydrate, lipids and proteins

### **Unit-1 Nutrition**

- Introduction, Importance of nutrition Calorific values, Respiratory quotient – Definition, and its significance. BMR: Definition, factor affecting BMR Special dynamic action of food.
- Physical activities - Energy expenditure for various activities. Calculation of energy requirement of a person.
- Concept of Balanced diet and Recommended dietary allowances
- Role of carbohydrates, lipids and protein in diet
- Nutritional disorders.



## **Unit-2 Carbohydrate Chemistry**

- a) Definition, general classification of carbohydrates
- b) Composition, sources, properties and functions of carbohydrates

### **Carbohydrate Metabolism**





- a) Glycolysis, gluconeogenesis, kerb cycle and Cori cycle – General outline of cycle and introduction to enzymes involved
- b) Glycogenesis, Glycogenolysis (glycogen metabolism): General outline of cycle and introduction to enzymes involved

### **Unit-3 Lipid Chemistry**

- a) Definition, general classification and functions of lipids and fatty acids
- d) Lipoproteins: Definition, classification, properties, Sources and function
- c) introduction to ketone bodies

#### **Lipid Metabolism**

- a) Introduction to lipid metabolism, Lipolysis and lipogenesis general outline and enzymes involved
- b) General outline of beta oxidation of fatty acids

### **Unit-4 Amino-acid Chemistry**

- a) Amino acid chemistry: Definition, Classification, Peptide bonds and Biologically important peptides
- c) Protein chemistry: Definition, Classification, Functions of proteins

#### **Amino acid and Protein Metabolism**

- a) Transamination and deamination general introduction
- b) Introduction to Urea cycle

### **Unit-5 Digestion and Absorption - General characteristics of digestion and absorption, Digestion and absorption of carbohydrates, proteins and lipids. Disorders of digestion and absorption**

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Environmental Sciences-</b> <b>Theory</b>	<b>Course</b> <b>Description</b> Value added course	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course Code</b> <b>DCH001</b>

**COURSE OBJECTIVES** -To impart knowledge of fundamentals of Environmental sciences. To educate the students to make them confident and to develop the skills of Environmental protection and to increase awareness in society through education. (Problem-Solving Skills). To train the student's with appropriate combinations of old and new emerging concepts in new technologies, techniques and latest developments for their current and potential uses in their profession (Successful Career and Entrepreneurship)

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Recognize the history, structure, function, interactions and trends of key socio-environmental systems on personal, organizational and intellectual level regarding our surroundings through different media.
<b>CO 2</b>	Examine the generation of scientific knowledge and how that knowledge is presented, evaluated, framed and applied for environmental protection by conservation of Natural resources.
<b>CO 3</b>	Articulate a coherent philosophy of the environment and consider ethical bases for responding to environmental questions.
<b>CO 4</b>	Understand the role of conservation of resources and public awareness in prevention of pollution and ultimately for the sustainable development of society.
<b>CO 5</b>	Understand the social responsibility towards protection of environment and society



**Unit-1**    **T**    The Multidisciplinary Nature of Environmental Studies Definition, scope and importance need for public awareness.

**Unit-2**    **N** **Natural Resources Renewable and Non-renewable Resources**

- Natural resources and associated problems.
  - (a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
  - (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
  - (c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
  - (d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, Case studies.
  - (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
  - (f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.



### **Unit-3 Ecosystems**

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem. Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem: (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

#### **Biodiversity and Its Conservation**

- Introduction, definition: genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.



- Biodiversity at global, National and local levels.
- India as a mega-diversity nation. Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

#### **Unit-4 Environmental Pollution**

- Definition
- Causes, effects and control measures of
  - (a) Air pollution                      (b) Water pollution                      (c) Soil pollution                      (d) Marine pollution
  - (e) Noise pollution                      (f) Thermal pollution                      (g) Nuclear hazards
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution. •Pollution case studies.
- Disaster management: Floods, earthquake, cyclone and landslides.



## **Unit-5 Social Issues and the Environment**

- From unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act. • Water (Prevention and Control of Pollution) Act. • Wildlife Protection Act • Forest Conservation Act.
- Issues involved in enforcement of environmental legislation. • Public awareness.

### **Human Population and the Environment**

- Population growth, variation among nations.
- Population explosion—Family Welfare Programme.
- Environment and human health.



- Human rights.

- Value education.

HIV/AIDS.

- Women and Child Welfare.
- Role of Information Technology in environment and human health.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Communication Skills-</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Ability</b> <b>Enhancement</b>	<b>Credit per</b> <b>Semester</b> <b>2 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>DEN001A</b>

## COURSE OBJECTIVES

<b>1</b>	To enhance English language competence in reading, writing, listening and speaking.
<b>2</b>	Switch the approach from teacher-centred to student-centred one.
<b>3</b>	Minimize the Grammar Translation Method of ELT while trying to replace it with direct method.
<b>4</b>	Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centered learning rather than on the teacher-centered learning.
<b>5</b>	To link communication skills with the organizational behavior
<b>6</b>	To inculcate skills that are very much required for employability and adjust in the professional Environment

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
<b>CO 2</b>	Ability to analyze the usage of English words in different contexts.



<b>CO 3</b>	An understanding of technical and academic articles' comprehension.
<b>CO 4</b>	The ability to present oneself at multinational levels knowing the type of different standards of English

**Unit-1 Basics of Organizational Communication:** Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture

**Unit-2 Writing Skills:** Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration

**Unit-3 Composition:** Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,

**Unit-4 Vocabulary Building:** Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms

**Unit-5 Professional and Technical Communication :** Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Communication Skills-</b> <b>Practical</b>	<b>Course</b> <b>Description</b> <b>Ability</b> <b>Enhancement</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>DEN001A</b>

**Unit-1 Basics of Organizational Communication:** Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time- management, Following Deadlines etc

**Unit-2 Write Dialogue from the different contexts of corporate culture:** Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc

**Unit-3 Composition:** Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc

**Unit-4 Vocabulary Building:** Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc



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**Unit-5 Professional and Technical Communication :** Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Fundamentals of</b> <b>Computer-Theory</b>	<b>Course</b> <b>Description</b> <b>Foundation</b>	<b>Credit per</b> <b>Semester</b> <b>2 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BML006A</b>

## COURSE OBJECTIVES

The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Introduction to computer and Input output devices
<b>CO 2</b>	Processor and memory and Storage Devices
<b>CO 3</b>	Introduction of windows and Introduction to MS
<b>CO 4</b>	Introduction to Excel and Introduction to power-point
<b>CO-5</b>	Introduction of Operating System, Computer networks and Internet and its Applications

## Unit-1

- **Introduction to computer:** Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
- **Input output devices:** Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).

## Unit-2

- **Processor and memory:** The Central Processing Unit (CPU), main memory.
- **Storage Devices:** Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

### Unit-3

- **Introduction of windows:** History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
- **Introduction to MS-Word:** introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.

### Unit-4

- **Introduction to Excel:** introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
- **Introduction to power-point:** introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.

### Unit-5

- **Introduction of Operating System:** introduction, operating system concepts, types of operating system.
- **Computer networks:** introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
- **Internet and its Applications:** definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet. Application of Computers in clinical settings.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester:</b> <b>1</b>
<b>Course</b> <b>Fundamentals of</b> <b>Computer-Practical</b>	<b>Course</b> <b>Description</b> <b>Core Practical</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BML007A</b>

## **COURSE OBJECTIVES**

The students will be able to learn all practical aspects of fundamental of computer

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Practical learning to use MS office: MS word, MS PowerPoint, MS Excel
<b>CO 2</b>	Practically To install different software
<b>CO 3</b>	How to do Data entry efficiency
<b>CO 4</b>	Practical related to all theory units of Fundamentals of Computer syllabus

**Unit 1-**Learning to use MS office: MS word, MS PowerPoint, MS Excel.

**Unit 2-** To install different software

**Unit 3-** Data entry efficiency

**Unit 4-** Practical related to all theory units of Fundamentals of Computer syllabus

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Cultural Education- I</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Value added</b> <b>course</b>	<b>Credit per</b> <b>Semester</b> <b>2 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DIN001A</b>

## **COURSE OBJECTIVES**

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to acknowledge and appreciate the richness of Indian Culture
<b>CO 2</b>	Ability to represent the culture ethics in real life

## **UNIT-I**

### **Holy Scriptures-A**

1. Introduction to Vedanta and Bhagavad Gita, Goals of Life – Purusharthas, Introduction to different Dharm Granthas (Various religious scriptures from Hindu, Muslim, Christian, Bodh, Jain religions)
2. Introduction to Yoga, Overview of Patanjali's Yoga Sutras

## **UNIT-II**

### **Society and Culture-I**

3. Introduction to Indian Culture and Major Symbols of Indian Culture

4. Major Indian Cultural and Ethical Values- Respect, Compassion, Kindness, Forgiveness, Introspection, Honesty, Justice, Loyalty, Devotion, Self Sacrifice, Hospitality, Vasudhev Kutumbkum

### **UNIT-III**

#### **India in Progress-I**

5. Education, Science and Technology in Ancient India

6. Values from Indian History- War of Mahabharata, War of Kalinga, Freedom Struggle of India, Major Farmer Movements, Major Religious and Social Upliftment Movements

### **UNIT-IV**

#### **Great Indian Personalities-I**

7. Life and works of the Great People of India- Sushruta, Dadhichi, Ashtvakra, Anusuya, Panini, Charaka, Kalidas, Aryabhatta, Samudragupta, Ashoka, Chandragupt Mourya, Porus, Satyabhama, Dhruv, Prahlad, Chankya, Varahmihira, Bhism, Karan, Dronacharya, Meera Bai, Surdas, Dadudayal, Kabir, Mahatma Buddha, Mahavir, Guru Nanak Dev, Guru Gobind Singh, Mohammad Saheb, Jesus Christ, Veer Shivaji, Maharana Pratap, Maharani Laxmi Bai, Maharani Padmini, Hadi Rani Shal Kanwar, Panna Dhai

**\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to she/he will be required to make a Power Point Presentation on the learning and face Viva-voce by committee of teachers.**



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Human Anatomy-2</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BML008A</b>

### **COURSE OBJECTIVE**

To provide an opportunity for lab technologists who distinguish themselves in Human Anatomy - practical, theoretical knowledge and knowledge application, to undertake research based training in Anatomy. To capture distinguished medical students and offer them such training as would enable them to sub-specialize in anatomy at an early stage of their career. To develop as research scientists and research based teachers for schools of allied health sciences both locally and externally. It also strengthens the research foundation of the students with broad vision of leading in research based teaching of anatomy and stimulates the research attitudes and aptitudes of students.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the anatomy of Peritoneum
<b>CO 2</b>	To understand the anatomy of Urinary system
<b>CO 3</b>	To understand the anatomy of Reproductive system
<b>CO 4</b>	To understand the anatomy of Endocrine glands
<b>CO 5</b>	To understand the anatomy of Nervous system

## **THEORY**

### **Unit-1 Peritoneum**

- i. Description in brief

### **Unit-2 Urinary system**

- i. Kidney, ureter, urinary bladder, male and female urethra
- i. Histology of kidney, ureter and urinary bladder

### **Unit-3 Reproductive system**

- i. Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology)
- i. Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)
- . Mammary gland

### **Unit-4 Endocrine glands**

- i. Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal gland – (gross & histology)



## **Unit-5 Nervous system**

- i. Neuron
- i. Classification of NS
- i. Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve
  - . (gross & histology)
  - . Meninges, Ventricles & cerebrospinal fluid
- i. Names of basal nuclei
- i. Blood supply of brain
- i. Cranial nerves
  - . Sympathetic trunk & names of parasympathetic ganglia
  - . Skin: Skin-histology
- i. Appendages of skin
- i. Eye: Parts of eye & lacrimal apparatus
- i. Extra-ocular muscles & nerve supply
  - . Ear: parts of ear- external, middle and inner ear and contents
  - . Spermatogenesis & oogenesis
- i. Ovulation, fertilization
- i. Fetal circulation

i. Placenta

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Human Anatomy-2</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>BML009A</b>

**PRACTICAL**

<b>Unit-1</b>	Identification of Bones and Organs
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<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Human Physiology-2</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BML010A</b>

**COURSE OBJECTIVES:** The course in Physiology is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Physiology of Excretory system
<b>CO 2</b>	Physiological functions of Endocrine system
<b>CO 3</b>	Physiological functions of Reproductive system
<b>CO 4</b>	Physiological functions of Nervous system
<b>CO 5</b>	Physiological functions of Nervous system

## **THEORY**

### **Unit-1 Excretory system**

- i. Physiological anatomy of kidney, structure and functions of excretory system, structure of nephron.
- i. Mechanism of formation of Urine. & mechanism of concentration and dilution of urine.
- i. The Counter Current System: Physiology of micturition and Regulation of Body temperature in Humans.

### **Unit-2 Endocrine system**

- i. General principles of endocrinology
- i. The pituitary Gland.
- i. The Thyroid Gland, The parathyroid, calcitonin and Vitamin D.
- . The Adrenal Cortex & Pancreas.

### **Unit-3 Reproductive system**

- i. Changes during Puberty, Classification of Male sex hormones and their functions, Spermatogenesis & semen.
- i. Changes during Puberty, Classification and Functions of female sex hormones, menstruation, ovulation and contraception.
- i. Physiological changes during pregnancy, functions of placenta and physiology of lactation.



#### **Unit-4    Nervous system**

- i. Organization of Nervous system, The Synapse , Physiology of receptor organs for special and general sensation, physiology of reflex action, classification and properties of reflexes.
- i. Intro to Sensory and motor system. Functions of hypothalamus, thalamus, basal ganglia, cerebrum & cerebellum.



i. Autonomic nervous system, Cerebrospinal Fluid and Blood Brain Barrier.

### Unit-5 Special Senses

i. Taste and Olfaction.

i. Vision—structure and function of eye, errors of refraction & their correction. Color blindness.

i. Hearing—structure and function of ear, general outline of mechanism of hearing and perception of sound.

JECRC UNIVERSITY School of Allied Health Sciences	Program B.Sc. Medical Lab Technology (BMLT)			Semester: 2
Course Biochemistry-2 Theory	Course Description Core	Credit per Semester 3 credits	Hours per Semester 3 hours	Course Code BML011A

**COURSE OBJECTIVES:** This course provides the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It covers basic biochemical, cellular, biological and microbiological processes, basic chemical reactions in the prokaryotic and eukaryotic cells, the structure of biological molecules, introduction to the nutrients.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Functions and biochemistry of Enzymes, Nucleotide and Nucleic acid
<b>CO 2</b>	Functions and biochemistry of Vitamins and Mineral Metabolism
<b>CO 3</b>	Functions and biochemistry of Connective tissue
<b>CO 4</b>	Functions and biochemistry of Hormone, Acid-Base balance and water balance
<b>CO 5</b>	Functions and biochemistry of Electrolyte balance and clinical aspect of biochemistry

**Unit-1 Enzymes** – Classification, definition, Active site, Cofactor (Coenzyme, Activator), Isoenzymes, Proenzyme. Factors effecting enzyme activity, Enzyme inhibition and significance.

**Nucleic Acids-** DNA and RNA chemistry and functions, Difference between DNA and RNA, Structure of DNA (Watson and Crick model) and tRNA, rRNA, mRNA.

**Unit-2 Vitamins** – general classification, sources of vitamin and functions, RDA and common deficiency symptoms

**Mineral Metabolism-** Definition, Sources, RDA, Digestion, absorption, transport, excretion, functions, common disorders associated with mineral metabolism.

**Unit-3 Water balance** - Water distribution in the body, Body water, water turnover and its regulation in brief.

**Electrolyte balance – Basic concept of Osmolarity** and distribution of electrolytes in brief

Introduction to role of aldosterone, rennin angiotensin system and ANF in brief

**Unit-4 Hormone Action** - Definition, classification, Mechanism of hormone action. Receptors, signal transduction, second messengers and cell function.

**Unit-5 Acid-Base balance** - Acids, bases and buffers, pH. Buffer systems of the body, bicarbonate buffer system. Osmosis, dialysis, surface tension.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Basic Haematology</b> <b>Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BML012A</b>

**COURSE OBJECTIVES:** This course provides the knowledge of the composition of blood and methods of estimating different components of blood. The basic concepts of Haematology & routine clinical investigations of Haematology laboratory.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Basics of Haematology
<b>CO 2</b>	Collection and preservation of blood sample and Anticoagulants
<b>CO 3</b>	Learn about Hemoglobin
<b>CO 4</b>	Physiological properties of coagulation factors
<b>CO 5</b>	To learn Urine analysis and Quality assurance in Haematology

### Unit-1

#### 1. Introduction to Haematology

- Definition
  - Importance
  - Important equipment used
- #### 2. Laboratory organization and safety measures in Haematology Laboratory
- #### 3. Introduction to blood, its composition, function and normal cellular components

### Unit-2

- #### 1. Anticoagulants: types, mode of action and preference of anticoagulants for different hematological studies
- #### 2. Collection and preservation of blood sample for various hematological investigations
- #### 3. Formation of cellular components of blood (Haemopoiesis)
- Erythropoiesis
  - Leucopoiesis
  - Thrombopoiesis

### Unit-3

- #### 1. Hemoglobin: definition, types, structure, synthesis and degradation
- #### 2. Morphology of normal blood cells

### Unit-4

- #### 1. Normal Hemostasis & physiological properties of coagulation factors
- #### 2. Radioactivity: definition, half-life, physical decay and units



### Unit-5

1. Urine analysis
2. Quality assurance in Haematology
  - Internal and external quality control including reference preparation
  - Routine quality assurance protocol
  - Statistical analysis i.e. Standard deviation, Co-efficient of variation, accuracy and precision

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Basic Haematology Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1credits</b>	<b>Hours per Semester</b> <b>2hours</b>	<b>Course Code</b> <b>BML013A</b>

**COURSE OBJECTIVES:** The main objective of the course is to impart the knowledge of Basic Haematology Practical

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Preparation of various anticoagulants
<b>CO 2</b>	Collection of blood sample for various Lab Investigations
<b>CO 3</b>	Routine Haematology Lab Instruments
<b>CO 4</b>	Identification of Normal blood cells
<b>CO 5</b>	Urine Analysis

### Unit-1

Preparation of various anticoagulants:

- EDTA
- Sodium Citrate,
- Oxalate with Fluoride

### Unit-2

Collection of blood sample for various Lab Investigations

### Unit-3

Familiarization and working of routine Haematology Lab Instruments

- Microscopes
- Haemocytometers
- Colorimeter
- Spectrophotometer
- Glass pipettes & Auto pipettes
- Glassware
- Sahli's Apparatus

### Unit-4

Identification of Normal blood cells

### Unit-5

Urine Analysis:

- Routine biochemistry of Urine for:
- pH
- Specific Gravity
- Glucose
- Ketones
- Bilirubin
- Albumin
- Microscopic Examination of Urine

JECRC UNIVERSITY School of Allied Health Sciences	Program B.Sc. Medical Lab Technology (BMLT)			Semester: 2
Course General & Clinical Psychology	Course Description Core Theory	Credit per Semester 3 credits	Hours per Semester 3 hours	Course Code BML014A

**COURSE OBJECTIVES** -Human Psychology involves the study of various behavioral patterns of individuals, theories of development, normal and abnormal aspects of motor, social, emotional and language development, communication and interaction skills appropriate to various age groups. The study of these subjects will help the student to understand their clients while assessment and while planning appropriate treatment methods.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Basics and Introduction of Psychology and growth and development of humans on psychological aspects.
<b>CO 2</b>	Sensation, attention, perception motivational psychology
<b>CO 3</b>	Psychology of humans related to frustration, conflict, emotions and intelligence
<b>CO 4</b>	Thinking and learning on psychological basis and how to improve
<b>CO 5</b>	Improve personality by psychological aspect, social and clinical psychology for patient perspective

## THEORY

### Unit-1 Introduction to Psychology

- Schools: Structuralism, functionalism, behaviorism, Psychoanalysis.
- Methods: Introspection, observation, inventory and experimental method.
- Branches: psychology and applied psychology
- Psychology and physiotherapy

### Growth and Development

- Life span: Different stages of development (Infancy, childhood, adolescence, adulthood, middle age, old age).
- Heredity and environment: role of heredity and environment in physical and psychological development, “Nature v/s Nurture controversy”.



**Unit-2 Sensation, attention and perception**

- a) Sensation: Vision, Hearing, Olfactory, Gustatory and Cutaneous sensation, movement, equilibrium and visceral sense.
- b) Attention: Types of attention, Determinants of attention (subjective determinants and objective determinants).



c) Perception: Gestalt principles of organization of perception (principle of figure ground and principles of grouping), factors influencing perception (past experience and context).

d) Illusion and hallucination: different types.

### **Motivation**

a) Motivation cycle (need, drive, incentive, reward).

b) Classification of motives.

c) Abraham Maslow's theory of need hierarchy

## **Unit-3 Frustration and conflict**

a) Frustration: sources of frustration.

b) Conflict: types of conflict.

c) Management of frustration and conflict

### **Emotions**

a) Three levels of analysis of emotion (physiological level, subjective state, and overt behavior).

b) Theories of emotion

c) Stress and management of stress.

### **Intelligence**

a) Theories of intelligence.

b) Distribution of intelligence.

c) Assessment of intelligence

## **Unit-4 Thinking**

a) Reasoning: deductive and inductive reasoning

b) Problem solving: rules in problem solving (algorithm and heuristic)

c) Creative thinking: steps in creative thinking, traits of creative people

### **Learning**

a) Factors effecting learning.

b) Theories of learning: trial and error learning, classical conditioning, Operant conditioning, insight

learning, social learning theory.

c) The effective ways to learn: Massed/Spaced, Whole/Part, Recitation/Reading, Serial/Free recall, Incidental/Intentional learning, Knowledge of results, association, organization, and mnemonic methods.



**Unit-5    Personality**

- a) Approaches to personality: type & trait, behavioristic, psychoanalytic and humanistic approach.
- b) Personality assessment: observation, situational test, questionnaire, rating scale, interview, and projective techniques.
- c) Defense Mechanisms: denial of reality, rationalization, projection, reaction formation, identification, repression, regression, intellectualization, undoing, introjection, acting out.

**Social psychology**



a) Leadership: Different types of leaders. Different theoretical approaches to leadership.

b) Attitude: development of attitude. Change of attitude.

### **Clinical psychology**

Models of training, abnormal behavior assessment, clinical judgement, psychotherapy, self-management methods, physiotherapist patient interaction, aggression, self- imaging, stress management, assertive training, Group therapy, Body awareness, Pediatric, child and geriatric clinical psychology.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Professional Skills-Theory</b>	<b>Course</b> <b>Description</b> <b>Ability</b> <b>Enhancement</b>	<b>Credit per</b> <b>Semester</b> <b>2 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN002A</b>

### **COURSE OBJECTIVES**

<b>1.</b>	To enhance Professional competence in reading, writing, listening and speaking.
<b>2.</b>	Switch the approach from providing information about the language to use the language.
<b>3.</b>	Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
<b>4.</b>	Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
<b>5.</b>	Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
<b>6.</b>	Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
<b>CO 2</b>	Ability to analyze the usage of English words in professional scenario.
<b>CO 3</b>	An understanding of technical and academic articles' comprehension.
<b>CO 4</b>	The ability to present oneself at multinational levels as per the demand of the corporate culture

**Unit-1** Professional Grooming and Professional Culture: Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management

**Unit-2** Advanced Grammar: Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents

**Unit-3** Composition:, Memo, Notice, Circular, Book Review, Research Article, Reports

**Unit-4** Vocabulary Building: Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms

**Unit-5** Reading Comprehension: Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Professional Skills-Practical</b>	<b>Course</b> <b>Description</b> <b>Ability</b> <b>Enhancement</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN002A</b>

**Unit-1** Professional Grooming and Professional Culture: Role plays and Activities on Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management

**Unit-2** Advanced Grammar: Exercise Sessions for Common errors related to prepositions, articles, models , Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents

**Unit-3** Composition:, Memo, Notice, Circular, Book Review, Research Article, Reports – Giving Assignments based on practical applications, Practice sessions on different topics

**Unit-4** Vocabulary Building: Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms- Activities related to the appropriate use of words

**Unit-5** Reading Comprehension: Practice Reading Unseen Paragraphs- Finding Suitable title, Summarizing, Analyzing, Finding new words etc.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Culture Education - 2</b>	<b>Course Description</b> <b>Value added course</b>	<b>Credit per Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DIN002A</b>

### OBJECTIVES

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

**COURSE OUTCOMES (CO):** At the end of this course students will have:

<b>CO 1</b>	Ability to acknowledge and appreciate the richness of Indian Culture
<b>CO 2</b>	Ability to represent the culture ethics in real life

### Unit-1 Holy Scriptures-II

1. Bhagavad Gita and Life Management
2. Highlights of Indian Scriptures - Major Incidents and terms from various religious scriptures including Ramayana, Mahabharata, Guru Granth Saheb, Bible, Quran, Jain Scriptures, Bodh Scriptures
3. Historicity of Ramayana and Mahabharata

### Unit-2 Society and Culture-II

4. Indian Society: Its Strengths and Weaknesses
5. Health and Lifestyle related issues
6. Conservation of cultural heritage

### Unit-3 India in Progress-II

7. Role & Position of Women in Indian Society- Rituals like Sati, Dakin, Kanyavadh, Pardah, Devdasi, Child Marriage, Measures of Women Empowerment including Education, Constitutional and other Rights
8. Indian Models of Economy, Business and Management

### Unit-4 Great Indian Personalities-II

9. Life and works of the Great People of India- Raja Ram Mohan Roy, Swami Vivekanand, Madan Mohan Malviya, Ishwarchand VidyaSagar, JyotibaPhule, HomiBhabha, B.R. Ambedkar, Mahatma Gandhi, Chandra Shekhar Aazad, Abdul Hamid, Badshah Khan, Bhagat Singh, Ashfaqullah, Vir Sawarkar, Vir Banda Bahadur, Vir Haqiqat Rai, Subhash Chandra Bose,





Mother Teresa, Jagdish Chandra Basu, JRD Tata, Ratan Tata, Dada

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>General Clinical</b> <b>Microbiology</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BML015A</b>

**COURSE OBJECTIVE-** This subject gives a general insight into the history and basics of medical microbiology, imparts knowledge about equipment used in Medical Microbiology and basic procedures done in a medical microbiology laboratory i.e. microscopy, sterilization, disinfection, culture methods required to perform different microbiological tests in clinical microbiology lab and biomedical waste management.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the basics of microbiology, safety measures and glassware used in microbiology
<b>CO 2</b>	To understand the microscopes, sterilization and Antiseptics and disinfectants
<b>CO 3</b>	To understand the Biomedical waste management and microbes
<b>CO 4</b>	To understand the methods of culture media
<b>CO 5</b>	To understand the immunology and Care & handling of laboratory animals

## Unit-1

1. Introduction to Medical Microbiology:
  - i. Definition
  - ii. History
  - iii. Host – Microbe relationship
2. Safety measures in Clinical Microbiology
3. Glassware used in Clinical Microbiology Laboratory:
  - i. Introduction
  - ii. Care and handling of glassware
  - iii. Cleaning of glassware



- iv. Equipment used in clinical Microbiology Laboratory:
- v. Introduction
- vi. Care and maintenance including calibration

## **Unit-2**

### 1. Microscopy

- i. Introduction and history
- ii. Types, principle and operation mechanism of following microscopes
  - Light microscope
  - DGI
  - Fluorescent
  - Phase contrast
  - Electron microscope: Transmission/Scanning

### 2. Sterilization:

- Definition
- Types and principles of sterilization methods
- Heat (dry heat, moist heat with special Reference to autoclave)
- Radiation
- Filtration
- Efficiency testing to various sterilizers

### 3. Antiseptics and disinfectants:

- Definition
- Types and properties
- Mode of action - Uses of various disinfectants
- Precautions while using the disinfectants - Qualities of a good disinfectant
- Testing efficiency of various disinfectants

## **Unit-3**

### 1. Biomedical waste management in a Medical Microbiology laboratory:

Types of the waste generated – Segregation – Treatment –Disposal

### 2. General characteristics & classification of Microbes:

(Bacteria & fungi) Classification of microbes with special reference to prokaryotes & eukaryotes  
Morphological classification of bacteria

Bacterial anatomy (Bacterial cell structures)

### 3. Growth and Nutrition of Microbes:

- General nutritional & other requirements of the bacteria
- Classification of bacteria on the basis of their nutritional requirements
- Physical conditions required for growth.
- Normal growth cycle of bacteria (growth curve)
- Types of microbial cultures: Synchronous, Static, continuous culture.

## **Unit-4**

### 1. Culture media:

- Introduction
- Classification of culture media (Example & Uses) solid media, liquid media, semisolid, Media, routine/synthetic/defined media, basal media, enriched, enrichment, Selective differential media, sugar fermentation media, transport media, preservation media and anaerobic culture



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media

  
**Dr. Vishal Jain**  
Dean & Professor  
School of Allied Health Sciences  
JECRC University, Jaipur-302003



- Quality control in culture media
- Automation in culture media preparation
- 2. Aerobic & anaerobic culture methods:
  - Concepts
  - Methods Used for aerobic cultures
  - Methods used for anaerobic cultures

## **Unit-5**

1. Introductions to Immunology
  - Immunity
  - Antigens and Antibodies
2. Care & handling of laboratory animals:
  - Introduction, General care & handling
  - Ethics & legality in use of laboratory animals

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>General Clinical Microbiology</b> <b>–Practical</b>	<b>Course</b> <b>DescriptionCore</b>	<b>Credit per</b> <b>Semester2 credits</b>	<b>Hours per</b> <b>Semester4 hours</b>	<b>Course Code</b> <b>BML016A</b>

**COURSE OBJECTIVE-** This subject gives a general insight into the history and basics of medical microbiology practical, imparts knowledge about equipment used in Medical Microbiology and basic procedures done in a medical microbiology laboratory i.e. microscopy, sterilization, disinfection, culture methods required to perform different microbiological tests in clinical microbiology lab and biomedical waste management.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the how to work in microbiology laboratory, cleaning and sterilization of glassware, autoclave and use of microscopes
<b>CO 2</b>	To understand the methods of sterilizations, antiseptics and disinfectants
<b>CO 3</b>	To understand the uses and precautions while using disinfectants
<b>CO 4</b>	To understand the different morphological types of bacteria and preparation of culture media
<b>CO 5</b>	To understand the aerobic and anaerobic culture and laboratory animals

#### Unit-1

1. To demonstrate safe code of practice for a Microbiology laboratory
2. To prepare cleaning agents & to study the technique for cleaning & sterilization of glassware.
3. To demonstrate the working & handling of Compound microscope.
4. To demonstrate the method of sterilization by autoclave including its efficacy testing.

#### Unit-2

1. To demonstrate the method of sterilization by hot air oven including its efficacy testing
2. To demonstrate the method of sterilization of media/solution by filtration
3. Demonstration of Antiseptics, Spirit, Cetrimide & Povidone-Iodine
4. To demonstrate the use of disinfectants

#### Unit-3

1. Demonstrate the precaution while using disinfectants.
2. To prepare working dilution of commonly used disinfectants.
3. In-use test, Rideal-walker phenol co-efficient test

#### Unit-4

1. Kelsey-Sykes test, To demonstrate the different morphological types of bacteria
2. Preparation of one culture media from each type

#### Unit-5

1. To demonstrate aerobic culture, To demonstrate anaerobic culture
2. Visit to animal house & demonstrate about care of laboratory animals

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>Basic Clinical Biochemistry</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BML017A</b>

**COURSE OBJECTIVE-** The main objective of the subject is to impart the knowledge of apparatus, units, equipment, and volumetric analysis in the laboratory of clinical Biochemistry.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the Cleaning and care of general laboratory glass ware and equipment and Distilled water unit
<b>CO 2</b>	To understand the measurement and calibration of glass ware
<b>CO 3</b>	To understand the concept of pH and analytic balance
<b>CO 4</b>	To understand the solutions and reagents
<b>CO 5</b>	To understand the osmosis

## Unit-1

- Cleaning and care of general laboratory glass ware and equipment
  - Steps involved in cleaning soda lime glass
  - Steps involved in cleaning borosil glass
  - Preparation of chromic acid solution
  - Storage
- Distilled water
  - Method of preparation of distilled water
  - Type of water distillation plants
  - Storage of distilled water

## Unit-2

- Units of Measurement.
  - S.I unit and CGS units
  - Conversion
  - Strength, molecular weight, equivalent weight
  - Normality, Molarity, Molality
  - Numerical
- Calibration of volumetric apparatus
  - Flask
  - Pipettes
  - Burettes
  - Cylinders



### **Unit-3**

1. Analytical balance
  - Principle
  - Working
  - Maintenance
2. Concept of pH
  - Definition
  - Henderson Hassel batch equation
  - P a value
  - PH indicator
  - Methods of measurement of pH
  - pH paper
  - pH meter
  - Principle, working, maintenance and calibration of pH meter

### **Unit-4**

- Volumetric analysis
- Normal and molar solutions
- Standard solutions
- Preparation of reagents
- Storage of chemicals

### **Unit-5**

- Osmosis
- Definition
- Types of osmosis
- Factors affecting osmotic pressure
- Vant Hoff's equation
- Applications of osmosis
- Dialysis



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>Basic Clinical Biochemistry –</b> <b>Practical</b>	<b>Course</b> <b>DescriptionCore</b>	<b>Credit per</b> <b>Semester2 credits</b>	<b>Hours per</b> <b>Semester4 hours</b>	<b>Course Code</b> <b>BML018A</b>

**COURSE OBJECTIVE-** The main objective of the subject is to impart the knowledge of apparatus, units, equipment, and volumetric analysis in the laboratory of clinical Biochemistry in practical aspect.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the Cleaning and care of general laboratory glass ware and Preparation of Distilled water
<b>CO 2</b>	To understand the pH meter and prepare 0.1 N NaOH solution
<b>CO 3</b>	To understand the preparation of .2N HCl solution and 0.1 molarH <sub>2</sub> SO <sub>4</sub>
<b>CO 4</b>	To understand the preparation of Sodium carbonate solution
<b>CO 5</b>	To understand the osmosis and dialysis

### Unit-1

1. Cleaning of the laboratory glass ware (Volumetric and non-volumetric)
2. Preparation of distilled water

### Unit-2

1. Principle, working and maintenance of pH meter.
2. To prepare 0.1 N NaOH solution.

### Unit-3

1. To prepare 0.2N HCl solution.
2. To prepare 0.1 molarH<sub>2</sub>SO<sub>4</sub>

### Unit-4

1. To prepare 0.2 Molar Sodium carbonate solution.

### Unit-5

1. Demonstration of osmosis and dialysis.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>Law &amp; Ethics</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BML019A</b>

**COURSE OBJECTIVE-** Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Medical Lab technicians are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows:

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Students able to learn Introduction and Code of conduct Medical ethics
<b>CO 2</b>	Learn about Basic principles and Malpractice and negligence
<b>CO 3</b>	Learn about consent and right of patient
<b>CO 4</b>	Learn about organ transplant and Medico legal aspects of medical record
<b>CO 5</b>	Professional Indemnity insurance policy and informed consent

### Unit-1

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct

### Unit-2

1. Basic principles of medical ethics – Confidentiality
2. Malpractice and negligence - Rational and irrational drug therapy

### Unit-3

1. Autonomy and informed consent - Right of patients
2. Care of the terminally ill- Euthanasia



#### **Unit-4**

1. Organ transplantation
2. Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.

#### **Unit-5**

1. Professional Indemnity insurance policy
2. Development of standardized protocol to avoid near miss or sentinel events
3. Obtaining an informed consent.
4. Ethics in the profession of Medical Laboratory Technology

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>Professional values</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BML020A</b>

**COURSE OBJECTIVE-** The module on professionalism will deliver the concept of what it means to be a professional and how a specialized profession is different from a usual vocation. It also explains how relevant is professionalism in terms of healthcare system and how it affects the overall patient environment.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Learn Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality
<b>CO 2</b>	Learn ethical or moral values
<b>CO 3</b>	Learn professional behavior
<b>CO 4</b>	Learn professional accountability and responsibility
<b>CO 5</b>	Learn Cultural issues in the healthcare environment and team efforts

### Unit-1

Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality

### Unit-2

Personal values- ethical or moral values

### Unit-3

Attitude and behavior- professional behavior, treating people equally

### Unit-4

Code of conduct, professional accountability and responsibility, misconduct

### Unit-5

Differences between professions and importance of team efforts

Cultural issues in the healthcare environment

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>Life Skills – 1 (Personality Development)</b>	<b>Course Description</b> <b>Ability Enhancement</b>	<b>Credit per Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN003A</b>

**COURSE OBJECTIVE-** To prepare the students as per the industry demands. Switching to Activity and Task based Teaching modules. To focus on the linguistic aspects in relation to life situations. Facilitating the aspects of behavioral skills in language. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields
<b>CO 2</b>	Ability to learn by doing it practically in the classroom
<b>CO 3</b>	Ability to learn by creating an environment and adapting to the environment.
<b>CO 4</b>	The ability to prepare the students as per the need of the Multi-cultural scenario around.

- UNIT 1**
- Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion
  - Basics of Narrating and describing things
- UNIT 2**
- Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview
  - CV/Resume Drafting and HR Interview advance theory
  - Basics of Video Interviews and Video Profiles for Job
- UNIT 3**
- Types of listening, advantages and disadvantages
- UNIT 4**
- Basics of Group Discussion, Presenting New Idea/Concept/Proposal/Project/ Report



## **UNIT 5**

Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>Life Skills – 1 (Personality</b> <b>Development) Practical</b>	<b>Course</b> <b>Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN003B</b>

- UNIT 1**
- Debates / Speeches / Addressing the public / Extempore/Group Discussion
  - Describing a hypothetical situation / theme / surroundings / appearance/personality traits/company/ a professional Concept/New Idea, / New Project through PPT and video aids
- UNIT 2**
- Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview
  - CV/Resume Drafting and HR Interview practice sessions elaborating the points as per the CV and industry demand
  - Video Interviews and Video Profiles for Job-Practice session for Online Interviews
- UNIT 3**
- Listening to variety of audio/video conversations including interviews, news, reports, reports, GDs, dialogues from body language, logic, wit and vocabulary perspectives
- UNIT 4**
- Group Discussion-Practice sessions, Presenting New Idea/Concept/Proposal/Project/ Report
- UNIT 5**
- Activities on how to be a strong Personality, Motivation, Case studies for Resourcefulness and out of the box thinking, Role plays and Case studies on Risk taking, Self confidence and Self-esteem, Decision Making, Emotion Management, Cultural Adaptability, Multicultural Perspective towards things, ideas, views, codes etc

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Lab Technology (BMLT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>Value Education and</b> <b>Ethics -1</b>	<b>Course</b> <b>Description</b> <b>Value added</b> <b>course</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>1 hours</b>	<b>Course</b> <b>Code</b> <b>DIN003A</b>

## COURSE OBJECTIVES

1. To give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.
2. Making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to acknowledge and appreciate the ethical beauty of India
<b>CO 2</b>	Ability to incorporate the values of human lives in real life applications

### Lessons from the Ramayana

Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

### Lessons from the Mahabharata

Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

### Lessons from the Upanishads

Introduction to the Upanishads: Sruti versus Smrti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, SatyakamaJabala, Aruni, Shvetaketu.



## Message of the Bhagavad Gita

Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War – The anguish of Arjuna – Counsel by Sri. Krishna – Key teachings of the Bhagavad Gita – Karma Yoga, Jnana Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

## Life and Message of Swami Vivekananda

Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji's life.

## Life and Teachings of Spiritual Masters India

Sri Rama, Sri Krishna, Sri Buddha, AdiShankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda.

## Insights into Indian Arts and Literature

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 4</b>
<b>Course</b> <b>Systematic Bacteriology</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>BML021A</b>

**COURSE OBJECTIVE- :** This subject will give information about the different types of bacterial culture procedures, staining procedures and biochemical tests used for identification of bacteria. The students will learn the morphology cultural characteristics, biochemical characteristics & laboratory diagnosis of various bacteria.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the basic of bacteriology and culture media.
<b>CO 2</b>	To understand the staining techniques, principle and reagent preparation.
<b>CO 3</b>	To understand the Biochemical tests for identification of different bacteria.
<b>CO 4</b>	To understand the Definition, classification, various characteristics, pathogenesis and laboratory diagnosis of various bacteria.
<b>CO 5</b>	To Understand the various characteristics of bacteria and their lab diagnosis

#### **Systematic Bacteriology**

##### **Unit 1:-**

1. Bacterial culture :- Instruments used to seed culture media
2. Culture procedures – seeding a plate
3. Staining techniques in bacteriology
4. Significance of staining in bacteriology

##### **Unit 2:-**

Principle, Reagent preparation, procedures and interpretation of the following

- 1 Simple staining and Negative staining
2. Gram stain ,Albert's stain , Neisser's stain, Ziehl –Neelsen staining, Capsule staining, Flagella staining, Spore staining, Fontana stain for spirochetes.

##### **Unit 3:-**

Principle, procedures and interpretation of the following biochemical tests for identification of different bacteria. Definition, Classification, Various characteristics

1 Catalase , Coagulase , Indole , Methyl Red , VogesProskauer , Urease, Citrate , Oxidase , TSIA  
Nitrate reduction , Carbohydrate fermentation , Hage and Leifson , Bile solubility , H<sub>2</sub> S production  
Demonstration of motility , Decarboxylases , CAMP , Hippurate hydrolysis , Nagler's reaction Cholera-  
red reaction.

#### **Unit 4:-**

Definition, Classification, Various characteristics (morphological, cultural and biochemical),  
pathogenesis and laboratory diagnosis of the following bacteria :-

1 Staphylococcus , Streptococcus , Pneumococcus , Neisseria gonorrhea and Neisseria meningitis,  
Haemophilis , Corynebacterium , Enterobacteriaceae: Escherichia coli, Klebsiella, Citrobacter,  
Enterobacter, Proteus, Salmonella, Shigella, Yersinia enterocolitica and Yersinia pestis.

#### **Unit 5:-**

Definition, Classification, Various characteristics of the following:-

Vibrio, Aeromonas and Plesiomonas , Clostridia of wound infection , Mycobacterium tuberculosis  
complex, Atypical Mycobacteria and M. leprae , Spirochetes – Treponema, Borrelia and leptospira  
Bordetella and brucella , Mycoplasma and Ureaplasma , Rickettsia , Chlamydia

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 4</b>
<b>Course</b> <b>Systematic Bacteriology</b> <b>Practical</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester 2 hours</b>	<b>Course Code</b> <b>BML022A</b>

**COURSE OBJECTIVE-** The subject gives a general insight into the history and basics of Systematic bacteriology practical, imparts knowledge about equipment used in Systematic bacteriology and basic procedures of staining done in a systematic bacteriology.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the basic instrument used in systematic bacteriology.
<b>CO 2</b>	To understand the staining techniques and reagent preparation.
<b>CO 3</b>	To understand the Biochemical tests and techniques.
<b>CO 4</b>	To understand the laboratory diagnosis of various bacteria.
<b>CO 5</b>	To Understand the various techniques about motility methods in bacteriology.

### **Systematic Bacteriology – Practical**

1. To demonstrate the instruments used to seed culture media
2. To learn techniques for Inoculation of bacteria on culture media
3. To isolate specific bacteria from a mixture of organisms.
4. To demonstrate simple staining (Methylene blue)
5. To prepare India ink preparation to demonstrate negative staining.
6. Bacterial identification: To demonstrate reagent preparation, procedure and interpretation for
  - 6.1 Gram stain
  - 6.2 Albert stain
  - 6.3 Neisser's staining
  - 6.4 Z-N staining
  - 6.5 Capsule staining
  - 6.6 Demonstration of flagella by staining methods
  - 6.7 Spore staining
  - 6.8 To demonstrate spirochetes by Fontana staining procedure
7. To prepare the reagent and demonstrate following biochemical tests with positive and negative control bacteria:
  - 7.1 Catalase
  - 7.2 Coagulase
  - 7.3 Indole
  - 7.4 Methyl Red (MR)
  - 7.5 VogesProskauer (VP)
  - 7.6 Urease
  - 7.7 Citrate
  - 7.8 Oxidase
  - 7.9 TSIA
  - 7.10 Nitrate reduction
  - 7.11 Carbohydrate fermentation
  - 7.12 Huger and Leifson
  - 7.13 Bile solubility
  - 7.14 H<sub>2</sub>S production
  - 7.15 Demonstration and motility
  - 7.16 Decarboxylases
  - 7.17 CAMP
  - 7.18 Hippurate hydrolysis
  - 7.19 Nagler's reaction

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 4</b>
<b>Course</b> <b>Applied Clinical Bacteriology</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>BML023A</b>

**COURSE OBJECTIVE-** This part will cover the laboratory strategy in the diagnosis of various infective syndromes i.e. choice of samples, collection and transportation and processing of samples for isolation of bacterial pathogens and then to put antibiotic susceptibility testing. This will also cover bacteriological examination of water, milk, food, air, I/V fluids and nosocomial infections. Further it will make the candidate familiar to epidemiology, epidemiological markers and preservation of microbes.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the Laboratory strategy in the diagnosis of various infective syndromes.
<b>CO 2</b>	To understand the Antibiotic susceptibility testing in bacteriology.
<b>CO 3</b>	To understand the basics of nucleic acid techniques.
<b>CO 4</b>	To understand the bacteriological examination of water, milk, food and air.
<b>CO 5</b>	To Understand the sterility testing of fluid.

### **Applied Clinical Bacteriology**

#### **Unit-1**

1. Laboratory strategy in the diagnosis of various infective syndromes:  
Samples of choice, collection, transportation and processing of samples for laboratory diagnosis of the following complications:

- 1.1 Septicemia and bacteremia
- 1.2 Upper Respiratory tract infections
- 1.3 Lower respiratory tract infections
- 1.4 Wound, skin, and deep sepsis
- 1.5 Urinary tract infections
- 1.6 Genital Tract infections
- 1.7 Meningitis
- 1.8 Gastro intestinal infections
- 1.9 Enteric fever
- 1.10 Tuberculosis (Pulmonary and Extra-pulmonary)
- 1.11 Pyrexia of unknown origin

#### **Unit-2**

2. Antibiotic susceptibility testing in bacteriology

- 2.1 Definition of antibiotics
- 2.2 Culture medium used for Antibiotic susceptibility testing
- 2.3 Preparation and standardization of inoculum
- 2.4 Control bacterial strains
- 2.5 Choice of antibiotics
- 2.6 MIC and MBC: Concepts and methods for determination
- 2.7 Various methods of Antibiotic susceptibility testing with special reference to Stokes and Kirby-Bauer method

### **Unit-3**

Basics of Nucleic acid techniques in diagnostic microbiology with special reference to Polymerase chain reaction (PCR)

Automation in bacterial culture detection and antimicrobial susceptibility testing: Principles and importance.

### **Unit-4**

Bacteriological examination of water, milk, food and air

#### **1 Examination of water**

- 1.1 Collection and transportation of water sample
- 1.2 Presumptive coliform count
- 1.3 Eijkman test
- 1.4 Introduction and importance of other bacteria considered as indicators of fecal contamination
- 1.5 Membrane filtration tests
- 1.6 Interpretation of results

#### **2 Examination of Milk and milk products**

- 2.1 Basic Concepts regarding gradation of milk
- 2.2 Various tests for Bacteriological examination of milk

#### **3 Examination of food articles**

- 1 Basic Concepts regarding classification of food like frozen food, canned food, raw food, cooked food etc.
- 2 Various tests for Bacteriological examination with special reference to food poisoning bacteria

#### **4 Examination of Air**

- 1 Significance of air bacteriology in healthcare facilities
- 2 Settle plate method
- 3 Types of air sampling instruments
- 4 Collection processing and reporting of an air sample

## Unit-5

### Sterility testing of I/v fluids

- 1 Collection, transportation and processing of I/v fluids for bacterial contamination
- 2 Recording the result and interpretation

#### Nosocomial Infection:

- 1 Introduction, sources and types of nosocomial infections.
- 2 Surveillance of hospital environment for microbial load.
- 3 Role of microbiology laboratory in control of nosocomial infections

#### Epidemiological markers:

- 1 Introduction
- 2 Types
- 3 Serotyping
- 4 Phage typing and
- 5 Bacteriocin typing

### Preservation methods for microbes

- 1 Basic concepts of preservation of microbes
- 2 Why do we need to preserve bacteria?
- 3 Principle and procedures of various short term and long term preservation methods with special reference to Lyophilization

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 4</b>
<b>Course</b> <b>Applied Clinical</b> <b>Bacteriology Practical</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester 2hours</b>	<b>Course Code</b> <b>BML024A</b>

**COURSE OBJECTIVE-** This course deals with characteristic, properties and microbiological significance of clinical bacteria.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the isolation techniques of pure culture.
<b>CO 2</b>	To understand the clinical sample for identification of bacterial pathogens.
<b>CO 3</b>	To understand the automation of bacterial culture.
<b>CO 4</b>	To understand the antibiotic susceptibility testing of various methods.
<b>CO 5</b>	To Understand the various methods for sterility testing in clinical laboratory.

**Applied Clinical Bacteriology – Practical**

1. Inoculation of different culture media
2. Isolation of pure cultures
3. Processing of following clinical samples for culture and identification of bacterial pathogens:
  - 3.1 Blood
  - 3.2 Throat swab
  - 3.3 Sputum
  - 3.4 Pus
  - 3.5 Urine
  - 3.6 Stool for Salmonella, Shigella and Vibrio cholerae
  - 3.7 C.S.F. and other body fluids
4. Demonstration of PCR
5. Demonstration of automation in bacterial culture detection and antimicrobial susceptibility testing
6. Antimicrobial susceptibility testing
  - 6.1 Introduction and terms used
  - 6.2 Preparation and standardization of inoculum
  - 6.3 To demonstrate reference bacterial strains
  - 6.4 To determine MIC and MBC of known bacteria against a known antibiotic
  - 6.5 To perform antibiotic susceptibility testing of clinical isolates by using
    - 6.5.1 Stokes method
    - 6.5.2 Kirby-Bauer method
7. Collection, transportation and processing of following articles for bacteriological examination:
  - 7.1 Water
  - 7.2 Milk



7.3 Food and

7.4 Air

8. To demonstrate sterility testing of intravenous fluid with positive and negative controls

9. Demonstration of serotyping and bacteriocin typing

10. Demonstration of lyophilization and other available preservation methods

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b><u>B.Sc. Medical Laboratory Technology (BMLT)</u></b>			<b>Semester:</b> <b>4</b>
<b>Course</b> <b>Applied Haematology-I</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester 3</b> <b>hours</b>	<b>Course Code</b> <b>BML025A</b>

**COURSE OBJECTIVE-** The students will be made aware of the methods of estimating different components of blood. Students will learn the basic concepts of staining and coagulation in Haematology laboratory.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the basic of Hemoglobin and Hemoglobin estimation method.
<b>CO 2</b>	To understand the Principle mechanism and different methods for the measuring Erythrocyte Sedimentation Rate(ESR)
<b>CO 3</b>	To understand the various method for packed cell volume/hematocrit value.
<b>CO 4</b>	To understand the staining techniques in haematology.
<b>CO 5</b>	To Understand the Preparation of Reagents for coagulation studies.

### **Applied Haematology-I**

#### **Unit-1**

1. Haemoglobinometry: Different methods to measure Haemoglobin with merits and demerits
2. Haemocytometry: Introduction, Principle, Reagent preparation, procedure, errors involved and means to minimize errors.

- 1 RBC Count,
- 2 Total leucocytes count(TLC)
- 3 Platelet Count.
- 4 Absolute Eosinophil count
- 5 Differential leucocytes count

#### **Unit-2**

Principle mechanism and different methods with merit and demerits for the measuring Erythrocyte Sedimentation Rate(ESR) and its significance

Macroscopic and microscopic examination of seminal fluid

Examination of CSF and other body fluids for cytology i.e. pleural, peritoneal and synovial fluid etc.

#### **Unit-3**

Different methods with merit and demerits for packed cell volume/Haematocrit value

Physiological variations in Hb, PCV, TLC and Platelets

Preparation of blood films

Types, Methods of preparation (Thick and thin smear/film) and utility

#### **Unit -4**

Staining techniques in Haematology (Romanowsky's stains): Principle, composition, preparation of staining reagents and procedure of the following

- 1 Giemsa's stain
- 2 Leishman's stain
- 3 Wright's stain
- 4 Field's stain
- 5 JSB stain.

Normal and absolute values in Haematology

#### **Unit-5**

1. Preparation of Reagents for coagulation studies:

M/40 Calcium chloride

Brain Thromboplastin

Cephalin

Adsorbed Plasma

2. Screening Tests for coagulation Studies and their significance

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>		<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>		<b>Semester: 4</b>
<b>Course</b> <b>Applied Haematology</b> <b>Practical</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>BML026A</b>

**COURSE OBJECTIVE-** To learn clinical and laboratory investigation, diagnosis and medical management of diseases of the blood and blood cell count methods.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the Hb estimation of various methods.
<b>CO 2</b>	To understand the varioud methods for differential cell count.
<b>CO 3</b>	To understand the techniques of wintrobe & wester gren ESR method.
<b>CO 4</b>	To understand the Cytological examination of csf & otherr body fluid.
<b>CO 5</b>	To Understand the various methods for coagulation studies.

#### **Applied Haematology-I – Practical**

1. Hb Estimation
  - 1.1 Sahli's method
  - 1.2 Cyanmetha haemoglobin method
  - 1.3 Oxyhaemoglobin method
2. Total leukocyte count
3. Platelets count
4. Absolute Eosinophil count
5. Preparation of smear and staining with Giemsa and Leishman stain.
6. ESR( Wintrobe and Wester gren method)
7. Packed cell volume (Macro & Micro)
8. Cytological examination of CSF and other body fluids
9. Physical and Microscopic examination of seminal fluid including sperm count
10. Perform normal DLC
11. Preparation of M/40 Calcium chloride
  - 11.1 Brain thromboplastin and standardization
  - 11.2 Cephalin 11.3 Adsorbed plasma
12. Perform BT, CT, Hess test, PT and APTT

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>		<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>		<b>Semester: 4</b>
<b>Course</b> <b>Analytical</b> <b>Biochemistry</b>	<b>Clinical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester 3</b> <b>hours</b>
<b>Course Code</b> <b>BML027A</b>				

**COURSE OBJECTIVE-** The students will learn basic principles/mechanisms, procedures and various types of techniques commonly performed in analytical biochemistry such as: spectrophotometry, colorimetry, photometry and chromatography, electrophoresis.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the basic principles/mechanisms, procedures and various types of Spectrophotometry.
<b>CO 2</b>	To understand the basic principles/mechanisms, procedures and various types of colorimetry
<b>CO 3</b>	To understand the basic principles/mechanisms, procedures and various types of photometry.
<b>CO 4</b>	To understand the basic principles/mechanisms, procedures and various types of chromatography.
<b>CO 5</b>	To understand the basic principles/mechanisms, procedures and various types of Electrophoresis.

### **Analytical Clinical Biochemistry**

#### **Unit-1**

##### Spectrophotometry

- 1.1 Introduction
- 1.2 Theory of spectrophotometry
- 1.3 Lambert's law and Beer's law

#### **Unit-2.**

- 1.1 Colorimetry
- 1.2 Introduction
- 1.3 Theory of colorimetry
- 1.4 Types of colorimetry and importance of colorimetry.

#### **Unit-3.**

##### Photometry

- 2.1 Introduction
- 2.2 General principles of flame photometry
- 2.3 Limitations of flame photometry

## 2.4 Instrumentation

## 2.5 Applications of flame photometry

## 2.6 Atomic absorption spectroscopy – Principle & applications

### **Unit-4.**

#### Chromatography

##### 3.1 Introduction

##### 3.2 Types of chromatography

3.3 Paper Chromatography: Introduction, principle, types, details for qualitative and quantitative analysis, application

3.4 Thin layer chromatography: Introduction, experimental techniques, application of TLC, limitations, High performance thin layer chromatography

3.5 Column chromatography: Introduction, principle column efficiency, application of column chromatography

3.6 Gas chromatography: Introduction principle, instrumentation, application

3.7 Ion exchange chromatography: Introduction, Definition and principle, cation and anion exchangers, application

3.8 Gel Chromatography: Introduction Principle and method, application and advantages

### **Unit-5.**

#### Electrophoresis:

##### 4.1 Introduction

##### 4.2 Principle

###### 4.2.1 Instrumentation

###### 4.2.2 Applications

##### 4.3 Types of electrophoresis

###### 4.3.1 Paper electrophoresis

###### 4.3.2 Gel electrophoresis

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Medical Laboratory Technology (BMLT)</u></b>			<b>Semester: 4</b>
<b>Course</b> <b>Analytical Clinical Biochemistry</b> <b>Practical</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester 2 hours</b>	<b>Course Code</b> <b>BML028A</b>

**COURSE OBJECTIVE-** The scope of the subject is providing the principle to understand the experimental methods such as spectrophotometry, colorimetry, photometry and chromatography, electrophoresis.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the principle, working & maintenance of spectrophotometer.
<b>CO 2</b>	To understand the principle, working & maintenance of colorimeter.
<b>CO 3</b>	To understand the principle, working & maintenance of various types of photometer.
<b>CO 4</b>	To understand the principle, procedure of various types of chromatography.
<b>CO 5</b>	To Understand the principle & procedure of various types of Electrophoresis

Analytical Clinical Biochemistry- Practical

UNIT1:

1. To demonstrate the principle, working & maintenance of spectrophotometer.
2. To demonstrate the principle, working & maintenance of colorimeter.

UNIT2:

3. To demonstrate the principle, working & maintenance of flame photometer.
4. To demonstrate the principle, procedure of paper chromatography.

UNIT3:

5. To demonstrate the principle & procedure of Gas chromatography.
6. To demonstrate the principle & demonstration of TLC.

UNIT4:

7. To demonstrate the principle & procedure of column chromatography.

UNIT5:

8. To demonstrate the principle & procedure of Electrophoresis

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 4</b>
<b>Course</b> <b>Basic Applied Histopathology</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>BML029A</b>

**COURSE OBJECTIVE-** this section, students will be made aware of terminology used in histotechnology, various instruments and their maintenance and also learn the processing of various samples for histopathological investigations.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the Histotechnology.
<b>CO 2</b>	To understand the Basic Concept of Fixation.
<b>CO 3</b>	To understand the method of decalcification.
<b>CO 4</b>	To understand the manual and automatic tissue processing.
<b>CO 5</b>	To Understand the staining, impregnation and mountants.

### Unit-1

Introduction to Histotechnology

Collection and transportation of specimens for histological examination

Processing of various tissues for histological examination

### Unit-2

Basic concepts of fixation

Various types of fixatives used in a routine histopathology laboratory

Simple fixatives

Compound fixatives

Special fixatives for demonstration of various tissue elements

### Unit-3

Decalcification

Criteria of a good decalcification agent

Technique of decalcification followed with selection of tissue, fixation, and decalcification, neutralization of acid and thorough washing



Various types of decalcifying fluids: Organic & Inorganic Acid, chelating agents, Use of Ion-exchange resins and Electrophoretic decalcification and treatment of hard tissues which are not calcified

#### **Unit- 4**

1 Procedure followed by Dehydration, Clearing, Infiltration and routine timing schedule for manual or automatic tissue processing.

2 Components & principles of various types of automatic tissue

4. Definition

Various types of embedding media, Section Cutting

Introduction regarding equipment used for sectioning

5 Microtome Knives, Sharpening of Microtome Knives, Honing, Stropping, various types of microtome and their applications

6. Freezing Microtome and various types of Cryostats.

Faults in paraffin section cutting with reason and remedy, spreading the sections and attachment or mounting of sections to glass slides.

#### **Unit-5**

Staining, Impregnation and Mountants

1 Theory of Staining, Classifications of Dyes, Principles of Dye Chemistry

2 Stains and Dyes and their uses

3 Types of Stains, Chemical Staining Action, Mordants and Accentuators, Metachromasia

4 Use of Controls in Staining Procedures

5 Preparation of Stains, solvents, aniline water and buffers etc.

6 Commonly used mountants in histotechnology lab

7 General Staining Procedures for Paraffin Infiltrated and Embedded tissue

8 Nuclear Stains and Cytoplasmic stains

9 Equipment and Procedure for manual Staining and Automatic Staining Technique

10 Mounting of Cover Slips, Labeling and Cataloguing the Slides

Routine Staining Procedures

1 Haematoxylin and Eosin Staining, various types of Haematoxylin

2 Mallory's Phosphotungstic Acid Haematoxylin (PTAH)

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 4</b>
<b>Course</b> <b>Basic Applied Histopathology</b> <b>Practical</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester 2 hours</b>	<b>Course Code</b> <b>BML030A</b>

**COURSE OBJECTIVE-** This subject will examine the practice of basic routine histological techniques including fixation, processing , embedding , sectioning & stining of tissue.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the basic knowledge about instrument used in dissection.
<b>CO 2</b>	To understand the preparation of various fixative used in histopathology Lab.
<b>CO 3</b>	To understand the various methods and chemicals use in decalcification.
<b>CO 4</b>	To understand the processing of tissue by manual and automated processor.
<b>CO 5</b>	To Understand the various techniques of staining and mountanting of stained smear.

#### **Applied Histopathology-I - Practical**

##### **UNIT 1:**

1. Demonstration of instruments used for dissection
2. Use of antiseptics, disinfectants and insecticides in a tissue culture processing laboratory

##### **UNIT 2:**

2. Reception and labeling of histological specimens

##### **UNIT 3:**

#### **4 Preparation of various fixatives**

- 4.1 Helly's fluid
- 4.2 Zenker's fluid
- 4.3 Bouin's fluid
- 4.4 Corney's fluid
- 4.5 10% Neutral formalin
- 4.6 Formal saline
- 4.7 Formal acetic acid
- 4.8 Pereyn's fluid

**UNIT4:**

1. Testing of melting point of paraffin wax and perform embedding of given tissue in paraffin block
2. To process a bone for decalcification
3. To prepare ascending and descending grades of alcohol from absolute alcohol
4. Processing of tissue by manual and automated processor method
5. To demonstrate various part and types of microtome
6. To learn sharpening of microtome knife (Honing and stropping technique), and types of disposable blades in use (High and Low Profile).

**UNIT5:**

1. To perform section cutting (Rough and Fine)
2. To practice attachment of tissue sections to glass slides
3. To learn using tissue floatation bath and drying of sections in oven (60-65C)
4. To perform & practice the Haematoxylin and Eosin staining technique
5. To perform & practice the Mallory's Phospho tungstic Acid Haematoxylin (PTAH)
6. To learn mounting of stained smears.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 4</b>
<b>Course</b> <b>Life Skills - II</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester 2 hours</b>	<b>Course Code</b> <b>BML030A</b>

### Course Objectives

1. Students will be able to interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience.
2. Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
3. Students will be able to reason, model, and draw conclusions or make decisions with mathematical, statistical, and quantitative information.
4. Students will be able to critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
5. Students will be able to use appropriate technology in a given context.

### Course Outcomes (CO):

**At the end of this course students will have:**

- CO1: Demonstrate procedural fluency with real number arithmetic operations and use those operations to represent real-world scenarios and to solve stated problems. Demonstrate number sense, including dimensional analysis and conversions between fractions, decimals, and percentages. Determine when approximations are appropriate and when exact calculations are necessary.
- CO2: Solve linear equations, graph and interpret linear models, and read and apply formulas. Demonstrate a basic understanding of displays of univariate data such as bar graphs, histograms, dotplots, and circle graphs, including appropriate labeling.
- CO3: Take charge of their own learning through good classroom habits, time management, and persistence. Participate in the classroom community through written and oral communication.

## **Syllabus: Theory**

- UNIT 1      Number System:**
- a. Number system
  - b. Power cycle
  - c. Remainder cycle
  - d. Factors, Multiples
  - e. HCF and LCM
- UNIT 2      Data Arrangements and Blood Relations:**
- a. Linear Arrangement
  - b. Circular Arrangement
  - c. Multi-dimensional Arrangement
  - d. Blood Relations
- UNIT 3      Time and Work:**
- a. Work with different efficiencies
  - b. Pipes and cisterns
  - c. Work equivalence
  - d. Division of wages
- UNIT 4      Coding & Decoding, Series, Analogy, Odd Man Out and Visual Reasoning:**
- a. Coding and Decoding
  - b. Series, Analogy
  - d. Odd Man Out, e. Visual Reasoning
- UNIT 5      Percentages, Simple Interest and Compound Interest:**
- a. Percentages as Fractions and Decimals
  - b. Percentage Increase / Decrease
  - c. Simple Interest
  - d. Compound Interest
  - e. Relation Between Simple and Compound Interest
- UNIT 6      Permutation, Combination and Probability:**
- a. Fundamental Counting Principle
  - b. Permutation and Combination
  - c. Computation of Permutation
  - d. Circular Permutations
  - e. Computation of Combination
  - f. Probability
- UNIT 7      Data Interpretation and Data Sufficiency:**
- a. Data Interpretation – Tables
  - b. Data Interpretation - Pie Chart
  - c. Data Interpretation - Bar Graph
  - d. Data Sufficiency
- UNIT 8      Profit and Loss, Partnerships and Averages:**
- a. Basic terminologies in profit and loss
  - b. Partnership
  - c. Averages
  - d. Weighted average
  - e. Mixtures and allegations

## Methodology for Evaluation

1. Internal Assessment
  - a) Class/ Home Assignments (Minimum One from each Unit) : 30 Marks
  - b) In Semester Tests (Minimum two) : 30 Marks
2. Term End :40 Marks

\*Note: Minimum one class assignment shall be given in each turn in the Lab which will be attempted by the students in the class itself and evaluated by the end of the day. Balance work shall be completed at home and submitted at the beginning of the next turn in Lab.

## Suggested Reading:

1. Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;
2. The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;
3. How to Ace the Brainteaser Interview, by John Kador, Mc Graw Hill Publishers.
4. Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
5. Quicker Maths, by M tyra& K Kundan, BSC Publishing Co. Pvt. Ltd., Delhi;
6. Owl Purdue University online teaching resources

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b><u>Program</u></b> <b><u>B.Sc. Medical Laboratory Technology (BMLT)</u></b>			<b>Semester: 5</b>
<b>Course</b> <b>Applied Clinical</b> <b>Biochemistry-I</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester 3</b> <b>credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>BML031A</b>

**COURSE OBJECTIVE-** The students will learn how to analyze various clinical patients' samples, for estimation of different components which are the cause of the disease or are the diagnostic/prognostic markers. This subject gives information about various clinically important enzymes & automation techniques.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand about Blood sugar estimation and G.T.T
<b>CO 2</b>	To understand about serum urea and cholesterol
<b>CO 3</b>	To understand about Serum bilirubin and Creatinine estimation
<b>CO 4</b>	To understand about Serum calcium and Uric acid estimation
<b>CO 5</b>	To understand about Electrolytes and trace elements, radioisotopes and radioactivity and Quality control in clinical bio-chemistry

### **UNIT1:-**

1. Blood sugar estimation and G.T.T
  - 1.1.Principle and methods of estimation
  - 1.2.Normal and abnormal values
  - 1.3.True and apparent sugar
  - 1.4.Metabolism of sugar
  - 1.5.Precautionary measures
  - 1.6.Renal threshold
  - 1.7.Importance and performance of GTT
  - 1.8.Clinical importance of blood sugar and GTT

## **UNIT2:-**

### **1. Serum urea**

- 1.1. Formation and excretion of urea
- 1.2. Principles and procedures of different methods of urea estimation
- 1.3. Normal and abnormal levels
- 1.4. Clinical importance

### **2. Serum cholesterol**

- 2.1. Formation and estimation of cholesterol
- 2.2. Various methods of estimation including principles and procedures
- 2.3. Normal and abnormal values
- 2.4. Clinical importance

## **UNIT3:-**

### **1. Serum bilirubin**

- 1.1. Formation and excretion of bilirubin
- 1.2. Metabolism of bile pigments
- 1.3. Conjugated and unconjugated bilirubin

### **2. Principles and procedures of serum bilirubin estimation**

- 2.1. Normal and abnormal values
- 2.2. Clinical importance

### **3. Creatinine estimation**

- 3.1. Principles and procedures of estimation
- 3.2. Normal and abnormal/ values
- 3.3. Clinical importance

## **UNIT4:-**

### **1. Serum calcium**



- 1.1.Principles and procedures estimation
- 1.2.Normal and abnormal values
- 1.3.Clinical importance
2. Uric acid estimation
  - 2.1.Principles and procedures estimation
  - 2.2.Normal and abnormal values
  - 2.3.Clinical importance

#### **UNIT5:-**

1. Electrolytes and trace elements
  - 1.1. Functions of electrolytes like Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup>. Other essential trace elements like Ca<sup>2+</sup>, Fe<sup>2+</sup> etc. Metabolism of these ions
  - 1.2. Principles and procedures of estimation
  - 1.3. Normal and abnormal values
2. Clinical importance and Application of radioisotopes. Their brief description and use.
  - 2.1.Instruments for detection of Radioactivity
- 3.. Quality control in clinical bio-chemistry

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 5</b>
<b>Course</b> <b>Applied Clinical</b> <b>Biochemistry-I Practical</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester 3 credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>BML032A</b>

**COURSE OBJECTIVE-** The students will be taught about Hazards & safety measures in a clinical biochemistry lab, Estimation of blood Sugar and Laboratory organization, management Principles of and procedures of serum tests.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn

<b>CO 1</b>	To understand the Estimation of blood Sugar and GTT
<b>CO 2</b>	To understand the Serum Urea and plasma Estimation
<b>CO 3</b>	To understand the Estimation of electrolyte and serum cholesterol.
<b>CO 4</b>	To understand the Estimation of Phosphorous and preparation of reagent
<b>CO 5</b>	To understand the Estimation of serum calcium and serum creatinine

### **Applied Clinical Biochemistry-I - Practical**

#### **UNIT 1:-**

1. Estimation of blood Sugar (Folin-Wu method, enzyme methods etc.)
2. Performance of GTT

#### **UNIT 2:-**

1. Serum Urea estimation
2. Plasma and serum protein estimation

#### **UNIT 3:-**

1. Serum cholesterol estimation
2. Estimation of electrolyte level (Na<sup>+</sup>, K<sup>+</sup> and Cl<sup>-</sup> by flame photometer and kit methods)

#### **UNIT 4:-**

1. Preparation all types of reagents
2. Estimation of Serum bilirubin
3. Estimation of Phosphorous

#### **UNIT 5:-**

1. Estimation of Serum calcium
2. Estimation of Serum creatinine
3. Estimation of Serum uric acid

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 5</b>
<b>Course</b> <b>Applied Histopathology-II</b>	<b>Course</b> <b>Description Core</b>	<b>C r e d i t</b> <b>perSemester</b> <b>3 c r e d i t s</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>BML033A</b>

**COURSE OBJECTIVE-** : Students will learn about various staining procedures for demonstration of different substances. The students will learn about special staining procedures, its handling & testing of various histological specimens in addition to cryostat sectioning and electron microscopic procedures

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand about Cryostat sectioning and Special Staining Procedures
<b>CO 2</b>	To understand about carbohydrate, lipids and protein. Bacteria and fungi tissue section. Tissue requiring special treatment
<b>CO 3</b>	To understand Enzyme histochemistry and Vital staining.
<b>CO 4</b>	To understand Neuro-pathological techniques. Museum techniques.
<b>CO 5</b>	To understand Electron Microscope. Micrometry and Morphometry

### **BMLS-504: Applied Histopathology-II**

#### **UNIT 1:-**

1. Cryostat sectioning, its applications in diagnostic histopathology.
2. Special Staining Procedures for detection of
  - 2.1 Connective tissue elements, Trichrome staining, muscle fibers, elastic, reticulin fibers, collagen fibers etc.
  - 2.2 Metachromatic staining such as Toluidine blue on frozen sections
  - 2.3 Principles of metal impregnation techniques.
  - 2.4 Demonstration and identification of minerals and pigments, removal of Pigments/artifacts in tissue sections

## **UNIT 2:-**

1. Demonstration of Proteins & nucleic acids.
2. Demonstration of Carbohydrates, lipids, fat & fat like substances.
3. Demonstration of bacteria and fungi in tissue section.
4. Tissue requiring special treatment i.e. eye ball, bone marrow, and muscle biopsy, under calcified or unclarified bones, whole brain, and whole lungs including other large organs.

## **UNIT 3:-**

1. Enzyme histochemistry: Diagnostic applications and the demonstration of Phosphatases, Dehydrogenases, Oxidases & Peroxidases.
2. Vital staining.

## **UNIT 4:-**

1. Neuro-pathological techniques.
2. Museum techniques.

## **UNIT 5:-**

1. Electron Microscope:
  - 1.1 working principle and its components
  - 1.2 Processing, embedding and ultra-microtomy
2. Micrometry and Morphometry

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Medical Laboratory Technology (BMLT)</u></b>			<b>Semester: 5</b>
<b>Course</b> <b>Applied Histopathology-II</b> <b>Practical</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester 3</b> <b>credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>BML034A</b>

**COURSE OBJECTIVE-** In this section, students will be made aware of terminology used in histo-technology, various instruments and the maintenance and also learn the processing of various samples for histo-pathological investigations.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand cut frozen section and to prepare Schiff reagent and ammonical reagent.
<b>CO 2</b>	To understand the stain a paraffin section for the demonstration of smooth muscle.
<b>CO 3</b>	To understand stain a paraffin section for Mucicarmine, Alcian blue and pearl stain.
<b>CO 4</b>	To understand the presence of bacteria and fungi in paraffin embedded sections using.
<b>CO 5</b>	To understand the stain for nucleic acid DNA and RNA.

### **BMLS-508: Applied Histopathology-II - Practical**

#### **UNIT 1:-**

1. To cut frozen section and stain for Haematoxylin and Eosin, Metachromatic stain  
Toluidine blue- \_o‘ and Oil Red \_O‘ staining for the demonstration of fat
2. To prepare Schiff’s reagent in the lab and do Periodic Acid Schiff’s (PAS) stain on a paraffin section
3. To prepare ammonical silver bath in the laboratory and stain paraffin embedded section for the demonstration of reticulin fibers.

#### **UNIT 2:-**

1. To stain a paraffin section for the demonstration of smooth muscle by Van Gieson’s Stain
2. To perform Masson’s trichrome stain on a paraffin section for the demonstration of collagen fiber, muscle fiber and other cell elements.
3. To stain the paraffin section for the demonstration of the elastic fibers (EVG).
4. To stain Decalcified paraffin embedded section for the presence of calcium salts (Von Kossa’s method).

### **UNIT 3:-**

1. To stain a paraffin section for the following Mucicarmine, Alcian blue.
2. To stain a paraffin section for the demonstration of iron (Perl's stain)

### **UNIT 4:-**

1. To demonstrate the presence of bacteria and fungi in paraffin embedded sections using the following staining procedures:
  - 1.1 Gram's staining
  - 1.2 AFB staining (Ziehl Neilson's staining) for M. tuberculosis and leprae
  - 1.3 Grocott's stain for fungi
  - 1.4 Schmorl's reaction for reducing substances (melanin)

### **UNIT 5:-**

1. To stain for nucleic acid (DNA and RNA)
  - 1.1 Feulgen Staining
  - 1.2 Methyl Green-Pyronin Staining
  - 1.3 Enzymatic methods

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 5</b>
<b>Course</b> <b>Applied Hematology-II</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester 3</b> <b>credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>BML035A</b>

**COURSE OBJECTIVE-** The students will be made aware of the safety precautions in Haematology, basic concepts of Automation, quantitative assay of coagulation factors, Karyotyping etc. and will learn about concepts such as safety precautions, quality assurance, biomedical waste management and automation in haematology. It will also cover bone marrow examination, red cell anomalies, disorder of leucocytes, L.E. cell phenomenon.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand about Safety precautions in Haematology. Automation in Haematology. Bone marrow examination
<b>CO 2</b>	Red cell anomalies and Reticulocyte
<b>CO 3</b>	To understand about Lupus Erythematosus (L.E) cell phenomenon.
<b>CO 4</b>	Factor deficiency, coagulation factors and Screening of inhibitors
<b>CO 5</b>	Karyotyping, Cyto-chemical staining and Biomedical waste management in Haematology laboratory

## **BMLS-502: Applied Haematology-II**

### **UNIT 1:-**

1. Safety precautions in Haematology
2. Basic concepts of automation in Haematology with special reference to:
  - 2.1 Blood cell counter
  - 2.2 Coagulometer
3. Bone marrow examination
  - 3.1 Composition and functions
  - 3.2 Aspiration of bone marrow (Adults and children)
  - 3.3 Processing of aspirated bone marrow (Preparation & staining of smear)
  - 3.4 Brief knowledge about examination of aspirated bone marrow (differential cell counts)





and cellular ratios)

### 3.5 Processing and staining of trephine biopsy specimens

## **UNIT 2:-**

### 1. Red cell anomalies

1.1 Morphological changes such as variation in size shape & staining character.

### 2. Reticulocytes: Definition, different methods to count, Absolute reticulocyte count and IRF (Immature reticulocyte fraction) and significance of reticulocytes.

## **UNIT 3:-**

### 1. Lupus Erythematosus (L.E) cell phenomenon.

1.1 Definition of L.E. cell.

1.2 Demonstration of L.E. cell by various methods.

1.3 Clinical significance.

## **UNIT 4:-**

### 1. Correction studies for Factor deficiency

### 2. Quantitative assay of coagulation factors

2.1 Principle

2.2 Procedure

### 3. Screening of inhibitors

3.1 Inhibitors against coagulation factors

3.2 APLA

## **UNIT 5:-**

### 1. Karyotyping: Chromosomal studies in hematological disorders (PBL and Bone marrow)

11. Cyto-chemical staining: Principles, method and significance

12. Biomedical waste management in Haematology laboratory (Other than Radioactive material)

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester:</b> <b>5</b>
<b>Course</b> <b>Applied Haematology-II</b> <b>Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester 1</b> <b>credits</b>	<b>Hours per</b> <b>Semester 2</b> <b>hours</b>	<b>Course</b> <b>Code</b> <b>BML036A</b>

**COURSE OBJECTIVE-** The students will be made aware of different anemia, Leukemia, chromosomal studies, bleeding disorders and radiation hazards and understand about Safety precautions in Haematology.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand the morphology of Normal and abnormal RBCs and WBCs
<b>CO 2</b>	To understand Calculating INR and determining the ISI of thromboplastin and quantitative factors
<b>CO 3</b>	To understand the Quantification of inhibitors by Bethesda method
<b>CO 4</b>	To understand the Anti-cardiolipin antibodies ACA and ELT
<b>CO 5</b>	To understand the Urea clot solubility test for factor XIII

### **BMLS-506: Applied Haematology-II – Practical**

#### **UNIT 1:-**

1. Review the morphology of Normal and abnormal RBCs
2. Review the morphology of normal and immature WBCs
3. WBCs anomalies

#### **UNIT 2:-**

1. Calculating INR and determining the ISI of thromboplastin
2. Quantitative Factor assays:
  - 2.1 Factor VIII
  - 2.2 Factor IX
  - 2.3 Factor VII
  - 2.4 Factor X
  - 2.5 Factor V

**UNIT 3:-**

1. Quantification of inhibitors (Bethesda method)
2. APLA : Lupus Anticoagulant (LA)

**UNIT 4:-**

1. Anti-cardiolipin antibodies (ACA)
2. Perform Euglobulin clot lysis test (ELT)

**UNIT 5:-**

1. Urea clot solubility test for factor XIII

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 5</b>
<b>Course</b> <b>Blood Banking &amp; Genetics</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester 1</b> <b>credits</b>	<b>Hours per Semester 2</b> <b>hours</b>	<b>Course Code</b> <b>BML037A</b>

**COURSE OBJECTIVE-** Blood banking will make students learn about blood grouping & blood transfusion. The students will learn about the concept of blood grouping, compatibility testing in blood transfusion & screening of donated blood for various infectious diseases. Genetics will make students learn about Fundamentals of Heredity. The students will learn about the concept of inheritance in various genetic diseases.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Introduction to Blood Banking and blood group systems.
<b>CO 2</b>	Blood transfusion, collection and cross matching
<b>CO 3</b>	Complications, precautions and hazards of blood transfusion. Various anticoagulants. Selection of donor and collection of blood from a healthy donor
<b>CO 4</b>	Preparation of various fractions of blood for transfusion and therapeutic purposes such
<b>CO 5</b>	Different tests of blood grouping, screening of blood from different diseases and screening of blood donors.

## **BMLS-702: Blood Banking and Genetics**

### **UNIT1:-**

1. Introduction to Blood Banking
2. History and discovery of various blood group systems
3. ABO blood group system
4. Rh and other major blood group system
5. Sources of error in blood grouping and their elimination.
6. ABO grouping: Forward and reverse grouping. Causes of discrimination between forward and reverse grouping
7. Rh grouping

## **UNIT2:-**

1. Compatibility test in blood transfusion
2. Collection of blood for cross matching from a blood bag
3. Major cross matching
4. Minor cross matching
5. Use of enzymes in blood bank specially Papain

## **UNIT3:-**

1. Complications and hazards of blood transfusion
2. Laboratory investigations of transfusion reactions and mismatched blood transfusion.
3. Precautions while procurement and storage of grouping antisera
4. Various anticoagulants used to collect blood for transfusion purposes
5. Selection of donor and procedure for collection of blood from a healthy donor

## **UNIT4:-**

1. Preparation of various fractions of blood for transfusion and therapeutic purposes such as:
  - 1.1 Packed red cells, washed red cells and FROZEN Red cells
  - 1.2 Platelet Rich Plasma (PRP), Platelet concentrate and frozen platelets.
  - 1.3 Fresh plasma (FP), Fresh Frozen Plasma (FFP) and cryoprecipitate
  - 1.4 Brief introduction of blood substitute/artificial blood
  - 1.5 Haemopheresis: pertaining to Leucocytes, platelets and plasma.

## **UNIT5:-**

1. Direct and Indirect Coomb's test
2. Rh grouping and determination of Du in case of Rh negative
3. Screening of blood for Malaria, Microfilaria, HBs Ag, Syphilis and HIV
4. Acid Citrate Dextrose (ACD) and Citrate Phosphate Dextrose (CPD) Solutions
5. Screening of blood donor: physical examination including medical history of the donor

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 5</b>
<b>Course</b> <b>Immunology &amp; Bacterial</b> <b>Serology (T)</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>(BML038A)</b>

**COURSE OBJECTIVE-** : This section will cover the basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases. It will also cover medically important fungi, infections caused by them and their laboratory diagnosis.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	History and introduction to immunology and Medical Microbiology:
<b>CO 2</b>	Various serological tests
<b>CO 3</b>	Complement system and Immune response
<b>CO 4</b>	Understand about Hypersensitivity
<b>CO 5</b>	Understand about Vaccines

## **BMLS-501: Immunology and Bacterial Serology**

### **UNIT 1:-**

1. History and introduction to immunology
2. Principle, procedure and applications of under mentioned in Medical Microbiology:
  - 2.1 Complement fixation test
  - 2.2 Immuno- fluorescence
  - 2.3 ELISA
  - 2.4 SDS-PAGE
  - 2.5 Western blotting

### **UNIT 2:-**

1. Principle, procedure and interpretation of various serological tests:
  - 1.1 Widal
  - 1.2 VDRL

1.3 ASO

1.4 CRP

1.5 Brucella tube agglutination

1.6 Rose-Waaler

### **UNIT3:-**

1. Complement system:

1.1 Definition

1.2 Basic concepts about its components

1.3 Complement activation pathways

2. Immune response:

2.1 Introduction

2.2 Basic concepts of Humoral and Cellular immune responses

### **UNIT4:-**

1. Hypersensitivity:

1.1 Definition

1.2 Types of hypersensitivity reactions

1.3 Basic concepts of autoimmunity and brief knowledge about autoimmune diseases

1.4 Automation in diagnostic serology

### **UNIT5:-**

1. Vaccines:

1.1 Definition

1.2 Types

1.3 Vaccination schedule

1.4 Brief knowledge about ‘Extended programme of immunization’ (EPI) in India

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 5</b>
<b>Course</b> <b>Immunology &amp; Bacterial</b> <b>Serology Practical</b>	<b>Course</b> <b>Description Core</b>	<b>Credit per</b> <b>Semester 3</b> <b>credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>(BML039A)</b>

**COURSE OBJECTIVE-** The student will be able to identify antibodies. These are proteins made by a type of white blood cell in response to a foreign substance (antigen) in the body. Investigating problems with the immune system.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand Collection of blood sample and to perform haemolysin titration.
<b>CO 2</b>	To understand the Preparation of Phosphate buffers and Standardization of cell concentration by Spectrophotometer .
<b>CO 3</b>	To understand how to Perform the different Serological tests .
<b>CO 4</b>	To understand the Latex agglutination and Rheumatoid factor .
<b>CO 5</b>	To understand the antigen/antibody determination by Immuno fluorescence.

### **BMLS-505: Immunology and Bacterial Serology – Practical**

#### **UNIT 1:-**

1. Collection of blood sample by vein puncture, separation and preservation of serum
2. Performing Haemolysin titration for Rose-Waaler test

#### **UNIT 2:-**

1. Preparation of Phosphate buffers, Verinol buffer, ASO buffer, Richardson's buffer, Buffers of different pH and Molarity, Tris buffer, Standardization of cell concentration by Spectrophotometer

#### **UNIT 3:-**

1. Performance of Serological tests i.e.
  - 1.1 Widal,
  - 1.2 Brucella Tube Agglutination,
  - 1.3 VDRL (including Antigen Preparation),
  - 1.4 ASO (Anti-Streptolysin \_O')



**UNIT 4:-**

- 1.C-Reactive Protein (Latex agglutination)
- 2.Rheumatoid factor (RF) Latex agglutination
- 3.Rose Waaler test,

**UNIT 5:-**

1. Demonstration of antigen/antibody determination by Immuno fluorescence (IF),  
Immuno-diffusion, precipitation in Agarose gel (Ouchterlony), CCIEP, ELISA, SDS -  
PAGE and Western blotting

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester:</b> <b>6</b>
<b>Course</b> <b>Immunology &amp; Molecular</b> <b>Biology</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credits per</b> <b>semester 3</b> <b>credits</b>	<b>Hours per</b> <b>Semester 3</b> <b>hours</b>	<b>Course</b> <b>Code</b> <b>(BML047A)</b>

**COURSE OBJECTIVE- :** This section will cover the basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases. It will also cover medically important fungi, infections caused by them and their laboratory diagnosis.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	History and introduction to immunology and Molecular biology
<b>CO 2</b>	Various immunology and molecular biology tests
<b>CO 3</b>	Complement system and Immune response
<b>CO 4</b>	Understand about Hypersensitivity and Autoimmunity
<b>CO 5</b>	Understand about molecular biology

### **BMLS-501: Immunology and Molecular Biology**

#### **UNIT 1:-**

1. Introduction to immunology
2. Cell of the immune system

#### **UNIT 2:-**

1. Types and mechanism of immune response
2. Lymphoid organs of the immune system

#### **UNIT3:-**

1. MHC I & II
2. HLA Typing and Crossmatching
3. Transplant immunology
4. Hypersensitivity: Definition, Types and Mechanisms

#### **UNIT4:-**

1. Autoimmunity
2. Immune tolerance basic concepts
3. Introduction to molecular biology
4. Relationship of molecular biology with other science

## **UNIT5:-**

1. Molecular biology techniques: Principles, Reagent used, procedure and application in medical diagnostics.
  2. Polymerase chain reaction and it's advanced version.
  3. Gel electrophoresis
  4. Western blotting
  5. Chemical composition of DNA
- 
- 5.1 DNA Replication
  - 5.2 DNA Damage and Repair
  - 5.3 Regulation of prokaryotic and Eukaryotic Gene expression
  - 5.4 Cell cycle

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 6</b>
<b>Course</b> <b>Immunology &amp; Molecular</b> <b>Biology Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1credits</b>	<b>Hours per</b> <b>Semester 2</b> <b>hours</b>	<b>Course</b> <b>Code</b> <b>(BML048A)</b>

**COURSE OBJECTIVE-** The student will be able to identify antibodies. These are proteins made by a type of white blood cell in response to a foreign substance (antigen) in the body. Investigating problems with the immune system.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To Understand immunology and molecular biology test
<b>CO 2</b>	To understand how to separate the immune system cell.
<b>CO 3</b>	To understand the antigen/antibody determination by western blotting
<b>CO 4</b>	To understand the test of polymerase chain reaction, HLA typing and western blotting
<b>CO 5</b>	To understand the estimation and isolation of DNA and RNA

#### **UNIT 1:-**

1. Peripheral blood mononuclear cell(PBMC) isolation by gradient centrifugation
2. T and B cell separation
3. Immunofluorescence

#### **UNIT 2:-**

1. Anti-Nuclear Antibody (ANA)
2. Anti-Neutrophil Cytoplasmic Antibody (ANCA)
3. AIDS Immunology and Pathogenesis (AIP)

#### **UNIT 3:-**

1. Thyroid Microsomal Antigen (TMA)-Agglutination reactions
2. Electrophoresis
3. Gel diffusion

#### **UNIT 4:-**

1. Nephelometry
2. HLA: Typing Serology & Cross match

## Molecular typing

3. Nitro blue Tetrazolium Chloride Test (NBT)
4. FACS for CD4 and CD8
5. ELISA for lab, diagnosis for AIDS

## UNIT 5:-

1. Polymerase Chain Reaction and it's advanced versions
2. Gel electrophoresis
3. Western blotting
4. Isolation of DNA and RNA
5. Estimation of DNA and RNA

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 6</b>
<b>Course</b> <b>Applied Clinical</b> <b>Biochemistry-I</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester 3</b> <b>credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>BML040A</b>

**COURSE OBJECTIVE-** The students will learn how to analyze various clinical patients' samples, for estimation of different components which are the cause of the disease or are the diagnostic/prognostic markers. This subject gives information about various clinically important enzymes & automation techniques.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	To understand about automation and method of estimation in clinic biochemistry
<b>CO 2</b>	To understand about gastric and renal functions
<b>CO 3</b>	To understand about liver function test and thyroid hormone test
<b>CO 4</b>	To understand about enzymes and its function
<b>CO 5</b>	To understand about renal calculi cerebrospinal fluid and rapid techniques in clinical biochemistry

### Unit1.

- 1 Automation in clinical biochemistry
- 2 Method of estimation and assessment for:
  - 2.1 Glucose tolerance test
  - 2.2 Insulin tolerance test
  - 2.3 Xylose excretion test.

### UNIT-2

1. Gastric analysis.
2. Clearance test for renal function.

### UNIT3

1. Qualitative test for:
  - 1.1 Urobilinogen
  - 1.2 Barbiturates
  - 1.3 T3, T4 and TSH
  - 1.4 Ketosteroid

### UNIT-4

1. Enzymes:
  - 1.1 Principles
  - 1.2 Clinical significance
2. Procedures for estimation

- 2.1 Acid phosphatase
- 2.2 Alkaline phosphatase
- 2.3 Lactate dehydrogenase aspartate transaminase
- 2.4 Alanine transaminase
- 2.5 Creatine phosphokinase

## **UNIT-5**

- 1. Qualitative analysis of Renal calculi.
- 2. Chemical examination of Cerebrospinal fluid.
- 3. Brief knowledge about rapid techniques in clinical biochemistry

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester:</b> <b>6</b>
<b>Course</b> <b>Applied Clinical</b> <b>Biochemistry-I Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester 1</b> <b>credits</b>	<b>Hours per</b> <b>Semester 2</b> <b>hours</b>	<b>Course</b> <b>Code</b> <b>BML041A</b>

### **Applied Clinical Biochemistry-I - Practical**

**COURSE OBJECTIVE-** The students will be taught about Hazards & safety measures in a clinical biochemistry lab, Estimation of blood Sugar and Laboratory organization, management Principles of and procedures of serum tests.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn

<b>CO 1</b>	To understand the Estimation of blood Sugar and GTT
<b>CO 2</b>	To understand the Estimation of uric acid in urine
<b>CO 3</b>	To understand the Estimation Serum lactate dehydrogenase
<b>CO 4</b>	To understand the Estimation of alkaline phosphatase
<b>CO 5</b>	To understand the Estimation of creatinine clearance

#### **Unit 1**

1. Estimation of Glucose tolerance test (GTT).
2. Estimation of Insulin tolerance test (ITT).

#### **Unit 2**

3. Determination of Uric acid in Urine.
4. Determination of Creatinine clearance.
5. Determination of Urea clearance.

#### **Unit 3**

6. Determination of Serum acid phosphatase.
7. Determination of Serum Alkaline phosphatase.

#### **Unit 4**

8. Determination of Serum Lactate dehydrogenase.

#### **Unit 5**

9. Determination of T3, T4 and TSH



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b><u>B.Sc. Medical Laboratory Technology (BMLT)</u></b>			<b>Semester: 6</b>
<b>Course</b> <b>Research Methodology</b> <b>and Biostatistics</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester 3</b> <b>credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>(BML042A)</b>

### Research Methodology and Biostatistics

**COURSE OBJECTIVE:-** The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings. The students will also be made aware of the need of biostatistics and understanding of data, sampling methods, in addition to being given information about the relation between data and variables.

Research Methodology:

Course Outcome:-

CO-1:- To understand the research method and research problem.
CO-2:- To understand the types of data and Data collection methods.
CO-3:- To understand the Basic Concepts of Bio-statistics and Understanding of data in bio-statistics
CO-4:- To understand the Relation between data & variables and Understanding of statistical analysis.
CO-5:- To understand the Derivation of medical terms and Data entry and management

### UNIT1:

1. Introduction to research methods
2. Identifying research problem
3. Ethical issues in research
4. Research design

### UNIT2:

1. Types of Data
2. Research tools and Data collection methods
3. Sampling methods
4. Developing a research propos

### UNIT3:

1. Basic Concepts of Biostatistics
2. Need of biostatistics
3. What is biostatistics: beyond definition

#### 4. Understanding of data in biostatistics

#### 5. How & where to get relevant data

#### **UNIT4:**

- 1.. Relation between data & variables
2. Type of variables: defining data set
3. Collection of relevant data: sampling methods
4. Construction of study: population, sample, normality and its beyond (not design of study, perhaps)
5. Summarizing data on the pretext of underlined study
6. Understanding of statistical analysis (not methods)

#### **UNIT5:**

1. Derivation of medical terms.
2. Conventions for combined morphemes and the formation of plurals.
3. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
4. Interpret medical orders/reports.
5. Data entry and management on electronic health record system.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 6</b>
<b>Course</b> <b>Cytology and</b> <b>Cytotechniques</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester 3</b> <b>credits</b>	<b>Hours per</b> <b>Semester 3</b> <b>hours</b>	<b>Course Code</b> <b>(BML043A)</b>

**COURSE OBJECTIVE:-** The students will learn about various staining procedures for demonstration of different substances & various cytological investigations. This will include special staining procedures & handling & testing of various cytological specimens.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn

<b>CO 1</b>	To understand the cryostat and cytochemistry
<b>CO 2</b>	To understand the vital staining and Aspiration cytology
<b>CO 3</b>	To understand the Role of cytotechnologist and Fluid Cytology
<b>CO 4</b>	To understand the Body Fluids Pleural, Pericardial, Ascitic
<b>CO 5</b>	To understand the Automation in cytology

## UNIT1

1. Cryostat sectioning, its applications in diagnostic cytopathology
2. Enzyme Cytochemistry:
  - 2.1 Diagnostic applications
  - 2.2 Demonstration of Phosphatases, Dehydrogenases, Oxidases & Peroxidases

## UNIT2

1. Vital staining for Sex Chromatin
2. Aspiration cytology
3. Principle

## UNIT3

1. Indications & utility of the technique with special emphasis on role of cytotechnologist in FNAC clinics
2. Exfoliative cytology (Papanicolaou technique for the staining of cervical smears)
3. Cervical cytology
4. Fluid Cytology

#### **UNIT 4**

- 1 Urine
- 2 CSF
- 3 Body Fluids (Pleural, Pericardial, Ascitic)

#### **UNIT 5**

1. Automation in cytology
2. Liquid based cytology: Principles and preparation, Cytocentrifuge, molecular cytology, Cell Block and Immune-cytochemistry

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 6</b>
<b>Course</b> <b>Cytology and</b> <b>Cytotechniques practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1credits</b>	<b>Hours per</b> <b>Semester 2hours</b>	<b>Course Code</b> <b>(BML044A)</b>

**COURSE OBJECTIVE:-** The students will learn about various staining procedures for demonstration of different substances & various cytological investigations. This will include special staining procedures & handling & testing of various cytological specimens.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn

<b>CO 1</b>	To understand the cryostat and cytochemistry
<b>CO 2</b>	To understand the vital staining and Aspiration cytology
<b>CO 3</b>	To understand the Role of cytotechnologist and Fluid Cytology
<b>CO 4</b>	To understand the Body Fluids Pleural, Pericardial, Ascitic
<b>CO 5</b>	To understand the Automation in cytology

#### Cytopathology – Practical

1. To perform Papnicolaou's stain on cervical smear
2. To perform Guard's staining for demonstration sex chromatin (Barr bodies on a buccal smear)
3. To perform Shorr's staining for Hormonal assessment
4. To cut frozen sections of Gynaec tissue
5. . To perform CSF sample and body fluids by cytospin
6. Should know the various stains used in Cytology lab:l
7. May Grunwald Giemsa, H&E,

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 6</b>
<b>Course</b> <b>Medical Parasitology &amp;</b> <b>Virology</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester 3</b> <b>credits</b>	<b>Hours per</b> <b>Semester 3 hours</b>	<b>Course Code</b> <b>(BML045A)</b>

**COURSE OBJECTIVE:-**The student will be taught about introduction, general characteristics, life cycle and laboratory diagnosis of various Medically important Viruses and medically important parasites.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn

CO1: To understand general characteristics, life cycle and laboratory diagnosis of various.
CO2: To understand the Processing of samples for viral culture and various staining for virus.
CO3: To understand general characteristics, life cycle and laboratory diagnosis of parasites.
CO4: To understand the Processing of samples for Helminthology/ Helminthic parasites
CO5: To understand Examination of blood film for Malarial parasite and Microfilariae and preservation of parasitological sample.

#### **UNIT1:-**

1. Introduction to medical virology
2. Introduction to medically important viruses
3. Structure and Classification of viruses.
4. Multiplication of viruses

#### **UNIT2:-**

5. Collection, transportation and storage of sample for viral diagnosis
6. Staining techniques used in Virology
7. Processing of samples for viral culture (Egg inoculation and tissue culture)
8. Rapid diagnosis of viral infections with special reference to HIV, HBV and HCV

### **UNIT3:-**

1. Introduction to Medical Parasitology with respect to terms used in Parasitology.
2. Protozoology/ Protozoal parasites:
  - 2.1 General characteristics of protozoa.
  - 2.2 Geographical distribution, Habitat, Morphology, life cycle, Mode of infection and laboratory diagnosis of Entamoeba sp.
  - 2.3 Geographical distribution, Habitat, Morphology, life cycle, Mode of infection and laboratory diagnosis of Intestinal and vaginal flagellates Intestinal and vaginal flagellates i.e. Giardia, Trichomonas sp.

### **UNIT 4:-**

1. Helminthology/ Helminthic parasites:

General characteristics of Cestodes, Trematodes and Nematodes
- 2 Geographical distribution, Habitat, Morphology, life cycle, Mode of infection and laboratory diagnosis of
  - 2.1 Taenia solium and saginata
  - 2.2 Echinococcus granulosus
  - 2.3 Hymenolepis nana
  - 2.4 Enterobius vermicularis
3. Diagnostic procedures:
  - 3.1 Examination of Stool for parasites
  - 3.2 For intestinal protozoal infections
  - 3.3 General rules for microscopic examination of stool samples 3.4 Collection of stool samples

### **UNIT 5:-**

1. Examination of blood film for Malarial parasite and Microfilariae 2. Collection, Transport, processing and preservation of samples for routine parasitological investigations
3. Morphology, life cycle and lab-diagnosis of Giardia and Entamoeba
4. Morphology, life cycle and lab-diagnosis of Roundworms and Hookworms
5. Morphology, life cycle and lab-diagnosis of T. solium and T. saginata 10. Morphology, life cycle and lab-diagnosis of Malarial parasite with special reference to P. vivax and P. falciparum
6. Concentration techniques for demonstration of Ova and Cysts (Principles and applications)

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>B.Sc. Medical Laboratory Technology (BMLT)</b>			<b>Semester: 6</b>
<b>Course</b> <b>Medical Parasitology &amp;</b> <b>Virology practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1credits</b>	<b>Hours per</b> <b>Semester 2 hours</b>	<b>Course Code</b> <b>(BML046A)</b>

**COURSE OBJECTIVE:-**The student will be taught about introduction, general characteristics, life cycle and laboratory diagnosis of various Medically important Viruses and medically important parasites.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn

CO1: To understand general characteristics, life cycle and laboratory diagnosis of various.
CO2: To understand the Processing of samples for viral culture and various staining for virus.
CO3: To understand general characteristics, life cycle and laboratory diagnosis of parasites.
CO4: To understand the Processing of samples for Helminthology/ Helminthic parasites
CO5: To understand Examination of blood film for Malarial parasite and Microfilariae and preservation of parasitological sample.

- 1.To perform KOH preparation, Gram stain, Potassium Hydroxide - Calcofluor White method, India Ink preparation, Modified Kinyoun Acid Fast Stain for Nocardia, LCB preparation.
- 2.To demonstrate structure of viruses and their multiplication from charts etc.
3. To perform Giemsa stain, Seller's stain, immunofluorescent staining procedures for diagnosis of viral infections
- 4.. Demonstration of fertilized hen egg
5. Demonstration of various inoculation routes in fertilized hen egg
- 6.Routine stool examination for detection of intestinal parasites with concentration methods:
  - 6.1 Saline preparation
  - 6.2 Iodine preparation
  - 6.3 Floatation method
  - 6.4 Centrifugation method
  - 6.5 Formal ether method
  - 6.6 Zinc sulphate method



# **JECRC UNIVERSITY**

**School of Allied Health Sciences**

**Department of Physiotherapy**

**Bachelor In Physiotherapy**

**Course Duration: - 4 years + 6 months compulsory rotatory internship**



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Dean & Professor  
School of Allied Health Sciences  
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**PROGRAMME EDUCATIONAL OBJECTIVES (PEO'S)**

- **PEO 1:** Demonstrate knowledge of the theoretical basis of physiotherapy.
- **PEO 2:** Demonstrate clinical competency in evaluation, treatment planning and implementation.
- **PEO 3:** Integrate knowledge of basic sciences and physiotherapy in order to modify treatment approaches that reflect the breadth and scope of physiotherapy practice.
- **PEO 4:** Integrate the use of basic principles of research in critical analysis of concepts and findings generated by self and others.
- **PEO 5:** Actively recognize the rights and dignity of individuals in planning and administering programs of care.
- **PEO 6:** Identify with and contribute to the aims and ideals of the profession.
- **PEO 7:** Function as competent physical therapists in any health care setting.
- **PEO 8:** Demonstrate command of knowledge which is necessary to function as an independent problem solver and learner in the practice environment.
- **PEO 9:** Practice in an ethical and legal manner.

## **PROGRAMME OUTCOMES (POs) POs and its Attributes: Physiotherapy Graduates will be able to-**

- **PO 1:** System Of Health Care: Recognize the role of Physiotherapy in the context of health need of the community and National priorities in the health sectors. Understanding the rules, responsibility and expertise of all health professionals and how they work as a team member to delivered health care with their expertise and ability to communicate effectively with them.
- **PO 2:** Fundamental Knowledge: Basic knowledge comprises Human Anatomy, Physiology, pathology, Pharmacology, Medicine, Surgical Conditions and their Physiotherapeutic management. Students will be able to know about the physiotherapy concepts and skills related to basic medical knowledge, therapeutic modalities, electrotherapy and special techniques and executes particular task and understanding the factor that might disturb normal structure and function with proper rehabilitation how to overcome from underlying problem.
- **PO 3:** Assessment: A holistic approach of patient assessment through various learning process with physical therapy domain from impairment to disability and categorized to store towards normal ADL. The student able to learn Physiotherapy assessment, treatment, plan and its outcome for appropriate tailored program in effective care and rehabilitation.
- **PO 4:** Critical Thinking: Indentify, define and deal with problems of professional practice through logical, analytical and critical thinking. Acquire the necessary knowledge and skills to help them practice efficiently and accurately. Apply the methods of evaluation and differential diagnosis in Physiotherapy and develop the appropriate rehabilitation program for patients. Student learns in analyzing evaluating information and bridging the gap from theoretical knowledge to clinical practice by critical reasoning and problem solving in physiotherapy practice.
- **PO 5:** Manual Approaches: Physical therapy a non invasive approach an idea lies behind manual therapy by including articular, myomanual, and neural, sensorimotor, gross skill development and along with respiratory exercise to be restoring their normal functioning.
- **PO 6:** Physiotherapy and Society: Applying the medical knowledge with contextual frame work to assess societal, health, safety legal and cultural issues and consequent responsibilities relevant to the professional physical therapist.
- **PO 7:** Individual And Team Work: Students will be able to work with the medical team in a creative and flexible manner and show responsibility, commitment and leadership in various treatment approaches.
- **PO 8:** Professional Ethics: Physical therapy encompasses broad ethical principle and commit to professional ethics providing sound platform to maintain dignity and accountability without medical negligence. Students will be able to apply ethical principles and commit to professional ethics and responsibilities and norms of physiotherapy practice.
- **PO 9:** Communication Skills, Indian culture, Environment studies and basics and

advance computer knowledge: Apply the communication and collaboration skills, values, ethics and attitudes that will enable them to effectively deal with patients, families and medical team.



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- **PO 10: Research Possesses:** Studies by incorporate from practice based evidence to evidence based practice. Research strategies and techniques that develop their problem oriented learning, evidence based problem solving and decision making skills in the field of Physiotherapy. Understand the need of research in formulation of new approach with rational the evidence based practice to provide sound platform to meet high standard of care and rehabilitation.
- **PO 11: Management & Finance:** Through an understanding of organizational governance, the ability to be an active participant in professional organization where one can use KSA to manage projects and in multidisciplinary environment by using various resources and infrastructure from government NGO.
- **PO 12: Life Long Learning:** An appreciation of responsibility to maintain standards of physiotherapy practice gives life learning process enables every individual to address problem solving and judgement in efficient manner.

### **PROGRAM SPECIFIC OUTCOMES (PSOS)**

**PSO 1:** Develop the ability to collect history, perform relevant clinical assessment and frame appropriate electrotherapeutic and exercise therapy management for the patients

**PSO 2:** Demonstrate clinical decision making ability and provide appropriate patient care.

**PSO 3:** Able to counsel the patients, family, colleagues and students regarding all necessary aspects of physiotherapy treatment protocol.

**PSO 4:** Promote health education and improved quality of life through socially accepted and ethical practice of the profession.

**PSO 5:** Work effectively in various inter professional collaborative settings like hospitals, Rehabilitation Centers, Special Schools, Health and Fitness Centers, Geriatric Centers, Ergonomic Consultant in different Sectors, such as corporate, Private Consultation, Home Care Services, Industrial Sectors, Sports Injuries management.

**JECRC University School of Allied Health Sciences**

**Bachelor In Physiotherapy Scheme**

Se me ste r	Cou rse Cod e	Course	Lect ure Hour s	Tutor ials Hour s	Practi cal Hours	Tota l Hour s	Lectu re Credi ts	Tutor ial Credi ts	Practi cal Cred its	Tota l Cred its	Cours e Categ ory
1	BPY 001 A	Human Anatomy-1 Theory	3	0	0	3	3	0	0	3	Core
1	BPY 002 A	Human Anatomy-1 Practical	0	0	2	2	0	0	1	1	Core
1	BPY 003 A	Human Physiology-1 Theory	3	0	0	3	3	0	0	3	Core
1	BPY 004 A	Human Physiology-1 Practical	0	0	2	2	0	0	1	1	Core
1	BPY 005 A	Biochemistry-1	3	0	0	3	3	0	0	3	Core
1	BPY 006 A	Fundamentals of Computer- Theory	2	0	0	2	2	0	0	2	Found ation
1	BPY 007 A	Fundamentals of Computer- Practical	0	0	2	2	0	0	1	1	Found ation
1	DCH 001 A	EVS	3	1	0	4	3	1	0	4	Found ation
1	DEN 001 A	Communication Skills	2	0	0	2	2	0	0	2	Found ation
1	DEN 001 B	Communication Skills - Practical	0	0	2	2	0	0	1	1	Found ation
1	DIN 001 A	Cultural Education- I	2	0	0	2	2	0	0	2	Projec t

  
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		<b>Total</b>	<b>18</b>	<b>0</b>	<b>8</b>	<b>27</b>	<b>18</b>	<b>1</b>	<b>4</b>	<b>23</b>	
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Se me	Cou rse	Course	Lect ure	Tutor ials	Practi cal Hours	Tota l	Lectu re	Tutor ial	Practi cal	Tota l	Cours e
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se r	Cod e		Hour s	Hour s		Hou rs	Credi ts	Credi ts	Credit s	Cred its	Categ ory
2	BPY 008 A	Human Anatomy-2 Theory	3	0	0	3	3	0	0	3	Core
2	BPY 009 A	Human Anatomy-2 Practical	0	0	2	2	0	0	1	1	Core
2	BPY 010 A	Human Physiology-2 Theory	3	0	0	3	3	0	0	3	Core
2	BPY 011 A	Human Physiology-2 Practical	0	0	2	2	0	0	1	1	Core
2	BPY 012 A	Biochemistry-2	3	0	0	3	3	0	0	3	Core
2	BPY 013 A	Basic Principles of Biomechanics	3	0	0	3	3	0	0	3	Core
2	BPY 014 A	General & Clinical Psychology	3	0	0	3	3	0	0	3	Core
2	DEN 002 A	Professional Skills	2	0	0	2	2	0	0	2	Found ation
2	DEN 002 B	Professional Skills - Practical	0	0	2	2	0	0	1	1	Found ation
2	DIN 002 A	Culture Education - 2	2	0	0	2	2	0	0	2	Projec t
		<b>Total</b>	<b>19</b>	<b>0</b>	<b>6</b>	<b>25</b>	<b>19</b>	<b>0</b>	<b>3</b>	<b>22</b>	

Se me ste r	Cou rse Cod e	Course	Lect ure Hour s	Tutor ials Hour s	Practi cal Hours	Tota l Hou rs	Lectu re Credi ts	Tutor ial Credi ts	Practi cal Credit s	Tota l Cred its	Cours e Categ ory
3	BPY 015 A	Biomechanics and kinesiology	3	0	0	3	3	0	0	3	Core

  
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<b>3</b>	<b>BPY 016 A</b>	Exercise Therapy-1	3	0	0	3	3	0	0	3	Core
<b>3</b>	<b>BPY 017 A</b>	Exercise Therapy-1 Practical	0	0	4	4	0	0	2	2	Core

3	BPY 018 A	Electrotherapy-1	3	0	0	3	3	0	0	3	Core
3	BPY 019 A	Electrotherapy-1 Practical	0	0	4	4	0	0	2	2	Core
3	BPY 020 A	Law, Ethics & Professional values	3	0	0	3	3	0	0	3	Core
3	DEN 003 A	Life Skills-1(Personality Development)	1	0	2	3	1	0	1	2	Project
3	DIN 003 A	Value Education and Ethics -1	1	0	0	1	1	0	0	1	Project
		<b>Total</b>	<b>14</b>	<b>0</b>	<b>10</b>	<b>24</b>	<b>14</b>	<b>0</b>	<b>5</b>	<b>19</b>	

Se me ste r	Cou rse Cod e	Course	Lect ure Hour s	Tutor ials Hour s	Practi cal Hours	Tota l Hour s	Lectu re Credi ts	Tutor ial Credi ts	Practi cal Cred its	Tota l Cred its	Cours e Categ ory
4	BPY 021 A	Exercise Therapy-2	3	0	0	3	3	0	0	3	Core
4	BPY 022 A	Exercise Therapy-2 Practical	0	0	4	4	0	0	2	2	Core
4	BPY 023 A	Electrotherapy-2	3	0	0	3	3	0	0	3	Core
4	BPY 024 A	Electrotherapy-2 Practical	0	0	4	4	0	0	2	2	Core
4	BPY 025 A	Pathology	3	0	0	3	3	0	0	3	Core

<b>4</b>	BPY 026 A	Pharmacology	3	0	0	3	3	0	0	3	Core
<b>4</b>	BPY 027 A	Microbiology	3	0	0	3	3	0	0	3	Core

4	DM A01 1A	Life Skills - 2 (Aptitude)	1	0	2	3	1	0	1	2	Found ation
4	DIN 004 A	Value Education and Ethics – 2	1	0	0	1	1	0	0	1	Projec t
		<b>Total</b>	<b>17</b>	<b>0</b>	<b>10</b>	<b>27</b>	<b>17</b>	<b>0</b>	<b>5</b>	<b>22</b>	

Se me ste r	Cou rse Cod e	Course	Lect ure Hour s	Tutor ials Hour s	Practi cal Hours	Tota l Hour s	Lectu re Credi ts	Tutor ial Credi ts	Practi cal Cred its	Tota l Cred its	Cours e Categ ory
5	BPY 028 A	Clinical Orthopaedics and Sports Injury-1	4	0	0	4	4	0	0	4	Core
5	BPY 029 A	Physiotherapy in Orthopaedics and Sports Injury-1	3	0	0	3	3	0	0	3	Core
5	BPY 030 A	Physiotherapy in Orthopaedics and Sports Injury-1 Practical	0	0	2	2	0	0	1	1	Core
5	BPY 031 A	Clinical Neurology and Neurosurgery-1	4	0	0	4	4	0	0	4	Core
5	BPY 032 A	Physiotherapy in Clinical Neurology and Neurosurgery-1	3	0	0	3	3	0	0	3	Core
5	BPY 033 A	Physiotherapy in Clinical Neurology and Neurosurgery-1 Practical	0	0	2	2	0	0	1	1	Core
5	BPY 034 A	Community Physiotherapy	3	0	0	3	3	0	0	3	Core
5	BPY 035 A	Community Physiotherapy Practical	0	0	2	2	0	0	1	1	Core
		<b>Total</b>	<b>17</b>	<b>0</b>	<b>6</b>	<b>23</b>	<b>17</b>	<b>0</b>	<b>3</b>	<b>20</b>	

5		Clinical Training - 24 Hours in a Week for One Month									
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Se me ste r	Cou rse Cod e	Course	Lect ure Hour s	Tutor ials Hour s	Practi cal Hours	Tota l Hour s	Lectu re Credi ts	Tutor ial Credi ts	Practi cal Credit s	Tota l Cred its	Cours e Categ ory
6	BPY 036 A	Orthopaedics and Sports Injury-2	4	0	0	4	4	0	0	4	Core
6	BPY 037 A	Physiotherapy in Orthopaedics and Sports Injury-2	3	0	0	3	3	0	0	3	Core
6	BPY 038 A	Physiotherapy in Orthopaedics and Sports Injury-2 Practical	0	0	2	2	0	0	1	1	Core
6	BPY 039 A	Neurology and Neurosurgery-2	4	0	0	4	4	0	0	4	Core
6	BPY 040 A	Physiotherapy in Neurology and Neurosurgery-2	3	0	0	3	3	0	0	3	Core
6	BPY 041 A	Physiotherapy in Neurology and Neurosurgery-2 Practical	0	0	2	2	0	0	1	1	Core
6	BPY 042 A	General Surgery - 1	4	0	0	4	4	0	0	4	Core
		<b>Total</b>	<b>18</b>	<b>0</b>	<b>4</b>	<b>22</b>	<b>18</b>	<b>0</b>	<b>2</b>	<b>20</b>	
6		Clinical Training - 24 Hours in a Week for One Month									

Se me ste r	Cou rse Cod e	Course	Lect ure Hour s	Tutor ials Hour s	Practi cal Hours	Tota l Hour s	Lectu re Credi ts	Tutor ial Credi ts	Practi cal Credit s	Tota l Cred its	Cours e Categ ory
7	BPY 043 A	General Surgery - 2	4	0	0	4	4	0	0	4	Core
7	BPY 044 A	Physiotherapy in General Surgery	3	0	0	3	3	0	0	3	Core

  
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<b>7</b>	<b>BPY 045 A</b>	<b>Physiotherapy in General Surgery- Practical</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>Core</b>
<b>7</b>	<b>BPY 046 A</b>	<b>General Medicine 1</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>Core</b>

7	BPY 047 A	Community Medicine	3	0	0	3	3	0	0	3	Core
7	BPY 048 A	Biostatistics and Research Methodology	4	0	0	4	4	0	0	4	Core
		<b>Total</b>	<b>18</b>	<b>0</b>	<b>2</b>	<b>20</b>	<b>18</b>	<b>0</b>	<b>1</b>	<b>19</b>	
7		Clinical Training - 24 Hours in a Week for Two Months									

Se me ste r	Cou rse Cod e	Course	Lect ure Hour s	Tutor ials Hour s	Practi cal Hours	Tota l Hour s	Lectu re Credi ts	Tutor ial Credi ts	Practi cal Credi ts	Tota l Credi ts	Cours e Categ ory
8	BPY 049 A	Cardiovascular and Pulmonary conditions	4	0	0	4	4	0	0	4	Core
8	BPY 050 A	Physiotherapy in Cardiovascular and Pulmonary conditions	3	0	0	3	3	0	0	3	Core
8	BPY 051 A	Physiotherapy in Cardiovascular and Pulmonary conditions- Practical	0	0	2	2	0	0	1	1	Core
8	BPY 052 A	General Medicine 2	4	0	0	4	4	0	0	4	Core
8	BPY 053 A	Physiotherapy in Medical Conditions	3	0	0	3	3	0	0	3	Core
8	BPY 054 A	Physiotherapy in Medical Conditions - Practical	0	0	2	2	0	0	1	1	Core
8	BPY 055 A	Research Project and Dissertation	0	0	4	4	0	0	2	2	Core
		<b>Total</b>	<b>14</b>	<b>0</b>	<b>8</b>	<b>22</b>	<b>14</b>	<b>0</b>	<b>4</b>	<b>18</b>	
8		Clinical Training - 24 Hours in a Week for Two Months									



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9		Compulsory 6 Months Rotatory Clinical Internship (8 Hours per Day)									
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<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Human Anatomy-I Theory</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY001A</b>

**COURSE OBJECTIVES** - It is designed to provide students with the working knowledge of the structure of the human body which is essential foundation for their clinical studies. The study of anatomy will include identification of all gross anatomical structures. Particular emphasis will be placed on description of bones, joints, muscles, the brain, cardio pulmonary and nervous system, as these are related to the application of physiotherapy in patients.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Basic Anatomical aspect of Skeleton, Joints, Muscles, Cardiovascular System, Lymphatic System, Nervous System, Skin and Fasciae, Connective Tissue, Ligaments and Raphe and positions of body, axes, planes, common anatomical terminologies.
<b>CO 2</b>	Basic anatomical human development and growth related to histology and embryology

  
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<b>CO 3</b>	Anatomy of bones and soft parts of thorax including cardio vascular system, lungs, respiratory system, diaphragm and respiratory muscles.
<b>CO 4</b>	Anatomy of abdomen including all soft viscera and their functions
<b>CO 5</b>	Anatomical aspect of reproductive system and endocrine glands

## **Unit-1 General Anatomy**

1. Introduction
2. Skeleton
3. Joints
4. Muscles
5. Cardiovascular System
6. Lymphatic System
7. Nervous System
8. Skin and Fasciae
9. Connective Tissue, Ligaments and Raphe

**Unit-2 Histology-** General Histology, study of the basic tissues of the body; Microscope, Cell, Epithelium, Connective Tissue, Cartilage, Bone, Muscular tissue, Nerve Tissue – Transverse section & Longitudinal Section, Circulatory system – large sized artery, medium sized artery, large sized vein, lymphoid tissue, Skin and its appendages.

### **Embryology**

1. Ovum, Spermatozoa, fertilization and formation of the Germ layers and their derivations.
2. Development of skin, Fascia, blood vessels, lymphatic,
3. Development of bones, axial and appendicular skeleton and muscles,
4. Neural tube, brain vessels and spinal cord,
5. Development of brain and brain stem structures

## **Unit-3 Thorax**

1. Cardio – Vascular System Mediastinum: Divisions and contents; Pericardium: Thoracic Wall: position, shape and parts of the heart; conducting System; blood Supply and nerve supply of the heart; names of the blood vessels and their distribution in the body – region wise.
2. Respiratory system - Outline of respiratory passages: Pleura and lungs: position, parts, relations, blood supply and nerve supply; Lungs – emphasize on broncho-pulmonary segments.
3. Diaphragm: Origin, insertion, nerve supply and action, openings in the diaphragm.
4. Intercostal muscles and Accessory muscles of respiration: Origin, insertion, nerve supply and action.

## **Unit-4 Abdomen**

1. Peritoneum: Parietal peritoneum, visceral peritoneum, folds of peritoneum, functions of peritoneum.
2. Large blood vessels of the gut.
3. Location, size, shape, features, blood supply, nerve supply and functions of the following: stomach, liver, spleen, pancreas, kidney, urinary bladder, intestines, gall bladder

## **Unit-5 Reproductive System**

Position, shape, size, functions, blood supply and nerve supply of the male and female reproductive system.

### **Endocrine glands**

Position, shape, size, function, blood supply and nerve supply of the following glands: Hypothalamus and pituitary gland, thyroid glands, parathyroid glands, Adrenal glands, pancreatic islets, ovaries and testes, pineal glands, thymus.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Human Anatomy-I Practical</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>BPY002A</b>

**COURSE OBJECTIVES** - It is designed to provide students with the working knowledge of the structure of the human body which is essential foundation for their clinical studies.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Practical aspect of general anatomy
<b>CO 2</b>	Learn the basics of histology and embryology
<b>CO 3</b>	Various structures of the Respiratory and Circulatory System
<b>CO 4</b>	Different parts of abdomen related to practical approach
<b>CO 5</b>	Various structures of the Reproductive System and Endocrine glands

**Unit-1 General Anatomy-** (Slides, Models and charts)

**Unit-2 General Histology –** (Slides, Models and charts)

**Embryology –** (Models and charts)

  
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**Unit-3    Respiratory and Circulatory System**—(Slides, Models and charts)

**Unit-4 Abdomen-** (Slides, Models and charts)

**Unit-5 Reproductive System and Endocrine glands-**(Slides, Models and charts)

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<b>Course</b> <b>Human Physiology-I Theory</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY003A</b>

**COURSE OBJECTIVES** - The course in Physiology is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Basic structure and function of cell and nerve muscle physiology
<b>CO 2</b>	Function of blood and its content
<b>CO 3</b>	Physiology of respiration and disorders of respiration
<b>CO 4</b>	Function and structure of heart and blood vessels
<b>CO 5</b>	Physiological functions of digestive system

  
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**Unit-1 Cell:**

1. Morphology. Organelles: their structure and functions
2. Transport Mechanisms across the cell membrane
3. Body fluids: Distribution, composition.

**Nerve Muscle Physiology:**

1. Introduction: Resting membrane potential. Action potential – ionic basis and properties.
2. Nerve: Structure and functions of neurons. Classification, Properties and impulse transmission of nerve fibers. Nerve injury – degeneration and regeneration.
3. Neuroglia: Types and functions.
4. Muscle: Classification. Skeletal muscle: Structure. Neuromuscular junction: Structure. Neuromuscular transmission, myasthenia gravis. Excitation- Contraction coupling. Rigor mortis.

## **Unit-2 Blood:**

1. Introduction: Composition and functions of blood.
2. Plasma: Composition, formation, functions. Plasma proteins.
3. Red Blood Corpuscle: count and its variations. Erythropoiesis- stages, factors regulating. Reticulo-endothelial system (in brief) Haemoglobin –structure, function and derivatives Anemia (in detail), types of Jaundice. Blood indices, Packed Cell Volume (PCV), Erythrocyte Sedimentation Rate (ESR).
4. White Blood Corpuscle: Classification. Morphology, functions, count, its variation of each.  
Immunity
5. Platelets: Morphology, functions, count, its variations
6. Hemostatic mechanisms: Blood coagulation–factors, mechanisms. Their disorders. Anticoagulants.
7. Blood Groups: Landsteiner's law. Types, significance, determination, Erythroblastosis foetalis.
8. Blood Transfusion: Cross matching. Indications and complications.
9. Lymph: Composition, formation, circulation and functions.

### **Unit-3 Respiratory System -**

1. Introduction: Physiological anatomy – Pleura, tracheo-bronchial tree, alveolus, respiratory membrane and their nerve supply. Functions of respiratory system. Respiratory muscles.
2. Mechanics of breathing: Intrapleural and Intrapulmonary pressure changes during respiration. Chest expansion. Lung compliance: Normal value, pressure-volume curve, factors affecting compliance and its variations. Surfactant – Composition, production, functions. RDS
3. Spirometry: Lung volumes and capacities. Timed vital capacity and its clinical significance. Maximum ventilation volume. Respiratory minute volume.
4. Dead Space: Types and their definition.
5. Pulmonary Circulation. Ventilation-perfusion ratio and its importance.
6. Transport of respiratory gases: Diffusion across the respiratory membrane. Oxygen transport – Different forms, oxygen-haemoglobin dissociation curve. Factors affecting it. P50, Haldane and Bohr Effect. Carbon dioxide transport: Different forms, chloride shift.
7. Regulation of Respiration: Neural Regulation. Hering-breuer's reflex. Voluntary control. Chemical Regulation.
8. Hypoxia: Effects of hypoxia. Types of hypoxia. Hyperbaric oxygen therapy.
9. Acclimatization Hypercapnoea. Asphyxia. Cyanosis – types and features. Dysbarism
10. Disorders of Respiration: Dyspnoea. Orthopnoea. Hyperpnoea, hyperventilation, apnoea, tachypnoea. periodic breathing – types Artificial respiration
11. Respiratory changes during exercise.

### **Unit-4 Cardiovascular System:**

1. Introduction: Physiological anatomy and nerve supply of the heart and blood vessels. Organization of CVS. Cardiac muscles: Structure. Ionic basis of action potential and pacemaker potential. Properties.
2. Conducting system: Components. Impulse conduction Cardiac Cycle: Definition. Phases of cardiac cycle. Pressure and volume curves. Heart sounds – causes, character. ECG: Definition. Different types of leads. Waves and their causes. P-R interval. Heart block.
3. Cardiac Output: Definition. Normal value. Determinants. Stroke volume and its regulation. Heart rate and its regulation. Their variations
4. Arterial Blood Pressure: Definition. Normal values and its variations. Determinants. Peripheral resistance. Regulation of BP.
5. Arterial pulse.
6. Shock – Definition. Classification–causes and features
7. Regional Circulation: Coronary, Cerebral and Cutaneous circulation.
8. Cardiovascular changes during exercise.

#### **Unit-5 Digestive System -**

1. Introduction: Physiological anatomy and nerve supply of alimentary canal. Enteric nervous system
2. Salivary Secretion: Saliva: Composition. Functions. Regulation. Mastication (in brief)
3. Swallowing: Definition. Different stages. Function.
4. Stomach: Functions. Gastric juice: Gland, composition, function, regulation. Gastrin: Production, function and regulation. Peptic ulcer. Gastric motility. Gastric emptying. Vomiting.
5. Pancreatic Secretion: Composition, production, function. Regulation.
6. Liver: Functions of liver. Bile secretion: Composition, functions and regulation. Gallbladder: Functions.
7. Intestine: Succus entericus: Composition, function and regulation of secretion. Intestinal motility and its function and regulation.
8. Mechanism of Defecation.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Human Physiology-I Practical</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>BPY004A</b>

**COURSE OBJECTIVES:** The course in Physiology is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate procedures to determine hematology findings.
<b>CO 2</b>	Recognize the abnormalities in the hematology findings

  
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**Unit-1 Hematology:**

1. Study of Microscope and its uses
2. Determination of Red Blood Corpuscle count
3. Determination of White Blood Corpuscle count
4. Differential leukocyte count
5. Estimation of hemoglobin
6. Estimation of platelets



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7. Absolute eosinophil count
8. Reticulocyte count
9. Determination of blood groups and Rh typing
10. Determination of bleeding time
11. Determination of clotting time

**Unit-2 Demonstrations only**

1. Determination of Erythrocyte Sedimentation Rate
2. Determination of Packed Cell Volume

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<b>Course</b> <b>Biochemistry-I Theory</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY005A</b>

**COURSE OBJECTIVE-** This course provides the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It covers basic biochemical, cellular, biological and microbiological processes, basic chemical reactions in the prokaryotic and eukaryotic cells, the structure of biological molecules, introduction to the nutrients i.e. carbohydrates, fats, enzymes, nucleic acids and amino acids.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Nutrition and its importance and requirement
<b>CO 2</b>	Functions and biochemistry of carbohydrate
<b>CO 3</b>	Functions and biochemistry of Lipid
<b>CO 4</b>	Functions and biochemistry of amino acid

  
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<b>CO 5</b>	General characteristics of digestion and absorption carbohydrate, lipids and proteins
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**Unit-1**

**Nutrition**

a) Introduction, Importance of nutrition Calorific values,  
Respiratory quotient – Definition, and its significance Energy



requirement of a person - Basal metabolic rate: Definition, Normal values, factor affecting BMR Special dynamic action of food.

b) Physical activities - Energy expenditure for various activities. Calculation of energy requirement of a person

c) Balanced diet

i. Recommended dietary allowances

ii. Role of carbohydrates in diet: Digestible carbohydrates and dietary fibers

iii. Role of lipids in diet

iv. Role of proteins in diet: Quality of proteins - Biological value, net protein utilization, Nutritional aspects of proteins- essential and non- essential amino acids. Nitrogen balance

v. Nutritional disorders.

## **Unit-2**

### **Carbohydrate Chemistry**

a) Definition, general classification with examples, Glycosidic bond

b) Structures, composition, sources, properties and functions of Monosaccharides, Disaccharides, Oligosaccharides and Polysaccharides.

c) Glycosaminoglycan (mucopolysaccharides)

### **Carbohydrate Metabolism**

a) Introduction, Glycolysis – Aerobic, Anaerobic Citric acid cycle, Substrate level phosphorylation.

b) Glycogen metabolism – Glycogenesis, Glycogenolysis, Metabolic disorders glycogen,

c) Gluconeogenesis, Cori cycle

d) Hormonal regulation of glucose, Glycosuria, Diabetes mellitus.

## **Unit-3**

### **Lipid Chemistry**

- a) Definition, general classification
- b) Definition, classification, properties and functions of Fatty acids, Triacylglycerol, Phospholipids, Cholesterol
- c) Essential fatty acids and their importance
- d) Lipoproteins: Definition, classification, properties, Sources and function Ketone bodies



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## **Lipid Metabolism**

- a) Introduction to lipid metabolism, Lipolysis, Oxidation of fatty acids -oxidation of fatty acids,
- b) Lipogenesis - Denovo synthesis of fatty acids, chain elongation, desaturation, triacylglycerol synthesis, fat metabolism in adipose tissues
- c) Ketone body metabolism: Ketone body formation (ketogenesis), utilization (ketolysis), ketosis, Rothera's test.
- d) Cholesterol metabolism: synthesis, degradation, cholesterol transport
- e) Hypercholesterolemia and its effects (atherosclerosis and coronary heart diseases) Hypocholesterolemic agents, Common hyperlipoproteinemia, Fatty liver

## **Unit-4**

### **Amino-acid Chemistry**

- a) Amino acid chemistry: Definition, Classification, Peptide bonds
- b) Peptides: Definition, Biologically important peptides
- c) Protein chemistry: Definition, Classification, Functions of proteins

### **Amino acid and Protein Metabolism**

- a) Catabolism of amino acids - Introduction, transamination, deamination, Fate of ammonia, transport of ammonia, Urea cycle
- b) Specialized products formed from amino acids - from glycine, arginine, methionine, phenylalanine and tyrosine.

## **Unit-5**

**Digestion and Absorption** - General characteristics of di carbohydrates, proteins and lipids. Disorders of digestion and ab

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<b>Course Environmental Sciences- Theory</b>	<b>Course Description Foundation</b>	<b>Credit per Semester 3 credits</b>	<b>Hours per Semester 3 hours</b>	<b>Course Code DCH001</b>	

**COURSE OBJECTIVES** -To impart knowledge of fundamentals of Environmental sciences. To educate the students to make them confident and to develop the skills of Environmental protection and to increase awareness in society through education. (Problem-Solving Skills). To train the student's with appropriate combinations of old and new emerging concepts in new technologies, techniques and latest developments for their current and potential uses in their profession (Successful Career and Entrepreneurship)

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

  
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<b>CO 1</b>	Recognize the history, structure, function, interactions and trends of key socio-environmental systems on personal, organizational and intellectual level regarding our surroundings through different media.
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<b>CO 2</b>	Examine the generation of scientific knowledge and how that knowledge is presented, evaluated, framed and applied for environmental protection by conservation of Natural resources.
<b>CO 3</b>	Articulate a coherent philosophy of the environment and consider ethical bases for responding to environmental questions.
<b>CO 4</b>	Understand the role of conservation of resources and public awareness in prevention of pollution and ultimately for the sustainable development of society.
<b>CO 5</b>	Understand the social responsibility towards protection of environment and society

**Unit-1** The Multidisciplinary Nature of Environmental Studies Definition, scope and importance need for public awareness.

**Unit-2** **Natural Resources Renewable and Non-renewable Resources**

- Natural resources and associated problems.

(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, Case studies. (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

### **Unit-3    Ecosystems**

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem. Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem: (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

#### **Biodiversity and Its Conservation**

- Introduction, definition: genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.

- Biodiversity at global, National and local levels.
- India as a mega-diversity nation. Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

#### **Unit-4 Environmental Pollution**

- Definition
- Causes, effects and control measures of
 

(a) Air pollution	(b) Water pollution	(c) Soil pollution	(d) Marine pollution
(e) Noise pollution	(f) Thermal pollution	(g) Nuclear hazards	
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution. •Pollution case studies.
- Disaster management: Floods, earthquake, cyclone and landslides.

#### **Unit-5 Social Issues and the Environment**

- From unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.      • Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.                                      •Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Public awareness.

#### **Human Population and the Environment**

- Population growth, variation among nations.
- Population explosion—Family Welfare Programme.
- Environment and human health.
- Human rights.
- Value education.

#### **HIV/AIDS.**

- Women and Child Welfare. •Role of Information Technology in environment and human health.



<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Communication Skills-Theory</b>	<b>Course Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN001A</b>

### **COURSE OBJECTIVES**

<b>1</b>	To enhance English language competence in reading, writing, listening and speaking.
<b>2</b>	Switch the approach from teacher-centred to student-centred one.
<b>3</b>	Minimize the Grammar Translation Method of ELT while trying to replace it with direct method.
<b>4</b>	Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centered learning rather than on the teacher-centered learning.
<b>5</b>	To link communication skills with the organizational behavior
<b>6</b>	To inculcate skills that are very much required for employability and adjust in the professional Environment

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

  
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<b>CO 1</b>	Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
<b>CO 2</b>	Ability to analyze the usage of English words in different contexts.
<b>CO 3</b>	An understanding of technical and academic articles' comprehension.
<b>CO 4</b>	The ability to present oneself at multinational levels knowing the type of different

	standards of English
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- Unit-1 Basics of Organizational Communication:** Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
- Unit-2 Writing Skills:** Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
- Unit-3 Composition:** Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
- Unit-4 Vocabulary Building:** Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
- Unit-5 Professional and Technical Communication :** Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

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<b>Course</b> <b>Communication Skills-Practical</b>	<b>Course Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN001A</b>

- Unit-1 Basics of Organizational Communication:** Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time- management, Following Deadlines etc
- Unit-2 Write Dialogue from the different contexts of corporate culture:** Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
- Unit-3 Composition:** Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc

  
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- Unit-4 Vocabulary Building:** Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
- Unit-5 Professional and Technical Communication :** Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Fundamentals of Computer-Theory</b>	<b>Course Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>BPY006A</b>

### **COURSE OBJECTIVES**

The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Introduction to computer and Input output devices
<b>CO 2</b>	Processor and memory and Storage Devices
<b>CO 3</b>	Introduction of windows and Introduction to MS

  
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<b>CO 4</b>	Introduction to Excel and Introduction to power-point
<b>CO-5</b>	Introduction of Operating System, Computer networks and Internet and its Applications

## **Unit-1**

- **Introduction to computer:** Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
- **Input output devices:** Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).

## Unit-2

- **Processor and memory:** The Central Processing Unit (CPU), main memory.
- **Storage Devices:** Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

## Unit-3

- **Introduction of windows:** History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
- **Introduction to MS-Word:** introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.

## Unit-4

- **Introduction to Excel:** introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
- **Introduction to power-point:** introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.

## Unit-5

- **Introduction of Operating System:** introduction, operating system concepts, types of operating system.
- **Computer networks:** introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
- **Internet and its Applications:** definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet. Application of Computers in clinical settings.

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<b>Course</b> <b>Fundamentals of Computer-Practical</b>	<b>Course Description</b> <b>Core Practical</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>BPY007A</b>

### **COURSE OBJECTIVES**

The students will be able to learn all practical aspects of fundamental of computer

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Practical learning to use MS office: MS word, MS PowerPoint, MS Excel
<b>CO 2</b>	Practically To install different software
<b>CO 3</b>	How to do Data entry efficiency

  
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<b>CO 4</b>	Practical related to all theory units of Fundamentals of Computer syllabus
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**Unit 1**-Learning to use MS office: MS word, MS PowerPoint, MS Excel.

**Unit 2**- To install different software

**Unit 3**- Data entry efficiency

**Unit 4-** Practical related to all theory units of Fundamentals of Computer syllabus

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 1</b>
<b>Course</b> <b>Cultural Education- I</b>	<b>Course Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DIN001A</b>

**COURSE OBJECTIVES**

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to acknowledge and appreciate the richness of Indian Culture
<b>CO 2</b>	Ability to represent the culture ethics in real life

**UNIT-I**

**Holy Scriptures-A**

1. Introduction to Vedanta and Bhagavad Gita, Goals of Life – Purusharthas, Introduction

  
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to different Dhram Granthas (Various religious scriptures from Hindu, Muslim, Christian, Bodh, Jain religions)

## 2. Introduction to Yoga, Overview of Patanjali's Yoga Sutras

## UNIT-II

### Society and Culture-I

3. Introduction to Indian Culture and Major Symbols of Indian Culture
4. Major Indian Cultural and Ethical Values- Respect, Compassion, Kindness, Forgiveness, Introspection, Honesty, Justice, Loyalty, Devotion, Self Sacrifice, Hospitality, Vasudhev Kutumbkum

## UNIT-III

### India in Progress-I

5. Education, Science and Technology in Ancient India
6. Values from Indian History- War of Mahabharata, War of Kalinga, Freedom Struggle of India, Major Farmer Movements, Major Religious and Social Upliftment Movements

## UNIT-IV

### Great Indian Personalities-I

7. Life and works of the Great People of India- Sushruta, Dadhichi, Ashtvakra, Anusuya, Panini, Charaka, Kalidas, Aryabhatta, Samudragupta, Ashoka, Chandragupt Mourya, Porus, Satyabhama, Dhruv, Prahlad, Chankya, Varahmihira, Bhism, Karan, Dronacharya, Meera Bai, Surdas, Dadudayal, Kabir, Mahatma Budhha, Mahavir, Guru Nanak Dev, Guru Gobind Singh, Mohammad Saheb, Jesus Christ, Veer Shivaji, Maharana Pratap, Maharani Laxmi Bai, Maharani Padmini, Hadi Rani Shal Kanwar, Panna Dhai

**\*oint Presentation on the learning and face Viva-voce by committee of teachers.**

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Human Anatomy-2 Theory</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY008A</b>

## COURSE OBJECTIVE

Studies are concerned with the topographical and functional anatomy of the limbs. Particular attention is paid to the muscles, bones and joints of the regions. The head and neck and central nervous system (CNS) are studied with particular reference to topics of importance to Physiotherapists. The study of the CNS includes detailed consideration of the control of motor function.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

  
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<b>CO 1</b>	Anatomy of upper extremity including bones, joints, soft tissue parts and muscles related to shoulder elbow, wrist and hand joints. Surface land-marks, and radiological aspects of anatomy. Demonstrate movements of upper extremity joints. Identify & describe the origin/insertion, nerve /blood supply, root value & function of various upper extremity skeletal muscles.
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<b>CO 2</b>	Anatomy of lower extremity including bones, joints, soft tissue parts and muscles related to Hip, Knee, Ankle and foot joints. Surface land-marks, and radiological aspects of anatomy. Demonstrate movements of lower extremity joints. Identify & describe the origin/insertion, nerve /blood supply, root value & function of various lower extremity skeletal muscles.
<b>CO 3</b>	Anatomy of head and neck bones, joints, soft tissue parts and muscles of head, face and neck. Surface land-marks, and radiological aspects of anatomy. Identify & describe the origin/insertion, nerve /blood supply, root value & function of various head and neck muscles.
<b>CO 4</b>	Anatomy of trunk and pelvis bones, joints, soft tissue parts and muscles of Cervical, thoracic, lumbar, sacral and coccygeal vertebrae, ribs and pelvic girdle. Surface land-marks, and radiological aspects of anatomy. Identify & describe the origin/insertion, nerve /blood supply, root value & function of various Trunk & Pelvis skeletal muscles.
<b>CO 5</b>	Anatomical basis of clinical conditions of nervous system. Outline various parts of nervous system: Source, course & components of various trans-sections of spinal tracts and C.N.S; Source, course & components of various trans-sections of brain, cranial nerves (Special emphasis to III, IV, V, VI and VII) and peripheral nerves. Describe blood circulation of C.N.S. & spinal cord. Describe the course of peripheral nerves.

## **THEORY**

### **Unit-1 Upper Extremity-**

- Osteology: Clavicles, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges.
- Soft parts: Breast, pectoral region, axilla, front of arm, back of arm, cubital fossa, front of fore arm, back of fore arm, palm, dorsum of hand, muscles, nerves, blood vessels and lymphatic drainage of upper extremity.
- Joints: Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.
- Arches of hand, skin of the palm and dorsum of hand.

### **Unit-2 Lower Extremity-**

- Osteology: Hip bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.
- Soft parts: Gluteal region, front and back of the thigh (Femoral triangle, femoral canal and inguinal canal), medial side of the thigh (Adductor canal), lateral side of the thigh, popliteal fossa, anterior and posterior compartment of leg, sole of the foot, lymphatic drainage of lower limb, venous drainage of the lower limb, arterial supply of the lower limb, arches of foot, skin of foot.

c) Joints: Hip Joint, Knee joint, Ankle joint, joints of the foot.

**Unit-3 Head and Neck-**

a) Osteology: Mandible and bones of the skull.

b) Soft parts: Muscles of the face and neck and their nerve and blood supply-extra ocular muscles, triangles of the neck.

c) Gross anatomy of eyeball, nose, ears and tongue.

**Unit-4 Trunk & Pelvis:**

i. Osteology: Cervical, thoracic, lumbar, sacral and coccygeal vertebrae and ribs.

ii. Soft tissue: Pre and Para vertebral muscles, intercostals muscles, anterior abdominal wall muscles, Inter-vertebral disc.

iii. Pelvic girdle and muscles of the pelvic floor.

## Unit-5 Neuro Anatomy –

Organization of Central Nervous system - Spinal nerves and autonomic nervous system mainly pertaining to cardiovascular, respiratory and urogenital system

- a) Cranial nerves
- b) Peripheral nervous system
- c) Peripheral nerve
- d) Neuromuscular junction
- e) Sensory end organs
- f) Central Nervous System
- g) Spinal segments and areas
- h) Brain Stem
- i) Cerebellum
- j) Inferior colliculi
- k) Superior Colliculi
- l) Thalamus
- m) Hypothalamus
- n) Corpus striatum
- o) Cerebral hemisphere
- p) Lateral ventricles
- q) Blood supply to brain
- r) Basal Ganglia
- s) The pyramidal system
- t) Pons, medulla, extra pyramidal systems
- u) Anatomical integration



<b>JECRC University</b> <b>School of Allied Health Sciences</b>	<b>Bachelor of Physiotherapy (BPT)</b>			
<b>Course</b> <b>Human Anatomy-2 Practical</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>BPY009A</b>

**COURSE OBJECTIVES:** Studies are concerned with the topographical and functional anatomy of the limbs and Nervous system, to give practical exposure for better understanding of anatomy.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Identification of upper extremity including bones, joints, soft tissue parts and muscles related to shoulder elbow, wrist and hand joints. Surface land-marks, and radiological aspects of anatomy. Demonstrate movements of upper extremity joints. Identify & describe the origin/insertion, nerve /blood supply, root value & function of various upper extremity skeletal muscles.
<b>CO 2</b>	Identification of lower extremity including bones, joints, soft tissue parts and muscles related to Hip, Knee, Ankle and foot joints. Surface land-marks, and radiological aspects of anatomy. Demonstrate movements of lower extremity joints. Identify & describe the origin/insertion, nerve /blood supply, root value & function of various lower extremity skeletal muscles.
<b>CO 3</b>	Identification of head and neck bones, joints, soft tissue parts and muscles of head, face and neck. Surface land-marks, and radiological aspects of anatomy. Identify & describe the origin/insertion, nerve /blood supply, root value & function of various head and neck muscles.
<b>CO 4</b>	Identification of trunk and pelvis bones, joints, soft tissue parts and muscles of Cervical, thoracic, lumbar, sacral and coccygeal vertebrae, ribs and pelvic girdle. Surface land-marks, and radiological aspects of anatomy. Identify & describe the origin/insertion, nerve /blood supply, root value & function of various Trunk & Pelvis skeletal muscles.
<b>CO 5</b>	Identification of clinical conditions of nervous system. Outline various parts of nervous system: Source, course & components of various trans-sections of spinal tracts and C.N.S; Source, course & components of various trans-sections of brain, cranial nerves (Special emphasis to III, IV, V, VI and VII) and peripheral nerves. Describe blood circulation of C.N.S. & spinal cord. Describe the course of peripheral nerves.

## PRACTICAL

## **Unit-1 Upper extremity – (Models and charts)**

### **a) Anatomy and Osteology:**

- i. Clavicles, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges.
- ii. Muscle of Upper Limb: Origin, Insertion, Nerve supply and Action of all the muscle of upper limb.
- iii. Joints: Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.  
Arches of hand, skin of the palm and dorsum of hand.

### **b) Soft parts:**

i. Breast, pectoral region, axilla, front of arm, back of arm, cubital fossa, front of fore arm, back of fore arm, palm, dorsum of hand, muscles, nerves, blood vessels and lymphatic drainage of upper extremity.

## **Unit-2 Lower Extremity – (Models and charts)**

Anatomy and Osteology:

- i. Hip bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.
- ii. Muscle of Lower Limb: Origin, Insertion, Nerve supply and Action of all the muscle of lower limb.
- iii. Joints: Hip Joint, Knee joint, Ankle joint, joints of the foot

b) Soft parts:

Gluteal region, front and back of the thigh (Femoral triangle, femoral canal and inguinal canal), medial side of the thigh (Adductor canal), lateral side of the thigh, popliteal fossa, anterior and posterior compartment of leg, sole of the foot, lymphatic drainage of lower limb, venous drainage of the lower limb, arterial supply of the lower limb, arches of foot, skin of foot

**Unit-3 Head and Neck-** (Models and charts)

- a) Osteology: Mandible and bones of the skull.
- b) Soft parts: Muscles of the face and neck and their nerve and blood supply; extra ocular muscles, triangles of the neck.
- c) Gross anatomy of eyeball, nose, ears and tongue.

**Unit-4 Trunk & Pelvis:** (Models and charts)

- i. Osteology: Cervical, thoracic, lumbar, sacral and coccygeal vertebrae and ribs.
- ii. Soft tissue: Pre and Para vertebral muscles, intercostals muscles, anterior abdominal wall muscles, Inter-vertebral disc.
- iii. Pelvic girdle and muscles of the pelvic floor.

**Unit-5 Neuro Anatomy-** (Models and charts)

Spinal nerves and autonomic nervous system, Cranial nerves, Peripheral nerve, Central Nervous System, Spinal segments and areas, Brain Stem, Cerebellum, Inferior colliculi, Superior Colliculi, Thalamus, Hypothalamus, Corpus striatum, Cerebral hemisphere, Lateral ventricles, Blood supply to brain, Basal Ganglia, The pyramidal system, Pons, medulla, extra pyramidal systems

<b>JECRC University</b> <b>School of Allied Health Sciences</b>	<b>Bachelor of Physiotherapy (BPT)</b>			Semester 2
<b>Course</b> <b>Human Physiology-2 Theory</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY010A</b>

**COURSE OBJECTIVES:** The course in Physiology is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Physiology of special senses
<b>CO 2</b>	Physiological functions of Nervous system.
<b>CO 3</b>	Physiological functions of renal system.
<b>CO 4</b>	Physiological functions of Reproductive system.
<b>CO 5</b>	Exercise physiology and Functions of hormones with their effects in body

## THEORY

### Unit-1 Special Senses -

- Vision: Introduction: Functional anatomy of eye ball. Functions of cornea, iris, pupil, aqueous humor – glaucoma, lens – cataract, vitreous humor, rods and cones. Photopic vision. Scotopic vision.
- Visual Pathway and the effects of lesions.
- Refractive Errors: myopia, hypermetropia, presbyopia and astigmatism.
- Visual Reflexes: Accommodation, Pupillary and Light. Visual acuity and Visual field. Light adaptation. Dark adaptation. Color vision – color blindness. Nyctalopia.
- Audition: Physiological anatomy of the ear. Functions of external ear, middle ear and inner ear. Structure of Cochlea and organ of Corti. Auditory pathway. Types of Deafness. Tests for hearing. Audiometry.
- Taste: Taste buds. Primary tastes. Gustatory pathway.
- Smell: Olfactory membrane. Olfactory pathway.
- Vestibular Apparatus: Crista ampullaris and macula. Functions. Disorders

## Unit-2 Nervous System

- a) Introduction: Organisation of CNS – central and peripheral nervous system. Functions of nervous system. Synapse: Functional anatomy, classification, Synaptic transmission. Properties.
- b) Sensory Mechanism: Sensory receptors: function, classification and properties. Sensory pathway: The ascending tracts – Posterior column tracts, lateral spinothalamic tract and the anterior spinothalamic tract – their origin, course, termination and functions. The trigeminal pathway. Sensory cortex. Somatic sensations: crude touch, fine touch, tactile localization, tactile discrimination, stereognosis, vibration sense, kinesthetic sensations. Pain sensation: mechanism of pain. Cutaneous pain –slow and fast pain, hyperalgesia. Deep pain. Visceral pain – referred pain. Gate control theory of pain. tabes dorsalis, sensory ataxia.
- c) Motor Mechanism: Motor Cortex. Motor pathway: The descending tracts – pyramidal tracts, extrapyramidal tracts – origin, course, termination and functions. Upper motor neuron and lower motor neuron. Paralysis, monoplegia, paraplegia, hemiplegia and quadriplegia.
- d) Reflex Action: components, Bell-Magendie law, classification and Properties. Monosynaptic and polysynaptic reflexes, superficial reflexes, deep reflexes. Stretch reflex– structure of muscle spindle, pathway, higher control and functions. Inverse stretch reflex. Muscle tone – definition, and properties hypotonia, atonia and hypertonia. UMNL and LMNL
- e) Spinal cord Lesions: Complete transection and Hemisection of the spinal cord.

- f) Cerebellum: Functions. Cerebellar ataxia.
- g) Posture and Equilibrium: Postural reflexes – spinal, medullary, midbrain and cerebral reflexes.
- h) Thalamus and Hypothalamus: Nuclei. Functions. Thalamic syndrome
- i) Reticular Formation and Limbic System: Components and Functions.
- j) Basal Ganglia: Structures included and functions. Parkinson's disease.
- k) Cerebral Cortex: Lobes. Brodmann's areas and their functions. Higher functions of cerebral cortex – learning, memory and speech.
- l) EEG: Waves and features. Sleep: REM and NREM sleep.
- m) CSF: Formation, composition, circulation and functions. Lumbar puncture and its significance. Blood brain barrier. Hydrocephalus.
- n) ANS: Features and actions of parasympathetic and sympathetic nervous system.

### **Unit-3 Renal System -**

- a) Introduction: Physiological anatomy. Nephrons – cortical and juxtamedullary. Juxta- glomerular apparatus. Glomerular membrane. Renal blood flow and its regulation. Functions of kidneys.
- b) Mechanism of Urine Formation: Glomerular Filtration: Mechanism of glomerular filtration. GFR – normal value and factors affecting. Renal clearance. Inulin clearance. Creatinine clearance.
- c) Tubular Reabsorption: Reabsorption of Na<sup>+</sup>, glucose, HCO<sub>3</sub><sup>-</sup>, urea and water. Filtered load. Renal tubular transport maximum. Glucose clearance: TmG. Renal threshold for glucose.
- d) Tubular Secretion: Secretion of H<sup>+</sup> and K<sup>+</sup>. PAH clearance.
- e) Mechanism of concentrating and diluting the Urine: Counter-current mechanism. Regulation of water excretion. Diuresis. Diuretics.
- f) Micturition: Mechanism of micturition. Cystometrogram. Atonic bladder, automatic bladder.
- g) Acid-Base balance
- h) Artificial Kidney: Principle of haemodialysis.
- i) Skin and temperature regulation.

### **Unit-4 Reproductive System -**

- a) Introduction: Physiological anatomy reproductive organs. Sex determination. Sex differentiation. Disorder
- b) Male Reproductive System: Functions of testes. Pubertal changes in males. Spermatogenesis. Testosterone: action. Regulation of secretion. Semen.
- c) Female Reproductive System: Functions of ovaries and uterus. Pubertal changes in females. Oogenesis. Hormones: estrogen and progesterone-action. Regulation of secretion. Menstrual Cycle: Phases. Ovarian cycle. Uterine cycle. Hormonal basis. Menarche. Menopause. Pregnancy: Pregnancy tests. Physiological changes during pregnancy. Functions of placenta. Lactation. Contraception methods

## **Unit-5    Physiology of exercise –**

- a) Effects of acute and chronic exercise on
  - i. O<sub>2</sub> transport
  - ii. Muscle strength/power/endurance
  - iii. Basal Metabolic Rate /Respiratory Quotient.
  - iv. Hormonal and metabolic effect



- v. Cardiovascular system
- vi. Respiratory system
- vii. Body fluids and electrolyte
- b) Effect of gravity / altitude / acceleration / pressure on physical parameters
- c) Physiology of Age

### **Endocrine System -**

- a) Introduction: Major endocrine glands. Hormone: classification, mechanism of action.
- b) Functions of hormones
- c) Pituitary Gland: Anterior Pituitary and Posterior Pituitary hormones: Secretory cells, action on target cells, regulation of secretion of each hormone. Disorders: Gigantism, Acromegaly, Dwarfism, Diabetes insipidus. Physiology of growth and development: hormonal and other influences.
- d) Pituitary-Hypothalamic Relationship.
- e) Thyroid Gland: Thyroid hormone and calcitonin: secretory cells, synthesis, storage, action and regulation of secretion. Disorders: Myxedema, Cretinism, Grave's disease.
- f) Parathyroid hormones: secretory cell, action, regulation of secretion. Disorders: Hypoparathyroidism. Hyperthyroidism. Calcium metabolism and its regulation.
- g) Adrenal Gland: Adrenal Cortex: Secretory cells, synthesis, and action, regulation of secretion of Aldosterone, Cortisol, and Androgens. Disorders: Addison's disease, Cushing's syndrome, Conn's syndrome, Adrenogenital syndrome.
- h) Adrenal Medulla: Secretory cells, action, regulation of secretion of adrenaline and noradrenaline. Disorders: Pheochromocytoma.
- i) Endocrine Pancreas: Secretory cells, action, regulation of secretion of insulin and glucagon. Glucose metabolism and its regulation. Disorder: Diabetes mellitus.
- j) Calciferol, Thymus and Pineal gland (very brief).
- k) Local Hormones. (Briefly).

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Human Physiology-2 Practical</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>BPY011A</b>

**COURSE OBJECTIVES:** The course in Physiology practical is designed such that the students should be able to determine the basic procedures to examine various physiological functions of human body.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate procedures to determine pulses and blood pressure. Demonstrate procedures to examine sensory system & motor system  Demonstrate procedures to examine respiratory system & cardio vascular system. Demonstrate examination of reflexes 4 hours  Demonstrate examination of cranial nerves
<b>CO 2</b>	Demonstrate procedures of Spirometry, Artificial Respiration and Electro Cardio Gram

## **PRACTICAL**

### **Unit-1 Clinical Examination**

- Examination of Radial pulse.
- Recording of blood pressure
- Examination of Cardio Vascular System
- Examination of Respiratory system
- Examination of Sensory system
- Examination of Motor System
- Examination of reflexes
- Examination of cranial nerves

### **Unit-2 Demonstrations**

- Spirometry
- Artificial Respiration
- Electro Cardio Gram

Course	Course Description	Credit per Semester	Hours per Semester	Course Code
Biochemistry-2 Theory	Core	3 credits	3 hours	BPY012A

**COURSE OBJECTIVES:** This course provides the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies. It covers basic biochemical, cellular, biological and microbiological processes, basic chemical reactions in the prokaryotic and eukaryotic cells, the structure of biological molecules, introduction to the nutrients.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Functions and biochemistry of Enzymes, Nucleotide and Nucleic acid
<b>CO 2</b>	Functions and biochemistry of Vitamins and Mineral Metabolism
<b>CO 3</b>	Functions and biochemistry of Connective tissue
<b>CO 4</b>	Functions and biochemistry of Hormone, Acid-Base balance and water balance
<b>CO 5</b>	Functions and biochemistry of Electrolyte balance and clinical aspect of biochemistry

**Unit-1 Enzymes** – Definition, Active site, Cofactor (Coenzyme, Activator), Proenzyme. Classification with examples, Factors effecting enzyme activity, Enzyme inhibition and significance, Isoenzymes, Diagnostic enzymology (clinical significance of enzymes)

**Nucleotide and Nucleic acid Chemistry-** Nucleotide chemistry: Nucleotide composition, functions of free nucleotides in body. Nucleic acid (DNA and RNA) chemistry: Difference between DNA and RNA, Structure of DNA (Watson and Crick model), Functions of DNA. Structure and functions of tRNA, rRNA, mRNA.

**Unit-2 Vitamins** - Definition, classification according to solubility. Individual vitamins - Sources, Coenzyme forms, functions, RDA, digestion, absorption and transport, deficiency and toxicity.

**Mineral Metabolism-** Definition, Sources, RDA, Digestion, absorption, transport, excretion, functions, disorder of Individual minerals - Calcium, phosphate, iron, Magnesium, fluoride, selenium, molybdenum, copper. Phosphate, calcium and iron in detail.

**Unit-3 Biochemistry of Connective tissue** - Introduction, various connective tissue proteins: Collagen, elastin - Structure and associated disorders. Glycoproteins, Proteoglycans.

**Unit-4    Hormone Action** - Definition, classification, Mechanism of hormone action. Receptors, signal transduction, second messengers and cell function

**Acid-Base balance** - Acids, bases and buffers, pH. Buffer systems of the body, bicarbonate buffer system  
Role of lungs and kidneys in acid base balance, Acid base imbalance.

**Water balance** - Water distribution in the body, Body water, water turnover, Regulation of water balance:  
role of ADH and thirst centre.

**Unit-5 Electrolyte balance** - Osmolarity. Distribution of electrolytes. Electrolyte balance: Role of aldosterone, rennin angiotensin system and ANF.

**Clinical Biochemistry** - Normal levels of blood and urine constituents, Relevance of blood and urine levels of Glucose, Urea, Uric acid, Creatinine, Calcium, Phosphates, pH and Bicarbonate. Liver function tests, Renal function tests.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Basic Principles of Biomechanics</b>	<b>Course Description</b> <b>Core Theory</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY013A</b>

**COURSE OBJECTIVES:** Biomechanics involves the study of basic concepts of human movement, and application of various biomechanical principles in the evaluation and treatment of disorders of musculoskeletal system. Students are taught to understand the various quantitative and qualitative methods of movement. Mechanical principles of various treatment methods are studied. Study of posture and gait are also included.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Basic concepts in Biomechanics- Kinetics and Kinematics
<b>CO 2</b>	Concept of joint structure and function. Biomechanics of movements at joints related to planes and axis.
<b>CO 3</b>	Basics of muscle structure and functions. Biomechanics of muscle related to force production
<b>CO 4</b>	Biomechanics of the Thorax and Chest wall.
<b>CO 5</b>	Biomechanics of The Temporo mandibular Joint. Describe Biomechanics of vertebral column.

## **THEORY**

### **Unit-1 Basic Concepts in Biomechanics: Kinematics and Kinetics**

**1**

- a) Types of Motion
- b) Location of Motion
- c) Direction of Motion
- d) Magnitude of Motion
- e) Definition of Forces
- f) Force of Gravity
- g) Reaction forces
- h) Equilibrium
- i) Objects in Motion
- j) Force of friction
- k) Concurrent force systems
- l) Parallel force system
- m) Work
- n) Moment arm of force
- o) Force components
- p) Equilibrium of levers

  
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## **Unit-2 Joint structure and Function**

- a) Joint design
- b) Materials used in human joints
- c) General properties of connective tissues
- d) Complexity of human joint design
- e) Joint function
- f) General effects of disease, injury and immobilization.



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**Unit-3 Muscle structure and function**

- a) Mobility and stability functions of muscles
- b) Elements of muscle structure
- c) Muscle function
- d) Effects of immobilization, injury and aging

**Unit-4 Biomechanics of the Thorax and Chest wall**

- a) General structure and function
- b) Rib cage and the muscles associated with the rib cage
- c) Ventilatory motions: its coordination and integration
- d) Developmental aspects of structure and function
- e) Changes in normal structure and function in relation to pregnancy, scoliosis and COPD

**Unit-5 The Temporomandibular Joint- General features, structure, function and dysfunction**

**Biomechanics of the Vertebral column**

- a) Describe the general structure and function of the vertebral column,.
- b) Describe factors affecting stability and mobility.
- c) Regional structure and function of cervical, dorsal, lumbar and sacral vertebrae.
- d) Motions of the vertebral column.
- e) Lumbar-pelvic rhythm.
- f) Rotation of the vertebrae in each region.
- g) Movements of the ribs during rotation.
- h) Describe the muscles of the vertebral column, flexors, extensor, rotators and lateral flexors.
- i) Describe the effects of injury, developmental deficits, defects in vertebrae
- j) Forces acting on the vertebral column during specific motions.
- k) General effects of injury and aging



<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>General &amp; Clinical Psychology</b>	<b>Course Description</b> <b>Core Theory</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY014A</b>

**COURSE OBJECTIVES** -Human Psychology involves the study of various behavioral patterns of individuals, theories of development, normal and abnormal aspects of motor, social, emotional and language development, communication and interaction skills appropriate to various age groups. The study of these subjects will help the student to understand their clients while assessment and while planning appropriate treatment methods.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Basics and Introduction of Psychology and growth and development of humans on psychological aspects.
<b>CO 2</b>	Sensation, attention, perception motivational psychology
<b>CO 3</b>	Psychology of humans related to frustration, conflict, emotions and intelligence
<b>CO 4</b>	Thinking and learning on psychological basis and how to improve
<b>CO 5</b>	Improve personality by psychological aspect, social and clinical psychology for patient perspective

## **THEORY**

### **Unit-1 Introduction to Psychology**

- a) Schools: Structuralism, functionalism, behaviorism, Psychoanalysis.
- b) Methods: Introspection, observation, inventory and experimental method.
- c) Branches: psychology and applied psychology
- d) Psychology and physiotherapy

#### **Growth and Development**

- a) Life span: Different stages of development (Infancy, childhood, adolescence, adulthood, middle age, old age).
- b) Heredity and environment: role of heredity and environment in physical and psychological development, “Nature v/s Nurture controversy”.

## **Unit-2    Sensation, attention and perception**

- a) Sensation: Vision, Hearing, Olfactory, Gustatory and Cutaneous sensation, movement, equilibrium and visceral sense.
- b) Attention: Types of attention, Determinants of attention (subjective determinants and objective determinants).
- c) Perception: Gestalt principles of organization of perception (principle of figure ground and principles of grouping), factors influencing perception (past experience and context).
- d) Illusion and hallucination: different types.

### **Motivation**

- a) Motivation cycle (need, drive, incentive, reward).
- b) Classification of motives.
- c) Abraham Maslow's theory of need hierarchy

## **Unit-3    Frustration and conflict**

- a) Frustration: sources of frustration.
- b) Conflict: types of conflict.
- c) Management of frustration and conflict

## **Emotions**

- a) Three levels of analysis of emotion (physiological level, subjective state, and overt behavior).
- b) Theories of emotion
- c) Stress and management of stress.

## **Intelligence**

- a) Theories of intelligence.
- b) Distribution of intelligence.
- c) Assessment of intelligence

## **Unit-4 Thinking**

- a) Reasoning: deductive and inductive reasoning
- b) Problem solving: rules in problem solving (algorithm and heuristic)
- c) Creative thinking: steps in creative thinking, traits of creative people

## **Learning**

- a) Factors effecting learning.
- b) Theories of learning: trial and error learning, classical conditioning, Operant conditioning, insight learning, social learning theory.
- c) The effective ways to learn: Massed/Spaced, Whole/Part, Recitation/Reading, Serial/Free recall, Incidental/Intentional learning, Knowledge of results, association, organization, and mnemonic methods.

## **Unit-5 Personality**

- a) Approaches to personality: type & trait, behavioristic, psychoanalytic and humanistic approach.
- b) Personality assessment: observation, situational test, questionnaire, rating scale, interview, and projective techniques.
- c) Defense Mechanisms: denial of reality, rationalization, projection, reaction formation, identification, repression, regression, intellectualization, undoing, introjection, acting out.

## **Social psychology**

- a) Leadership: Different types of leaders. Different theoretical approaches to leadership.
- b) Attitude: development of attitude. Change of attitude.

## **Clinical psychology**

Models of training, abnormal behavior assessment, clinical judgement, psychotherapy, self-management methods, physiotherapist patient interaction, aggression, self- imaging, stress management, assertive training, Group therapy, Body awareness, Pediatric, child and geriatric clinical psychology.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Professional Skills-Theory</b>	<b>Course Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN002A</b>

#### **COURSE OBJECTIVES**

<b>1.</b>	To enhance Professional competence in reading, writing, listening and speaking.
<b>2.</b>	Switch the approach from providing information about the language to use the language.
<b>3.</b>	Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
<b>4.</b>	Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
<b>5.</b>	Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
<b>6.</b>	Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

#### **COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
<b>CO 2</b>	Ability to analyze the usage of English words in professional scenario.
<b>CO 3</b>	An understanding of technical and academic articles' comprehension.
<b>CO 4</b>	The ability to present oneself at multinational levels as per the demand of the corporate culture

**Unit-1** Professional Grooming and Professional Culture: Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management

**Unit-2** Advanced Grammar: Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents

**Unit-3** Composition:, Memo, Notice, Circular, Book Review, Research Article, Reports

**Unit-4** Vocabulary Building: Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms

  
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**Unit-5** Reading Comprehension: Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction



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<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Professional Skills-Practical</b>	<b>Course Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN002A</b>

**Unit-1** Professional Grooming and Professional Culture: Role plays and Activities on Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management

**Unit-2** Advanced Grammar: Exercise Sessions for Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents

**Unit-3** Composition:, Memo, Notice, Circular, Book Review, Research Article, Reports – Giving Assignments based on practical applications, Practice sessions on different topics

**Unit-4** Vocabulary Building: Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms- Activities related to the appropriate use of words

**Unit-5** Reading Comprehension: Practice Reading Unseen Paragraphs- Finding Suitable title, Summarizing, Analyzing, Finding new words etc.

  
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<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 2</b>
<b>Course</b> <b>Culture Education - 2</b>	<b>Course Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DIN002A</b>

## OBJECTIVES

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

**COURSE OUTCOMES (CO):** At the end of this course students will have:

<b>CO 1</b>	Ability to acknowledge and appreciate the richness of Indian Culture
<b>CO 2</b>	Ability to represent the culture ethics in real life

### Unit-1 Holy Scriptures-II

1. Bhagavad Gita and Life Management
2. Highlights of Indian Scriptures - Major Incidents and terms from various religious scriptures including Ramayana, Mahabharata, Guru Granth Saheb, Bible, Quran, Jain Scriptures, Bodh Scriptures
3. Historicity of Ramayana and Mahabharata

### Unit-2 Society and Culture-II

4. Indian Society: Its Strengths and Weaknesses
5. Health and Lifestyle related issues
6. Conservation of cultural heritage

### Unit-3 India in Progress-II

7. Role & Position of Women in Indian Society- Rituals like Sati, Dakin, Kanyavadh, Pardah, Devdasi, Child Marriage, Measures of Women Empowerment including Education, Constitutional and other Rights
8. Indian Models of Economy, Business and Management

### Unit-4 Great Indian Personalities-II

9. Life and works of the Great People of India- Raja Ram Mohan Roy, Swami Vivekanand, Madan Mohan Malviya, Ishwarchand VidyaSagar, JyotibaPhule, HomiBhabha, B.R. Ambedkar, Mahatma Gandhi, Chandra Shekhar Aazad, Abdul Hamid, Badshah Khan, Bhagat Singh, Ashfaqullah, Vir Sawarkar, Vir Banda Bahadur, VirHaqiqat Rai, Subhash Chandra Bose, Mother Teresa, Jagdish Chandra Basu, JRD Tata, Ratan Tata, Dada Saheb Phalke, Major Dhayan Chand, A P J Abdul Kalaam, Kailash Satyarthi, Aruna Roy, Mahasweta Devi, Udaya Kumar, Narayan Murthy, Azim Premji

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>Biomechanics and kinesiology</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY015A</b>

**COURSE OBJECTIVES** - Biomechanics involves the study of basic concepts of human movement, and application of various biomechanical principles in the evaluation and treatment of disorders of musculoskeletal system. Students are taught to understand the various quantitative and qualitative methods of movement. Mechanical principles of various treatment methods are studied. Study of biomechanics of joints and spine

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Movement mechanics of shoulder complex and elbow complex
<b>CO 2</b>	Biomechanical science of Wrist and Hip complex
<b>CO 3</b>	Biomechanics of Knee and Ankle and Foot
<b>CO 4</b>	Learn about Posture
<b>CO 5</b>	Normal and pathological gait pattern

### **Unit-1**

Biomechanics of Shoulder complex  
Biomechanics of Elbow complex

### **Unit-2**

Biomechanics of Wrist complex  
Biomechanics of Hip complex

### **Unit-3**

Biomechanics of Knee complex  
Biomechanics of Ankle and Foot complex

### **Unit-4**

Posture

### **Unit-5**

Normal and Pathological Gait

  
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<b>Course</b> <b>Exercise Therapy-1</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY016A</b>

**COURSE OBJECTIVES** - In this course, the students will learn the principles and effects of exercise as a therapeutic modality and will learn the techniques in the restoration of physical functions.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Fundamentals and derived body position and different method of testing related to joints and muscles and special senses
<b>CO 2</b>	Learn active and passive movements
<b>CO 3</b>	Different types of exercises free, active, passive and resisted
<b>CO 4</b>	Learn scientific therapeutic massage
<b>CO 5</b>	Learn Specific exercise regimens, posture and walking aids

## Unit-1

1. Starting Positions – Fundamental positions & derived Positions

2. Methods of Testing

a. Functional tests

b. Measurement of Joint range: ROM-Definition, Normal ROM for all peripheral joints & spine, Goniometer- parts, types, principles, uses, Limitations of goniometry, Techniques for measurement of ROM for all peripheral joints

c. Tests for neuromuscular efficiency

i. Electrical tests

ii. Manual Muscle Testing: Introduction to MMT, Principles & Aims, Indications & Limitations, Techniques of MMT for group & individual: Techniques of MMT for upper limb / Techniques of MMT for lower limb / Techniques of MMT for spine.

iii. Anthropometric Measurements: Muscle girth – biceps, triceps, forearm, quadriceps, calf

iv. Static power Test

v. Dynamic power Test

vi. Endurance test

vii. Speed test

d. Tests for Co-ordination

e. Tests for sensation

f. Pulmonary Function tests

g. Measurement of Limb Length: true limb length, apparent limb length, segmental limb

  
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length

h. Measurement of the angle of Pelvic Inclination

## **Unit-2**

### **Movements**

#### **1. Active Movements**



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## **2. Passive Movements**

Causes of immobility, Classification of Passive movements, Specific definitions related to passive movements, Principles of giving passive movements, Indications, contraindications, effects of uses , Techniques of giving passive movements.

## **Unit-3**

### **Exercises**

1. Free exercise: Classification, principles, techniques, indications, contraindications, effects and uses
2. Active Assisted Exercise: principles, techniques, indications, contraindications, effects and uses Assisted-Resisted Exercise: principles, techniques, indications, contraindications, effects and uses Resisted Exercise: Definition, principles, indications, contraindications, precautions & techniques, effects and uses
3. Types of resisted exercises: Manual and Mechanical resistance exercise, Isometric exercise, Dynamic exercise: Concentric and Eccentric, Dynamic exercise: Constant versus variable resistance, Isokinetic exercise, Open-Chain and Closed-Chain exercise.

## **Unit-4**

### **1. THERAPEUTIC MASSAGE**

- History and Classification of Massage Technique
- Principles, Indications and Contraindications
- Technique of Massage Manipulations
- Physiological and Therapeutic Uses of Specific Manipulations

2. Relaxation -Definitions: Muscle Tone, Postural tone, Voluntary Movement, Degrees of relaxation, Pathological tension in muscle, Stress mechanics, types of stresses, Effects of stress on the body mechanism, Indications of relaxation, Methods & techniques of relaxation-Principles & uses: General, Local, Jacobson's, Mitchel's, additional methods

## **Unit-5**

1. Specific exercise regimens
  - a. Isotonic: de Lormes, Oxford, MacQueen, Circut weight training
  - b. Isometric: BRIME (Brief Resisted Isometric Exercise), Multiple Angle
  - c. Isometrics Isokinetic regimens
2. Posture -Definition, Active and Inactive Postures, Postural Mechanism, Patterns of Posture, Principles of re-education: corrective methods and techniques, Patient education.
3. Walking Aids -Types: Crutches, Canes, Frames; Principles and training with walking aids

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<b>Course</b> <b>Exercise Therapy-1 Practical</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>4 hours</b>	<b>Course Code</b> <b>BPY017A</b>

**COURSE OBJECTIVES** - The students of exercise therapy are to be trained in Practical Laboratory work for all the topics discussed in theory. The student must be able to evaluate and apply judiciously the different methods of exercise therapy techniques on the patients. They must be able to

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Students learn and practice fundamentals and derived body position and different method of testing related to joints and muscles and special senses
<b>CO 2</b>	Students learn and practice active and passive movements
<b>CO 3</b>	Students learn and practice different types of exercises free, active, passive and resisted
<b>CO 4</b>	Students learn and practice scientific therapeutic massage
<b>CO 5</b>	Students learn and practice specific exercise regimens, posture and walking aids

### **Unit-1 Demonstrate practical approach**

1. Starting Positions – Fundamental positions & derived Positions

2. Methods of Testing

a. Functional tests

b. Measurement of Joint range: ROM-Definition, Normal ROM for all peripheral joints & spine, Goniometer- parts, types, principles, uses, Limitations of goniometry, Techniques for measurement of ROM for all peripheral joints

c. Tests for neuromuscular efficiency

i. Electrical tests

ii. Manual Muscle Testing: Introduction to MMT, Principles & Aims, Indications & Limitations, Techniques of MMT for group & individual: Techniques of MMT for upper limb / Techniques of MMT for lower limb / Techniques of MMT for spine.

iii. Anthropometric Measurements: Muscle girth – biceps, triceps, forearm, quadriceps, calf

iv. Static power Test

v. Dynamic power Test

vi. Endurance test

vii. Speed test

d. Tests for Co-ordination

e. Tests for sensation

f. Pulmonary Function tests

g. Measurement of Limb Length: true limb length, apparent limb length, segmental limb

  
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length

h. Measurement of the angle of Pelvic Inclination



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<b>Course</b> <b>Electro Therapy-1</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY018A</b>

**COURSE OBJECTIVES** - In this course the student will learn the Principles, Techniques, and Effects, Indication, Contra-Indication and the dosage parameter for various indications of electro therapeutic modalities in the restoration of physical function. The objective of this course is that the student will be able to list the indications, contra indications, dosages of electro therapy modalities, demonstrates the different techniques, and describe their effects on various conditions.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	About dangers of electric current, shock prevention and TENS electrotherapeutic modality
<b>CO 2</b>	About IFT, Russian and Rebox Medium frequency therapeutic modalities
<b>CO 3</b>	Learn about ultrasound as physiotherapeutic modality
<b>CO 4</b>	Learn about LASER as physiotherapeutic modality
<b>CO 5</b>	Learn about superficial heating modalities as physiotherapeutic modality

### Unit-1

1. Dangers-short circuit, electric shocks: Micro/ Macro shocks, Precaution-safety devices, earthing, fuses etc., First aid and initial management of electric shock and Burns: electrical & chemical burns, prevention and management
2. TENS: Define TENS, Types of TENS, Conventional TENS, Acupuncture TENS, Burst TENS, Brief & Intense TENS, Modulated TENS. Types of Electrodes & Placement of Electrodes, Dosage parameters, Physiological & Therapeutic effects, Indications & Contraindications
3. Pain: Define Pain, Theories of Pain (Outline only), Pain Gate Control theory in detail.

### Unit-2- Medium Frequency

1. Interferential Therapy: Define IFT, Principle of Production of IFT, Static Interference System, Dynamic Interference system, Dosage Parameters for IFT, Electrode placement in IFT, Physiological & Therapeutic effects, Indications & Contraindications.
2. Russian Current
3. Rebox type Current

### Unit-3- Ultrasound

Define Ultrasound, Frequency, Piezo Electric effects: Direct, Reverse, Production of US, Treatment Dosage parameters: Continuous & Pulsed mode, Intensity, US Fields: Near field, Far field, Half value distance, Attenuation, Coupling Media, Thermal effects, Non-thermal effects,

  
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Principles & Application of US: Direct contact, Water bag, Water bath, Solid sterile gel pack method for wound. Uses of US, Indications & Contraindications, Dangers of Ultrasound. Phonophoresis: Define Phonophoresis, Methods of application, commonly used drugs, Uses. Dosages of US



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#### **Unit-4 - LASER**

Define LASER. Types of LASER. Principles of Production. Production of LASER by various methods. Methods of application of LASER. Dosage of LASER. Physiological & Therapeutic effects of LASER. Safety precautions of LASER. Classifications of LASER. Energy density & power density

#### **Unit-5- Superficial heating Modalities**

1. Wax Therapy: Principle of Wax Therapy application – latent Heat, Composition of Wax Bath Therapy unit, Methods of application of Wax, Physiological & Therapeutic effects, Indications & Contraindication, Dangers.
2. Contrast Bath: Methods of application, Therapeutic uses, Indications & Contraindications.
3. Moist Heat Therapy: Hydro collator packs – in brief, Methods of applications, Therapeutic uses, Indications & Contraindications.
4. Cyclotherm: Principles of production, Therapeutic uses, Indications & Contraindications.
5. Fluidotherapy: Construction, Method of application, Therapeutic uses, Indications & Contraindications.
6. Whirl Pool Bath: Construction, Method of Application, Therapeutic Uses, Indications & Contraindications.
7. Cryotherapy: Define- Cryotherapy, Principle- Latent heat of fusion, Physiological & Therapeutics effects, Techniques of Applications, Indications & Contraindications, Dangers, Methods of application with dosages.

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<b>Course</b> <b>Electro Therapy-1 Practical</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>2 credits</b>	<b>Hours per Semester</b> <b>4 hours</b>	<b>Course Code</b> <b>BPY019A</b>

**COURSE OBJECTIVES** - The student of Electrotherapy must be able to learn the practical use of electrotherapy modalities applying the principles of electrotherapy with proper techniques, choice of dosage parameters and safety precautions.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Students learn and practice about TENS
<b>CO 2</b>	Students learn and practice about IFT, Russian and Rebox current
<b>CO 3</b>	Students learn and practice about Ultrasound
<b>CO 4</b>	Students learn and practice about LASER
<b>CO 5</b>	Students learn and practice about superficial heating modalities

#### **Unit-1**

Demonstrate practical approach of TENS

#### **Unit-2**

Demonstrate practical approach of IFT, Russian and Rebox current

#### **Unit-3**

Demonstrate practical approach of Ultrasound

#### **Unit-4**

Demonstrate practical approach of LASER

#### **Unit-5**

Demonstrate practical approach of superficial heating modalities

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<b>Course</b> <b>Law, Ethics &amp; Professional values</b>	<b>Course Description</b> <b>Core</b>	<b>Credit per Semester</b> <b>3 credits</b>	<b>Hours per Semester</b> <b>3 hours</b>	<b>Course Code</b> <b>BPY020A</b>

**COURSE OBJECTIVES** - Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical/ Physiotherapy ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows:

The module on professionalism will deliver the concept of what it means to be a professional and how physiotherapy profession is different from a usual vocation. It also explains how relevant is professionalism in terms of healthcare system and how it affects the overall patient environment.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Basics of medical ethics and Malpractice and negligence
<b>CO 2</b>	Right of patient, organ transplantation
<b>CO 3</b>	Medico legal aspects of medical records and informed consent
<b>CO 4</b>	Codes and laws of physiotherapy practice
<b>CO 5</b>	Professional values, professional behavior and professional accountability and responsibility

### Unit-1

1. Medical ethics versus medical law - Definition - Goal - Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics – Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy

  
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## Unit-2



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1. Autonomy and informed consent - Right of patients
2. Care of the terminally ill- Euthanasia
3. Organ transplantation

### **Medical diagnosis versus physiotherapy diagnosis**

#### **Unit-3**

1. Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.
2. Professional Indemnity insurance policy
3. Development of standardized protocol to avoid near miss or sentinel events
4. Obtaining an informed consent.
5. Biomedical ethical principles

#### **Unit-4**

1. Code of ethics for physiotherapists
2. Ethics documents for physiotherapists
3. Laws affecting physiotherapy practice

#### **Unit-5**

1. Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality. Core values- Accountability, Altruism, Compassion/ caring, excellence, integrity, professional duties, social responsibility
2. Attitude and behavior- professional behavior, treating people equally
3. Code of conduct, professional accountability and responsibility, misconduct
4. Cultural issues in the healthcare environment
5. Entry level health care practitioner, direct access, autonomy in profession, practitioner of practice and evidence based practice.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>Life Skills – 1 (Personality Development)</b>	<b>Course Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>1 hours</b>	<b>Course Code</b> <b>DEN003A</b>

**COURSE OBJECTIVE-** To prepare the students as per the industry demands. Switching to Activity and Task based Teaching modules. To focus on the linguistic aspects in relation to life situations. Facilitating the aspects of behavioral skills in language. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields
<b>CO 2</b>	Ability to learn by doing it practically in the classroom
<b>CO 3</b>	Ability to learn by creating an environment and adapting to the environment.
<b>CO 4</b>	The ability to prepare the students as per the need of the Multi-cultural scenario around.

- |               |   |
|---------------|---|
| <b>UNIT 1</b> | <ul style="list-style-type: none"> <li>Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion</li> <li>Basics of Narrating and describing things</li> </ul>  |
| <b>UNIT 2</b> | <ul style="list-style-type: none"> <li>Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview</li> </ul>  |
| <b>UNIT 3</b> | <ul style="list-style-type: none"> <li>CV/Resume Drafting and HR Interview advance theory</li> <li>Basics of Video Interviews and Video Profiles for Job</li> <li>Types of listening, advantages and disadvantages</li> </ul> |
| <b>UNIT 4</b> | <ul style="list-style-type: none"> <li>Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report</li> </ul>   |

  
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## **UNIT 5**

Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc



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<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester: 3</b>
<b>Course</b> <b>Life Skills – 1 (Personality Development) Practical</b>	<b>Course Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>2 hours</b>	<b>Course Code</b> <b>DEN003B</b>

- UNIT 1**
- Debates / Speeches / Addressing the public / Extempore/Group Discussion
  - Describing a hypothetical situation / theme / surroundings / appearance/personality traits/company/ a professional Concept/New Idea, / New Project through PPT and video aids
- UNIT 2**
- Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview
  - CV/Resume Drafting and HR Interview practice sessions elaborating the points as per the CV and industry demand
  - Video Interviews and Video Profiles for Job-Practice session for Online Interviews
- UNIT 3**
- Listening to variety of audio/video conversations including interviews, news, reports, reports, GDs, dialogues from body language, logic, wit and vocabulary perspectives
- UNIT 4**
- Group Discussion-Practice sessions, Presenting New Idea/Concept/Proposal/ Project/ Report
- UNIT 5**
- Activities on how to be a strong Personality, Motivation, Case studies for Resourcefulness and out of the box thinking, Role plays and Case studies on Risk taking, Self confidence and Self-esteem, Decision Making, Emotion Management, Cultural Adaptability, Multicultural Perspective towards things, ideas, views, codes etc



<b>JECRC UNIVERSITY</b> <b>School of Allied Health Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Sem</b>
<b>Course</b> <b>Value Education and Ethics -1</b>	<b>Course Description</b> <b>Foundation</b>	<b>Credit per Semester</b> <b>1 credits</b>	<b>Hours per Semester</b> <b>1 hours</b>	<b>Cour</b> <b>DI</b>

## COURSE OBJECTIVES

1. To give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.
2. Making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Ability to acknowledge and appreciate the ethical beauty of India
<b>CO 2</b>	Ability to incorporate the values of human lives in real life applications

## Lessons from the Ramayana

Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

## Lessons from the Mahabharata

Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

## Lessons from the Upanishads

Introduction to the Upanishads: Sruti versus Smriti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, Satyakama Jabala, Aruni, Shvetaketu.

## Message of the Bhagavad Gita

Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War  
– The anguish of Arjuna – Counsel by Sri. Krishna – Key teachings of the Bhagavad Gita –

Karma Yoga, Jnana Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

### **Life and Message of Swami Vivekananda**

Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji's life.

### **Life and Teachings of Spiritual Masters India**

Sri Rama, Sri Krishna, Sri Buddha, AdiShankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda.

### **Insights into Indian Arts and Literature**

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>5</b>
<b>Course</b> <b>Clinical Orthopedics and</b> <b>Sports Injury-1</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BPY028A</b>

**COURSE OBJECTIVES** - This subject follows the basic science subjects to provide the knowledge about Orthopedic conditions the therapist would encounter in their practice. The objective of this course is that after completion of the lectures and discussion the student will be able to demonstrate an understanding of orthopedic conditions causing disability, list the etiology, clinical features and methods of investigations and management.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Introduction to Orthopedics and Traumatology of Musculoskeletal Disorders.
<b>CO 2</b>	Fractures and dislocations of upper extremity and hand injuries.
<b>CO 3</b>	Fractures of Spine.
<b>CO 4</b>	Regional conditions.
<b>CO 5</b>	Soft tissue injuries and Orthopedic surgeries

#### **Unit-1 Introduction**

- Introduction to musculoskeletal conditions.
- Clinical examination in musculoskeletal disorders.
- Common investigative procedures
- Radiological and Imaging techniques in musculoskeletal conditions.
- Inflammation and repair, soft tissue healing

#### **Traumatology**

- Fracture: definition, types, signs, and symptoms
- Fracture healing
- Complications of fractures
- Conservative and surgical approaches
- Principles of management – reduction (open/closed, immobilization etc)
- Subluxation/dislocations – definition, signs and symptoms, management (conservative and operative)

#### **Unit-2 Fractures and Dislocations of Upper Limb**

- Fractures of Upper Limb - causes, clinical features, mechanism of injury, complications, conservative and surgical management of the following fractures:**
  - Fractures of clavicle and scapula
  - Fractures of greater tuberosity and neck of humerus

- iii. Fracture shaft of humerus
- iv. Supracondylar fracture of humerus
- v. Fractures of capitulum, radial head, olecranon, coronoid, and epicondyles
- vi. Side swipe injury of elbow
- vii. Both bone fractures of ulna and radius
- viii. Fracture of forearm – Monteggia, Galeazzi fracture–dislocation
- ix. Chauffeur's fracture
- x. Colle's fracture
- xi. Smith's fracture
- xii. Scaphoid fracture
- xiii. Fracture of the metacarpals
- xiv. Bennett's fracture
- xv. Fracture of the phalanges. (Proximal and middle)

#### **b) Dislocations of Upper Limb-**

- i. Anterior dislocation of shoulder – mechanism of injury, clinical feature, complications, conservative management (Kocher's and Hippocrates manoeuvre), surgical management (putti plat, bankart's) etc
- ii. Recurrent dislocation of shoulder
- iii. Posterior dislocation of shoulder – mechanism of injury, clinical features, and management
- iv. Posterior dislocation of elbow – mechanism of injury, clinical feature, complications & management

**Hand Injuries** - mechanism of injury, clinical features, and management of the following–

- a) Crush injuries
- b) Flexor and extensor injuries
- c) Burn injuries of hand

#### **Unit-3 Fracture of Spine**

a) **Fracture of Cervical Spine** - Mechanism of injury, clinical feature, complications (quadriplegia); Management- immobilization (collar, cast, brace, traction); Management for stabilization, management of complication (bladder and bowel, quadriplegia)

- ☐ Clay shoveller's fracture
- ☐ Hangman's fracture
- ☐ Fracture odontoid
- ☐ Fracture of atlas

b) **Fracture of Thoracic and Lumbar Regions** - Mechanism of injury, clinical features, and management— conservative and surgical of common fractures around thoracic and lumbar regions

- ☐ Fracture of coccyx
- ☐ Fracture of Rib Cage - Mechanism of injury, clinical features, management for Fracture Ribs, Fracture of sternum

**Cervical and Lumbar Pathology:** Causes, clinical feature, patho-physiology, investigations, management-Medical and surgical for the following:

- a) Prolapsed Intervertebral Disc (PID)
- b) Spinal Canal Stenosis
- c) Spondylosis (cervical and lumbar)
- d) Spondylolysis
- e) Spondylolisthesis
- f) Lumbago/ Lumbosacral strain
- g) Sacralisation
- h) Lumbarisation
- i) Coccydynia
- j) Hemivertebra

#### **Unit-4 Regional Conditions**

Definition, Clinical features, and management of the following regional conditions

- a) Shoulder: Periarthritis shoulder (adhesive capsulitis), Rotator cuff tendinitis, Supraspinatus Tendinitis, Infraspinatus Tendinitis, Bicipital Tendinitis, Subacromial Bursitis
- b) Elbow: Tennis Elbow, Golfer's Elbow, Olecranon Bursitis (student's elbow) Triceps Tendinitis
- c) Wrist and Hand: De Quervain's Tenosynovitis, Ganglion, Trigger Finger/ Thumb, Mallet Finger, Carpal Tunnel Syndrome, Dupuytren's Contracture
- d) Pelvis and Hip: IT Band Syndrome, Piriformis Syndrome, Trochanteric Bursitis
- e) Knee: Osteochondritis Dissecans, Prepatellar and Suprapatellar Bursitis Popliteal Tendinitis, Patellar Tendinitis, Chondromalacia Patella, Plica Syndrome, Fat Pad Syndrome (Hoffa's syndrome)
- f) Ankle and Foot: Ankle Sprains, Plantar Fasciitis / Calcaneal Spur, Tarsal Tunnel Syndrome, Achilles Tendinitis, Metatarsalgia, Morton's Neuroma

#### **Unit-5 Soft Tissue Injuries**

- a) Define terms such as sprains, strains, contusion, tendinitis, rupture, Tenosynovitis, Tendinosis, bursitis
- b) Mechanism of injury of each, clinical features, managements- conservative and surgical of the following soft tissue injuries:
  - i. Meniscal injuries of knee
  - ii. Cruciate injuries of knee
  - iii. Medial and lateral collateral injuries of knee
  - iv. Lateral ligament of ankle
  - v. Wrist sprains
  - vi. Strains- quadriceps, hamstrings, calf, biceps, triceps etc
  - vii. Contusions- quadriceps, gluteal, calf, deltoid etc
  - viii. Tendon ruptures-Achilles, rotator cuff muscles, biceps, pectorals etc

**Orthopedic Surgeries:** Indications, Classification, Types, Principles of management of the following Surgeries: 3 Hours

- a) Arthrodesis
- b) Arthroplasty (partial and total replacement)
- c) Osteotomy
- d) External fixators
- e) Spinal stabilization surgeries (Harrington's, Luque's, Steffi plating) etc
- f) Limb reattachments



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Dean & Professor  
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<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>5</b>
<b>Course</b> <b>Physiotherapy in</b> <b>Orthopedics and Sports</b> <b>Injury-1</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BPY029A</b>

**COURSE OBJECTIVES** - The subject serves to integrate the knowledge gained by the students in orthopedics and traumatology with skills to apply these in clinical situations of dysfunction and musculoskeletal pathology. The objective of the course is that after the specified hours of lectures and demonstrations the student will be able to identify disabilities due to musculoskeletal dysfunction, plan and set treatment goals and apply the skills gained in exercise therapy and electrotherapy in these clinical situations to restore musculoskeletal function.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Physiotherapy Assessment for Musculoskeletal Conditions
<b>CO 2</b>	Physiotherapy management for upper extremity fractures and dislocations
<b>CO 3</b>	Physiotherapy management of spinal conditions
<b>CO 4</b>	Regional conditions of upper extremity
<b>CO 5</b>	Sports injuries and orthopedics surgery

**Unit-1 PT assessment for Musculoskeletal conditions –**

- i. SOAP format
- ii. Subjective - history taking, informed consent, personal, past, medical and socioeconomic history, chief complaints, history of present illness. Pain assessment – its intensity, character, aggravating and relieving factors, site and location.
- iii. Objective- on observation - body built swelling, muscle atrophy, deformities, posture and gait.
- iv. On palpation, tenderness-grades, muscle spasm, swelling-methods of swelling assessment, bony prominences, soft tissue texture and integrity, warmth and vasomotor disturbances.
- v. On examination – ROM – active and passive, resisted isometric tests, limb length-apparent, true and segmental, girth measurement, muscle length testing-tightness, contracture

**Fractures –**

- i. Types, classification, signs and symptoms, complications.
- ii. Fracture healing - factors affecting fracture healing. Principles of fracture management - reduction - open and closed, immobilization - sling, cast, brace, slab, traction - manual, mechanical, skin, skeletal, lumbar and Cervical traction, external fixation, functional cast bracing.
- iii. PT management in complications - early and late - shock, compartment syndrome, Volkman's Ischemic Contracture (VIC), fat embolism, delayed and mal union, Reflex Sympathetic Dystrophy (RSD), myositis ossificans, Avascular Necrosis (AVN), pressure sores etc.

- iv. Physiotherapy assessment in fracture cases.
- v. Aims of PT management in fracture cases - short- and long-term goals.
- vi. Principles of PT management in fractures - Guidelines for fracture treatment during period of immobilization and guidelines for treatment after immobilization period

## **Unit-2 Physiotherapy management for upper extremity fractures and dislocations**

- 1. PT assessment and management of upper limb fractures and dislocations.
- 2. PT assessment and management of lower limb fractures and dislocations including pelvis.
- 3. PT assessment and management spinal fractures
- 4. Selection and application of physiotherapeutic techniques, maneuver's, modalities for preventive, curative and rehabilitative means in all conditions.
- 5. Principles of various schools of thought in manual therapy. (Briefly Maitland and Mc-kenzie)

## **Unit-3 Physiotherapy management of Spinal Conditions**

- 1. Review the causes, signs and symptoms, investigations, radiological features, neurological signs.
- 2. PT assessment, aims, and management and home program of the following conditions: Cervical Spondylosis, Lumbar Spondylosis, Spondylolisthesis, Spinal canal stenosis, Spondylolysis, Sacro-iliac joint dysfunction, Sacralisation, Lumbarisation, Intervertebral disc prolapse, Coccydynia, Spina bifida occulta
- 3. Effects of spinal traction, types of traction, modes of application, indications for spinal traction, contraindications, precautions, limitations of traction

## **Unit-4 Shoulder joint:**

Shoulder instabilities, TOS, RSD, Impingement syndrome - conservative and post-operative PT management. Total shoulder replacement and Hemi replacement. - Post operative PT management. AC joint injuries - rehabilitation. Rotator cuff tears-conservative and surgical repair. Sub acromial decompression- Post operative PT management

### **Elbow and forearm:**

Excision of radial head - Post operative PT management. Total elbow arthroplasty- Post operative PT management

### **Wrist and Hand:**

Total wrist arthroplasty. Repair of ruptured extensor tendons. Carpal tunnel syndrome. Flexor and extensor tendon lacerations - Post operative PT management

## **Unit-5 SPORTS CONDITIONS**

- 1. **Introduction to sports physiotherapy:** Scope of physiotherapy in sports 1 hour
- 2. **Assessment and evaluation of players:** Clinical examination, investigative procedures and documentation of sports injuries and pre- participation evaluation of sports players 1 hours
- 3. **Physical fitness:** assessment and evaluation of components of physical fitness including functional tests: muscle strength, flexibility, agility, balance, co-ordination, sensory deficits, cardio-pulmonary endurance. 1 hours



**4. Patho-mechanics and examination of sports injuries:** causes and mechanism of sports injuries. Examination of sports injuries in upper extremity, thorax and abdomen, head, neck and face, lower extremity, and spine

**5. Prevention and management of sports injuries:** prevention of sports injuries, management of acute sports injuries and advanced rehabilitation of sports players. Treatment guidelines for soft tissue injuries- Acute, Sub acute and chronic stages. Repair of soft tissues- rupture of muscle, tendon, and Ligamentous tears. Soft tissue injuries- prevention and rehabilitation of, Lateral ligament sprain of ankle. Rotator cuff injuries. Collateral and Cruciate injuries of knee. Meniscal injuries of knee. Supraspinatus and Bicipital tendonitis. Pre patellar and Sub-acromial bursitis. Tennis and Golfer's elbow. Hamstring strains, Quadriceps contusion, TA rupture. Dequervain's tenosynovitis. Trigger and Mallet finger. Plantar fasciitis. Wrist sprains

**6. Enhancing sports performance:** Sports psychology and nutrition

**Orthopaedic surgeries:**

Pre and post-operative PT assessment, goals, precautions and PT management of following surgeries such as: Arthrodesis, Osteotomy, Arthroplasty-partial and total - Excision arthroplasty, excision arthroplasty with implant, interposition arthroplasty and total replacement; Tendon transplant, Soft tissue release- tenotomy, myotomy, lengthening; Arthroscopy, Spinal stabilization, Re-attachment of limbs, External fixators, Synovectomy

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<b>Course</b> <b>Physiotherapy in</b> <b>Orthopedics and Sports</b> <b>Injury-1 Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credit</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BPY030A</b>

**COURSE OBJECTIVES:** At the end of the course the students will be able to learn all the practical approaches of all the topics discussed in theory.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate practical approaches of physiotherapy in Orthopedic Conditions and Sports Injury
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**Unit-1** Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.

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<b>Course</b> <b>Clinical Neurology and</b> <b>Neurosurgery-1</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BPY031A</b>

**COURSE OBJECTIVES** - This subject follows the basic science subjects to provide the knowledge about relevant aspects of neurology & neurosurgery. The student will have a general understanding of the diseases the therapist would encounter in their practice. The objective of this course is that after all lectures and discussion the student will be able to list the etiology, pathology, clinical features, and treatment methods for various neurological conditions

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Foundational concepts of Clinical Neurological Evaluation
<b>CO 2</b>	Neurodegenerative Disorders
<b>CO 3</b>	Disorders of Cranial nerves, peripheral nerves and behavior
<b>CO 4</b>	Traumatic Brain Injury
<b>CO 5</b>	Infections of Brain and Spinal Cord

- Unit-1**
1. Principles of clinical diagnosis, higher mental function, assessment of brain & spinal cord function, evaluation of cranial nerves and evaluation of autonomic nervous system.
  2. Neurological Investigations: principles, methods, views, normal/abnormal values/features, types of following investigative procedures- skull x-ray, CT, MRI, evoked potentials, lumbar puncture, CSF examination, EMG, NCV
  3. Classification of neurological involvement depending on level of lesion.
  4. Neuro Intensive Care Unit

## **Unit-2 Neurodegenerative Disorders**

Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, and complications of following disorders –

a). Amyotrophic lateral sclerosis

b). Multiple sclerosis

c). Myasthenia Gravis

d). Pyramidal and Extra Pyramidal Disorders

### **Unit-3 1. Polyneuropathies:**

a). Classification and Features of Peripheral Nerve Injuries

b). Guillain-Barre syndrome – Causes, clinical features, management of GBS

### **2. Diseases of Cranial Nerves**

**3. Neuro-ophthalmology:** Assessment of visual function – acuity, field, color vision, Pupillary reflex, accommodation reflex, abnormalities of optic disc, disorders of optic nerve, tract, radiation, occipital pole, disorders of higher visual processing, disorders of pupil, disorders of eye movements, central disorders of eye movement

**4. Deafness, vertigo, and imbalance:** Physiology of hearing, disorders of hearing, examination & investigations of hearing, tests of vestibular function, vertigo, peripheral vestibular disorders, central vestibular vertigo.

### **Unit-4 Traumatic Brain Injury**

1. Head Injury: Etiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications.

2. Neurogenic Bladder

3. Higher cortical, neuro psychological and neurobehavioral disorders:

Causes of blackouts, physiological nature of Epilepsy, classification, clinical features, investigations, medical & surgical management of following disorders –

Non-epileptic attacks of childhood, Epilepsy in childhood, Seizures, and Epilepsy syndromes in adult.

Classification and clinical features of Dyssomnias, Parasomnias, Dementia, Obsessive-compulsive disorders.

Neural basis of consciousness, causes & investigations of Coma, criteria for diagnosis of Brain death.

Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, management of Perceptual disorders and Speech disorders.

### **Unit-5 Infections of brain and spinal cord:**

Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders –

a) Meningitis

b) Encephalitis,

c) Poliomyelitis and

- d) Post polio syndrome.
- e) Complications of systemic infections on nervous system – Septic encephalopathy, AIDS, Rheumatic fever, Brucellosis, Tetanus, and Pertussis.

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<b>Course</b> <b>Physiotherapy in Clinical</b> <b>Neurology and</b> <b>Neurosurgery-1</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BPY032A</b>

### **COURSE OBJECTIVES:**

The subject serves to integrate the knowledge gained by the students in neurology and neurosurgery with skills to apply these in clinical situations of dysfunction and neurological pathology. The objective of the course is that after the specified hours of lectures and demonstrations the student will be able to identify disabilities due to neurological dysfunction, plan and set treatment goals and apply the skills gained in exercise therapy and electrotherapy in these clinical situations to restore neurological function.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Foundational Concepts of Physiotherapy Assessment of Neurological Conditions
<b>CO 2</b>	Neurorehabilitation Approaches
<b>CO 3</b>	Physiotherapy Management of Neurological Gait
<b>CO 4</b>	Physiotherapy Management of Nerve Disorders and Injuries
<b>CO 5</b>	Physiotherapy Management of Neurodegenerative Disorders and Traumatic Brain Injury

### **Unit-1 Neurological Physiotherapy Assessment:**

Required materials for examination, Chief complaints, History taking – Present, Past, medical, familial, personal histories, Observation, Palpation, Higher mental function – Consciousness, Orientation, Wakefulness, memory, Speech, Reading, Language, Writing, Calculations, Perception, Left right confusion, Reasoning, and Judgment, Motor Examination – Muscle power, Muscle tone, Spasticity, Flaccidity, Reflexes – Developmental reflexes, deep tendon reflexes, Superficial reflexes, Sensory examination – Superficial, Deep and Cortical sensations, Special tests – Romberg's, Kernig's sign, Brudzki sign, Tinels's sign, Slum test, Lehermitte's sign, Bells Phenomenon, Gower's sign, Sun set sign, Battle's sign,

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Glabellar tap sign, etc, Balance examination, coordination examination, Gait analysis – Kinetics & Kinematics (Quantitative & Qualitative analysis), Functional Analysis, Assessment tools & Scales – Modified Ashworth scale, Berg balance scale, FIM, Barthel index, Glasgow coma scale, Mini mental state examination, Rancho Los Amigos Scale for Head injury, APGAR score, ASIA scale, Reflex Grading. Differential diagnosis

#### **Unit-2 Neuro Rehabilitation Approaches:**

Neuro physiological Techniques – Concepts, Principles, Techniques, Effects of following Neurophysiological techniques: NDT, PNF, Rood's Sensory motor Approach, Sensory Integration Approach, Brunnstorm movement therapy, Motor relearning program, Contemporary task-oriented approach, Muscle re-education approach and Constraint induced movement therapy.

#### **Unit-3 Assessment and management of Neurological gaits:**

Quantitative and Qualitative (Kinetic & Kinematics) analysis, List of Problems, short- & Long-Term goals, Management of following Neurological Gaits – Hemiplegic gait, Parkinson gait, High step gait, Hyperkinetic gait, Hypokinetic gait, Waddling gait, Scissoring gait, Spastic gait, Choreaform Gait, Diplegic Gait, and Myopathic Gait.

#### **Unit-4 PT Management of Nerve Injuries and Disorders**

Assessment and PT Management of –

- a) Bell's palsy
- b) Facial palsy
- c) Trigeminal Neuralgia
- d) PNI
- e) GBS

#### **Unit-5 PT Management of Neuro-degenerative disorders and TBI:**

Assessment and PT Management of –

- a) Multiple Sclerosis
- b) Myasthenia Gravis
- c) MND
- d) ALS

- e) Parkinson's Disease
- f) Head Injury

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<b>Course</b> <b>Physiotherapy in Clinical</b> <b>Neurology and</b> <b>Neurosurgery-1 Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credit</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BPY033A</b>

### **COURSE OBJECTIVES:**

At the end of the course the students will be able to learn all the practical approaches of all the topics discussed in theory.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate practical approaches of physiotherapy in Neurological and Neuro-Surgical Conditions
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**Unit-1** Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>5</b>
<b>Course</b> <b>Community Physiotherapy</b>	<b>Course</b> <b>Description</b> <b>Core Practical</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BPY034A</b>

## COURSE OBJECTIVES

The subject serves to integrate the knowledge gained by the students in community medicine and other areas with skills to apply these in clinical situations of health and disease and its prevention. The objective of the course is that after the specified hours of lectures and demonstrations the student will be able to identify rehabilitation methods to prevent disabilities and dysfunctions due to various disease conditions and plan and set treatment goals and apply the skills gained in rehabilitating and restoring functions.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Introduction, principles, planning and management of Community Based Rehabilitation
<b>CO 2</b>	Disability and disability evaluation
<b>CO 3</b>	Role of Government, Social Work and Voluntary Organizations in CBR and different Rehabilitation Programs
<b>CO 4</b>	Role of Physiotherapy in Community Based Rehabilitation
<b>CO 5</b>	Geriatrics, Industrial Health and Ergonomics including Occupational, Psychological and Biological Hazards.

## UNIT 1

- Rehabilitation: Definition, Types
- Community:** Definition of Community, Multiplicity of Communities, and Community based approach, Community Entry strategies, Community Based Rehabilitation (CBR) and Community development, Community initiated versus community-oriented programme, Community participation and mobilization
- Introduction to Community Based Rehabilitation:** Definition, Historical review, Concept of CBR, Need for CBR, Difference between Institution based and Community based Rehabilitation, Objectives of CBR, Scope of CBR, Members of CBR team, Modelsof CBR

  
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- iv. **Principles of Community based Rehabilitation:** W.H.O.'s policies-about rural health care- concept of primary /tertiary health centers-district hospitals etc., Role of P.T.- Principles of a team work of Medical person/P.T./O.T. audiologist/speech therapist /P.&O./vocational guide in C.B.R. of physically handicapped person, Agencies involved in rehabilitation of physical handicapped - Legislation for physically handicapped. Concept of multipurpose health worker. Role of family members in the rehabilitation of a physically handicapped
- v. **Planning and management of CBR Programmes:** CBR Programmed planning and management, Ownership and Governance, Decentralization and CBR, Management of CBR, programmed sustainability, Communication and Coordination, Community participation, mobilization and awareness, CBR programme influence on promoting and developing public policies

## UNIT 2

- i. **Disability:** Definition of Impairment, Handicap and Disability, Difference between impairment, handicap and disability, causes of disability, Types of disability, Prevention of disability, Disability in developed countries, Disability in developing countries. Disability Surveys: Demography. Screening: Early detection of disabilities and developmental disorders, Prevention of disabilities- Types and levels
- ii. **Disability Evaluation:** Introduction, What, Why and How to evaluate, Quantitative versus Qualitative data, Uses of evaluation findings.
- iii. **Orthotics, Prosthetics, Splints and wheel chair**

## UNIT 3

- i. **Role of Government in CBR:** Laws, Policies, Programme, Human Rights Policy, Present rehabilitation services, Legal aspects of rehabilitation
- ii. **Role of Social work in CBR:** Definition of social work, Methods of social work, History of social work, Role of social worker in rehabilitation
- iii. **Role of voluntary Organizations in CBR:** Charitable Organizations, Voluntary health agencies, National level and International NGO's, Multilateral and Bilateral agencies. International Health Organizations: WHO, UNICEF, UNDP, UNFPA, FAO, ILO, World bank, USAID, SIDA, DANIDA, Rockefeller, Ford foundation, CARE, REDCROSS.
- iv. **National District Level Rehabilitation Programme:** Charitable Organizations, Voluntary health agencies, National level and International NGO's, Multilateral and Bilateral agencies. International Health Organizations: WHO, UNICEF, UNDP, UNFPA, FAO, ILO, World bank, USAID, SIDA, DANIDA, Rockefeller, Ford foundation, CARE, REDCROSS.

## UNIT 4

- i. **Role of Physiotherapy in CBR:** Screening for disabilities, Prescribing exercise programme, Prescribing and devising low cost locally available assistive aids, Modifications physical and architectural barriers for disabled, Disability prevention, Strategies to improve ADL, Rehabilitation programmes for various neuro-musculoskeletal and cardiothoracic disabilities
- ii. **Screening and rehabilitation of paediatric disorders in the community:** Early detection of high risk babies, Maternal nutrition and education, Rehabilitation of Cerebral Palsy, Polio, Downs Syndrome, Muscular Dystrophies etc., Prevention and rehabilitation of

- mental retardation and Behavioural disorders, Immunization programmes, Early intervention in high risk babies, Genetic counselling
- iii. **Extension services and mobile units:** Introduction, Need, Camp approach
- iv. **Vocational training in rehabilitation:** Introduction, Need, Vocational evaluation, Vocational rehabilitation services

## UNIT 5

- i. **Geriatrics:** Physiology of Aging /degenerative changes- Musculoskeletal/Neuromotor/cardio-respiratory-/Metabolic, Endocrine, Cognitive, Immune systems. Role of Physiotherapy in Hospital based care, Half-way homes, Residential homes, Meals on wheels etc. Home for the aged, Institution based Geriatric Rehabilitation. Few conditions: - Alzheimer's disease, Dementia, Parkinson's Disease, Incontinence, Iatrogenic drug reactions, etc. Ethics of Geriatric Rehabilitation
- ii. **Industrial Health & Ergonomics-** Occupational Hazards in the industrial area:
- I. Accidents due to
- a) Physical agents-e.g.-Heat/cold, light, noise, Vibration, U.V. radiation, Ionizing radiation
- b) Chemical Agents-Inhalation, local action, ingestion
- II. Accidents due to
- a) Mechanical hazards-overuse/fatigue injuries due to ergonomic alteration & ergonomic evaluation of workplace-mechanical stresses per hierarchy
- ☐ sedentary table work –executives, clerk
- ☐ inappropriate seating arrangement- vehicle drivers
- ☐ constant standing- watchman- Défense forces, surgeons
- ☐ Over-exertion in laborers, common accidents - Role of P.T.-Stress management
- b) Psychological hazards- e.g. executives, monotonicity & dissatisfaction in job, anxiety of work completion with quality, Role of P.T. in Industrial setup & Stress management-relaxation modes
- c) Biological Hazards

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>5</b>
<b>Course</b> <b>Community Physiotherapy</b> <b>- Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credit</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BPY035A</b>

### **COURSE OBJECTIVES:**

At the end of the course the students will be able to learn all the practical approaches of all the topics discussed in theory.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate practical approaches of physiotherapy in Neurological and Neuro-Surgical Conditions
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**Unit-1** Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>6</b>
<b>Course</b> <b>Clinical Orthopedics and</b> <b>Sports Injury-2</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BPY036A</b>

**COURSE OBJECTIVES** - This subject follows the basic science subjects to provide the knowledge about Orthopedic conditions the therapist would encounter in their practice. The objective of this course is that after completion of the lectures and discussion the student will be able to demonstrate an understanding of orthopedic conditions causing disability, list the etiology, clinical features and methods of investigations and management.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Fractures of Spine
<b>CO 2</b>	Fractures and Dislocations of Upper Limb
<b>CO 3</b>	Fractures and Dislocations of Lower Limb
<b>CO 4</b>	Deformities
<b>CO 5</b>	Diseases of Bones and Joints

#### **Unit-1 Introduction**

- Introduction to musculoskeletal conditions.
- Clinical examination in musculoskeletal disorders.
- Common investigative procedures
- Radiological and Imaging techniques in musculoskeletal conditions.
- Inflammation and repair, soft tissue healing

#### **Traumatology**

- Fracture: definition, types, signs, and symptoms
- Fracture healing
- Complications of fractures
- Conservative and surgical approaches
- Principles of management – reduction (open/closed, immobilization etc)
- Subluxation/dislocations – definition, signs and symptoms, management (conservative and operative)

#### **Unit-2 Fractures and Dislocations of Upper Limb**

- Fractures of Upper Limb - causes, clinical features, mechanism of injury, complications, conservative and surgical management of the following fractures:**

  
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- i. Fractures of clavicle and scapula
- ii. Fractures of greater tuberosity and neck of humerus
- iii. Fracture shaft of humerus
- iv. Supracondylar fracture of humerus
- v. Fractures of capitulum, radial head, olecranon, coronoid, and epicondyles
- vi. Side swipe injury of elbow
- vii. Both bone fractures of ulna and radius
- viii. Fracture of forearm – Monteggia, Galeazzi fracture–dislocation
- ix. Chauffeur's fracture
- x. Colle's fracture
- xi. Smith's fracture
- xii. Scaphoid fracture
- xiii. Fracture of the metacarpals
- xiv. Bennett's fracture
- xv. Fracture of the phalanges. (Proximal and middle)

#### **b) Dislocations of Upper Limb-**

- i. Anterior dislocation of shoulder – mechanism of injury, clinical feature, complications, conservative management (Kocher's and Hippocrates manoeuvre), surgical management (putti plat, bankart's) etc
- ii. Recurrent dislocation of shoulder
- iii. Posterior dislocation of shoulder – mechanism of injury, clinical features, and management
- iv. Posterior dislocation of elbow – mechanism of injury, clinical feature, complications & management

**Hand Injuries** - mechanism of injury, clinical features, and management of the following–

- a) Crush injuries
- b) Flexor and extensor injuries
- c) Burn injuries of hand

#### **Unit-3 Fracture of Spine**

a) **Fracture of Cervical Spine** - Mechanism of injury, clinical feature, complications (quadriplegia); Management- immobilization (collar, cast, brace, traction); Management for stabilization, management of complication (bladder and bowel, quadriplegia)

- ☐ Clay shoveller's fracture
- ☐ Hangman's fracture
- ☐ Fracture odontoid
- ☐ Fracture of atlas

b) **Fracture of Thoracic and Lumbar Regions** - Mechanism of injury, clinical features, and management— conservative and surgical of common fractures around thoracic and lumbar regions

- ☐ Fracture of coccyx
- ☐ Fracture of Rib Cage - Mechanism of injury, clinical features, management for Fracture Ribs, Fracture of sternum

**Cervical and Lumbar Pathology:** Causes, clinical feature, patho-physiology, investigations, management-Medical and surgical for the following:

- a) Prolapsed Intervertebral Disc (PID)
- b) Spinal Canal Stenosis
- c) Spondylosis (cervical and lumbar)
- d) Spondylolysis
- e) Spondylolisthesis
- f) Lumbago/ Lumbosacral strain
- g) Sacralisation
- h) Lumbarisation
- i) Coccydynia
- j) Hemivertebra

#### **Unit-4 Regional Conditions**

Definition, Clinical features, and management of the following regional conditions

- a) Shoulder: Periarthritis shoulder (adhesive capsulitis), Rotator cuff tendinitis, Supraspinatus Tendinitis, Infraspinatus Tendinitis, Bicipital Tendinitis, Subacromial Bursitis
- b) Elbow: Tennis Elbow, Golfer's Elbow, Olecranon Bursitis (student's elbow) Triceps Tendinitis
- c) Wrist and Hand: De Quervain's Tenosynovitis, Ganglion, Trigger Finger/ Thumb, Mallet Finger, Carpal Tunnel Syndrome, Dupuytren's Contracture
- d) Pelvis and Hip: IT Band Syndrome, Piriformis Syndrome, Trochanteric Bursitis
- e) Knee: Osteochondritis Dissecans, Prepatellar and Suprapatellar Bursitis Popliteal Tendinitis, Patellar Tendinitis, Chondromalacia Patella, Plica Syndrome, Fat Pad Syndrome (Hoffa's syndrome)
- f) Ankle and Foot: Ankle Sprains, Plantar Fasciitis / Calcaneal Spur, Tarsal Tunnel Syndrome, Achilles Tendinitis, Metatarsalgia, Morton's Neuroma

#### **Unit-5 Soft Tissue Injuries**

- a) Define terms such as sprains, strains, contusion, tendinitis, rupture, Tenosynovitis, Tendinosis, bursitis
- b) Mechanism of injury of each, clinical features, managements- conservative and surgical of the following soft tissue injuries:
  - i. Meniscal injuries of knee
  - ii. Cruciate injuries of knee
  - iii. Medial and lateral collateral injuries of knee
  - iv. Lateral ligament of ankle
  - v. Wrist sprains
  - vi. Strains- quadriceps, hamstrings, calf, biceps, triceps etc
  - vii. Contusions- quadriceps, gluteal, calf, deltoid etc
  - viii. Tendon ruptures-Achilles, rotator cuff muscles, biceps, pectorals etc

**Orthopedic Surgeries:** Indications, Classification, Types, Principles of management of the following Surgeries: 3 Hours

- a) Arthrodesis
- b) Arthroplasty (partial and total replacement)
- c) Osteotomy
- d) External fixators
- e) Spinal stabilization surgeries (Harrington's, Luque's, Steffi plating) etc
- f) Limb reattachments



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<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>6</b>
<b>Course</b> <b>Physiotherapy in</b> <b>Orthopedics and Sports</b> <b>Injury-2</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BPY037A</b>

**COURSE OBJECTIVES** - The subject serves to integrate the knowledge gained by the students in orthopedics and traumatology with skills to apply these in clinical situations of dysfunction and musculoskeletal pathology. The objective of the course is that after the specified hours of lectures and demonstrations the student will be able to identify disabilities due to musculoskeletal dysfunction, plan and set treatment goals and apply the skills gained in exercise therapy and electrotherapy in these clinical situations to restore musculoskeletal function.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Physiotherapy Management of Spinal Fractures
<b>CO 2</b>	Physiotherapy Management of Fractures and Dislocations of Upper Limb
<b>CO 3</b>	Physiotherapy Management of Fractures and Dislocations of Lower Limb
<b>CO 4</b>	Physiotherapy Management of Deformities
<b>CO 5</b>	Physiotherapy Management of Diseases of Bones and Joints

**Unit-1 PT assessment for Musculoskeletal conditions –**

- vi. SOAP format
- vii. Subjective - history taking, informed consent, personal, past, medical and socioeconomic history, chief complaints, history of present illness. Pain assessment – its intensity, character, aggravating and relieving factors, site and location.
- viii. Objective- on observation - body built swelling, muscle atrophy, deformities, posture and gait.
- ix. On palpation, tenderness-grades, muscle spasm, swelling-methods of swelling assessment, bony prominences, soft tissue texture and integrity, warmth and vasomotor disturbances.
- x. On examination – ROM – active and passive, resisted isometric tests, limb length-apparent, true and segmental, girth measurement, muscle length testing-tightness, contracture

**Fractures –**

- vii. Types, classification, signs and symptoms, complications.
- viii. Fracture healing - factors affecting fracture healing. Principles of fracture management - reduction - open and closed, immobilization - sling, cast, brace, slab, traction - manual, mechanical, skin, skeletal, lumbar and Cervical traction, external fixation, functional cast bracing.
- ix. PT management in complications - early and late - shock, compartment syndrome, Volkman's Ischemic Contracture (VIC), fat embolism, delayed and mal union, Reflex Sympathetic Dystrophy (RSD), myositis ossificans, Avascular Necrosis (AVN), pressure sores etc.

- x. Physiotherapy assessment in fracture cases.
- xi. Aims of PT management in fracture cases - short- and long-term goals.
- xii. Principles of PT management in fractures - Guidelines for fracture treatment during period of immobilization and guidelines for treatment after immobilization period

## **Unit-2 Physiotherapy management for upper extremity fractures and dislocations**

- 6. PT assessment and management of upper limb fractures and dislocations.
- 7. PT assessment and management of lower limb fractures and dislocations including pelvis.
- 8. PT assessment and management spinal fractures
- 9. Selection and application of physiotherapeutic techniques, maneuver's, modalities for preventive, curative and rehabilitative means in all conditions.
- 10. Principles of various schools of thought in manual therapy. (Briefly Maitland and Mc-kenzie)

## **Unit-3 Physiotherapy management of Spinal Conditions**

- 4. Review the causes, signs and symptoms, investigations, radiological features, neurological signs.
- 5. PT assessment, aims, and management and home program of the following conditions: Cervical Spondylosis, Lumbar Spondylosis, Spondylolisthesis, Spinal canal stenosis, Spondylolysis, Sacro-iliac joint dysfunction, Sacralisation, Lumbarisation, Intervertebral disc prolapse, Coccydynia, Spina bifida occulta
- 6. Effects of spinal traction, types of traction, modes of application, indications for spinal traction, contraindications, precautions, limitations of traction

## **Unit-4 Shoulder joint:**

Shoulder instabilities, TOS, RSD, Impingement syndrome - conservative and post-operative PT management. Total shoulder replacement and Hemi replacement. - Post operative PT management. AC joint injuries - rehabilitation. Rotator cuff tears-conservative and surgical repair. Sub acromial decompression- Post operative PT management

### **Elbow and forearm:**

Excision of radial head - Post operative PT management. Total elbow arthroplasty- Post operative PT management

### **Wrist and Hand:**

Total wrist arthroplasty. Repair of ruptured extensor tendons. Carpal tunnel syndrome. Flexor and extensor tendon lacerations - Post operative PT management

## **Unit-5 SPORTS CONDITIONS**

- 1. **Introduction to sports physiotherapy:** Scope of physiotherapy in sports 1 hour
- 2. **Assessment and evaluation of players:** Clinical examination, investigative procedures and documentation of sports injuries and pre- participation evaluation of sports players 1 hours
- 3. **Physical fitness:** assessment and evaluation of components of physical fitness including functional tests: muscle strength, flexibility, agility, balance, co-ordination, sensory deficits, cardio-pulmonary endurance. 1 hours

**4. Patho-mechanics and examination of sports injuries:** causes and mechanism of sports injuries. Examination of sports injuries in upper extremity, thorax and abdomen, head, neck and face, lower extremity, and spine

**5. Prevention and management of sports injuries:** prevention of sports injuries, management of acute sports injuries and advanced rehabilitation of sports players. Treatment guidelines for soft tissue injuries- Acute, Sub acute and chronic stages. Repair of soft tissues- rupture of muscle, tendon, and Ligamentous tears. Soft tissue injuries- prevention and rehabilitation of, Lateral ligament sprain of ankle. Rotator cuff injuries. Collateral and Cruciate injuries of knee. Meniscal injuries of knee. Supraspinatus and Bicipital tendonitis. Pre patellar and Sub-acromial bursitis. Tennis and Golfer's elbow. Hamstring strains, Quadriceps contusion, TA rupture. Dequervain's tenosynovitis. Trigger and Mallet finger. Plantar fasciitis. Wrist sprains

**6. Enhancing sports performance:** Sports psychology and nutrition

**Orthopaedic surgeries:**

Pre and post-operative PT assessment, goals, precautions and PT management of following surgeries such as: Arthrodesis, Osteotomy, Arthroplasty-partial and total - Excision arthroplasty, excision arthroplasty with implant, interposition arthroplasty and total replacement; Tendon transplant, Soft tissue release- tenotomy, myotomy, lengthening; Arthroscopy, Spinal stabilization, Re-attachment of limbs, External fixators, Synovectomy

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>6</b>
<b>Course</b> <b>Physiotherapy in</b> <b>Orthopedics and Sports</b> <b>Injury-1I Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credit</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BPY038A</b>

**COURSE OBJECTIVES:** At the end of the course the students will be able to learn all the practical approaches of all the topics discussed in theory.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate practical approaches of physiotherapy in Orthopedic Conditions and Sports Injury
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**Unit-1** Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>6</b>
<b>Course</b> <b>Neurology and</b> <b>Neurosurgery-II</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BPY039A</b>

**COURSE OBJECTIVES** - This subject follows the basic science subjects to provide the knowledge about relevant aspects of neurology & neurosurgery. The student will have a general understanding of the diseases the therapist would encounter in their practice. The objective of this course is that after all lectures and discussion the student will be able to list the etiology, pathology, clinical features, and treatment methods for various neurological conditions

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Stroke and Cerebrovascular Diseases
<b>CO 2</b>	Spinal Cord Injuries and Disorders
<b>CO 3</b>	Pediatric Neurology
<b>CO 4</b>	Brain and Spinal Cord Tumors
<b>CO 5</b>	Cerebellar Coordination and Movement Disorders

## **Stroke**

### **Unit-1**

1. Cerebrovascular diseases: Define stroke, TIA, RIA, stroke in evolution, multi-infarct dementia and Lacunar infarct.
2. Classification of stroke – Ischemic, hemorrhagic, venous infarcts. Risk factors, cause of ischemic stroke, causes of hemorrhagic stroke.
3. Classification of hemorrhagic stroke, classification of stroke based on symptoms, stroke syndrome, investigations, differential diagnosis, medical and surgical management.

## **Spinal Cord Injuries and Disorders**

Functions of tracts, definition, etiology, risk factors, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders –

### **Unit-2**

1. Spinal cord injury

2. Compression by IVD prolapse,
3. Spinal epidural abscess
4. Transverse myelitis, Viral myelitis
5. Syringomyelia
6. Spina bifida

### **Unit-3 Pediatric Neurology**

Classification, clinical features, investigations, medical and surgical management of :

1. Cerebral palsy
2. Hydrocephalus
3. Arnold-chiari malformation
4. Muscular Dystrophy
5. Down's syndrome

### **Unit-4 Brain and Spinal Cord Tumors**

Classification, clinical features, investigations, medical and surgical management of

1. Brain Tumours
2. Spinal Cord Tumours

### **Unit-5 Cerebellar Coordination and Movement Disorders:**

Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders –

1. Movement disorders:
  - a) Parkinson's disease, Dystonia, Chorea, Ballism, Athedosis
  - b) Myoclonus and Wilson's disease
2. Cerebellar and coordination disorders:
  - a) Ataxia
  - b) Tabes dorsalis
  - c) Syphilis.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>6</b>
<b>Course</b> <b>Physiotherapy in</b> <b>Neurology and</b> <b>Neurosurgery-II</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BPY040A</b>

### **COURSE OBJECTIVES:**

The subject serves to integrate the knowledge gained by the students in neurology and neurosurgery with skills to apply these in clinical situations of dysfunction and neurological pathology. The objective of the course is that after the specified hours of lectures and demonstrations the student will be able to identify disabilities due to neurological dysfunction, plan and set treatment goals and apply the skills gained in exercise therapy and electrotherapy in these clinical situations to restore neurological function.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Foundational Concepts of Physiotherapy Assessment of Neurological Conditions
<b>CO 2</b>	Neurorehabilitation Approaches
<b>CO 3</b>	Physiotherapy Management of Neurological Gait
<b>CO 4</b>	Physiotherapy Management of Nerve Disorders and Injuries
<b>CO 5</b>	Physiotherapy Management of Neurodegenerative Disorders and Traumatic Brain Injury

### **Unit-1 Neurological Physiotherapy Assessment:**


1. Assessment and PT Management of CVA and CVD
2. Pre and Post-Surgical Assessment and PT Management of Neuro Surgical Conditions

### **Unit-2 Neuro Rehabilitation Approaches:**

Neuro physiological Techniques – Concepts, Principles, Techniques, Effects of following Neurophysiological techniques: NDT, PNF, Rood's Sensory motor Approach, Sensory Integration Approach, Brunnstorm movement therapy, Motor relearning program, Contemporary task-oriented approach, Muscle re-education approach and Constraint induced movement therapy.

### **Unit-3 Assessment and management of Neurological gaits:**

Quantitative and Qualitative (Kinetic & Kinematics) analysis, List of Problems, short- & Long-Term goals, Management of following Neurological Gaits –

  
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Hemiplegic gait, Parkinson gait, High step gait, Hyperkinetic gait, Hypokinetic gait, Waddling gait, Scissoring gait, Spastic gait, Choreaform Gait, Diplegic Gait, and Myopathic Gait.

#### **Unit-4 PT Management of Nerve Injuries and Disorders**

Assessment and PT Management of –

- f) Bell's palsy
- g) Facial palsy
- h) Trigeminal Neuralgia
- i) PNI
- j) GBS

#### **Unit-5 PT Management of Neuro-degenerative disorders and TBI:**

Assessment and PT Management of –

- g) Multiple Sclerosis
- h) Myasthenia Gravis
- i) MND
- j) ALS
- k) Parkinson's Disease
- l) Head Injury

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>6</b>
<b>Course</b> <b>Physiotherapy in Clinical</b> <b>Neurology and</b> <b>Neurosurgery-2 Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credit</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BPY041A</b>

### **COURSE OBJECTIVES:**

At the end of the course the students will be able to learn all the practical approaches of all the topics discussed in theory.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate practical approaches of physiotherapy in Neurological and Neuro-Surgical Conditions
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**Unit-1** Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>6</b>
<b>Course</b> <b>General Surgery</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credits</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BPY042A</b>

## **COURSE OBJECTIVES**

The subject serves to integrate the knowledge gained by the students in

community medicine and other areas with skills to apply these in clinical situations of health and disease

and its prevention. The objective of the course is that after the specified hours of lectures and demonstrations the student will be able to identify rehabilitation methods to prevent disabilities and dysfunctions due to various disease conditions and plan and set treatment goals and apply the skills gained in rehabilitating and restoring functions.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Fundamentals of general surgical procedures and intensive care
<b>CO 2</b>	Post-Operative Complications and their specific management
<b>CO 3</b>	Plastic Surgery
<b>CO 4</b>	Cardio-thoracic Surgery
<b>CO 5</b>	Abdominal Surgery

### **Unit 1. General Surgery -**

- (1) Principles of pre and postoperative management of surgical patients.
- (2) Shock - definition, types, clinical features, pathology and management
- (3) Hemorrhage - common sites, complication, clinical features and management.
- (4) Surgical intensive care.
- (5) Description of events frequently accompanying in general anesthesia, blood transfusion and physiological response of the body to surgery.
- (6) Wounds and wound infections, Sinuses and ulcers.
- (7) Burns: Degrees of burns and, management and reconstructive surgery following burns and complications of Burns.

### **Unit 2. Post operative complications & management**

II. Accidents due to

- a) Mechanical hazards-overuse/fatigue injuries due to ergonomic alteration & ergonomic evaluation of workplace-mechanical stresses per hierarchy

  
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- ☐ sedentary table work –executives, clerk
- ☐ inappropriate seating arrangement- vehicle drivers
- ☐ constant standing- watchman- Défense forces, surgeons
- ☐ Over-exertion in laborers, common accidents - Role of P.T.-Stress management

b) Psychological hazards- e.g. executives, monotonicity & dissatisfaction in job, anxiety of work completion with quality, Role of P.T. in Industrial setup & Stress management-relaxation modes

c) Biological Hazards

**Unit 3. Plastic Surgery** - Principles of sinuplasty, tendon transplant, cosmetic surgery, types of grafts, surgery of hand with emphasis on management of trauma and leprosy.

**Unit 4. Cardiothoracic Surgery** - Incisions for cardiothoracic surgery (Thoracotomy, Thoracoplasty, Lobectomy, Pneumonectomy, Decortication, CABG, Valvular Surgery, Congenital, Heart Disease Surgeries and Surgery for Peripheral Vascular Disease)

**Unit 5. Abdominal Surgery** - Incisions, complications and management of various abdominal surgeries.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>7</b>
<b>Course</b> <b>General Surgery 2</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BPY043A</b>

**COURSE OBJECTIVES** - This subject follows the basic science subjects to provide the knowledge about Surgical conditions the therapist would encounter in their practice. The objective of this course is that after completion of the lectures and discussion the student will be able to demonstrate an understanding of surgical conditions causing disability, list the etiology, clinical features and methods of investigations and management.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Physiology of menstrual cycle
<b>CO 2</b>	Pregnancy
<b>CO 3</b>	Prolapse of uterus and vagina
<b>CO 4</b>	Surgical procedures involving child birth
<b>CO 5</b>	Carcinoma of female reproductive organs

- Unit-1** Physiology of menstrual cycle –
- ovulation cycle,
  - uterine cycle,
  - Cx cycle,
  - duration,
  - amount
  - Hormonal regulation of menstruation,

- Unit-2** Pregnancy
- Diagnosis of pregnancy
  - Abortion
  - Physiological changes during pregnancy
  - High risk pregnancy, prenatal common complications – investigation and management
  - Normal puerperium, lactation
  - Family planning.

- Unit-3** Prolapse of uterus and vagina

- Unit-4** Surgical procedures involving child birth. a. Definition, Indications and Management of the following surgical procedures – pelvic repair, caesarian section, nephrectomy, Hysterosalphyngography, Dilatation and Curettage, Laproscopy, Colposcopy, Hysterectomy.
- Unit-5** Carcinoma of female reproductive organs – surgical management in brief Mastectomy – Simple, radical. Hysterectomy


<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>7</b>
<b>Course</b> <b>Physiotherapy in</b> <b>General Surgery-2</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BPY044A</b>

**COURSE OBJECTIVES** - The subject serves to integrate the knowledge gained by the students in surgical and traumatology with skills to apply these in clinical situations of dysfunction and pathology. The objective of the course is that after the specified hours of lectures and demonstrations the student will be able to identify disabilities due to dysfunction, plan and set treatment goals and apply the skills gained in exercise therapy and electrotherapy in these clinical situations to restore musculoskeletal function.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Physiotherapy in Mother and Child care
<b>CO 2</b>	Physiotherapy in pre and post-operative conditions
<b>CO 3</b>	Physiotherapy Management of Burn and Wound
<b>CO 4</b>	Physiotherapy Management in dermatology
<b>CO 5</b>	Physiotherapy Management in Oncology

- Unit-1** 1. Physiotherapy in mother and child care – ante and post-natal management, early intervention and stimulation therapy in child care (movement therapy)  
2. Applied Yoga in Obstetric and Gynecological conditions
- Unit-2** Physiotherapy in pre and post-operative stages. Operations on upper G.I.T.- oesophagus, stomach, duodenum 8. Operations on large and small intestine – Appendisectomy, cholecystectomy, partial colectomy, ileostomy, hernia and herniotomy, hernioraphy, hernioplasty.
- Unit-3** Burns and its treatment – physiotherapy in burns, skin grafts, and reconstructive surgeries. . Management of wound ulcers- Care of ulcers and wounds - Care of surgical scars-U.V.R and other electro therapeutics for healing of wounds, prevention of Hyper-granulated Scars Keloids, Electrotherapeutics measures for relief of pain during mobilization of scars tissues.
- Unit-4** Physiotherapy in dermatology -Documentation of assessment, treatment and follow up skin conditions. U.V.R therapy in various skin conditions; Vitiligo; Hair loss; Pigmentation; Infected wounds ulcers. Faradic foot bath for Hyperhydrosis. Massage maneuvers for cosmetic purpose of

  
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skin; use of specific oil as medium; Care of anesthetic hand and foot; Evaluation, planning and management of leprosy-prescription, fitting and training with prosthetic and orthotic devices.

**Unit-5** Physiotherapy intervention in the management of Medical, Surgical and Radiation Oncology Cases.



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>7</b>
<b>Course</b> <b>Physiotherapy in</b> <b>General Surgery</b> <b>Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credit</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BPY045A</b>

**COURSE OBJECTIVES:** At the end of the course the students will be able to learn all the practical approaches of all the topics discussed in theory.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate practical approaches of physiotherapy in General Surgical Conditions
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**Unit-1** Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>7</b>
<b>Course</b> <b>General Medicine I</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BPY046A</b>

**COURSE OBJECTIVES** - This subject follows the basic science subjects to provide the knowledge about relevant aspects of medicine & pediatrics. The student will have a general understanding of the diseases the therapist would encounter in their practice. The objective of this course is that after all lectures and discussion the student will be able to list the etiology, pathology, clinical features, and treatment methods for various medical conditions

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Infections and Poisoning
<b>CO 2</b>	Endocrine Diseases
<b>CO 3</b>	Diseases of Blood
<b>CO 4</b>	Diseases of the digestive system
<b>CO 5</b>	Diseases of the Skin

#### **Unit-1**

Infection : Effects of Infection on the body – Pathology – source and spread of infection – vaccinations – generalized infections – rashes and infection – food poisoning and gastroenteritis – sexually transmitted diseases – HIV infections and Aids.

Poisoning: Clinical features – general management – common agents in poisoning – pharmaceutical agents – drugs of misuse – chemical pesticides – Envenomation.

#### **Unit-2**

Endocrine diseases: Common presenting symptoms of Endocrine disease – common classical disease presentations, clinical features and its management; Diabetes Mellitus: Etiology and pathogenesis of diabetes – clinical manifestations of the disease – management of the disease – Complications of diabetes

Diseases of the blood: Examinations of blood disorders – Clinical manifestations of blood disease; Anemia – signs and symptoms – types and management ; Hemophilia Cause – clinical

**Unit-3** features severity of disease – management – complications due to repeated hemorrhages – complications due to therapy

**Unit-4** Diseases of the digestive system : Clinical manifestations of gastrointestinal disease – Etiology, clinical features, diagnosis, complications and treatment of the following conditions : Reflux Oesophagitis, Achlasia Cardia, Carcinoma of Oesophagus, GI bleeding, Peptic Ulcer disease, Carcinoma of Stomach, Pancreatitis, Malabsorption Syndrome, Ulcerative Colitis, Peritonitis, Infections of Alimentary Tract ; Clinical manifestations of liver diseases - Aetiology, clinical features, diagnosis, complications and treatment of the following conditions : Viral Hepatitis, Wilson's Disease, Alpha1-antitrypsin deficiency, Tumors of the Liver, Gall stones, Cholecystitis.

**Unit-5** Diseases of the Skin: Examination and clinical manifestations of skin diseases; Causes, clinical features and management of the following skin conditions: Leprosy, Psoriasis, Pigmentary Anomalies, Vasomotor disorders, Dermatitis, Coccal and Fungal Parasitic and Viral infections.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>7</b>
<b>Course</b> <b>Community Medicine</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BPY047A</b>

### **COURSE OBJECTIVES:**

This subject follows the basic science subjects to provide the knowledge about conditions the therapist would encounter in their practice in the community. The objective of this course is that after 60 hrs of lectures and discussion the student will be able to demonstrate an understanding of various aspects of health and disease list the methods of health administration, health education and disease preventive measures


**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Health and Disease
<b>CO 2</b>	Epidemiology
<b>CO 3</b>	Public Health Administration
<b>CO 4</b>	Health Programs in India
<b>CO 5</b>	Family Planning

**Unit-1** Health and Disease: Definitions, Concepts, Dimensions and Indicators of Health, Concept of well-being, Spectrum and Determinants of Health, Concept and natural history of Disease, Concepts of disease control and prevention, Modes of Intervention, Population Medicine, The role of socio-economic and cultural environment in health and disease.

**Unit-2** Epidemiology, definition and scope. Principles of Epidemiology and Epidemiological methods: Components and Aims, Basic measurements, Methods, Uses of Epidemiology, Infectious disease epidemiology, Dynamics and modes of disease transmission, Host defenses and Immunizing agents, Hazards of Immunization, Disease prevention and control, Disinfection. Screening for Disease: Concept of screening, Aims and Objectives, Uses and types of screening.

**Unit-3** Public health administration- an overview of the health administration set up at Central and state levels. The national health programme-highlighting the role of social, economic and cultural factors

  
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in the implementation of the national programmes. Health problems of vulnerable groups- pregnant and lactating women, infants and pre-school children, occupational groups.

**Unit-4** Health programmes in India: Vector borne disease control programme, National leprosy eradication programme, National tuberculosis programme, National AIDS control programme, National programme for control of blindness, Iodine deficiency disorders (IDD) programme, Universal Immunisation programme, Reproductive and child health programme, National cancer control programme, National mental health programme. National diabetes control programme, National family welfare programme, National sanitation and water supply programme, Minimum needs programme.

**Unit-5** Demography and Family Planning: Demographic cycle, Fertility, Family planning-objectives of national family planning programme and family planning methods, A general idea of advantage and disadvantages of the methods.

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<b>Course</b> <b>Research Methodology</b> <b>and Bio-statistics Theory</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BPY048A</b>

**COURSE OBJECTIVE-** This course provides the knowledge and skills in Application of basic concepts of statistics & principles of scientific enquiry in planning and evaluating the results. Participate in or conduct descriptive, exploration, survey studies in Physiotherapy practice. Present data in appropriate methods

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Research Methodology
<b>CO 2</b>	Study and its Designs
<b>CO 3</b>	Sampling Designs and Outcome Measures
<b>CO 4</b>	Evidence Based Research
<b>CO 5</b>	Applied Bio-statistics

#### **Unit-1**

1. Introduction to research
2. Types of research
3. Defining a research question
4. Research Methods: Designing methodology, Reporting results, Type I and Type II bias.
5. Communicating research.

#### **Unit-2**

4. Qualitative study designs
  - a. Grounded theory and Phenomenological methods.
5. Use of Delphi process
6. Quantitative study
7. Type I and type II bias
8. Study design: types
  - a. Case study, Case series, longitudinal cohort, Pre post design, Time series design, repeated measures design, Randomized control design.

### **Unit-3**

9. Sampling design, calculating minimum sample size based on design



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10. Measurement: Properties of measurement: reliability, validity, responsiveness, MCID.

11. Outcome measures: Use of outcome measures in rehabilitation research

#### **Unit-4**

14. Evaluating published research: looking at the evidence

15. Introduction to evidence based practice, evaluating evidence,

16. Asking clinical questions

17. Translating of evidence into practice: strategies

18. Use of clinical practice guidelines, clinical pathways, prediction rules to inform practice.

#### **Unit-5**

1. Descriptive Statistics and measurement variability

2. Statistical inference

3. Comparison of group means: T-test

4. Analysis of variance

5. Multiple comparison tests

6. Non parametric tests

7. Correlations

8. Regression

9. Analysis of frequencies: Chi square

10. Statistical measure of reliability

11. Power analysis – Determining sample size

12. Epidemiological Measures – Rate, Ratio, Proportion, Incidence and prevalence, Relative risk,

Risk ratio, Odds ratio



<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>7</b>
<b>Course</b> <b>Cardiovascular and</b> <b>Pulmonary Conditions</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BPY049A</b>

**COURSE OBJECTIVES** -Following the basic science and clinical science course, this course introduces the Student in cardio-thoracic conditions which commonly cause disability. The objective of this course is that after lectures and demonstration in addition to clinics the student will be able to demonstrate an understanding of Cardio-thoracic conditions causing disability and their management. Particular effort is made in this course to avoid burdening the student with any detail pertaining to diagnosis which will not contribute to their understanding of the limitations imposed by cardiovascular pathology on the functioning of the individual.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Cardiovascular Diseases
<b>CO 2</b>	Disorders of the Heart
<b>CO 3</b>	Respiratory Diseases
<b>CO 4</b>	Chest Wall Disorders
<b>CO5</b>	Respiratory Tract Infections

**Unit-1** Cardiovascular Diseases : Examination of the Cardiovascular System Investigations : ECG, Exercise Stress Testing, Radiology ; Clinical manifestations of Cardiovascular disease ; Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following diseases and disorders of the heart : Pericarditis, Myocarditis, Endocarditis, Rheumatic Fever – resulting in valve disorders, Ischemic Heart Disease, Coronary Valve Disease, Congenital disorders of the Heart, Cardiac Arrest ; Examination and Investigations of diseases of arteries and veins ; Hypertension : Definition, causes, classification, types, assessment, investigations and management.

**Unit-2** Disorders of the Heart – Definition, Clinical features, diagnosis and choice of management for the following disorders : Congenital Heart diseases – Acyanotic congenital heart disease & Cyanotic congenital heart disease : Patent Ductus Arteriosus, Coarctation of Aorta, Atrial Septal Defect, Ventricular Septal Defect, Tetralogy of Fallot, Transposition of Great Vessels ; Acquired Heart

Disease – Mitral Stenosis & Insufficiency, Aortic Stenosis and Insufficiency, Ischemic Heart Disease – Coronary Artery Disease, Cardiac tumors.

**Unit-3** Respiratory Disease : Examination of the Respiratory System – Investigations : Chest Radiographs, Pulmonary Function Testing, Arterial Blood Gas Analysis ; Clinical manifestations of Lung disease ; Patterns of lung disease – Chronic Obstructive Lung Disease and Restrictive Lung Disease ; Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following lung diseases : Chronic Bronchitis, Emphysema, Asthma, Bronchiectasis, Cystic Fibrosis, Upper Respiratory Tract Infections, Pneumonia, Tuberculosis, Fungal Diseases, Interstitial Lung Diseases, Diseases of the pleura, diaphragm and chest wall ; Respiratory failure – Definition, types, causes, clinical features, diagnosis and management.

**Unit-4** Chest wall disorders- Definition, Clinical features, diagnosis and choice of management for the following disorders – chest wall deformities, chest wall tumors, Spontaneous Pneumothorax, Pleural Effusion, Empyema Thoracis, Lung abscess, Bronchiectasis, Tuberculosis, Bronchogenic Carcinoma, Bronchial Adenomas, Metastatic tumors of the Lung, tracheal Stenosis, Congenital tracheomalacia, Neoplasms of the trachea, Lesions of the Mediastinum. Carcinoma of the female breast.

**Unit 5** Respiratory Tract Infections, Pneumonia, Tuberculosis, Fungal Diseases, Interstitial Lung Diseases, Diseases of the pleura, diaphragm and chest wall ; Respiratory failure – Definition, types, causes, clinical features, diagnosis and management.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>8</b>
<b>Course</b> <b>Physiotherapy in</b> <b>Cardiovascular and</b> <b>Pulmonary Conditions</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BPY050A</b>

**COURSE OBJECTIVES** - The subject is designed to provide knowledge in assessing and planning physiotherapy interventions for various General, Medical and Surgical conditions. The student must be able to reassess the patient as necessary, to monitor the patient in regard to treatment, to monitor the patient's vital signs, student must know emergency drugs indication and contra-indication, care in intensive care unit (ICU) and to provide appropriate interventions to the patient.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Physiotherapy techniques to increase lung volume
<b>CO 2</b>	Physiotherapy to decrease work of breathing
<b>CO 3</b>	Physiotherapy techniques to clear secretions
<b>CO 4</b>	Physiotherapy in ICU
<b>CO 5</b>	Physiotherapy in Mechanical Ventilation

- Unit-1** Physiotherapy techniques to increase lung volume – controlled mobilization, positioning, breathing exercises, Neurophysiological Facilitation of Respiration, Mechanical aids - Incentive Spirometry, CPAP, IPPB.
- Unit-2** Physiotherapy techniques to decrease the work of breathing – Measures to optimize the balance between energy supply and demand, positioning, Breathing re-education – Breathing control techniques, mechanical aids – IPPB, CPAP, BiPAP.
- Unit-3** Physiotherapy techniques to clear secretions – Hydration, Humidification & Nebulisation, Mobilisation and Breathing exercises, Postural Drainage, Manual techniques – Percussion, Vibration and Shaking, Rib Springing, ACBT, Autogenic Drainage, Mechanical Aids – PEP, Flutter, IPPB, Facilitation of Cough and Huff, Nasopharyngeal Suctioning.

- Unit-4** Introduction to ICU : ICU monitoring –Apparatus, Airways and Tubes used in the ICU - Physiotherapy in the ICU – Common conditions in the ICU – Tetanus, Head Injury, Lung Disease, Pulmonary Oedema, Multiple Organ Failure, Neuromuscular Disease, Smoke Inhalation, Poisoning, Aspiration, Near Drowning, ARDS, Shock; Dealing with an Emergency Situation in the ICU.
- Unit-5** Respiratory failure – Oxygen Therapy and Mechanical Ventilation

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>8</b>
<b>Course</b> <b>Physiotherapy in</b> <b>Cardiovascular and</b> <b>Pulmonary Conditions</b> <b>Practical</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credit</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BPY051A</b>

**COURSE OBJECTIVES:** At the end of the course the students will be able to learn all the practical approaches of all the topics discussed in theory.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate practical approaches of physiotherapy in Cardiopulmonary Conditions
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**Unit-1** Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>8</b>
<b>Course</b> <b>General Medicine 2</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>4 credits</b>	<b>Hours per</b> <b>Semester</b> <b>4 hours</b>	<b>Course</b> <b>Code</b> <b>BPY052A</b>

**COURSE OBJECTIVES** - This subject follows the basic science subjects to provide the knowledge about relevant aspects of medicine & pediatrics. The student will have a general understanding of the diseases the therapist would encounter in their practice. The objective of this course is that after all lectures and discussion the student will be able to list the etiology, pathology, clinical features, and treatment methods for various medical conditions

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Low Birth Weight Babies
<b>CO 2</b>	Cerebral Palsy
<b>CO 3</b>	Sensory Disorders
<b>CO 4</b>	Psychiatric Disorders
<b>CO 5</b>	Spina Bifida and Muscular Dystrophy

**Unit-1**

Problems and management of LBW infants

Perinatal problems and management

Congenital abnormalities and management

Respiratory conditions of childhood

**Unit-2**

Cerebral Palsy – causes, complications, clinical manifestations, treatment ; Spina Bifida – management and treatment, Epilepsies – types, diagnosis and treatment; Recognizing developmental delay, common causes of delay ; Orthopedic and Neuromuscular disorders in childhood, clinical features and management

**Unit-3**

Sensory disorders – problems resulting from loss of vision and hearing ; Learning and behavioural problems – Hyperactivity, Autism, Challenging behaviours, Educational delay, Delayed Child.

**Unit-4** Psychiatric Disorders: Classifications, Causes, Clinical manifestations and treatment methods used in Psychiatry. Modalities of psychiatric treatment, Psychiatric illness and physiotherapy, Brief description of Etio-pathogenesis, manifestations, and management of psychiatric illnesses -. Anxiety neurosis, Depression, Obsessive compulsive neurosis, Psychosis, Maniac-depressive psychosis, Post-traumatic stress disorder, Psychosomatic reactions: Stress and Health, theories of Stress

**Unit-5** Spina Bifida  
Muscular Dystrophy

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>8</b>
<b>Course</b> <b>Physiotherapy in Medical</b> <b>Conditions</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>3 credits</b>	<b>Hours per</b> <b>Semester</b> <b>3 hours</b>	<b>Course</b> <b>Code</b> <b>BPY053A</b>

**COURSE OBJECTIVES:** At the end of the course the candidate will be able to: 1. Identify discuss and analyze medical dysfunctions based on pathophysiological principles and arrive at appropriate functional diagnosis. 2. Acquire knowledge of rationals of basic investigative approaches in the medical system 3. Execute effective physiotherapeutic measures (with appropriate clinical reasoning) and exercise, conditioning in general medical conditions. 4. Acquire knowledge of the overview of patient's care in the I.C.U. for bronchial hygiene and continuous monitoring of the patient in I.C.U. 5. Select strategies for cure, care and prevention, adopt restorative and rehabilitative measures for maximum possible functional independence of a patient at home, work and in community.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	PT Management of Cerebral Palsy
<b>CO 2</b>	PT Management of Spina Bifida
<b>CO 3</b>	PT Management of Muscular Dystrophy
<b>CO 4</b>	Diabetic Foot
<b>CO 5</b>	Mental Retardation

**Unit-1** PT assessment and rehab program for Cerebral Palsy

**Unit-2** PT assessment and rehab program for Spina Bifida

**Unit-3** PT assessment and rehab program for Muscular Dystrophy

**Unit-4** PT assessment and rehab program for Diabetic Foot

  
**Dr. Vishal Jain**  
 Dean & Professor  
 School of Allied Health Sciences  
 JECRC University, Jaipur-302005



**Unit-5** PT assessment and rehab program for Mental Retardation and Delayed Child

<b>JECRC UNIVERSITY</b> <b>School of Allied Health</b> <b>Sciences</b>	<b>Program</b> <b>Bachelor of Physiotherapy (BPT)</b>			<b>Semester:</b> <b>8</b>
<b>Course</b> <b>Physiotherapy in</b> <b>Medical Conditions</b>	<b>Course</b> <b>Description</b> <b>Core</b>	<b>Credit per</b> <b>Semester</b> <b>1 credit</b>	<b>Hours per</b> <b>Semester</b> <b>2 hours</b>	<b>Course</b> <b>Code</b> <b>BPY054A</b>

**COURSE OBJECTIVES:** At the end of the course the students will be able to learn all the practical approaches of all the topics discussed in theory.

**COURSE OUTCOMES:** At the end of the course the student will be able to learn –

<b>CO 1</b>	Demonstrate practical approaches of physiotherapy in Medical Conditions
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**Unit-1** Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.

## **School of Computer Applications**

### **Bachelor of Computer Applications**

#### **Syllabus of the Courses offering Employability (2022-23)**

#### **Course Name: Computer Organization and Architecture**

#### **Course Code: BCA115C**

#### **Course Objectives:-**

- To provide information about digital computer technology and how data is represented in computer system.
- To discuss in detail the operation of the arithmetic Unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To have a systematic understanding of the basic structure and operation of a digital computer.
- To clear concepts of central processing unit and describes the structure of arithmetic/logic units.
- To understand the pipelining and vector processing concepts.

#### **Unit1**

SOP and POS Expressions, Karnaugh Map Simplification - Universal gates, Sequential circuits and combinational circuits, Flip Flops, Registers, Counters, Decoder, Encoder, Multiplexer, De-multiplexer, Arithmetic circuits,

#### **Unit 2**

Computer Organization and Design - Instruction Codes- Computer Registers- Computer Instructions - Instruction Cycle - Memory Reference Instructions - Input Output configuration

#### **Unit 3**

Central Processing Unit: Introduction- General Register Organization - Stack Organization - Instruction Formats - Addressing Modes - Data Transfer and Manipulation - Conditional Branch Instructions - Program Interrupts

#### **Unit 4**

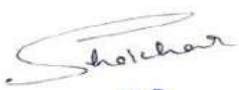
Pipeline and Vector Processing Parallel Processing - Pipelining - Arithmetic Pipeline - Instruction Pipeline - Vector Processing - Array Processors

#### **Unit 5**

Memory Organization Memory Hierarchy - Types of Memory - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory Computer Arithmetic – Introduction – Multiplication

#### **Course Outcome: (COs):-**

**On successful completion of this course, the learner will be able to:**

  
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CO1: Understand the concept of basic representation of data in computer.

CO2: Analyze the working of arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.

CO3: Develop an understanding of concepts of central processing unit and describes the structure of arithmetic/logic units.

CO4: Illustrate the basic structure and operation of a digital computer.

CO5: Demonstrate the pipelining and vector processing concepts.

**Text Books:**

1. Morris Mano, “Computer system architecture”, 5<sup>th</sup> edition, Pearson Education.

2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Naraig Manjikian, “Computer Organization and Embedded Systems”, (6e), McGraw Hill Publication, 2012

**Reference Books :**

D. A. Patterson and J. L. Hennessy, “Computer Organization and Design - The Hardware/Software Interface”, (5e), Morgan Kaufmann, 2011

Mohammed Rafiquzzaman and Rajan Chandra, “Modern Computer Architecture”, Galgotia Publications Pvt. Ltd. 2008.

William Stallings, “Computer Organization and Architecture Designing for Performance”, (8e), PHI, 2009.

## **Course Name: Computational Thinking and Problem Solving**

**Course Code: BCA173A**

### **Course Objectives:**

1. To provide exposure to problem solving through programming.
2. To enhance the ability to solve the problem through various concepts searching and sorting
3. To demonstrate the concept of problem solving using various methods.
4. To evaluate the concept of Abstraction, greedy methods, divide and conquer method.

### **Unit 1**

Basics Introduction of Information and data, Number Systems-Binary, Hexadecimal, Octal, Conversion, BCD, Introduction to Computer System-I/O Devices, Memory , Computer Software, Operating System, Data Communications and Computer Network, Internet & WWW

### **.Unit 2**

Algorithm-Definition, Characteristics, Advantages and disadvantages, Flowchart –Definition, Define symbols of flowchart, Advantages and disadvantages, Problem Solving -Problem definition, Problem decomposition, Abstraction, Greedy Method, Divide and Conquer.

### **Unit-3**

Algorithmic Thinking Algorithm and Flowcharting, Name binding, Selection, Repetition.

### **Unit 4**

Data organization: List and Arrays, Modularization, Problem Solving: Factoring and Recursion Techniques,

### **Unit 5**

Searching and sorting techniques, Text processing and pattern matching.

### **Course Outcomes (COs):-**

**On successful completion of this course, the learner will be able to:**

CO1: Understand the concept of computer, data, information and number system.

CO2: Analyze the problem by defining and using concepts of greedy method and divide and conquer.

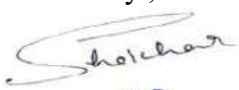
CO3: Illustrate the basic structure and operation of flowchart, selection and repetition.

CO4: Develop an understanding of concepts of Array, modularization, and concepts of recursion.

CO5: Examine the searching and sorting concepts.

### **Reference Books:-**

1. David Riley and Kenny Hunt , Computational thinking for modern solver, Chapman & Hall/CRC, 2014
2. R.G. Dromey , “How to solve it by Computer”, PHI, 2008

  
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School of Computer Applications  
JECRC University Jaipur

## **Course Name: Object Oriented Programming Using C++**

**Course Code: BCA126B**

### **Course Objectives:**

1. To explain the difference between object oriented programming and procedural programming and features of object oriented programming.
2. To be able to create programs using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
3. To be able to build C++ classes using appropriate encapsulation, objects and functions.
4. To be able to apply operator overloading in different form.
5. To be able to understand the working of files.

### **UNIT 1**

Introduction to C++, Object Oriented Concepts, Basics of C++ environment, Classes & Object, Data members, Access specifiers, Defining member functions, inline member functions, nesting of member functions, Array within a class, Static data members, Constant members , Arrays of objects, Objects as arguments, Returning objects, Constructors, Default Constructors, Parameterized constructors, Copy constructors, Destructors, friend functions, friend classes.

### **UNIT 2**

Compile time polymorphism, function overloading, Overloading operators, Overloading unary, Overloading binary, Overloading using friends, Overloading constructor Manipulation of strings using operators, overloading constructors, Inheritance, Base classes and derived classes, Protected members, Types, constructors in base derived classes,

### **UNIT 3**

Run time Polymorphism, function overriding, virtual base class, Virtual functions, pure virtual function, Abstract classes, class containership. Exception handling- basics of exception handling, exception handling mechanism, throw , catch, rethrow exceptions.

### **UNIT 4**

Fundamentals of pointers, New, Delete operators, pointer declarations, operations on pointers, passing pointers to function, passing an entire array to a function, pointers and two-dimensional arrays, array of pointers, passing functions to other functions, pointers to structures, this pointer.

### **UNIT 5**

class templates, class templates with multiple parameters, function templates, function templates with multiple parameters, Data files -C++ stream classes, unformatted and formatted I/O operations, Opening and closing

of files, File modes, File pointers and manipulation, Sequential input and output operations , Updating a file, Error handling during file operations.

### **Course Outcomes:**

**Upon successful completion of this subject students should be able to:**

CO1: Understand the features of C++ supporting object oriented programming

CO2: Be able to program using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.

CO3: Be able to apply operator overloading in different form.

CO4: Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism

CO5: Able to understand the working with files like opening and closing of files.

### **Text Books**

1. ReemaThereja, "Object Oriented Programming with C++", First Edition, Oxford University Press ,2015
2. Let Us C: BalaGuruswamy, TATA McGraw Hill.

### **Reference Books**

1. Object Oriented Programming with C++, Souravsahay, Oxford University, Sept 2012.
2. Richard F. Gilberg, Behrouz A. Forouzan, "Data structures, A Pseudocode Approach with C", (2e), Cengage Learning India Pvt.Ltd, India, 2009.
3. Robert Kruc& Bruce Lening, "Data structures & Program Design in C", (2e), Pearson, 2007.

## **Course Name: Operating System**

**Course Code: BCA113B**

### **Course Objectives::**

1. To understand the OS role in the overall computer system
2. To study the operations performed by OS as a resource manager and the scheduling policies of OS
3. To understand the different memory management techniques
4. To understand process concurrency and synchronization
5. To understand the concepts of input/output, storage and file management and to study different OS and compare their features.

### **Syllabus**

#### **Unit – I**

**Introduction**-Operating system objectives, User view, System view, Operating system definition ,Types, Functions, Computer System Organization, Computer System Architecture, OS Structure, Operating System services, User and OS Interface, System Programs, Operating System Design and Implementation, OS Structure.

#### **Unit – II**

**Process and CPU Scheduling** – Process concepts, The Process, Process State, Process Control Block, Threads, Process Scheduling, Scheduling Criteria, Scheduling algorithms Scheduling Queues, Schedulers, Context Switch, Operations on Processes, System calls, Process Synchronization, The Critical Section Problem, Peterson's solution, Synchronization Hardware, Semaphores.

#### **Unit – III**

**Deadlocks**- Deadlock characterization, Methods of handling deadlock, Deadlock Prevention,Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

#### **Unit- IV**

**Memory Management** – Memory Management Strategies- Overlays and Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table, Virtual Memory Management- Segmentation, Paging, Demand Paging, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing.

## **Unit - V**

**File System and Security** - File-System Structure, File-System Implementation , Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery, NFS, Organization of I/O Function, I/O Buffering, Disk Organization, Disk Scheduling, RAID, Operating Systems view of file system, Disk space management. System Security- The Security Problem, Program Threats, Policies, System and Network Threats, User Authentication, Security Models.

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Differentiate between different types of Operating Systems and their working, functions and services

CO2: Define, restate, discuss, and explain the policies for scheduling and deadlocks

CO3: Apply techniques and algorithms for memory allocation, management, process, synchronization, system calls, and file systems

CO4: Design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems

CO5: Measure, evaluate, and compare OS components through algorithms of disk Management and security and protection.

### **Text Books**

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8<sup>th</sup> edition, John Wiley Publications ,2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3<sup>rd</sup> edition, Pearson Education ,2007.

### **Reference Books**

1. G. Nutt, Operating Systems: A Modern Perspective, 2<sup>nd</sup> edition Pearson Education ,1997.
2. W. Stallings, Operating Systems, Internals & Design Principles, 5<sup>th</sup> edition, Prentice Hall of India, 2008.
3. “Operating Systems: Internals and Design Principles” by William Stallings



## **Course Name: Web Technologies**

**Course Code: BCA152B**

### **Course Objectives:**

1. To be able to develop a dynamic webpage by the use of java script and DHTML.
2. To be able to write a well formed / valid XML document.
3. To be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
4. To be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
5. To be able to write a server side java application called JSP to catch form data sent from client and store it on database.

### **Syllabus**

#### **Unit -1**

HTML5 and CSS3 HTML5- Basic Tags, Tables, Forms. HTML5 Tags, HTML Graphics, HTML media, HTML Graphics, HTML APIs. CSS - Background, Borders, margin, Box model. Styling text, fonts, list, links, tables. CSS overflow, float, inline blocks, pseudoclasses, pseudoelements. CSS border images, rounded corners

#### **Unit-2**

Java Script Client side scripting using java script, Introduction to java script, internal and external Java script files, variables, control statements, loops, Arrays , string handling , How to write functions in JavaScript, inputting and outputting from form elements to JavaScript. DOM concept, creating html elements using java script. Drawing 2D shapes, handling events. Introduction to AJAX

#### **Unit-3**

Building Single page applications with Angular JS Single page application – introduction , two way data binding, MVC in angular JS, controllers, getting user inputs , loops , Client side routing – accessing URL data , various ways to provide data in angular JS.

#### **Unit -4**

Server Side Programming Server side scripting, Difference between client side and server side scripting languages. Introduction to PHP, variables, control statements, loops, Arrays, string handling, PHP forms, Global variables in PHP, Regular expression and pattern matching, Database programming: inputting and

outputting data from MySQL using PHP, insertion , deletion and updating data. State management in web applications, cookies, Application and session state.

## **Unit-5**

Introduction to Xml, usage of XML, XML tags, elements and attributes, attribute type, XML validation: DTD and XSD, XML DOM Case study:-Application Development using Laravel framework

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Students are able to understand basic terms and protocols related to WWW.

CO2: Students are able to develop a dynamic webpage by the use of HTML/DHTML

CO3: Students will be able to write a well formed / valid XML document.

CO4: Students will be able to use java script for event handling etc.

CO5: Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.

### **Text books and references**

The Complete Reference, HTML and CSS by Thomas A Powell latest edition

XML Bible by Horold, Ellotte Rusty

Web Reference:- W3Schools.com

## **Course Name: Database Management System**

**Course Code: BCA114B**

### **Course Objectives:**

1. To enhance the fundamentals knowledge of data models and to conceptualize and depict a database system using ER diagram.
2. To develop programs and queries based on SQL and relational database, and do fundamental Operations of Relational Algebra & their Implementation.
3. To be able to know the fundamental concepts of transaction processing management.
4. To justify the concept of concurrency control techniques and recovery procedure.
5. To have an introductory knowledge about the Storage and Query processing Techniques.

### **Syllabus**

#### **Unit I**

Basic Concepts: Purpose of database systems-Components of DBMS – DBMS Architecture and Data Independence- Data modeling, Entity Relationship Model, Relational, Network, Hierarchical and object oriented models, Data Modeling using the Entity Relationship Model.

#### **Unit II**

Structure of relational databases:Relational Constraints, Domain Constraints, Key Constraints Referential Integrity Constraints, Relational Algebra, Fundamental Operations of Relational Algebra & their Implementation, Data definition with SQL, insert, delete and update statements in SQL – views – data manipulation with SQL.

#### **Unit III**

Query Processing: Methods for Joining Tables –Nested Loop Join Merge Join, Hybrid Join, Multiple table Join, Transforming Nested Queries to Joins, Object Relational SQL, Procedural SQL, Introduction to Embedded SQL

#### **Unit IV**

Database Design: Integrity Constraints – Domain Constraints- Referential integrity – Functional Dependency- Normalization using Functional Dependencies, Normal forms based on primary keys- general definitions of Second and Third Normal Forms. Boyce Codd Normal Form– Multivalued Dependencies and Forth Normal Form – Join Dependencies and Fifth Normal Form.

Transaction Management: Transaction Concept, ACID Properties, Transaction State, Implementation of ACID properties, Schedules. Concurrency Control: Need of concurrency control, Concurrency control techniques, Lock based protocols, binary lock, share and exclusive lock, two phase locking protocol. Introduction to recovery.

## Unit V

AWS DBMS: Introduction about AWS DBMS, Uses and applications of AWS DBMS, Comparison of AWS DBMS with traditional DBMS system, Introduction of AWS database services : Amazon Aurora, Amazon RDS, Amazon DynamoDB, Amazon Redshift , Amazon Neptune, Amazon DocumentDB ( With MongoDB compatibility), Design, provision and configure an appropriate database for a given scenario.

## Course Outcomes:

**Upon successful completion of this subject students should be able to:**

CO1: Recall the basic concept of DBMS and models of DBMS.

CO2: To know the fundamental concepts of transaction processing management.

CO3: To develop programs and queries based on SQL and relational database, and do fundamental Operations of Relational Algebra & their Implementation.

CO4: Contrast the concept of functional dependency, Normal forms, constraints and integrity

CO5: Able to understand the concept of concurrency control techniques and recovery

## Text Books

1. Fundamentals of Database System Elmasri and Navathe (4rd Edition), Pearson Education Asia (2008)
2. An Introduction to Database Systems - C.J.Date (7th Edition) Pearson Education Asia (2006)

## Reference Books

1. A.Silberschatz, H. Korth and S. Sudarshan, *Database System Concepts*, 5th Edition, McGraw Hill, 2010.
2. R. Ramakrishnan, J. Gehrke, *Database Management Systems*, 3<sup>rd</sup> edition, McGraw Hill International Edition, 2007.
3. Database System Concepts - Henry F Korth, Abraham Silbershatz, McGraw Hill 2nd edition. (2005).

## Course Name: Programming in Python

Course Code: BCA300A

### Course Objectives:

- CO1. To lineup the basics of Programming with Python, Features, history, data types, operators and variables and be able to solve real-world problems through Programming with Python.
- CO2. To be able to understand problem solving approaches, programming languages.
- CO3. To construct of Python language such as , functions, strings, file Handling.
- CO4. To Construct and implement Data structures, Classes and Objects and Inheritance
- CO5. To Understand and Implement operator overloading by defining special methods in Python classes.

### Syllabus

#### Unit I

Basics of Programming with Python: Features of Python, History of Python, The Future of Python, Writing and Executing First Python Program, Literal Constants, Numbers, Strings, Variables and Identifiers, Data Types Assigning or Initializing Values to Variables, Multiple Assignment, Multiple Statements on a Single Line, Boolean, Input Operation, Comments, Reserved Words, Indentation, Operators and Expressions, Arithmetic Operators, Comparison Operators, Assignment and In-place or Shortcut Operators, Unary Operators, Bitwise Operators, Shift Operators, Logical Operators, Membership Operators, Identity Operators, Operators Precedence and Associativity, Expressions in Python, Operations on Strings, Concatenation, Multiplication (or String Repetition), Slice a String, Other Data Types, Tuples, Lists, Dictionary, Type Conversion

#### Unit II

**Decision Control Statements:** Introduction to Decision Control Statements, Selection/Conditional Branching Statements, if Statement, if-else Statement, Nested if Statements, if-elif-else Statement, Basic Loop Structures/ Iterative Statements, while loop, for Loop, Selecting an appropriate loop, Nested Loops, The break Statement, The continue Statement, The pass Statement, The else Statement used with Loops: *Case Study 1 - Simple Calculator*, *Case Study 2 - Generating a Calendar*.

#### Unit III

Functions and Modules: Need for Functions, Function Declaration and Definition, Function Definition, Function Call, Function Parameters, Variable Scope and Lifetime, Local and Global Variables, Using the Global Statement, Resolution of Names, The return statement, More on Defining Functions, Required Arguments, Keyword Arguments, Default Arguments, Variable-length Arguments, Lambda Functions or Anonymous Functions, Documentation Strings, Good Programming Practices, Recursive Functions, Greatest

Common Divisor, Finding Exponents, The Fibonacci Series, Recursion vs Iteration, Modules, The from import statement, Name of Module, Making your own Modules, The dir() function, The Python Module, Modules and Namespaces, Packages in Python, Standard Library modules, Globals(), Locals(), and Reload(), Function Redefinition: Case Study 3 - Tower of Hanoi, Case Study 4 - Shuffling a Deck of Cards

Python Strings Revisited: Concatenating, Appending, and Multiplying Strings, Strings are Immutable, String Formatting Operator, Built-in String Methods and Functions, Slice Operation, Specifying Stride While Slicing Strings, ord() and chr() Functions, in and not in operators, Comparing Strings, Iterating String, The String Module, Regular Expressions, The match() Function, The search() Function, The sub() Function, The findall() and finditer() Functions, Flag Options, Metacharacters in Regular Expression, Character Classes, Groups, Application of Regular Expression to Extract Email  
**File Handling:** File Path, Types of Files, ASCII Text Files, Binary Files, Opening and Closing Files, The open() Function, The File Object Attributes, The close() Method, Reading and Writing Files, write() and writelines() Methods, append() Method, The read() and readline() Methods, Opening Files using with Keyword, Splitting Words, Some Other Useful File Methods, File Positions, Renaming and Deleting Files, Directory Methods, Methods from the os Module: Case Study 5 - Creating a Hash File (or a message digest of a file), Case Study 6 - Mail Merge Program, Case Study 7 - Finding Resolution of an Image

#### Unit IV

Data Structures: Sequence, Lists, Access Values in Lists, Updating Values in Lists, Nested Lists, Cloning Lists, Basic List Operations, List Methods, Using Lists as Stack, Using Lists as Queues, List Comprehensions, Looping in Lists, Functional Programming, filter() Function, map() Function, reduce() Function, Tuple, Creating Tuple, Utility of Tuples, Accessing Values in a Tuple, Updating Tuple, Deleting Elements in Tuple, Basic Tuple Operations, Tuple Assignment, Tuples for Returning Multiple Values, Nested Tuples, Checking the Index: index() method, Counting the Elements: count() Method, List Comprehension and Tuples, Variable-length Argument Tuples, The zip() Function, Advantages of Tuple over List, Sets, Creating a Set, Dictionaries, Creating a Dictionary, Accessing Values, Adding and Modifying an Item in a Dictionary, Modifying an Entry, Deleting Items, Sorting Items in a Dictionary, Looping over a Dictionary, Nested Dictionaries, Built-in Dictionary Functions and Methods, Difference between a List and a Dictionary, String Formatting with Dictionaries, When to use which Data Structure, List vs Tuple vs Dictionary vs Set  
**Classes and Objects:** Classes and Objects, Defining Classes, Creating Objects, Data Abstraction and Hiding through Classes, Class Method and self-Argument, The \_\_init\_\_() Method (The Class Constructor), Class Variables and Object Variables, The \_\_del\_\_() Method, Other Special Methods, Public and Private Data

Members, Private Methods, Calling a Class Method from Another Class Method, Built-in Functions to Check, Get, Set, and Delete Class Attributes, Built-in Class Attributes, Garbage Collection (Destroying Objects), Class Methods, Static Methods  
Inheritance: Inheriting Classes in Python, Polymorphism and Method Overriding, Types of Inheritance, Multiple Inheritance, Multi-level Inheritance, Multi-path Inheritance, Composition or Containership or Complex Objects, Abstract Classes and Interfaces, Metaclass

## UNIT V

Operator Overloading: Concept Of Operator Overloading, Advantage of Operator Overloading, Implementing Operator Overloading, Reverse Adding, Overriding `__getitem__()` and `__setitem__()` Methods, Overriding the in Operator, Overloading Miscellaneous Functions, Overriding the `__call__()` Method  
Error and Exception Handling: Syntax Errors, Logic Error, Exceptions, Handling Exceptions, Multiple Except Blocks, Multiple Exceptions in a Single Block, Except Block Without Exception, The else Clause, Raising Exceptions, Instantiating Exceptions, Handling Exceptions in Invoked Functions, Built-in and User-defined Exceptions, The finally Block, Pre-defined Clean-up Action, Re-raising Exception, Assertions in Python: Case Study 8 - Compressing String and Files

### Course Outcomes (COs):

**Upon successful completion of this subject students should be able to:**

CO1: Outline the basics of Programming with Python, Features, history, data types, operators and variables.

CO2: Understanding of Python especially Decision control, function and modules.

CO3: Understanding of the file handling.

CO4: Be exposed to Data Structure, object oriented concepts in Programming with Python, decision controls and function.

CO5: Understand and Implement Operator Overloading.

### Text Books

1. Programming with Python, Oxford, ReemaThareja, June 2017
2. “Programming Python” by Mark Lutz and O’Reilly Media

### Reference Books

1. “Python Testing Cookbook” by Greg L Turnquist
2. “Head First Programming” by Paul Barry and David Griffiths
3. “Python Crash Course: A Hands-On, Project-Based Introduction to Programming” by Eric Matthes.

# **Course Name: Fundamental of Computer with C Programming**

**Course Code: BCA302A**

## **Course Objectives:**

1. The course is designed to provide complete knowledge of C language.
2. Students will be able to develop logics which will help them to create programs, applications in C.
3. By learning the basic programming constructs, they can easily switch over to any other language in future.
4. The course also provides hands-on training to help you write and test your coding skill, and prepare you for real-life application.
5. To be able to understand the working of files.

### **Unit I**

**Introductory concepts and C Fundamentals:** Introduction to Computers, Computer Characteristics, Modes of Operation, Types of Programming Languages, Introduction to C, Some Simple C Programs, Desirable Program Characteristics, The C Character Set, Identifiers and Keywords Data Types, Constants, Variables and Arrays, Declarations, Expressions, Statements, Symbolic Constants.

### **Unit II**

**Operators and Expressions and Data Input and Output:** Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, The Conditional Operator, Library Functions, Single Character Input, the getchar Function, Single Character Output, the putchar Function, Entering Input Data, the scanf Function, Writing Output Data The printf Function, The gets and puts Functions, Interactive (Conversational) Programming.

### **Unit III**

**Complete C Program and Control Statements:** Planning a C Program, writing a C Program, Entering the Program into the Computer, Compiling and Executing the Program, Error Diagnostics, Debugging Techniques, Control Statements, Branching: The if-else Statement Looping: while Statement, do while Statement, for Statement, Nested Control Structures, switch Statement, break Statement, continue Statement, Comma Operator, goto Statement.

### **Unit IV**

**Functions, Program Structure and Arrays:** Defining a Function, accessing a Function, Function Prototypes, Passing Arguments to a Function, Recursion, Storage Classes, Automatic Variables, External (Global) Variables, Static Variables, Multifile Programs, Library Functions, Defining an Array, Processing an Array, Passing Arrays to Functions, Multidimensional Arrays, Arrays and Strings.

### **Unit V**

**Pointers, Structures, Union and Data Files:** Declarations Passing Pointers to Functions, Pointers and One-Dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers, Passing Functions to Other Functions, Pointer Declarations, Structures and Unions, defining a Structure, processing a Structure, User-Defined Data Types (typedef), Structures and Pointers, Passing Structures to Functions, Self-Referential Structures Unions. Opening and Closing a Data File, creating a Data File, processing a Data File



**Course Outcomes-**

After Successful completion of this subject student should be able to:

CO1. Develop a C program, Control the sequence of the program and give logical outputs.

CO2. Implement strings in your C program, Store different data types in the same memory and Manage I/O operations in your C program.

CO3. Repeat the sequence of instructions and points for a memory location.

CO4. Apply code reusability with functions and data accessing with array.

CO5. Memory allocation with Pointer, structure and union, Understand the basics of file handling mechanisms

**Text Books:**

1. Schaum's outline of theory and problems of programming with c.
2. C Programming Absolute Beginner's Guide, Greg Perry

**Reference Books:**

1. C: The Complete Reference, By Herbert Schildt
2. C Programming in easy steps, 5th Edition, By Mike McGrath
3. C Programming Language, By Brian W. Kernighan

## Course Name: Data Structures and Algorithms

Course Code: BCA010

### Course Objectives:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques.
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.
5. To impart the basic concepts of algorithms implementation in optimized time.

### Unit 1

**Introduction and overview:** Introduction, basic terminology, elementary data organization, data structures, data structures operations, Abstract data types(ADT), Algorithms: Complexity, Time-space tradeoff.

**Preliminaries:** Introduction, Mathematical notation and functions, Algorithmic notations, control structures, complexity of algorithms, other asymptotic notation for complexity of algorithm, Sub algorithms, variables, data types.

### Unit 2

**String processing:** Introduction, Basic terminology, storing strings, character data type, string as ADT, String operations, word/text processing, Pattern matching algorithms.

**Arrays, Records and Pointers:** Introduction, linear arrays, arrays as ADT, representation of linear arrays in memory, traversing linear arrays, inserting and deleting, sorting , bubble sort, Searching, linear search. Binary search, multidimensional arrays, representations of polynomials using arrays, Dynamic memory management, records structure, Representation of records in memory, parallel arrays, matrices and sparse matrices.

### Unit 3

**Linked Lists:** Introduction of linked list, representation of linked list in memory traversing a linked list, searching a linked list, memory allocation garbage collection, insertion into a linked list, deletion from a linked list ,header linked list, circular linked list, two way list( doubly linked lists) Buddy systems.

Stacks, queues, recursion: Introduction, stacks, array representation of stacks, linked representation of stacks, stack as ADT, Arithmetic expression , polish notation, application of stacks, recursion, tower of Hanoi, implementation of recursive procedures by stacks, queues, linked representation of queues, queues as ADT, circular queues , Dequeues, priority queues, application of queue.

### Unit 4

**Trees: Introduction , Binary trees, representing binary trees in memory, traversing binary trees,** Traversal algorithm using stacks, Binary search tree, searching ,inserting and deleting in binary tree, balanced binary tree, AVL search tree, B-Tree (searching , insertion, deletion), B+ Tree, Red Black tree, Heap, heapsort, path length and Huffman code.

Graphs and their applications: Introduction, graph theory, sequential representation of graphs, adjacency matrix, path matrix, warshall algorithm, shortest path, linked representation of graph, operation on graphs, traversing a graph, posets, topological sorting, spanning tree .

## **Unit 5**

**Sorting and searching:** Introduction, sorting, insertion sort, selection sort, merge sort, shell sort, radix sort, searching and data modification and hashing.

### **Course Outcomes (COs):**

**Upon successful completion of this subject students will able**

CO1: Ability to analyse algorithms and a algorithm correctness.

CO2: Ability to implement various techniques of link list.

CO3: Ability to describe stack, queue with linked list operation.

CO4: Ability to have knowledge of tree and graphs concepts.

CO5: Ability to summarize searching and sorting techniques

### **Text Books**

1. R. G. Dromey, "How to Solve it by Computer", Second Edition, Prentice-Hall of India, 2002.
2. ReemaThereja,, "Data Structure using C" , Second Edition , Oxford University Press, 2014

### **Reference Books**

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education Asia, 2002.
2. ISRD Group, "Data Structures using C", Fifth Edition Tata McGraw Hill, 2007
3. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode" Third Edition Prentice-Hall of India, 2004.

## **Course Name: Programming in PHP**

**Course Code: BCA123A**

### **Course Objectives:**

1. To demonstrate the basics of the PHP and MYSQL, PHP configuration in IIS & Apache Web Server and features of PHP.
2. To understand how PHP, HTML and MYSQL work together to produce dynamic pages.
3. To apply specific PHP variables, data types, syntax and conditional statements.
4. To be able to apply control statements and database connectivity.
5. To make use of string functions and array functions.

### **Syllabus**

#### **Unit I**

Introduction to PHP, Installation of PHP and MySQL, PHP configuration in IIS & Apache Web Server and features of PHP, Writing PHP, How PHP code is parsed, Embedding PHP and HTML Executing PHP and viewing in Browser.

#### **Unit II**

Data types, Operators, PHP variables: static and global variables, Comments in PHP, Control Structures, Condition statements, If...Else, Switch, ?operator, Loops, While, Break Statement Continue. Do...While, For, For each, Exit, Die, Return

#### **Unit III**

Arrays in PHP, Working With Data, FORM element, INPUT elements, Validating the user input, Passing variables between pages, Passing variables through GET, Passing variables through POST, Passing variables through REQUEST, Working With Data, Built-in functions.

#### **Unit IV**

String Functions: chr, ord, strtolower, strtoupper, strlen, ltrim, rtrim, substr, strcmp, strcasecmp, strpos, strrpos, strstr, stristr, str\_replace, strrev, echo, print, Math Functions: abs, ceil, floor, round, fmod, min, max, pow, sqrt, rand.

## Unit V

Array Functions: count, list, in\_array, current, next, previous, end, each, sort, rsort, assort, array\_merge, array\_reverse User Defined Functions. Sessions and cookies, Concept of Session Starting session, Modifying session variables, registering and deleting session variable Concept of Cookies.

### Course Outcomes:

**Upon successful completion of this subject students should be able to:**

CO1: Demonstrate the basics of the PHP and MYSQL, PHP configuration in IIS & Apache Web Server and features of PHP.

CO2: Examine how web pages are developed using PHP array, form and input elements.

CO3: Apply specific PHP variables, data types, syntax and conditional statements.

CO4: Understand the basics of array functions and user defined functions.

CO5: Understand the basics of string functions like chr, ord, strtolower, strtoupper, strlen.

### Text Books

1. PHP Cookbook by David Sklar and Adam Trachtenberg, O'Reilly Media, Inc., ISBN: 978-1-449-36375-8.
2. Core PHP Programming, Leon Atkinson Pearson publishers, 2nd Edition, ISBN-13: 978-0130893987.

### Reference Books

1. The Complete Reference PHP, Stever Holzner McGraw Hill, Edition: 1 ISBN: 9780070223622.
2. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book: HTML, Javascript, PHP, Java, Jsp, XML and Ajax, Black Book” by Kogent Learning Solutions Inc.
3. “Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP ( 4th Revised Edition ) CD-ROM Included” by Ivan Batross

## **Course Name: Programming in Java**

**Course Code: BCA 133A**

### **Course Objectives:**

1. To be able to understanding the concept of programming paradigms, basic concept of object oriented programming and features of java.
2. To demonstrate the concept of data types, literals and basic structure of java programming.
3. To enhance the practical knowledge of decision making statements and control statements.
4. To be able to use variety technologies of Java and work with different platforms.
5. To examine the life cycle of applets and packages.

### **Syllabus**

#### **Unit I**

**The history and evolution of java:** Java lineage, Introduction of modern programming C and C++, creation of Java, C# connection, java applets, security, portability, java's magic byte code, servlets, java buzzwords( simple, object oriented, robust, multithreaded, architecture neutral, interpreted and high performance distributed and dynamic) Evolution of java, java SE 6.

**An overview of Java:** object oriented programming, two paradigms, abstraction, oops principles, simple program of java( Entering the program, Compiling the program) Two control statements, The if statement, for loop, using block of code, lexical issues, java class libraries.

**Data types variables and arrays:** The primitive types, integers, floating points type, characters, Booleans, literals, variables, Type conversion and casting, automatic type promotion in expressions, Arrays and their types, introduction of strings.

#### **Unit II**

**Operators:** Arithmetic operator, bitwise operator, relational operators, Boolean logical operators, assignment operator, operator precedence.

**Control Statements:** Java's selection statements, iteration statements, jump statement( using break, continue and return)

**Introducing classes:** Class fundamentals , declaring objects, assigning object reference variables, introducing methods, returning a value, constructors, parameterized constructors, this keyword, garbage collection.

#### **Unit III**

**Methods and Classes:** Overloading methods, overloading constructors, using object as parameter, argument passing, returning objects, recursion, introducing access control, and understanding static, final, arrays revisited, introduction of nested and inner classes, exploring the string class, use of command line arguments.

**Inheritance:** Basics of inheritance, use of super class and sub class variable, creating multilevel hierarchy, method overriding, use of abstract class, the object class.

#### **Unit IV**

**Packages and Interfaces:** Introduction of packages, finding packages and class path, access protection, importing packages, interfaces and their types.

**Exception handling:** Exception handling fundamentals, Exception types, uncaught exceptions, use of try and catch, multiple catch clause, nested try statements, use of throw statement, java's built in exceptions, chained exceptions, use of exceptions.

**Multithreaded programming:** The java thread model, thread priorities, synchronization, messaging, thread class and the run able interface, main thread, creating a thread, thread priorities, synchronization methods, inter thread communication, deadlock, suspending, resuming, and stopping threads, modern way to suspend, resume and stopping the threads and use of multithread.

#### **Unit V**

**Enumeration, auto boxing and annotations (Metadata):** Enumeration, values () and values of () methods, type wrappers, auto boxing, annotations.

**I/O, Applets and other topics:** I/O basics, streams, byte streams, character streams, reading console input, writing console output, print writer class, reading and writing files, applets fundamentals, transient and volatile modifiers, naïve methods.

**Generics:** introduction of generics, generics types, generic class parameters, bounded types, wildcard arguments, generic constructor, generic interfaces, raw types and legacy code, generic class hierarchies.

**The Java Library:** string handling, string constructors, string length, special string operations, character extraction, string comparison, searching strings and modifying a string.

#### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Understanding the concept of programming paradigms, basic concept of object oriented programming and features of java.

CO2: Enhance the practical knowledge of decision making statements and control statements.

CO3: Examine the life cycle of applets and packages and use the exception handling mechanism for handle the errors.

CO4: Illustrate the concept of Inheritance, Constructor, operator overloading and graphics in java.

CO5: Evaluate the concept of array, string, function, class and object.

### **Text Books**

1. Programming in Java, SachinMalhotra, Oxford University, November 2013
2. Java One step ahead, Seth and Juneja, Oxford University, May 2017.

### **Reference Books**

1. Programming with Java A Primer, E. Balaguruswamy Tata McGraw Hill Companies
2. R. NageswaraRao, "Core Java: An Integrated Approach", First Edition, DT Editorial Services, 2016.
3. Herbert Schildt, "The Complete Reference", Ninth Edition, McGraw Hill, 2014.

Cay S. Horstmann," Core Java", Ninth Edition, Prentice Hall,2012.



**Course Name: Advance Java**

**Course Code: BCA410A**

### **Course Objectives**

1. To exhaustive coverage of advanced topics on Java from tools to enterprise Java
2. To provide ample application-based examples, with step-by-step explanations
3. To provide thorough understanding of each topic through extensive examples alongwith the program codes and screenshots
4. To provides relevant software installation and configuration information wherever necessary
5. To comprises keywords, objective-type questions (with answers) and subjective-type questions for students at the end of all the chapters

### **Syllabus**

#### **Unit I**

**Introduction** : Java Evolution and history, Data types, Control statements , conditional statements, Classes and Objects, Arrays and strings, Functions & Interfaces, Inheritance, keywords: Static, Final, Super, Packages,

#### **Unit II**

**Applet, Exception Handling, Multi-threading & Garbage Collection:** Applet, Applet life Cycle, Exception Handling: Introduction, types, catching exceptions, tracing stack, custom exception classes

Multi-threading : Introduction, Main Thread, Creating Thread, Interrupting Thread, Suspending and Resuming, Thread Priority, Garbage Collection.

#### **Unit III**

**Collection frame work and Generic Programming:** Collection frame work: Introduction, Benefits, Collection Interfaces, and Collection Implementation.

Generic Programming: Introduction, Collection Framework and Generics, Type Naming, Generic Methods and Constructors, Type Inference, Bounded Type Parameters, Wildcards, Type Erasure, Restrictions on Generics.

#### **Unit IV**

**AWT, Swings & Input/Output:** AWT: AWT Class Hierarchy, Creating Container, Adding Components, Layout, AWT components, Event Handling, Dialog Boxes, Scrollbar, Menu.

Swings: Containment Hierarchy, Swing Components, Methods of Important Event Listener Interfaces Streams, Formatting, Data Streams, Object Stream, Reading/writing Arrays via Streams, Pipes, File I/O, Path, File

#### **Unit V**

**JDBC, Servlet & JSP:** JDBC: JDBC Drivers, JDBC Architecture, JDBC Classes and Interfaces, Loading a Driver, Making a Connection, Execute SQL Statement, SQL Statements, Retrieving Result, Getting Database Information, Metadata.

Servlet: Server-side Java, Servlet Architecture, Servlet Life Cycle, Generic Servlet.

JSP: JSP and HTTP, JSP Engines, JSP and Servlet, JSP Syntax, JSP Components

#### **Course Outcomes (Cos):**

**Upon successful completion of this subject students should be able to:**

CO1: Revise object oriented features of java language and develop java applet programming using various techniques.

CO2: Handling exceptions and develop multi- threaded applications.

CO3: Develop applications using collection framework and concepts of generic programming.

CO4: Develop applications using Abstract Window Toolkit

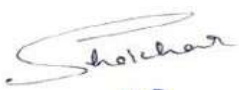
CO5: Develop server side programs using Servlets and develop Java Server Pages applications using JSP Tags.

#### **Text Books**

1. Advance java programming, Oxford, Uttam Kumar Roy, April 2015.
2. Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Second Edition, Oxford University Press , 2014.

#### **Reference Books**

1. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. JAVA How to Program. Dietel & Dietel, Eleventh Edition, Pearson Group
3. The complete reference JAVA2, Herbert schildt. TMH

  
HoD  
School of Computer Applications  
JECRC University Jaipur

Servlet: Server-side Java, Servlet Architecture, Servlet Life Cycle, Generic Servlet.

JSP: JSP and HTTP, JSP Engines, JSP and Servlet, JSP Syntax, JSP Components

## **Course Name: Computer Network**

### **Course Code: BCA135B**

#### **Course Objectives**

1. To be familiar with the terminology and concepts of Layering, Distributed Systems and Networks, Peer-to-Peer and Client-Server Networks.
2. To enhance the practical knowledge of protocols used in different layers.
3. To be familiar with physical layer based on telephone lines.
4. To be able to understand Error Detection, Error Correction, Flow Control.
5. To be able to understand the concept of Connection Oriented, Connectionless and routing algorithms.

#### **Syllabus**

##### **Unit I**

**Introduction to Computer Networks:** Definition: Network , The Need of Resources Sharing, data communications components, data representation, and data flow, network topologies, categories of networks, organizations that set standards in data communications and networking, introduction to Open Systems Interconnection (OSI) and the Internet model (TCP/IP) layers and services.

##### **Unit II**

**The Physical Layer & Media:** Functions of physical layer, issues related to the physical layer and the transmission medium that is controlled by the physical layer, Bandwidth Utilization: Multiplexing and Spreading, Transmission Media, Switching.

##### **Unit III**

**The Data Link Layer:** Error Detection and Correction, Data Link Control, Multiple Access. Wired LANs: Ethernet, Wireless LANs.

##### **Unit IV**

**The Network Layer:** Logical addressing: IPv4 and IPv6, Internet Protocol: IPv4, Datagram, Fragmentation, Checksum, IPv6 Advantages and Packet Format, Address mapping: ARP, RARP and DHCP, Forwarding, and Unicast and Multicast Routing.

## Unit V

**Transport Layer and Application Layer:** Process-to-Process Delivery: UDP, TCP, and SCTP. Congestion Control. Application Layer: Domain Name System, Remote Logging, Electronic Mail, and File Transfer, WWW and HTTP.

### Course Outcomes (COs):

**Upon successful completion of this subject students should be able to:**

CO1: To be familiar with the terminology and concepts of Layering, Distributed Systems and Networks, Peer-to-Peer and Client-Server Networks.

CO2: Describe, analyze and compare Physical Layer based on telephone lines.

CO3: Describe, analyze and compare a number of data link, network, and transport layer protocols, Error Detection, Error Correction and Flow Control.

CO4: Able to understand the concept of Connection Oriented, Connectionless and routing algorithms.

CO5: Enhance the practical knowledge of protocols used in different layers

### Text Books

1. Behrouz A. Forouzan, Data Communication and Networking, Fifth Edition, Mcgraw Hill, 2017.
2. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition, Pearson, 2011.

### Reference Books

1. Larry L. Peterson and Bruce S. Davie, Computer Networks: A System Approach, Fifth Edition, The Morgan Kaufmann Series in Networking, 2011
2. James Kurose and Keith Ross, Computer networking: A Top Down Approach, Seventh Edition, Pearson, 2017.
3. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2014

# **Course Name: Advance Data Structures and Algorithms**

## **Course Code: BCA411A**

### **Course Objectives:**

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques.
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.
5. To impart the basic concepts of algorithms implementation in optimized time .

### *Syllabus*

#### *Unit I*

**Introduction to Data Structures and Algorithms:** Elementary Data Structure Organization, Classification of Data Structures, Operation of Data Structures, Operations on Data Structures ,Abstract Data Type ,Algorithms, Different Approaches to, Designing an Algorithm, Control Structures Used in Algorithms, Time and Space Complexity, Omega Notation ( $\Omega$ ), Theta Notation ( $\Theta$ ) ,Other Useful Notations.

#### *UNIT II*

**Array and Linked List:** Declaration of Arrays, Accessing the Elements of an Array, Storing Values in Array, operations, Passing Array to functions, Pointers and Arrays, Arrays of Pointers, Two-dimensional Arrays, Operations on , Passing Two-dimensional Arrays to Functions, Pointers and Two-dimensional Arrays, Sparse Matrices .

Linked list Basic Terminologies, Memory Allocation and De-allocation for a Linked List, Singly Linked Lists, Circular Linked Lists, Doubly Linked Lists, Circular Doubly Linked Lists, Header Linked Lists, Multi-linked Lists, Applications of Linked Lists.

#### *UNIT III*

**Stack:** Array Representation of Stack, Operations on Stack, linked Representation of Stacks, Operations on a Linked Stack, Multiple Stacks, Applications of Stack,

**Queues:** Introduction to Queues, Array Representation of Queues ,Linked Representation of Queues, Types of Queues , Applications of Queues

#### UNIT IV

**Trees and BST** Trees: Types of trees , Creating a Binary Tree from a General Tree, Traversing a Binary Tree, Huffman's Tree

Binary Search Trees: BST Operations, Threaded Binary Trees, AVL Trees, Red-Black Trees, Splay Trees

#### UNIT V

**Graph, Searching & Sorting:** Basic Terminologies, Directed Graphs, Representations of Graphs, Graph Traversals Algorithms, Topological Sorting, Shortest-Path Algorithms.

**Searching & Sorting:** Introduction to searching, Linear and Binary Search, Interpolation Search, jump search, Sorting Types, Bubble, Insertion, Selection , Merge Sort, Radix Sort Shell Sort, Quick Sort, Heap Sort.

#### Course Outcomes (COs):

**Upon successful completion of this subject students will able**

CO1: Ability to analyse algorithms and a algorithm correctness.

CO2: Ability to implement various techniques of link list.

CO3: Ability to describe stack, queue with linked list operation.

CO4: Ability to have knowledge of tree and graphs concepts.

CO5: Ability to summarize searching and sorting techniques

#### Text Books

1. R. G. Dromey, "How to Solve it by Computer", Second Edition, Prentice-Hall of India, 2002.
2. Reema Thereja,, "Data Structure using C" , Second Edition , Oxford University Press, 2014

#### Reference Books

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education Asia, 2002.
2. ISRD Group, "Data Structures using C", Fifth Edition Tata McGraw Hill, 2007
3. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode" Third Edition Prentice-Hall of India, 2004.

**Course Name: Communication Skills**

**Course code: DEN001A**

**Course Objectives:**

1. To enhance English language competence in reading, writing, listening and speaking.
2. Switch the approach from teacher-centered to student-centered one.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centered learning rather than on the teacher-centered learning.
5. To link communication skills with the organizational behavior.
6. To inculcate skills that is very much required for employability and adjusts in the professional Environment.

**Syllabus: Theory**

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
<b>UNIT 2</b>	<b>Basic Writing Skills:</b> Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
<b>UNIT 3</b>	<b>Composition:</b> , Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

**Syllabus: Lab**

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive
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	mindset during work pressure, Activities to teach Time-management, Following Deadlines etc
<b>UNIT 2</b>	<b>Write Dialogue from the different contexts of corporate culture:</b> Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
<b>UNIT 3</b>	<b>Composition:</b> , Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

### Suggested Reading:

1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
8. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006

### Course Outcomes (CO):

#### At the end of this course students will have:

- CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
- CO2: Ability to analyze the usage of English words in different contexts.
- CO3: An understanding of technical and academic articles' comprehension.
- CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

**Course Name: Environmental Studies**

**Course Code: DCH001A**

### **Course Objectives**

1. To define and use correctly the common terms of environmental science.
2. To explain what makes up the environment, how it functions, and how humans are part of it.
3. To apply the concepts and principles of environmental science to propose solutions to specific environmental problems.
4. To analysis environmental writings and predictions and their impact on subsequent developments in human relationship with the environment.
5. To evaluate the adequacy of conclusions about environmental phenomena.

### **Syllabus**

#### **Unit I**

**Introduction and Natural Resources:** Multidisciplinary nature and public awareness, Renewable and nonrenewal resources and associated problems, Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources, Conservation of natural resources and human role.

#### **Unit II**

**Ecosystems:** Concept, Structure and function, Producers composers and decomposers, Energy flow, Ecological succession, Food chains webs and ecological pyramids, Characteristics structures and functions of ecosystems such as Forest, Grassland, Desert, Aquatic ecosystems.

#### **Unit III**

**Biodiversity and Conservation:** Definition, Genetic, Species, and Ecosystem diversity, Bio-geographical classification of India, Value of biodiversity at global, national, local levels, India as a mega diversity nation, Hot sports of biodiversity, Threats to biodiversity, Endangered and endemic species of India, In-situ and ex-situ conservation of biodiversity.

## Unit IV

**Environmental Pollution:** Definition, Causes, effects and control of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear hazards, human role in prevention of pollution, Solid waste management, Disaster management, floods, earthquake, cyclone and landslides.

## Unit V

**Social issues and Environment:** Unsustainable to sustainable development, Urban problems related to energy, Water conservation and watershed management, Resettlement and re-habitation, Ethics, Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents, holocaust, Waste land reclamation, Consumerism and waste products, Environment protection act, Wildlife protection act, Forest conservation act, Environmental issues in legislation, population explosion and family welfare program, Environment and human health, HIV, Women and child welfare, Role of information technology in environment and human health.

### Course Outcomes:

**Upon successful completion of this subject students should be able to:**

CO1: Understand fundamental physical and biological principles that govern natural processes.

CO2: Understand fundamental concepts from the social sciences and the humanities underlying environmental thought and governance.

CO3: Integrate and apply perspectives from across the natural sciences, social sciences, and the humanities in the context of complex environmental problems.

CO4: Apply the concepts and principles of environmental science to propose solutions to specific environmental problems.

CO5: Able to understand social and environmental issues.

### Text Books

1. Rajgopalan , “Environmental Studies From Crisis to Cure” , (3e), Oxford University Press.
2. Agarwal, K.C., Environmental Biology, Nidi Publication Ltd., Bikaner, 2001.

### Reference Books

1. BharuchaErach, Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmadabad, 2002.
2. Clark, R.S., Marine Pollution, Clanderson Press, Oxford, 2002.
3. Cunningham, W.P., et al., Environmental Encyclopedia, Jaico Publishing House, Mumbai, 2003.

## **Course Name: Certified Ethical Hacker**

**Course Code: BCAC13A**

### Background Network and Communication Technologies

- Networking technologies (e.g., hardware, infrastructure)
- Web technologies (e.g., web 2.0, skype)
- Systems technologies
- Communication protocols
- Telecommunication technologies
- Mobile technologies (e.g., smartphones)
- Wireless terminologies
- Cloud computing
- Cloud deployment models

### Information Security Threats and Attack Vectors

- Malware (e.g., Trojan, virus, backdoor, worms)
- Malware operations
- Information security threats and attack vectors
- Attacks on a system (e.g., DoS, DDoS, session hijacking, webserver and web application attacks, SQL injection, wireless threats)
- Botnet
- Cloud computing threats and attacks
- Mobile platform attack vectors
- Cryptography attacks

### Information Security Technologies

- Information security elements
- Information security management (e.g. IA, Defense-in-Depth, incident management)
- Security trends
- Hacking and ethical hacking
- Vulnerability assessment and penetration testing

- Cryptography
- Encryption algorithms
- Wireless encryption
- Bring Your Own Device (BYOD)
- Backups and archiving (e.g., local, network)
- IDS, firewalls, and honeypots

### *Unit – II*

#### Analysis / Assessment Information Security Assessment and Analysis

- Data analysis
- Systems analysis
- Risk assessments
- Vulnerability assessment and penetration testing
- Technical assessment methods
- Network sniffing
- Malware analysis

#### Information Security Assessment Process

- Footprinting
- Scanning (e.g., Port scanning, banner grabbing, vulnerability scanning, network discovery, proxy chaining, IP spoofing)
- Enumeration
- System hacking (e.g., password cracking, privilege escalation, executing applications, hiding files, covering tracks)

### *Unit – III*

#### Security Information Security Controls

- Systems security controls
- Application/file server
- IDS
- Firewalls
- Cryptography
- Disk Encryption
- Network security

- Physical security
- Threat modeling
- Biometrics
- Wireless access technology (e.g., networking, RFID, Bluetooth)
- Trusted networks
- Privacy/confidentiality (with regard to engagement)

#### Information Security Attack Detection

- Security policy implications
- Vulnerability detection
- IP Spoofing detection
- Verification procedures (e.g., false positive/negative validation)
- Social engineering (human factors manipulation)
- Vulnerability scanning
- Malware detection
- Sniffer detection
- DoS and DDoS detection
- Detect and block rogue AP
- Evading IDS (e.g., evasion, fragmentation)
- Evading Firewall (e.g., firewalking, tunneling)
- Honeypot detection
- Steganalysis

#### Information Security Attack Prevention

- Defend against web server attacks
- Patch management
- Encoding schemes for web application
- Defend against web application attacks
- Defend against SQL injection attacks
- Defend against wireless and Bluetooth attacks
- Mobile platforms security
- Mobile Device Management (MDM)
- BYOD Security

- Cloud computing security

#### *Unit – IV*

##### Tools / Systems / Programs Information Security Systems

- Network/host based intrusion
- Boundary protection appliances
- Access control mechanisms (e.g., smart cards)
- Cryptography techniques (e.g., IPSec, SSL, PGP)
- Domain name system (DNS)
- Network topologies
- Subnetting
- Routers / modems / switches
- Security models
- Database structures

##### Information Security Programs

- Operating environments (e.g., Linux, Windows, Mac)
- Anti-malware systems and programs (e.g., anti-keylogger, anti-spyware, anti-rootkit, anti-trojan, anti-virus)
- Wireless IPS deployment
- Programming languages (e.g. C++, Java, C#, C)
- Scripting languages (e.g., PHP, Javascript)

##### Information Security Tools

- Network/wireless sniffers (e.g., Wireshark, Aircrack-ng)
- Port scanning tools (e.g., Nmap, Hping)
- Vulnerability scanner (e.g., Nessus, Qualys, Retina)
- Vulnerability management and protection systems (e.g., Foundstone, Ecora)
- Log analysis tools
- Exploitation tools
- Footprinting tools (e.g., Maltego, FOCA, Recon-ng)
- Network discovery tools (e.g., Network Topology Mapper)
- Enumeration tools (e.g., SuperScan, Hyena, NetScanTools Pro)

- Steganography detection tools
- Malware detection tools
- DoS/DDoS protection tools
- Patch management tool (e.g., MBSA)
- Webserver security tools
- Web application security tools (e.g., Acunetix WVS)
- Web application firewall (e.g., dotDefender)
- SQL injection detection tools (e.g., IBM Security AppScan)
- Wireless and Bluetooth security tools
- Android, iOS, Windows Phone OS, and BlackBerry device security tools
- MDM Solutions
- Mobile Protection Tools
- Intrusion Detection Tools (e.g., Snort)
- Hardware and software firewalls (e.g., Comodo Firewall)
- Honeypot tools (e.g., KFSensor)
- IDS/Firewall evasion tools (e.g., Traffic IQ Professional)
- Packet fragment generators
- Honeypot Detection Tools
- Cloud security tools (e.g., Core CloudInspect)
- Cryptography tools (e.g., Advanced Encryption Package)
- Cryptography toolkit (e.g., OpenSSL)
- Disk encryption tools
- Cryptanalysis tool (e.g., CrypTool)

*Unit – V*

#### Procedures / Methodology Information Security Procedures

- Cryptography
- Public key infrastructure (PKI)
- Digital signature and Pretty Good Privacy (PGP)
- Security Architecture (SA)
- Service oriented architecture
- Information security incident
- N-tier application design
- TCP/IP networking (e.g., network routing)



- Security testing methodology

Information Security Assessment Methodologies

- Web server attack methodology
- Web application hacking methodology
- SQL injection methodology and evasion techniques
- SQL injection evasion techniques
- Wireless and Bluetooth hacking methodology
- Mobile platform (Android, iOS, Windows

Phone OS, and BlackBerry) hacking methodology

- Mobile Rooting and Jailbreaking

Regulation / Policy Information Security Policies/ Laws/Acts

- Security policies
- Compliance regulations (e.g., PCI-DSS,SOX)

Ethics of Information Security

- Professional code of conduct
- Appropriateness of hacking

# **Course Name: Dockers and Kubernetes Implementation**

**Course Code: BCA211A**

## **Course Objectives:**

CO1: Develop a thorough understanding of microservices architecture, its advantages over monolithic applications, and the importance of security and API management in microservices environments.

CO2: Master Node.js fundamentals, including installation, project setup, and utilization of development tools such as Nodeclipse.

CO3: Acquire practical skills in Docker, covering containerization concepts, image creation, Dockerfile usage, and container management.

CO4: Explore Kubernetes functionalities, including cluster setup, deployment configuration, scaling, and service management for container orchestration.

CO5: Apply Docker and Kubernetes knowledge to design, deploy, and manage microservices-based applications, ensuring scalability, reliability, and maintainability.

## **Syllabus**

### **Unit 1**

**Microservice Fundamentals:** Introduction to Microservices, Comparison with, Monolithic Applications, Microservice Security, API Management

### **Unit II**

**Node.js Introduction:** Introduction and Installation of Node.js, Sample Project Development, Introduction to Nodeclipse

### **Unit III**

**Docker Fundamentals:** Introduction to Docker, Containerization Concepts, Docker Image Creation and Management

### **Unit IV**

**Kubernetes Basics:** Introduction to Kubernetes, Cluster Setup, Deployment Configuration and Scaling

### **Unit V**

**Advanced Docker and Kubernetes Implementation:** Advanced Docker Concepts (e.g., Docker Compose), Kubernetes Service Management, Designing and Deploying Microservices Applications

## **Course Outcomes (COs):**

**Upon successful completion of this subject students will able**

CO1: Understand the fundamentals of microservices architecture, including its comparison with monolithic applications and key aspects of security and API management.

CO2: Gain proficiency in Node.js, including installation, project setup, and usage of tools like Nodeclipse.

CO3: Learn the concepts and practical implementation of Docker containers for packaging, distributing, and running applications.

CO4: Explore Kubernetes orchestration system for automating deployment, scaling, and management of containerized applications.

CO5: Apply Docker and Kubernetes knowledge to design and deploy scalable, resilient, and efficient microservices-based applications.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES  
AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		L							L			
CO2						H				M		
CO3				M				L				
CO4						L					L	
CO5	M				L							L

H = Highly Related; M = Medium; L = Low

**Reference Books**

1. IBM LMS Portal

## **Course Name: Deployment of Private Cloud**

### **Course Code: BCA212A**

#### **Course Objectives:**

CO1: Develop a comprehensive understanding of containers and Kubernetes, their advantages, and their significance in deploying private cloud infrastructure.

CO2: Master the features and functionalities of Red Hat OpenShift, including its installation process and the planning of development workflows on the platform.

CO3: Acquire practical skills in creating, building, and deploying Ruby-based applications on the OpenShift platform.

CO4: Learn the process of creating custom container images, managing builds, and image streams to streamline application deployment on OpenShift.

CO5: Explore the deployment, service, route, and storage management functionalities of OpenShift, and learn to efficiently manage application deployments in private cloud environments.

#### **Syllabus**

##### **Unit 1**

**Introduction to Containers and Kubernetes:** Overview of Containers, Introduction to Kubernetes

##### **Unit II**

**Red Hat OpenShift Overview:** Introduction to Red Hat OpenShift, Installation of OpenShift, Planning Development Process

##### **Unit III**

**Ruby Application Deployment on OpenShift:** Creating a Ruby-based Application, Building and Image Streams in OpenShift

##### **Unit IV**

**Custom Container Images and Deployments:** Creating Custom Container Images, Deployments in OpenShift

##### **Unit V**

**Application Management in OpenShift:** Service and Route Configuration, Allocating Persistent Storage, Managing Application Deployments

### Course Outcomes (COs):

**Upon successful completion of this subject students will able**

CO1: Understand the concepts of containers and Kubernetes and their role in deploying private cloud environments.

CO2: Gain proficiency in Red Hat OpenShift, including its features, installation process, and planning development workflows.

CO3: Learn to create and deploy Ruby-based applications on OpenShift platform.

CO4: Master the process of creating custom container images, managing builds, and image streams in OpenShift.

CO5: Acquire skills in deploying, managing, and scaling applications using OpenShift's deployment, service, route, and storage management functionalities.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		L							L			
CO2						H				M		
CO3				M				L				
CO4						L					L	
CO5	M				L							L

H = Highly Related; M = Medium; L = Low

### Reference Books

1. IBM LMS Portal

## **Course Name: REST API and IBM Watson Studio**

### **Course Code: BCA213A**

#### **Course Objectives:**

CO1: Develop a comprehensive understanding of JAXB and its usage in Java applications for XML data binding.

CO2: Explore the fundamentals of web services, including REST APIs, and their role in enabling communication between systems over the internet.

CO3: Acquire practical skills in designing and implementing RESTful APIs, including resource modeling, URI design, and HTTP methods usage.

CO4: Learn to develop Java clients to interact with REST APIs, including authentication, request handling, and response parsing.

#### **Syllabus**

##### **Unit 1**

**JAXB Introduction:** Overview of JAXB, JAXB Binding Process, Advantages of JAXB, JAXB Annotations, Practical Exercises

##### **Unit II**

**Web Services Overview:** Introduction to Web Services, Types of Web Services (SOAP, REST), Role of Web Services in Modern Applications, RESTful Architecture Principles, Web Service Standards (WSDL, SOAP, etc.)

##### **Unit III**

**REST APIs Fundamentals:** Introduction to REST APIs, REST vs. SOAP, RESTful Principles (Statelessness, Uniform Interface, etc.), Resource Modeling, URI Design and Best Practices

##### **Unit IV**

**Accessing REST API using Java client:** Introduction to Java REST Clients, REST Client Libraries (e.g., Apache HttpClient, Jersey Client), Authentication and Authorization, Handling HTTP Requests (GET, POST, PUT, DELETE), Parsing JSON/XML Responses

##### **Unit V**

**Practical Implementation and Case Studies:** Real-world REST API Examples, Building RESTful Services with Java EE (JAX-RS), Integration of REST APIs in Java Applications, Best Practices for REST API Development, Case Studies and Hands-on Projects

#### **Course Outcomes (COs):**

**Upon successful completion of this subject students will be able**

CO1: Understand the concepts of JAXB and its role in binding XML data to Java objects.

CO2: Gain an overview of web services, including REST APIs, and their significance in modern application development.

CO3: Master the principles and practices of RESTful API design and implementation.

CO4: Learn to access REST APIs using Java clients for building robust and scalable applications.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES  
AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		L							L			
CO2						H				M		
CO3				M				L				
CO4						L					L	
CO5	M				L							L

H = Highly Related; M = Medium; L = Low

*Reference Books*

1. IBM LMS Portal

## **Course Name: Machine Learning with Python**

### **Course Code: BCA218A**

#### **Course Objectives:**

CO1: Understand the basic concepts of Python language.

CO2: Understand the basics of Machine Learning & their types.

CO3: Understand various learning models, methods and applications under supervised and unsupervised learning

CO4: Understand data preprocessing for Machine Learning.

CO5: Solve real world problems through machine learning implementation leading to predictions.

#### **Syllabus**

**Unit I: Supervised vs Unsupervised Learning:** Machine learning vs statistical modeling, supervised vs unsupervised learning, supervised learning classification, unsupervised learning.

**Unit II: Supervised Learning I:** K-Nearest Neighbors, Decision Trees, Random Forests, Reliability of Random Forests, Advantages & Disadvantages of Decision trees

**Unit III: Supervised Learning II:** Regression Algorithms, Model Evaluation, Model Evaluation: overfitting and underfitting.

**Unit IV: Data Analysis & visualization :** using numpy, panda ,matplotlib, scipy etc

**Unit V:** Mini Project/Prediction

#### **Course Outcomes(COs):**

**Upon successful completion of this subject students will able**

CO1: Understand different types of machine learning and map problems to different classes of machine learning algorithms.

CO2: Describe and apply machine-learning algorithms including decision trees, naïve Bayes, and logistic regression.

CO3: Understand subtleties and application scenarios for different supervised classification algorithms discussed above.



CO4: Explain and apply machine-learning concepts such as regularization, overfitting, and Laplace smoothing to design efficient machine learning models.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M				M							
CO2						L			L			
CO3			L					L				
CO4						H				L		
CO5		H		L								L

H=Highly Related; M =Medium; L=Low

**Reference Books**

1. IBM LMS Portal

## **Course Name: Deep Learning and Machine Learning**

**Course Code: BCA219A**

### **Course Objectives:**

CO1: To introduce the idea of artificial neural networks and their architecture

CO2: To introduce techniques used for training artificial neural networks.

CO3: To enable design of an artificial neural network for classification

CO4: To enable design and deployment of deep learning models for machine learning problems

CO5: Solve real world problems through machine learning implementation leading to predictions.

### **Syllabus**

**Unit I: Deep Learning Concepts:** Neural network, Deep learning, The Vanishing Gradient, Restricted Boltzmann machines, deep belief network

**Unit II: Deep Learning Concepts Continued:** Convolutional networks, Recurrent nets, autoencoders, deep learning use cases

**Unit III: Platforms for Deep Learning:** Deep learning platform, H2O.ai, Dato GraphLab

**Unit IV: Deep Learning Software Libraries:** Deep Learning Library, Theano, deeplearning4j, caffe

**Unit V:** Mini Project/Prediction

### **Course Outcomes(COs):**

**Upon successful completion of this subject students will able**

CO1: Able to understand the mathematics behind functioning of artificial neural networks

CO2: Able to analyze the given dataset for designing a neural network based solution

CO3: Able to carry out design and implementation of deep learning models for signal/image processing applications

CO4: Able to design and deploy simple TensorFlow-based deep learning solutions to classification problems

CO5: Will understand the deep knowledge of Deep Learning and Machine Learning Algorithms

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M				M							
CO2						L			L			
CO3			L					L				
CO4						H				L		
CO5		H		L								L

H=Highly Related; M =Medium; L=Low

**Reference Books**

1. IBM LMS Portal

**Course Name: Introduction to Cloud Architecture**  
**Course Code: BCA247A**

**Course Objectives:**

- CO 1.** Make architectural decisions based on AWS architectural principles and best practices
- CO 2.** Use AWS services to make infrastructure scalable, reliable, and highly available
- CO 3.** Use AWS managed services to enable greater flexibility and resiliency in an infrastructure
- CO 4.** Increase performance and reduce cost of a cloud infrastructure built on AWS
- CO 5.** Use the AWS Well-Architected Framework to improve architectures that use AWS solutions

**UNIT I : AWS Academy Cloud Architecting**

Roles in cloud computing, Introducing Cloud Architecting, What is cloud architecting?, The AWS Well-Architected Framework, Best practices for building solutions on AWS, AWS global infrastructure, **Adding a Storage Layer** The simplest architecture, Using Amazon S3, Demo Demonstration: Amazon S3 Versioning, Hosting a Static Website, Storing data in Amazon S3 Moving data to and from Amazon S3 Demo Demonstration: Amazon S3 Transfer Acceleration, Choosing Regions for your architecture, Challenge Lab Challenge Lab: Creating a Static Website for the Café

**UNIT II: Adding a Compute Layer**

Architectural need, Adding compute with Amazon EC2, Choosing an Amazon Machine Image (AMI) to launch an Amazon EC2 instance, Selecting an Amazon EC2 instance type, Using user data to configure an EC2 instance, Demo Demonstration: Configuring an EC2 Instance with User Data, Adding storage to an Amazon EC2 instance, Guided Lab Guided Lab: Introducing Amazon Elastic, File System (Amazon EFS), Amazon EC2 pricing options, Demo Demonstration: Reviewing the Spot, Instance History Page, **Adding a Database Layer** Architectural need, Database layer considerations, Amazon Relational Database Service, (Amazon RDS), Guided Lab Guided Lab: Creating an Amazon RDS, database, Database security controls, Migrating data into AWS databases, Migrating a Database to Amazon RDS, **Creating a Networking Environment**, Architectural need, Creating an AWS networking environment, Connecting your AWS networking, environment to the internet, Demo Demonstration: Creating a Virtual Private Cloud Using the AWS Console, Demo (Optional) Demonstration: Creating a Virtual Private Cloud Using the AWS CLI, Securing your AWS networking environment, Guided Lab: Creating a Virtual Private Cloud, Challenge Lab Challenge Lab: Creating a VPC,

**UNIT III: Connecting Networks**

Connecting your remote network with, AWS Site-to-Site VPN, Connecting your remote network with AWS Direct Connect, Connecting virtual private clouds (VPCs) in AWS with VPC peering Creating a VPC Peering Connection, Scaling your VPC network with AWS, Transit Gateway, Activity AWS Transit Gateway , Connecting your VPC to supported AWS services, Securing User and Application Access, Account users and AWS Identity and Access Management (IAM), Activity Examining IAM policies Organizing users, Federating users, Demo Demonstration: EC2 Instance Profile, Multiple accounts Challenge Lab Challenge Lab: Controlling Account Access by Using IAM, Implementing Elasticity, High Availability, and Monitoring Scaling your compute resources, Demo Demonstration: Creating Scaling Policies for Amazon EC2 Auto Scaling, Scaling your databases, Designing an environment that's highly available, Creating a Highly Available Web Application, Demo Demonstration: Amazon Route, Guided Lab Guided Lab: Creating a Highly Available, Environment, Monitoring Challenge Lab Challenge Lab: Creating a Scalable and Highly Available Environment for the Café

**UNIT IV Automating Your Architecture**

Reasons to automate, Automating your infrastructure, Analyzing AWS CloudFormation Template Structure and Creating a Stack, Guided Lab Guided Lab: Automating Infrastructure, Deployment with AWS CloudFormation, Automating deployments, AWS Elastic Beanstalk, Challenge Lab: Automating Infrastructure Deployment Caching

Content, Overview of caching, Edge caching, Streaming Dynamic, Content Using Amazon CloudFront, Caching web sessions, Caching databases, Building Decoupled Architectures Decoupling with Amazon Simple Queue Service (Amazon SQS). Decoupling with Amazon Simple Notification Service (Amazon SNS), Sending messages between cloud applications and on-premises with Amazon MQ.

### UNIT V Building Microservices and Serverless

Introducing microservices, Building microservice applications with AWS container services, Guided Lab Breaking a Monolithic, Node.js Application into Microservices, Introducing serverless architectures, Lecture or Video Building serverless architectures with, AWS Lambda, Demo Demonstration: Creating an AWS Lambda Function, Using AWS Lambda, with Amazon S3, Guided Lab Guided Lab: Implementing a Serverless Architecture on AWS Lecture or Video Extending serverless architectures with Amazon API Gateway, Orchestrating microservices with AWS Step Functions Challenge Lab Challenge Lab: Implementing a Serverless Architecture for the Café, Planning for Disaster Disaster planning strategies, Disaster recover patterns, Hybrid Storage and Data Migration with AWS Storage Gateway, File Gateway, Bridging to Certification, Certification exam resources, Additional resources Discussion, Course capstone project.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							H				
CO2		H				H						
CO3		H							H			
CO4	H										H	
CO5	H											H

H = Highly Relevant ; M = Medium Relevant; L = Low Relevant

**Course Name Cloud Security**  
**Course Code BCA248A**

**Course Objective:**

- [CO1]Identify security benefits and responsibilities of using the Amazon Web Services (AWS) Cloud.
- [CO2]Use the identity and access management features of AWS.
- [CO3]Describe how to secure network access to AWS resources.
- [CO4]Explain the available methods for encrypting data at rest and data in transit.
- [CO5]Determine which AWS services can be used for monitoring and incident response.

**Syllabus**

**Unit 1: Introduction to Security on AWS**

Introduction, Security in the AWS Cloud, Security design principles, Shared responsibility model, Activity: Shared Responsibility Model

**UNIT II:Securing Access to Cloud Resources**

Introductionm, IAM fundamentals, Authenticating with IAM, Authorizing with IAM, Demo: Amazon S3 Cross-Account Resource-Based Policy, Additional authentication and access management services, AWS Organizations, Using Resource-Based Policies to Secure an S3 Bucket, **Securing Your Infrastructure**, Building a three-tier web application, Using VPCs to secure resources, Using security groups and network ACLs to control access, Using internet gateways and NAT gateways to manage communications, Balancing traffic, Pulling it all together, Protecting your compute resources, Securing VPC Resources by Using Security Groups

**UNIT III: Protecting Data in Your Application**

Introduction, Protect data at rest, Protect data in transit, Best practices for protecting data in Amazon S3, Additional data protection services, Introduction to AWS KMS, Protecting Data,

**UNIT IV: Logging and Monitoring,**

Importance of logging and monitoring, Capture and collect, Activity: Reading a Log File, AWS services with built-in logs, Monitor and report, Best practices for logging and monitoring, Additional AWS services for logging and monitoring Demo: Security Hub, Configure Monitoring and Logging in an AWS Environment

**UNIT V: Responding and Managing an Incident Response**

- Introduction, What is an incident?, Incident response on AWS, AWS Config, Additional incident response services, Best practices for incident response, Remediating an Incident by Using AWS Config

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							H				

CO2		H				H						
CO3					H				H			
CO4			H								H	
CO5	H											H

H = Highly Relevant ; M = Medium Relevant; L = Low Relevant

# **Course Name: AWS Academy Cloud Foundation Course**

## **Course Code: BCA249A**

### **Course Objectives:**

- CO1: Create an AWS Virtual Private Cloud (Amazon VPC).
- CO2: Demonstrate when to use Amazon Elastic Compute Cloud (EC2), AWS Lambda and AWS Elastic Beanstalk.
- CO3: Differentiate between Amazon S3, Amazon EBS, Amazon EFS and Amazon S3 Glacier.
- CO4: Demonstrate when to use AWS Database services including Amazon Relational Database Service (RDS), Amazon DynamoDB, Amazon Redshift, and Amazon Aurora.
- CO5: Explore key concepts related to Elastic Load Balancing (ELB), Amazon CloudWatch, and Auto Scaling

### **Syllabus**

#### **UNIT I: Cloud Concepts Overview:**

Introduction to cloud computing, Advantages of the cloud, Introduction to AWS, Moving to the AWS Cloud. **Cloud Economic and Billing**, Introduction, Fundamentals of Pricing, Total cost of ownership, Delaware North Case study, AWS organization, AWS Billing and cost Management, Billing dashboard, Technical Support Model,

#### **UNIT II: AWS Global Infrastructure Overview:**

Introduction, AWS Global Infrastructure, AWS Services and Service category, AWS management console click through. AWS shared responsibility model, AWS IAM, Securing a New AWS Account, Securing account and data, working to ensure compliance

#### **UNIT III: Networking and Content Delivery:**

Introduction, Networking Basics, Amazon VPC, VPC Networking, VPC Security, Route 53, Cloud front, **Compute**: Introduction, compute services overview, amazon EC2 part 1, amazon EC2 part 2, amazon EC2 part 3, amazon EC2 cost optimization, container service, Introduction to AWS Lambda, Introduction to AWS Elastic Beanstalk,

#### **UNIT IV: Storage:**

Introduction, AWS EBS( Elastic Block Store Console), AWS S3, AWS EFS, AWS S3 Glacier. **Databases**:  
Introduction , Amazon RDS, Amazon DynamoDB, Amazon Redshift, Amazon Aurora.

#### **UNIT V: Cloud Architecture:**

Introduction, AWS Well Architected framework design principles, operational excellence, security, reliability, performance efficiency, cost optimization, reliability and high availability, AWS trusted advisor, **Automatic Scaling Monitoring**: Introduction, Elastic Load Balancing, Amazon Cloud watch, Amazon EC2 Auto Scaling,

### **Course Outcome: Upon completion of this course, students will be able to**

- CO1:** Define the AWS Cloud
- CO2:** Explain the AWS pricing philosophy
- CO3:** Identify the global infrastructure components of AWS
- CO4:** Describe the security and compliance measures of the AWS Cloud, including AWS Identity and Access Management (IAM)
- CO5:** Create a virtual private cloud (VPC) by using Amazon Virtual Private Cloud (Amazon VPC)



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			H								
CO2		H								H		
CO3		H						H				
CO4	H										H	
CO5	H											H

H = Highly Relevant ; M = Medium Relevant; L = Low Relevant

## **Course Name: AWS Academy Cloud Developing**

**Course Code: BCA250A**

### **Course Objectives**

CO1 Recall cloud computing services and models.

CO2. Describe developing on AWS.

CO3. Configure AWS Identity and Access Management for programmatic access

CO4. Configure storage with Amazon S3 programmatically.

CO5. Develop with DynamoDB and explain caching

**UNIT I Welcome to Academy Cloud Developing (ACD):** Cloud prerequisites objectives and overview, AWS training portal, AWS free tier, AWS educate, AWS documentation scavenger hunt. Introduction to Developing on AWS System development lifecycle, steps to get started developing on AWS, working with AWS SDKs, errors and exceptions, introduction to AWS X-rays, introduction to amazon cloudwatch and AWS cloudtrail.

### **UNIT II – Introduction to AWS Identity and Access Management (IAM)**

Shared responsibility model , overview of IAM, authentication with IAM , authorization with IAM. Developing Storage Solutions with Amazon S3, Introduction to Amazon S3, Creating amazon S3 buckets, working with amazon S3 objects, protecting data and managing access to amazon S3 resources., Developing NoSQL Solutions with Amazon DynamoDB, Introduction to amazon dynamoDB, amazon dynamo DB Key concepts, partition and data distribution, secondary indexes, read/write throughput, streams and global tables, backup and restore, basic operations for amazon dynamoDB tables.

### **UNIT III Caching Information for Scalability**

Caching overview, caching with amazon cloudfront, caching with amazon elasticache, caching strategie, Introduction to Containers, Introduction to containers, Container VS Hardware virtualization, Microservices-use case for containers, Amazon container services. Developing Solutions with Amazon SQS and Amazon SNS Introduction to message queues, introduction to amazon SQS, amazon SQS developer concepts, introduction to amazon SNS, amazon SNS developer concepts, introduction to amazon MQ.

### **UNIT IV Developing Event-Driven Solutions with AWS Lambda**

Introduction to server less computing with AWS lambda, overview of AWS lambda, Execution model for invoking lambda functions, AWS lambda permissions, overview of authoring and configuring lambda functions, overview of deploying lambda functions. Developing Solutions with Amazon API Gateway, Application Programming Interfaces, Amazon API Gateway, Creating a RESTful API, Controlling Access to a RESTful API, Testing a RESTful API, Deploying a RESTful API, Invoking a RESTful API, Monitoring a RESTful API.

## UNIT V - Developing Solutions with AWS Step Functions

Workflow Coordination in Distributed Applications, Introduction to AWS Step Functions, StateTypes, AWS Step Functions Use Case, AWS Step Functions API. Developing Secure Applications on AWS, Secure Network Connections. Manage Application Secrets, Authenticate with AWS Security Token Service, Authenticate with Amazon Cognito. Deploying applications on AWS. Introducing DevOps, Using AWS Code Services for CI/CD, Introducing Deployment and Testing Strategies, Deploying Applications with AWS Elastic Beanstalk, Deploying Applications with AWS CloudFormation, Deploying Serverless Applications with AWS SAM

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							H				
CO2					H					H		
CO3		H							H			
CO4	H										H	
CO5				H								H

H = Highly Relevant ; M = Medium Relevant; L = Low Relevant

# **Course Name: Introduction to Cryptography**

## **Course Code: BCA416A**

### **Course Objectives:**

1. Define crypto primitives, and assess their applications, emphasizing the importance of strong cryptographic algorithms and cryptanalysis.
2. Analyze various hash functions, including SHA256 and Keccak, with practical examples, focusing on properties, applications, and their effectiveness.
3. Understand symmetric cryptography, assess the effectiveness of symmetric key algorithms, and propose security enhancements, while also comparing strengths and weaknesses of encryption methods like DES and AES.
4. Define asymmetric cryptosystems, delve into RSA and elliptic curve cryptography (ECC), comparing their functionality, and apply ECC with open SSL for analysis, emphasizing digital signatures' role and security.
5. Explore zero-knowledge proofs (ZKP), evaluate interactive and non-interactive ZKP, and apply ZKP for privacy, culminating in the design and implementation of a secure user authentication system using appropriate cryptographic techniques.

### **Syllabus**

#### **Unit 1 : Cryptosystem Basics**

What is Cryptography?, Evolution of Cryptography, Cryptography Concepts and Terminology, Need for strong cryptographic algorithms, Role of Cryptoanalysis, Need for Cryptography in Blockchain. Cryptosystems and Crypto Primitives, Different Types of Crypto Primitives, Applications of Hashing, Applications of Symmetric Cryptography, Applications of Asymmetric Cryptography, Digital Signatures. What is Hashing?, Hash Functions, Hash Function Properties, Applications and Variants of Hashing, Salting and Peppering, SHA256, Implementing SHA256, Keccak, SHA256 vs Keccak

#### **Unit 2: Symmetric Cryptography**

Introduction to Symmetric Key Cryptography, Steps Involved In Symmetric Cryptography, Implementing a Symmetric Algorithm, Issues with a basic symmetric cryptography

"One-Time Pad, Implementing One-Time Pad, Stream Cipher

Implementing Stream Cipher, Confusion and Diffusion, Block Cipher"

Data Encryption Standard (DES), Implementing DES, DES shortcomings, Advanced Encryption Standard (AES), Pros and Cons and Applications of AES, Implementing AES

### **Unit 3: Asymmetric Cryptosystems**

What is asymmetric cryptosystems, Steps Involved In Asymmetric Cryptography, Trapdoor Function, What is the RSA algorithm?, How does RSA work?, Applications of RSA, RSA execution in Java, Asymmetric Cryptography Techniques

What is an elliptic curve?, What is ECC?, How does ECC work?, Demonstration of ECC on open SSL, ECC vs RSA

What are Finite Fields?, How are finite fields defined over ECC?

What are Digital Signatures, Digital Signatures over ECC, Digital Signature Verification Over ECC, What are public keys?, Public Key Recovery over ECC

### **Unit 4: PKI Deepdive & ZKP**

Digital Signatures, Why do we need Digital Signatures Algorithms?, Digital Certificates, Why do we have Digital Certificates?, What is Web Of Trust?, What is the need for Web of Trust?

"What is ZKP, What are some applications of ZKP?, Proof of Knowledge

What is zk-snarks?, How do zk-snarks work?"

Interactive vs Non-Interactive ZKP, Pedersen Commitments, Pedersen Commitments over ECC, What is Bulletproof?, How does Bulletproof work?, What is privacy?, How does ZKP ensure privacy?

### **Unit 5: Project**

Checkpoint 1: Encryption using cryptographic algorithm, Checkpoint 2: Decrypt an encrypted message, Checkpoint 3: Objective / Subjective test on Basics of cryptography

Case study - Solution

Course Outcomes (COs):

**Upon successful completion of this subject students will able:**

**CO1:** Develop a strong foundational understanding of cryptography, including cryptosystems and cryptographic primitives, to assess their applications and effectiveness in various contexts.

**CO2:** Master symmetric key cryptography techniques, including implementation and analysis of algorithms like one-time pad, stream cipher, block cipher, DES, and AES, to enhance security and propose solutions for improvement.

**CO3:** Gain expertise in asymmetric cryptosystems, RSA algorithm, and elliptic curve cryptography (ECC), along with digital signatures, to design and implement secure cryptographic systems meeting specific requirements.

**CO4:** Explore advanced cryptographic concepts such as digital signatures, digital certificates, Web of Trust, and zero-knowledge proofs (ZKPs), and evaluate their effectiveness in achieving security and privacy goals.

**CO5:** Design and implement secure user authentication systems using hashing and cryptographic techniques, including symmetric and asymmetric encryption, and leverage zero-knowledge proofs (ZKPs) for enhanced security and password recovery mechanisms.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H							M			
CO2						M				H		
CO3				H				M				
CO4						M					H	
CO5	H				M							L

H = Highly Related; M = Medium; L = Low

#### **Text Books**

1. "Cryptography and Network Security: Principles and Practice" by William Stallings. The latest edition of this book is the 8th edition, published in 2021.
2. "Understanding Cryptography: A Textbook for Students and Practitioners" by Christof Paar and Jan Pelzl. The latest edition of this book is the 3rd edition,

published in 2018

### **Reference Books**

1. "Cryptography and Network Security: Principles and Practice" by William Stallings. The latest edition of this book is the 8th edition, published in 2021.
2. "Introduction to Cryptography: Principles and Applications" by Hans Delfs and Helmut Knebl. The latest edition of this book is the 3rd edition, published in 2018

**Course Name: Life Skills-I**

**Course Code: DEN003A**

**Course Objectives:**

CO1.To prepare the students as per the industry demands.

CO 2.Switching to Activity and Task based Teaching modules.

CO 3.To focus on the linguistic aspects in relation to life situations.

CO 4.Facilitating the aspects of behavioral skills in language.

CO 5. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.

**Syllabus: Theory**

<b>UNIT 1</b>	<ul style="list-style-type: none"><li>• Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion</li><li>• Basics of Narrating and describing things</li></ul>
<b>UNIT 2</b>	<ul style="list-style-type: none"><li>• Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview</li><li>• CV/Resume Drafting and HR Interview advance theory</li><li>• Basics of Video Interviews and Video Profiles for Job</li></ul>
<b>UNIT 3</b>	<ul style="list-style-type: none"><li>• Types of listening, advantages and disadvantages</li></ul>
<b>UNIT 4</b>	<ul style="list-style-type: none"><li>• Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report</li></ul>
<b>UNIT 5</b>	Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Buildingetc

**Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields.

CO2: Ability to learn by doing it practically in the classroom.

CO3: Ability to learn by creating an environment and adapting to the environment.

CO4: The ability to prepare the students as per the need of the Multi-cultural scenario around.

CO5: Ability to improve personality, self esteem and body language.

**TEXTBOOKS:**



- A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.
- Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
- Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.
- The Hard Truth about Soft Skills, by Amazon Publication.

#### **REFERENCES:**

- Quantitative Aptitude, by R S Aggarwal, S Chand Publ.
- Verbal and Non-verbal Reasoning, R S Aggarwal, S Chand Publ.
- Data Interpretation, R S Aggarwal, S Chand Publ. 4. Nova GRE, KAPAL GRE, Barrons GRE books;
- Quantitative Aptitude, The Institute of Chartered Accountants of India.
- More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.

## Course Name: Mathematical Foundation

Course Code: DMA051

### Course Objectives:

- CO 1. To introduce the concepts of mathematical logic.
- CO2. To introduce the concepts of sets, relations, and functions.
- CO3. To perform the operations associated with sets, functions, and relations.
- CO4 To introduce generating functions and use of matrix.
- CO 5 To relate practical examples to the appropriate set, function, or relation model, and interpret the associated operations and terminology in context.

### UNIT-I

**Permutations, Combinations and Logarithm:** Fundamental Principles of Counting, Multiplication Principle, Addition Principle, Different Rules on Permutation, Permutations of Different Things, Permutation of Things Not All Different, Repeated Permutations, Circular Permutations, Restricted Circular Permutations, Restricted Permutations, Different Rules on Combination, Combinations of Different Things, Restricted Combinations, Total Number of Combinations of Different Things, Total Number of Combinations of Things not all Different, Division of Groups. Introduction, Definition, Properties of Logarithms, Types of Logarithms, General Laws of Logarithm, Characteristic and Mantissa, Determination of Characteristic, Determination of Mantissa, Calculation of Logarithm of a Number, Determination of Mantissa of a Number Consisting of More than Four Digits.

### Unit II

**Sets :** Fundamental- Sets and Subsets, Operations on Sets, Sequences, Properties of Integers, Matrices. Logic- Proposition and Logical Operations, Conditional Statements, Methods of Proof, Mathematical Induction. Mathematical Logic-Statements and Notation, Connectives, Normal Forms, the Theory of Inference for the Statement Calculus, the Predicate Calculus, Inference Theory of the Predicate Calculus

### UNIT-III

**Determinants:** Definition, Minors, Cofactors, Properties of Determinants, MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramers Rule, Rank of Matrix Dependence of Vectors, Eigen Vectors of a Matrix, Caley-Hamilton Theorem

### UNIT-IV

**Limits & Continuity:** Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities.

**Differential calculus** - Functions and limits - Simple Differentiation of Algebraic Functions — Evaluation of First and Second Order Derivatives – Maxima and Minima.

### UNIT-V

**Integration:** Integral as Limit of Sum, Fundamental Theorem of Calculus( without proof.), Indefinite Integrals, Methods of Integration: Substitution, By Parts, Partial Fractions, Reduction Formulae for Trigonometric Functions, Gamma and Beta Functions(definition).

**Vector Algebra:** Definition of a vector in 2 and 3 Dimensions; Double and Triple Scalar and Vector Product.

Reference Books :

1. B.S. Grewal, “Elementary Engineering Mathematics”, 34th Ed., 1998.
2. Shanti Narayan, “Integral Calculus”, S. Chand & Company, 1999
3. H.K. Dass, “Advanced Engineering Mathematics”, S. Chand & Company, 9th Revised Edition, 2001.
4. Shanti Narayan, “Differential Calculus ”, S.Chand& Company, 1998.
5. B.S.Vatsa-Discrete Mathematics –New Age International Limited Publishers,New Delhi

**Course Outcomes:**

**Upon successful completion of this subject students should be able to:**

CO1: Ability to apply mathematical logic to solve problems

CO2:Able to use logical notations to define and reason about fundamental mathematical concepts such as sets relations and functions.

CO3: Able to formulate problems and solve recurrence relations.

CO4: Able to use the concepts of Matrix and use of theorems.

CO5: Able to apply differential calculus on different algebraic functions

**Course Name: Life skill –II (Aptitude)**

**Course Code:- DMA003A**

**Course Objectives:**

- CO1.To acquire the basic professional skills used in business and to learn etiquettes and socially accepted behavior.
- CO2. Apply the concept of GD with a clear and open discussion on any relevant topics.
- CO3. To learn the basic concepts of reading comprehension and problem solving techniques.
- CO4. To acquire the Data Sufficiency: Concepts and Problem Solving.
- CO5. Learn the concepts of reasoning with special focus on Non-verbal techniques.

**Professional Grooming and Practices:** Basics of Corporate culture, Key pillars of Business Etiquette. Basics of Etiquette: Etiquette – Socially acceptable ways of behavior, Personal hygiene, Professional attire, Cultural Adaptability. Introductions and Greetings: Rules of the handshake, Earning respect, Business manners. Telephone Etiquette: activities during the conversation, Conclude the call, To take a message. Body Language: Components, Undesirable body language, Desirable body language. Adapting to Corporate life: Dealing with people.

**Group Discussions:** Advantages of Group Discussions, Structured GD – Roles, Negative roles to be avoided, Personality traits to do well in a GD, Initiation techniques, How to perform in a group discussion, Summarization techniques. Listening Comprehension advanced: Exercise on improving listening skills, Grammar basics: Topics like clauses, punctuation, capitalization, number agreement, pronouns, tenses etc.

**Reading Comprehension advanced:** A course on how to approach middle level reading comprehension passages.

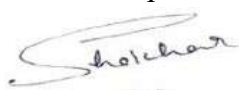
Problem solving – Money Related problems; Mixtures; Symbol Based problems; Clocks and Calendars; Simple, Linear, Quadratic and Polynomial Equations; Special Equations; Inequalities; Functions and Graphs; Sequence and Series; Set Theory; Permutations and Combinations; Probability; Statistics.

Data Sufficiency: Concepts and Problem Solving.

**Non-Verbal Reasoning and Simple Engineering Aptitude:** Mirror Image; Water Image; Paper Folding; Paper Cutting; Grouping Of Figures; Figure Formation and Analysis; Completion of Incomplete Pattern; Figure Matrix; Miscellaneous.  
Special Aptitude: Cloth, Leather, 2D and 3D Objects, Coin, Match Sticks, Stubs, Chalk, Chess Board, Land and geodesic problems etc., Related Problems

**Course Outcomes:**

After the completion of the course the student will be able to

  
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CO 1 Define and Identify different life skills required in personal and professional life

CO 2 Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.

CO 3 Explain the basic mechanics of effective communication and demonstrate these through presentations.

CO 4 Take part in group discussions

CO 5 Use appropriate thinking and problem solving techniques to solve new problems.

**TEXTBOOKS:**

- A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.
- Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
- Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.
- The Hard Truth about Soft Skills, by Amazone Publication.

## Course Name: Professional Skills

Course Code: DEN002A

### Course Objectives

1. To enhance Professional competence in reading, writing, listening and speaking.
2. Switch the approach from providing information about the language to use the language.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
6. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

### Course Outcomes (CO):

**At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario.

CO2: Ability to analyze the usage of English words in professional scenario.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels as per the demand of the corporate culture

### Syllabus

- |               |   |
|---------------|---|
| <b>UNIT 1</b> | <b>Professional Grooming and Professional Culture:</b><br>Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management |
| <b>UNIT 2</b> | <b>Advanced Grammar:</b> Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents  |
| <b>UNIT 3</b> | <b>Composition:</b> Memo, Notice, Circular, Book Review, Research Article, Reports  |
| <b>UNIT 4</b> | <b>Vocabulary Building:</b> Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms  |
| <b>UNIT 5</b> | <b>Reading Comprehension:</b> Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction   |

## **Course Name: Cryptography and Cyber Security**

**Course Code: BCA178A**

### **Course Objectives**

CO1. To understand basics of Cryptography and Network Security.

CO2. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.

CO3. To understand various protocols for network security to protect against the threats in the networks.

CO4. To know about various encryption techniques such as digital signatures use.

CO5. To study about message authentication and cyber crime security.

### **Unit 1**

Introduction to Cyber Security - Types of Attacks, Goals for Security, Security threat and vulnerability, Cyber security models (the CIA triad, the star model). Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers - Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion. Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations.

### **Unit 2**

Principals of public key crypto systems, RSA algorithm, security of RSA. Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, Introduction to SSL.

### **Unit 3**

Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions

### **Unit 4**

Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm.

### **Unit 5**

Introduction to Cyber Crime and security: Cyber Crimes, types of Cyber Crime, hacking, attack vectors, Cross Site Scripting (XSS), XSS Consequences. Cyber Space and criminal behaviour, traditional problems associated with Cyber Crime, Introduction to Incident Response, Digital Forensics - Phishing.

**Upon successful completion of this subject students should be able to:**

CO1: Classify the symmetric encryption techniques.

CO2: Illustrate various Public key cryptographic techniques.

CO3: Summarize the intrusion detection and its solutions to overcome the attacks.

CO4: Evaluate the authentication and hash algorithms.

CO5: Basic concepts of system level security.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	M									M		
CO2		H	M									M
CO3					L						H	
CO4		H					M			L		
CO5	H			H					M			

H = Highly Related; M = Medium; L = Low

**TEXTBOOK**

- William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education, Sixth Edition.

**REFERENCE**

- Nina Godbole and SunitBelpure, Cyber Security: Understanding Cyber crimes, ComputerForensics and Legal Perspectives, Willey India Pvt.Ltd.
- Dr T R Padmanabhan N Harini,"Cryptography and Security Paperback", Wiley India



## **Course Name: Introduction to Cloud Computing**

**Course Code: BCA163A**

### **Course Objective:**

1. To provide students with the fundamentals, essentials of Cloud Computing and cloud models.
2. To be able to work with cloud services and to provide a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
3. To learn about the cloud environment, building software systems and components that scale to millions of users in modern internet.
4. To understand basic and advance services provide by the cloud and basic architecture on which cloud is based upon.
5. To enable students exploring some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.

### **Syllabus**

#### **Unit I**

**Introduction:** Business and IT perspective, Cloud and virtualization, Cloud services requirements, cloud and dynamic infrastructure, cloud computing characteristics, cloud adoption.

Cloud models: Cloud characteristics, Measured Service, Cloud models, security in a public cloud, public verses private clouds, cloud infrastructure self service.

#### **Unit II**

**Cloud at a service:** Gamut of cloud solutions, principal technologies, cloud strategy, cloud design and implementation using SOA, Conceptual cloud model, cloud service demand.

#### **Unit III**

**Cloud solutions:** Cloud ecosystem, cloud business process management, cloud service management, cloud stack, computing on demand, cloud sourcing.

#### **Unit IV**

**Cloud management:** Resiliency, Provisioning, Asset management, cloud governance, high availability and disaster recovery, charging models, usage reporting, billing and metering.

#### **Unit V**

**Cloud and SOA:** SOA journey to infrastructure, SOA and cloud, SOA defined, SOA defined, SOA and IAAS, SOA based cloud infrastructure steps, SOA business and IT services.

### Course Outcomes (COs):

**Upon successful completion of this subject students should be able to:**

CO1: To provide students with the fundamentals, essentials of Cloud Computing and cloud models.

CO2: Students are able to work with cloud services and to provide a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.

CO3: Understand about the cloud solutions, Cloud ecosystem, cloud business process management.

CO4: To learn about designing and implement cloud computing application and cloud management.

CO5: Demonstrate the SOA journey to infrastructure, SOA and cloud and IT services.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H				L					H	
CO2				H						M		
CO3	H							M				M
CO4				H								
CO5		M			H				M			

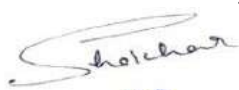
H = Highly Related; M = Medium; L = Low

### Text Books:

1. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,” Cloud Computing:Principles and Paradigms”, Edition1, Wiley,2011
2. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications

### Reference Books

1. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach
2. Barrie Sosinsky,”Cloud Computing Bible”,Edition1, Wiley-India, 2010

  
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 JECRC University Jaipur

3. Ronald L. Krutz, Russell Dean Vines, "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Edition 1, Wiley- India, 2010

**School of Computer Applications**  
**Master of Computer Applications**  
**Syllabus of the Courses offering Employability (2022-23)**  
**Course Name: Advance Java**  
**Course Code: MCA130A**

**Course Objectives**

1. To exhaustive coverage of advanced topics on Java from tools to enterprise Java
2. To provide ample application-based examples, with step-by-step explanations
3. To provide thorough understanding of each topic through extensive examples along with the program codes and screenshots
4. To provides relevant software installation and configuration information wherever necessary
5. To comprises keywords, objective-type questions (with answers) and subjective-type questions for students at the end of all the chapters

**Syllabus**

**Unit I**

**Introduction** : Java Evolution and history, Data types, Control statements , conditional statements, Classes and Objects, Arrays and strings, Functions & Interfaces, Inheritance, keywords: Static, Final, Super, Packages,

**Unit II**

**Applet, Exception Handling, Multi-threading & Garbage Collection:** Applet, Applet life Cycle, Exception Handling: Introduction, types, catching exceptions, tracing stack, custom exception classes

Multi-threading : Introduction, Main Thread, Creating Thread, Interrupting Thread, Suspending and Resuming, Thread Priority, Garbage Collection.

**Unit III**

**Collection frame work and Generic Programming:** Collection frame work: Introduction, Benefits, Collection Interfaces, and Collection Implementation.

Generic Programming: Introduction, Collection Framework and Generics, Type Naming, Generic Methods and Constructors, Type Inference, Bounded Type Parameters, Wildcards, Type Erasure, Restrictions on Generics.

#### **Unit IV**

**AWT, Swings & Input/Output:** AWT: AWT Class Hierarchy, Creating Container, Adding Components, Layout, AWT components, Event Handling, Dialog Boxes, Scrollbar, Menu.

Swings: Containment Hierarchy, Swing Components, Methods of Important Event Listener Interfaces Streams, Formatting, Data Streams, Object Stream, Reading/writing Arrays via Streams, Pipes, File I/O, Path, File

#### **Unit V**

**JDBC, Servlet & JSP:** JDBC: JDBC Drivers, JDBC Architecture, JDBC Classes and Interfaces, Loading a Driver, Making a Connection, Execute SQL Statement, SQL Statements ,Retrieving Result, Getting Database Information, Metadata.

Servlet: Server-side Java, Servlet Architecture, Servlet Life Cycle, Generic Servlet.

JSP: JSP and HTTP, JSP Engines, JSP and Servlet, JSP Syntax, JSP Components

#### **Course Outcomes (Cos):**

**Upon successful completion of this subject students should be able to:**

CO1: Revise object oriented features of java language and develop java applet programming using various techniques.

CO2: Handling exceptions and develop multi- threaded applications.

CO3: Develop applications using collection framework and concepts of generic programming.

CO4: Develop applications using Abstract Window Toolkit

CO5: Develop server side programs using Servlets and develop Java Server Pages applications using JSP Tags.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H	H						M			
CO2			M			L				M		
CO3				H								M
CO4	L							H				
CO5		M			H					L		

H = Highly Related; M = Medium; L = Low

**Text Books**

1. Advance java programming, Oxford, Uttam Kumar Roy, April 2015.
2. Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Second Edition, Oxford University Press , 2014.

**Reference Books**

1. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. JAVA How to Program. Dietel & Dietel, Eleventh Edition, Pearson Group
3. The complete reference JAVA2, Herbert schildt. TMH

**Course Name: Professional Communication Skills**

**Course Code: DEN004A**

**Course Objectives**

- a) To provide an overview of Business Communication process.
- b) To put in use the basic mechanics of Grammar and building vocabulary.
- c) To provide an outline to effective Organizational Communication.
- d) To underline the nuances of Business communication.
- e) To impart the correct practices of the strategies of Effective Business writing and presentations.

**Course Outcomes (CO):**

**At the end of this course students will be able to:**

CO1 : Distinguish among various levels of organizational communication and communication barriers while developing an understanding of Communication as a process in an organization.

CO2 : Stimulate Critical thinking by designing and developing clean and lucid writing skills.

CO3: Demonstrate the ability to write error free while making an optimum use of correct Business Vocabulary & Grammar.

CO4 : Write effective business correspondence with brevity and clarity by correct usage of English language words in different contexts.

CO5 : Demonstrate verbal and non-verbal communication ability through presentations.

**Syllabus: Theory**

<b>UNIT 1</b>	<b>Effective Business Communication</b> <ul style="list-style-type: none"><li>• Communication – An overview</li><li>• Origin, Meaning and Process of Communication</li><li>• Goals of Communication</li><li>• Organizational Communication</li><li>• Directions/Flow of Communications</li><li>• Barriers to Communication</li><li>• Cross cultural/Intercultural communication.</li></ul>
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<b>UNIT 2</b>	<b>Functional Grammar and Reading Comprehension:</b> <ul style="list-style-type: none"> <li>• Subject Verb Agreement/Concord</li> <li>• Tenses</li> <li>• Active Passive Voice</li> <li>• Narration</li> <li>• Common Errors</li> <li>• Reading and analysis of Business articles, success stories and case lets.</li> </ul>
<b>UNIT 3</b>	<b>Building Blocks of Vocabulary</b> <ul style="list-style-type: none"> <li>• Word Formation</li> <li>• Affixes, Homonyms</li> <li>• Synonyms and Antonyms</li> <li>• Business Idioms and Collections</li> </ul>
<b>UNIT 4</b>	<b>Writing Skills</b> <ul style="list-style-type: none"> <li>• Letter Writing</li> <li>• Email Writing</li> <li>• Précis Writing</li> <li>• Notice, Memo</li> <li>• Report Writing.</li> </ul>
<b>UNIT 5</b>	<b>Professional and Technical Communication</b> <ul style="list-style-type: none"> <li>• CV/Resume writing</li> <li>• Interview Skills :Telephonic Interview and Online Interview</li> <li>• Effective Presentation skills.</li> <li>• Business and Social Etiquette- Workplace hierarchy, proper way of making introductions, use of courteous language, appropriate business attire, cultural adaptability, Body language, Stress management</li> </ul>



## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									H	H		H
CO2									H	H		H
CO3									H	M		H
CO4									H	H		L
CO5									H	H		H

H = Highly Related; M = Medium; L = Low

### Syllabus: Lab

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> How to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time-management, Following Deadlines etc
<b>UNIT 2</b>	<b>Write Dialogue from the different contexts of corporate culture:</b> Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
<b>UNIT 3</b>	<b>Composition:</b> , Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

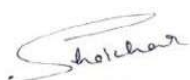
### Methodology for Evaluation

- a. Internal Assessment (Theory)
  - i. Home Assignments: One from each Unit : 15 Marks
  - ii. In Semester Tests (Minimum two) : 30 Marks
  - iii. Attendance : 05 Marks
- b. Term End (Theory) : 50 Marks

- c. Internal Assessment (Lab)  
(a) Daily Performance in the Lab : 50 Marks  
d. Term End (Lab) : 50 Marks

**Suggested Readings:**

1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
8. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006



HoD

School of Computer Applications  
JECRC University Jaipur

**Course Name: Advanced Computer Network**

**Course Code: MCA023A**

**Course Objectives**

1. To be familiar with the terminology and concepts of Layering, Distributed Systems and Networks, Peer-to-Peer and Client-Server Networks.
2. To enhance the practical knowledge of protocols used in different layers.
3. To be familiar with physical layer based on telephone lines.
4. To be able to understand Error Detection, Error Correction, Flow Control.
5. To be able to understand the concept of Connection Oriented, Connectionless and routing algorithms.

**Syllabus**

**Unit I**

**Introduction to Computer Networks:** Definition: Network , The Need of Resources Sharing , Concept of Layering, Distributed Systems and Networks, Peer-to-Peer and Client-Server Networks , Connection-Oriented Networks: X.25 and Frame Relay, Network Categories, Network Components & Connection, Layers and Services, The Protocols, Applications of Computer Networks, Security Issues

**Unit II**

**The Physical Layer:** The Duties Of Physical Layer, Infrared And Millimeter Waves, The ISM Bands, The Optical Light and Free Space Optics, Wired Physical Layer, Physical Layer Based on Telephone Line, 802.2, The LLC Layer, Wireless Physical Layer.

**Unit III**

**The Data Link Layer & The Medium Access Sub layer:** Introduction, Duties, The Error, Types of Errors, Redundancy, Error is Not Always Handled at the Data Link Layer, Error Detection, Error Correction, Flow Control, Protocols, The Sender and Receiver Concept, Timers and the Time Out Event, The Sending and Receiving Windows, The Sequence and Acknowledgment Numbers, Re-transmission, Duplicate Frames, Go Back N, Selective Repeat, Wired MAC Layer

## **Unit IV**

**The Network Layer:** Connection-Oriented Forwarding using Virtual Circuits, Connectionless Forwarding using Datagram, Connection-Oriented vs. Connectionless Forwarding, Forwarding Examples, Routing Algorithms, Hierarchical Routing , Broadcast Routing, Multicast Routing, Congestion, Network Layer Switching, Inter networking Issues, Security Issues at the Network Layer and IPSec

## **Unit V**

**Transport Layer and Application Layer:** Connection Management at the Transport Layer, Congestion Control, Comparison with Data Link Layer, Client-Server Communication, A Sample-Client Server Program, Efficient Management of Dynamic Connections, Domain Name System, The World Wide Web and HTTP, The Email System. File Transfer Protocol, Control and Data Connections

### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: To be familiar with the terminology and concepts of Layering, Distributed Systems and Networks, Peer-to-Peer and Client-Server Networks.

CO2: Describe, analyze and compare Physical Layer based on telephone lines.

CO3: Describe, analyze and compare a number of data link, network, and transport layer protocols, Error Detection, Error Correction and Flow Control.

CO4: Able to understand the concept of Connection Oriented, Connectionless and routing algorithms.

CO5: Enhance the practical knowledge of protocols used in different layers.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H									M		
CO2		H	M									M
CO3					M						M	
CO4							M					
CO5	M			H					M			

H = Highly Related; M = Medium; L = Low

**Text Books**

1. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2014
2. Computer Network, Bhushan Trivedi, Oxford University, May 2011.

**Reference Books**

1. Data Communication and network, Bhushan Trivedi, Oxford University, Feb 2016.
2. Behrouz A. Forouzan, Data Communication and Networking, Fifth Edition, Mcgraw Hill, 2013
3. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition, Pearson, 2011

**Course Name: Certified Network Defender (CND)**

**Course code: MCA210A**

**Unit – I**

**1. Computer Network and Defense Fundamentals**

- Understanding computer network
- Describing OSI and TCP/IP network Models
- Comparing OSI and TCP/IP network Models
- Understanding different types of networks
- Describing various network topologies
- Understanding various network components
- Explaining various protocols in TCP/IP protocol stack
- Explaining IP addressing concept
- Understanding Computer Network Defense (CND)
- Describing fundamental CND attributes
- Describing CND elements
- Describing CND process and approaches

**Network Security Threats, Vulnerabilities, and Attacks**

- Understanding threat, attack, and vulnerability
- Discussing network security concerns
- Reasons behind network security concerns
- Effect of network security breach on business continuity
- Understanding different types of network threats
- Understanding different types of network security vulnerabilities
- Understanding different types of network attacks
- Describing various network attacks

## Network Security Controls, Protocols, and Devices

- Understanding fundamental elements of network security
- Explaining network access control mechanism
- Understanding different types of access controls
- Explaining network Authentication, Authorization and Auditing (AAA) mechanism
- Explaining network data encryption mechanism
- Describing Public Key Infrastructure (PKI)
- Describing various network security protocols
- Describing various network security devices

## Unit – II

### Network Security Policy Design and Implementation

- Understanding security policy
- Need of security policies
- Describing the hierarchy of security policy
- Describing the characteristics of a good security policy
- Describing typical content of security policy
- Understanding policy statement
- Describing steps for creating and implementing security policy
- Designing of security policy
- Implementation of security policy
- Describing various types of security policy
- Designing of various security policies
- Discussing various information security related standards, laws and acts

### Physical Security • Understanding physical security

- Importance of physical security
- Factors affecting physical security
- Describing various physical security controls

- Understanding the selection of Fire Fighting Systems
- Describing various access control authentication techniques
- Understanding workplace security
- Understanding personnel security
- Describing Environmental Controls
- Importance of physical security awareness and training

#### Host Security • Understanding host security

- Understanding the importance of securing individual hosts
- Understanding threats specific to hosts
- Identifying paths to host threats
- Purpose of host before assessment
- Describing host security baselining
- Describing OS security baselining
- Understanding and describing security requirements for different types of servers
- Understanding security requirements for hardening of routers
- Understanding security requirements for hardening of switches
- Understanding data security concerns when data is at rest, in use, and in motion
- Understanding virtualization security

### **Unit – III**

#### Secure Firewall Configuration and Management

- Understanding firewalls
- Understanding firewall security concerns
- Describing various firewall technologies
- Describing firewall topologies
- Appropriate selection of firewall topologies
- Designing and configuring firewall ruleset
- Implementation of firewall policies
- Explaining the deployment and implementation of firewall
- Factors to consider before purchasing any firewall solution
- Describing the configuring, testing and deploying of firewalls



- Describing the management, maintenance and administration of firewall implementation
- Understanding firewall logging
- Measures for avoiding firewall evasion
- Understanding firewall security best practices

#### Secure IDS Configuration and Management

- Understanding different types of intrusions and their indications
- Understanding IDPS
- Importance of implementing IDPS
- Describing role of IDPS in network defense
- Describing functions, components, and working of IDPS
- Explaining various types of IDS implementation
- Describing staged deployment of NIDS and HIDS
- Describing fine-tuning of IDS by minimizing false positive and false negative rate
- Discussing characteristics of good IDS implementation
- Discussing common IDS implementation mistakes and their remedies
- Explaining various types of IPS implementation
- Discussing requirements for selecting appropriate IDPS product
- Technologies complementing IDS functionality

#### Secure VPN Configuration and Management

- Understanding Virtual Private Network (VPN) and its working
- Importance of establishing VPN
- Describing various VPN components
- Describing implementation of VPN concentrators and its functions
- Explaining different types of VPN technologies
- Discussing components for selecting appropriate VPN technology
- Explaining core functions of VPN
- Explaining various topologies for implementation of VPN
- Discussing various VPN security concerns
- Discussing various security implications to ensure VPN security and performance

## Unit – IV

### Wireless Network Defense

- Understanding wireless network
- Discussing various wireless standards
- Describing various wireless network topologies
- Describing possible use of wireless networks
- Explaining various wireless network components
- Explaining wireless encryption (WEP, WPA, WPA2) technologies
- Describing various authentication methods for wireless networks
- Discussing various types of threats on wireless networks
- Creation of inventory for wireless network components
- Appropriate placement of wireless Access Point (AP)
- Appropriate placement of wireless antenna
- Monitoring of wireless network traffic
- Detection and locating of rogue access points
- Prevention of wireless network from RF interference
- Describing various security implications for wireless network

### Network Traffic Monitoring and Analysis

- Understanding network traffic monitoring
- Importance of network traffic monitoring
- Discussing techniques used for network monitoring and analysis
- Appropriate position for network monitoring
- Connection of network monitoring system with managed switch
- Understanding network traffic signatures
- Baselining for normal traffic
- Disusing the various categories of suspicious traffic signatures
- Various techniques for attack signature analysis
- Understanding Wireshark components, working and features
- Demonstrating the use of various Wireshark filters
- Demonstrating the monitoring LAN traffic against policy violation
- Demonstrating the security monitoring of network traffic

- Demonstrating the detection of various attacks using Wireshark
- Discussing network bandwidth monitoring and performance improvement

#### Network Risk and Vulnerability Management

- Understanding risk and risk management
- Key roles and responsibilities in risk management
- Understanding Key Risk Indicators (KRI) in risk management
- Explaining phase involves in risk management
- Understanding enterprise network risk management
- Describing various risk management frameworks
- Discussing best practices for effective implementation of risk management
- Understanding vulnerability management
- Explaining various phases involved in vulnerability management
- Understanding vulnerability assessment and its importance
- Discussing requirements for effective network vulnerability assessment
- Discussing internal and external vulnerability assessment
- Discussing steps for effective external vulnerability assessment
- Describing various phases involve in vulnerability assessment
- Selection of appropriate vulnerability assessment tool
- Discussing best practices and precautions for deploying vulnerability assessment tool
- Describing vulnerability reporting, mitigation, remediation and verification

### Unit – V

#### Data Backup and Recovery

- Understanding data backup
- Describing the data backup plan
- Describing the identification of data to backup
- Determining the appropriate backup medium for data backup
- Understanding RAID backup technology and its advantages
- Describing RAID architecture
- Describing various RAID levels and their use
- Selection of appropriate RAID level
- Understanding Storage Area Network (SAN) backup technology and its advantages

- Best practices of using SAN
- Understanding Network Attached Storage (NAS) backup technology and its advantages
- Describing various types of NAS implementation

#### Network Incident Response and Management

- Understanding Incident Handling and Response (IH&R)
- Roles and responsibilities of Incident Response Team (IRT)
- Describing role of first responder
- Describing first response activities for network administrators
- Describing Incident Handling and Response (IH&R) process
- Understanding forensic investigation
- People involved in forensics investigation

Describing forensics investigation methodology

**Course Name: Certified Ethical Hacker (CEH)**

**Course Code: MCA211A**

**Unit – I**

Background Network and Communication Technologies

- Networking technologies (e.g., hardware, infrastructure)
- Web technologies (e.g., web 2.0, skype)
- Systems technologies
- Communication protocols
- Telecommunication technologies
- Mobile technologies (e.g., smartphones)
- Wireless terminologies
- Cloud computing
- Cloud deployment models

Information Security Threats and Attack Vectors

- Malware (e.g., Trojan, virus, backdoor, worms)
- Malware operations
- Information security threats and attack vectors
- Attacks on a system (e.g., DoS, DDoS, session hijacking, webserver and web application attacks, SQL injection, wireless threats)
- Botnet
- Cloud computing threats and attacks
- Mobile platform attack vectors
- Cryptography attacks

Information Security Technologies

- Information security elements

- Information security management (e.g. IA, Defense-in-Depth, incident management)
- Security trends
- Hacking and ethical hacking
- Vulnerability assessment and penetration testing
- Cryptography
- Encryption algorithms
- Wireless encryption
- Bring Your Own Device (BYOD)
- Backups and archiving (e.g., local, network)
- IDS, firewalls, and honeypots

## **Unit – II**

### Analysis / Assessment Information Security Assessment and Analysis

- Data analysis
- Systems analysis
- Risk assessments
- Vulnerability assessment and penetration testing
- Technical assessment methods
- Network sniffing
- Malware analysis

### Information Security Assessment Process

- Footprinting
- Scanning (e.g., Port scanning, banner grabbing, vulnerability scanning, network discovery, proxy chaining, IP spoofing)
- Enumeration
- System hacking (e.g., password cracking, privilege escalation, executing applications, hiding files, covering tracks)

## **Unit – III**

### Security Information Security Controls

- Systems security controls

- Application/file server
- IDS
- Firewalls
- Cryptography
- Disk Encryption
- Network security
- Physical security
- Threat modeling
- Biometrics
- Wireless access technology (e.g., networking, RFID, Bluetooth)
- Trusted networks
- Privacy/confidentiality (with regard to engagement)

#### Information Security Attack Detection

- Security policy implications
- Vulnerability detection
- IP Spoofing detection
- Verification procedures (e.g., false positive/negative validation)
- Social engineering (human factors manipulation)
- Vulnerability scanning
- Malware detection
- Sniffer detection
- DoS and DDoS detection
- Detect and block rogue AP
- Evading IDS (e.g., evasion, fragmentation)
- Evading Firewall (e.g., firewalking, tunneling)
- Honeypot detection
- Steganalysis

#### Information Security Attack Prevention

- Defend against web server attacks
- Patch management

- Encoding schemes for web application
- Defend against web application attacks
- Defend against SQL injection attacks
- Defend against wireless and Bluetooth attacks
- Mobile platforms security
- Mobile Device Management (MDM)
- BYOD Security
- Cloud computing security

## Unit – IV

### Tools / Systems / Programs Information Security Systems

- Network/host based intrusion
- Boundary protection appliances
- Access control mechanisms (e.g., smart cards)
- Cryptography techniques (e.g., IPSec, SSL, PGP)
- Domain name system (DNS)
- Network topologies
- Subnetting
- Routers / modems / switches
- Security models
- Database structures

### Information Security Programs

- Operating environments (e.g., Linux, Windows, Mac)
- Anti-malware systems and programs (e.g., anti-keylogger, anti-spyware, anti-rootkit, anti-trojan, anti-virus)
- Wireless IPS deployment
- Programming languages (e.g. C++, Java, C#, C)
- Scripting languages (e.g., PHP, Javascript)

### Information Security Tools

- Network/wireless sniffers (e.g., Wireshark, Aircrack-ng)



- Port scanning tools (e.g., Nmap, Hping)
- Vulnerability scanner (e.g., Nessus, Qualys, Retina)
- Vulnerability management and protection systems (e.g., Foundstone, Ecora)
- Log analysis tools
- Exploitation tools
- Footprinting tools (e.g., Maltego, FOCA, Recon-ng)
- Network discovery tools (e.g., Network Topology Mapper)
- Enumeration tools (e.g., SuperScan, Hyena, NetScanTools Pro)
- Steganography detection tools
- Malware detection tools
- DoS/DDoS protection tools
- Patch management tool (e.g., MBSA)
- Webserver security tools
- Web application security tools (e.g., Acunetix WVS)
- Web application firewall (e.g., dotDefender)
- SQL injection detection tools (e.g., IBM Security AppScan)
- Wireless and Bluetooth security tools
- Android, iOS, Windows Phone OS, and BlackBerry device security tools
- MDM Solutions
- Mobile Protection Tools
- Intrusion Detection Tools (e.g., Snort)
- Hardware and software firewalls (e.g., Comodo Firewall)
- Honeypot tools (e.g., KFSensor)
- IDS/Firewall evasion tools (e.g., Traffic IQ Professional)
- Packet fragment generators
- Honeypot Detection Tools
- Cloud security tools (e.g., Core CloudInspect)
- Cryptography tools (e.g., Advanced Encryption Package)
- Cryptography toolkit (e.g., OpenSSL)
- Disk encryption tools
- Cryptanalysis tool (e.g., CrypTool)

## Unit – V

### Procedures / Methodology Information Security Procedures

- Cryptography
- Public key infrastructure (PKI)
- Digital signature and Pretty Good Privacy (PGP)
- Security Architecture (SA)
- Service oriented architecture
- Information security incident
- N-tier application design
- TCP/IP networking (e.g., network routing)
- Security testing methodology

### Information Security Assessment Methodologies

- Web server attack methodology
- Web application hacking methodology
- SQL injection methodology and evasion techniques
- SQL injection evasion techniques
- Wireless and Bluetooth hacking methodology
- Mobile platform (Android, iOS, Windows

### Phone OS, and BlackBerry) hacking methodology

- Mobile Rooting and Jailbreaking

### Regulation / Policy Information Security Policies/ Laws/Acts

- Security policies
- Compliance regulations (e.g., PCI-DSS,SOX)

### Ethics of Information Security

- Professional code of conduct
- Appropriateness of hacking

**Course Name: Certified Application Security Engineer**

**Course Code: MCA212A**

**Unit – I**

Understanding Application Security, Threats and Attacks, Security Requirements Gathering

**Unit – II**

Secure Application Design and Architecture, Secure Coding Practices for Input Validation,

**Unit – III**

Secure Coding Practices for Authentication and Authorization, Secure Coding Practices for Cryptography

**Unit – IV**

Secure Coding Practices for Session Management, Secure Coding Practices for Error Handling

**Unit – V**

Static and Dynamic Application Security Testing (SAST & DAST), Secure Deployment and Maintenance

**Course Name: Web Development using HTML, Java Script and Node JSCourse**

**Code: MCA213A**

**Course Objective:**

1. To understand the principles of creating an effective web page, including an in-depth consideration of information architecture.
2. To become familiar with graphic design principles that relates to web design and learn how to implement theories into practice.
3. To develop skills in analyzing the usability of a web site.
4. To understand how to plan and conduct user research related to web usability.
5. To learn CSS grid layout and flexbox.

**Syllabus:**

**Web Development using HTML (8 hours)**

Module 1: Basics of HTML & CSS- HTML Basics, CSS

Module 2: HTML 5 Features- New HTML5 Tags, HTML5 Structural Elements, HTML5 Input Element

Module 3: Introduction to Client Server Architecture- Architecture & HTTP

**Course Outcomes:**

1. To learn techniques of responsive web design, including media queries.
2. To develop skills in digital imaging (Adobe Photoshop.)
3. To develop basic programming skills using HTML.
4. To be able to embed social media content into web pages.
5. To understand the language of the web: HTML and CSS.

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓						
CO2			✓			✓						
CO3					✓				✓			
CO4		✓			✓	✓						
CO5			✓						✓			

## Javascript (8 hours)

### Course Objectives:

1. To develop familiarity with the JavaScript language.
2. To learn to use best-practice idioms and patterns.
3. To understand concepts commonly used in dynamic language programming, such as introspection, higher-order functions, and closures.
4. To understand advanced language features such as prototypical inheritance

### Syllabus:

Module 1: Javascript Overview

Module 2: Loops and Functions

Module 3: Object Model- DOM

### Course Outcomes:

1. To become adept at implementing client-side interfaces through the use of the DOM, jQuery and AJAX.
2. To become familiar with common libraries and tools that are used in web application development.
3. To use JavaScript as an interactive tool for web development.
4. To hand code a number of interactive processes.
5. To implement interactive responses in the web pages.

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓						
CO2			✓			✓						
CO3	✓				✓				✓			
CO4		✓			✓							
CO5			✓						✓			

## NodeJS (12 hours)

### Course Objectives:

1. To learn why server-side JavaScript is useful
2. To Install Node.js
3. To learn how Node.js is architected to allow high scalability with asynchronous code
4. To create basic web applications with Node.js
5. To automate tasks with Gulp

### Syllabus:

Module 1: Introduction- Introduction to NodeJS, Express Framework and features of MongoDB

Module 2: Installation and Configuration- Installation of NodesJS and MongoDB, Nodeclipse plugin

Module 3: Basic Routing and File System- Routing and Global Objects, Synchronous vs Asynchronous file read

Module 4: View Templates- Templates, Serving Static Content

Module 5: Connecting to Database- Handling HTTP and HTTPS, Connecting to Database

Labs: Develop Web Application Using NodeJS Express

**Course Outcomes:**

1. To build an HTTP server using the core modules in Node.js
2. To use stream I/O to efficiently serve the web pages
3. To create modules to organize the server
4. To test the reliability of the application with unit tests
5. To convert the application to an MVC framework using Express

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓						
CO2			✓			✓						
CO3	✓				✓				✓			
CO4		✓			✓							
CO5			✓						✓			

# **Course Name: IBM Cloud Fundamental -Services**

## **Course Code: MCA214A**

### **Course Objectives:**

1. To understand the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability;
2. To analyze the benefits, as well as current and future challenges;
3. To examine cloud management techniques and cloudsoftware deployment considerations.
4. To compare the variety of programming models and develop working experience in several of them.
5. To analyze various cloud programming models and apply them to solve problems on the cloud.

### **Syllabus:**

Module 1: Introduction to Cloud Computing- Traditional Way of Working in Traditional IT Challenges, Future Trend in IT, what is Cloud Computing, Cloud Characteristics, Service and Delivery Model, Cloud Computing Helps Overcome IT Challenges, Traditional On-Premises-Core IT, Cloud Service, IBM Cloud- IAAS, PAAS, SAAS, IBM Cloud Platform as a Service Offerings, Cloud Delivery Models.

Module 2: Deep Dive into IBM Cloud- What is IBM Cloud, Evolution of IBM Cloud, Why IBM Cloud, IBM Cloud UI tour, IBM Cloud Region, Organizations, Spaces, Users and Domains, User Management, Monitoring and Logs, IBM Cloud Catalog, Containers, IBM Cloud Pricing Options

Module 3: IBM Cloud Architecture- Is IBM Cloud a Cloud Foundry, What is Cloud Foundry, Cloud Foundry Languages, Frameworks, and Services, Cloud Foundry Provides Increase in Speed and Agility, Cloud Foundry Architecture – CF Kernel Internal, Description of Each of the Components, Cloud Controller and Diego Brain sync, BBS, and Cell Reps, App Storage and Execution, Messaging, Metrics and Logging, Cloud Foundry - Application Staging, Various IBM Cloud architecture, Cloud Foundry Command Line Interface, Cloud Foundry tools

Module 4: IBM Cloud Services, IBM Cloud Services, Analytics Services, Watson Services, Storage, DevOps, Auto-Scaling, Why Register a Service, Adding a Service to Application, Requesting a New Service Instance, Configuring your Application to Interact with a Service, VCAP\_SERVICES, Service Metadata, IBM Cloud User Provided Service Instance – Service Metadata, IBM Cloud User Provided Service Instance - User Interface service metadata



Module 5: IBM Cloud DevOps Services- What is IBM Cloud DevOps Services, Continuous Delivery, Toolchains Overview, Code, Code Repository, Delivery Pipeline, Get started with Toolchains in IBM Cloud

Module 6: Node Red - Getting Started- Getting Started with Overview of Node-Red, What is Node-Red, Node-Red Software Download, Install Node-Red  
Installing Node.js Windows Build Tools, Running Node-Red, Node-Red Architecture

Module 7: Node Red - Node Creation- Creating Nodes, Create a Node-Red Flow, Explain Types of Nodes and Functions, Inject Node, Debug Node, Function Node, Change Node, Raspberry Pi Node, Switch Node, Palette Nodes

### Course Outcomes:

1. To explain the core concepts of the cloud computing paradigm.
2. To apply fundamental concepts in cloud infrastructures to understand the trade-offs in power, efficiency and cost.
3. To state how to leverage and manage single and multiple datacentres to build and deploy cloud applications that are resilient, elastic and cost-efficient.
4. To discuss system, network and storage virtualization and outline their role in enabling the cloud computing system model.
5. To Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓								✓			
CO2			✓									
CO3	✓			✓	✓							
CO4		✓		✓	✓							
CO5			✓						✓			

**Course Name: Angular JS and Spring Framework**

**Course Code: MCA216A**

**Angular JS (32 hours)**

**Course Objectives:**

1. To utilize AngularJS formats adequately.
2. To quickly create perplexing structures
3. To understanding two-way (proportional) information authoritative
4. To present route usefulness in web applications
5. To oversee conditions with Injection frameworks

**Syllabus:**

Module 1: Introduction to Javascript- Introduction to Javascript, Setting up a, Javascript Development Environment, Defining Variables, Understanding, Javascript Data Types, Using Operators, Implementing Looping, Creating, Functions, Understanding Variable Scope, Using Javascript Objects, Manipulating Strings, Working With Arrays, Adding Error Handling, Document Object Model in JS, Introduction to DOM, HTML and the DOM, Model View Controller, Angular Vs React., Where to Start?, Maturity, Features, Languages, Paradigms, and Patterns, Ecosystem, Adoption, Learning Curve and Development Experience, Putting it Into Context, One Framework to Rule Them All?

Module 2 – Introduction to Angular, Overview of Angular, Angular Architecture, Angular versions, Angular lifecycle, Angular core features, Why Angular, Setting up Angular, Introduction to TypeScript, Learning the Different Types, Understanding Interfaces, Implementing Classes, Implementing Modules, Understanding Functions, Hand-on Exercise

Module 3 - Angular Modules- Introduction to Components, Anatomy of a Component, Introduction to Data Binding, Data Binding and Customer Data Input, One-Way Data Binding

Module 4 – Testing Angular Apps- Overview of Karma and Jasmine, Planning test cases, Creating Unit Test Cases, Executing Unit Cases, The Debug Module  
DEBUGGING USING CHROME DEVTOOLS, Debugging Network Performance

Module 5 - Introduction to Boilerplate- Overview of Boilerplate, Boilerplate, Components, Hands on Exercise

**Course Outcomes:**

1. To securing web applications from dangers and pernicious clients
2. To understand the compiler for building better and more propelled orders
3. To utilize the testing system (Jasmine BDD) to test the web applications
4. To organizing the web application utilizing the vigorous index structure
5. To organizing, compose, and ultimately deploy the application.

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓					✓			
CO2			✓									
CO3	✓			✓	✓							
CO4		✓		✓	✓							
CO5			✓						✓			

### Spring framework Course (32 hours)

#### Course Objectives:

1. To gain an understanding of Spring and its approach to Dependency Injection
2. To describe Spring Beans, Spring Configuration and the Spring Container
3. To explore Spring Web MVC and learn about Spring REST
4. To explore Aspect Oriented Programming using Spring AOP
5. To be introduced to Spring Boot

#### Syllabus:

Module 1: Loose Coupling and its Benefits- Interfaces and its uses, Loose coupling

Module 2: Spring Framework Overview- Introduction to Spring, Installation, First application

Module 3: Spring Container and Dependency Injection- Spring Container types, Working of Spring container, Dependency Injection by Constructor, Injecting string-based values

Module 4: Bean Implementation- Introduction and Scope, creating source file, Implement Collections, Implement Java Based Configuration

Module 5: Aspect Oriented Programming- Spring AOP, Implement Aspect Oriented Programming

Module 6: Spring Data Access and Transaction Management- Spring JDBC, JDBC Template,

## Spring Transaction

Module 7: Develop Web Application using Spring- Spring Web MVC Overview, Advanced MVC Features, Development of Spring Web Application

### Course Outcomes:

1. To become Familiar with Spring Data
2. To be able to Develop Spring JSM applications
3. To create a web application using Spring MVC
4. To interpret data access mechanisms provided by Spring
5. To write test cases with Junit

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				✓	✓				✓			
CO2	✓		✓		✓							
CO3				✓								
CO4	✓	✓		✓								
CO5			✓						✓			

**Course Name: DevOps and Design Thinking**

**Course Code: MCA217A**

**Course Objectives:**

1. To understand the background and mind set of DevOps
2. To practice the version control and configuration management that support DevOps
3. To analyse how test automation supports DevOps
4. To study the essentials of continuous integration (CI)
5. To evaluate the changes to start making when first starting out with DevOps

**Syllabus:**

Module1: DevOps Fundamentals- Introduction ToDevOps, How is DevOps Different From Traditional IT, Recognizing the Business Value of DevOps, Introduction to Continuous Integration / Continuous Delivery / Continuous, Deployment, Introduction to DevOps Tools

Module 2: DevOpsUsecase- DevOps Use Case & Setup, DevOps in eCommerce, DevOps in Internet of Things, DevOps in Data Science & Data Engineering

Module 3: Advanced DevOps, Introduction to Advanced DevOps Concepts, Automatic Provisioning

Module 4: Introduction to DevOps on IBM Cloud- Introduction to Cloud, DevOps on IBM Cloud

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**Course Outcomes:**

1. To comply the principles and practices of continuous delivery (CD)
2. To identify the challenges and support for managing infrastructure and databases
3. To understand the differences between conventional and agile approaches
4. To estimate in an incremental and iterative fashion using practical techniques
5. To learn DevOps for CI/CD using containers, container orchestration and pipelines

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				✓	✓				✓			
CO2	✓		✓		✓							
CO3			✓									
CO4	✓	✓		✓								
CO5			✓						✓			

### Design thinking (8 hours)

#### Course Objectives:

1. To be familiar with design thinking concepts and principles
2. To practice the methods, processes and tools of design thinking.
3. To apply the design thinking approach and have ability to model real world situations.
4. To analyse primary and secondary research in the introduction to design Thinking
5. To understand the pitfalls and Cautions in Design Thinking Workgroups

#### Syllabus:

Module 1: About Design Thinking, Introduction to Design Thinking, Importance of Design Thinking, History of Design Thinking.

Module 2: IBM Design Thinking Framework, Introduction

Module 3: The Principles Guide Us- Introduction, Focus on User Outcomes, Restless Reinvention, Diverse Empowered Teams

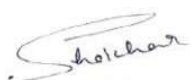
Module 5: The Keys Align Us- The Keys Align Us, Hills

#### Course Outcomes:

1. To examine Design Thinking concepts and principles
2. To practice the methods, processes, and tools of Design Thinking
3. To apply the Design Thinking approach and model to real world situations
4. To analyze the role of primary and secondary research in the discovery stage of design thinking.

5. To perform Role Playing of Scenarios for the Case Study.

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				✓	✓				✓			
CO2	✓		✓		✓							
CO3			✓									
CO4	✓	✓		✓								
CO5			✓						✓			



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**Course Name: Dockers and Kubernetes**

**Course Code: MCA218A**

**Course Objectives:**

**CO1:** Understand the fundamentals of Docker and Kubernetes, including installation and basic operations.

**CO2:** Learn advanced concepts such as Docker Swarm management and Kubernetes administration.

**CO3:** Master containerization techniques and best practices for deploying applications.

**CO4:** Learn to manage resources efficiently and scale applications dynamically using Kubernetes.

**CO5:** Gain practical experience in managing Docker containers and Kubernetes clusters, solving real-world challenges.

**Syllabus**

**Unit I**

**Introduction to Docker:** Overview of Docker technology, Installation and setup of Docker, Managing Docker images and containers

**UNIT II**

**Advanced Docker Concepts:** Docker registry, files, storage, and networking, Introduction to Docker Compose

**UNIT III**

**Docker Swarm Management:** Visualizing Docker Swarm, Managing Swarm services and stacks

**UNIT IV**

**Introduction to Kubernetes:** Installation of Kubernetes with Kubeadm, Understanding Kubernetes pods and node assignment

**UNIT V**

**Advanced Kubernetes Topics:** ConfigMaps, Secrets, and other Kubernetes objects, Deployment, DaemonSet, and ReplicaSet management

**Course Outcomes (COs):**

**Upon successful completion of this subject students will able**

**CO1:** Gain proficiency in using Docker and Kubernetes for containerization and orchestration.

**CO2:** Develop practical skills in managing Docker containers and Kubernetes clusters.

**CO3:** Understand the underlying concepts of containerization and their application in modern software development.

**CO4:** Learn to scale applications dynamically and efficiently manage resources using Kubernetes.

**CO5:** Enhance problem-solving and troubleshooting skills through hands-on experience with Docker and Kubernetes.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M							M			
CO2						L				L		
CO3				M				L				
CO4						L					L	
CO5	M				L							L

H = Highly Related; M = Medium; L = Low

**Reference Books**

1. IBM LMS Portal

**Course Name: Advance Data Structures and Algorithms**

**Course Code: MCA 121B**

**Course Objectives:**

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques.
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.
5. To impart the basic concepts of algorithms implementation in optimized time .

**Syllabus**

**Unit I**

**Introduction to Data Structures and Algorithms:** Elementary Data Structure Organization, Classification of Data Structures, Operation of Data Structures, Operations on DataStructures ,Abstract Data Type ,Algorithms, Different Approaches to, Designing an Algorithm, Control Structures Used in Algorithms, Time and Space Complexity, Omega Notation ( $\Omega$ ), Theta Notation ( $\Theta$ ) ,Other Useful Notations.

**UNIT II**

**Array and Linked List:** Declaration of Arrays, Accessing the Elements of an Array, Storing Values in Array, operations, Passing Array to functions, Pointers and Arrays, Arrays of Pointers, Two-dimensional Arrays, Operations on , Passing Two-dimensional Arrays to Functions, Pointers and Two-dimensional Arrays, Sparse Matrices .

Linked list Basic Terminologies, Memory Allocation and De-allocation for a Linked List, Singly Linked Lists, Circular Linked Lists, Doubly Linked Lists, Circular Doubly Linked Lists, Header Linked Lists, Multi-linked Lists, Applications of Linked Lists.

**UNIT III**

**Stack:** Array Representation of Stack, Operations on Stack, linked Representation of Stacks, Operations on a Linked Stack, Multiple Stacks, Applications of Stack,

**Queues:** Introduction to Queues, Array Representation of Queues ,Linked Representation of Queues, Types of Queues , Applications of Queues

#### **UNIT IV**

**Trees and BST**Trees: Types of trees , Creating a Binary Tree from a General Tree, Traversing a Binary Tree, Huffman's Tree

Binary Search Trees: BST Operations, Threaded Binary Trees, AVL Trees, Red-Black Trees, Splay Trees

#### **UNIT V**

**Graph, Searching & Sorting:** Basic Terminologies, Directed Graphs, Representations of Graphs, Graph Traversals Algorithms, Topological Sorting, Shortest-Path Algorithms.

**Searching & Sorting:** Introduction to searching, Linear and Binary Search, Interpolation Search, jump search, Sorting Types, Bubble, Insertion, Selection , Merge Sort, Radix Sort Shell Sort, Quick Sort, Heap Sort.

#### **Course Outcomes (COs):**

**Upon successful completion of this subject students will able**

CO1: Ability to analyse algorithms and a algorithm correctness.

CO2: Ability to implement various techniques of link list.

CO3: Ability to describe stack, queue with linked list operation.

CO4: Ability to have knowledge of tree and graphs concepts.

CO5: Ability to summarize searching and sorting techniques

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H							M			
CO2						M				H		
CO3				H				M				
CO4						M					H	
CO5	H				M							L

H = Highly Related; M = Medium; L = Low

### Text Books

1. R. G. Dromey, “How to Solve it by Computer”, Second Edition, Prentice-Hall of India, 2002.
2. Reema Thereja,, "Data Structure using C" , Second Edition , Oxford University Press, 2014

### Reference Books

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education Asia, 2002.
2. ISRD Group, “Data Structures using C”, Fifth Edition Tata McGraw Hill, 2007
3. Richard F. Gilberg, Behrouz A. Forouzan, “Data Structures – A Pseudocode” Third Edition Prentice-Hall of India, 2004.

**Course Name: Probabilistic modeling & reasoning**

**Course Code: MCA222A**

*Objectives: The objective of this course is to teach students the concepts of Statistics, probability, probability distribution, and other statistical methods to solve various engineering problems*

**UNIT – I**

**Introduction to Statistics:** Introduction to Statistics. Role of statistics in scientific methods, current applications of statistics.

**Scientific data gathering:** Sampling techniques, scientific studies, observational studies, data management.

**Data description:** Displaying data on a single variable (graphical methods, measure of central tendency, measure of spread), displaying relationship between two or more variables, measure of association between two or more variables.

**UNIT – II**

**Probability Theory:** Sample space and events, probability, axioms of probability, independent events, conditional probability, Bayes' theorem.

**Random Variables:** Discrete and continuous random variables. Probability distribution of discrete random variables, binomial distribution, poisson distribution. Probability distribution of continuous random variables, The uniform distribution, normal (gaussian) distribution, exponential distribution, gamma distribution, beta distribution, t-distribution,  $\chi^2$  distribution. Expectations, variance and covariance. Probability Inequalities. Bivariate distributions

**UNIT -III**

**Point Estimations:** Methods of finding estimators, method of moments, maximum likelihood estimators, bayes estimators. Methods of evaluating estimators, mean squared error, best unbiased estimator, sufficiency and unbiasedness

**Interval Estimations:** Confidence interval of means and proportions, Distribution free confidence interval of percentiles

## UNIT - IV

**Test of Statistical Hypothesis and p-values:** Tests about one mean, tests of equality of two means, test about proportions, p-values, likelihood ratio test, Bayesian tests

**Bayesian Statistics:** Bayesian inference of discrete random variable, Bayesian inference of binomial proportion, comparing Bayesian and frequentist inferences of proportion, comparing Bayesian and frequentist inferences of mean

**Univariate Statistics using Python:** Mean, Mode, Median, Variance, Standard Deviation, Normal Distribution, t-distribution, interval estimation, Hypothesis Testing, Pearson correlation test, ANOVA F-test

**Course Outcomes:**

On completion of this course, the students are expected to learn

CO1. Basics of Statistics and Probability distributions

CO2. Sampling theory and Theory of Estimation

CO3. Various tests of Hypothesis and Significance

CO4. Correlation and Regression and fitting of different types of curves

**Course Name: R Programming for Data Science and analysis**

**Course Code: MCA223A**

Objectives: The objective of this course is to teach students R Programming Language, basic functions in R programming language and critical techniques

**UNIT – I**

**Getting Started with R and R Workspace:** Introducing R, R as a programming Language, the need of R, Installing R, RStudio, RStudio's user interface, console, editor, environment pane, history pane, file pane, plots pane, package pane, help and viewer pane

R Workspace, R's working directory, R Project in R Studio, absolute and relative path, Inspecting an Environment, Inspect existing Symbols, View the structure of object, Removing symbols, Modifying Global Options, Modifying warning level, Library of Packages, Getting to know a package, Installing a Package from CRAN, Updating Package from CRAN, Installing package from online repository, Package Function, Masking and name conflicts

**UNIT – II**

**Basic Objects and Basic Expressions:** Vectors, Numeric Vectors, Logical Vectors, Character Vectors, subset vectors, Named Vectors, extracting element, converting vector, Arithmetic operators, create Matrix, Naming row and columns, subsetting matrix, matrix operators, creating and subsetting an Array, Creating a List, extracting element from list, subsetting a list, setting value, creating a value of data frame, subsetting a data frame, setting values, factors, useful functions of a data frame, loading and writing data on disk, creating a function, calling a function, dynamic typing, generalizing a function. Assignment Operators, Conditional Expression, using if as expression and statement, using if with vectors, vectorized if: ifelse, using switch, using for loop, nested for loop, while loop

## **Course Name: Machine Learning and Pattern Recognition**

### **Course Code: MCA224A**

**Objectives:** The objective of this course is to teach students the basic concepts of machine learning, supervised learning, unsupervised learning, and reinforcement learning

#### **UNIT – I**

**Introduction:** Learning systems, real world applications of machine learning, why machine learning, variable types and terminology, function approximation

**Types of machine learning:** Supervised learning, unsupervised learning, reinforcement learning

#### **UNIT – II**

**Important concepts of machine learning:** Parametric vs non-parametric models, the trade-off between prediction accuracy and model interpretability, the curse of dimensionality, measuring the quality of fit, bias-variance trade off, overfitting, model selection, no free lunch theorem

#### **UNIT – III**

**Linear Regression:** Linear regression, estimating the coefficients, assessing the accuracy of coefficient estimates, assessing the accuracy of the model, multiple linear regression, qualitative predictors.

#### **UNIT – IV**

**Classification:** Logistic regression, estimating regression coefficients, making predictions, multiple logistic regressions, linear discriminant analysis, bayes' theorem of classification, LDA for  $p=1$ , LDA for  $p>1$ , quadratic discriminant analysis.

#### **Reference Books:**

- Machine Learning by Tom M. Mitchell - McGraw Hill Education; First edition
- Pattern Recognition and Machine Learning (Information Science and Statistics) by Christopher M. Bishop - Springer; 1st ed. 2006. Corr. 2nd printing 2011 edition

#### **Course Outcomes:**

On completion of this course, the students are expected to learn

CO1. Basic Algorithms of Machine Learning

CO2. Supervised and Unsupervised Learning

CO3. Linear Regression, Classification, Tree, PCA, SVD, SVM CO4. Resampling Methods and



**Course Name: Neural Networks and deep learning**

**Course Code: MCA226A**

*Objectives: The objective of this course is to teach students the basic concepts of neural networks, neurons, and deep learning*

**UNIT – I**

**The neural network:** The neuron, linear perceptron, feed-forward neural network, limitations of linear neurons, sigmoid, tanh, relu neurons, softmax output layer, information theory, cross entropy, Kullback-Leibler divergence.

**UNIT – II**

**Training feed-forward neural network:** Gradient Descent, delta rules and learning rates, gradient descent with sigmoidal neurons, the backpropagation algorithms, stochastic and minibatch gradient descent, test sets, validation sets and overfitting, preventing overfitting

**UNIT – III**

**TensorFlow:** Computation graphs, graphs, sessions and fetches, constructing and managing graph, flowing tensors, sessions, data types, tensor arrays and shapes, names, variables, placeholders and simple optimization, linear regression and logistic regression using tensorflow

**UNIT – IV**

. **Implement Neural Network:** Introduction to Keras, Build neural network using Keras, Evaluating models, data preprocessing, feature engineering, feature learning, overfitting, underfitting, weight regularization, dropout, universal workflow of deep learning.

**Reference Books:**

Deep Learning with Python by Francois Chollet - Manning Publications; 1 edition

□ Deep Learning by Ian Goodfellow, Yoshua Bengio, Aaron Courville, Francis Bach - MIT Press (3 January 2017)

□ Tensor Flow for Deep Learning by Reza Zadeh, Bharath Ramsundar - Shroff/O'Reilly; First edition (2018)

**Course Outcomes:**

On completion of this course, the students are expected to learn

1. Neural Network, Feed Forward and Backpropagation
2. Tensorflow and Keras
3. RNN, CNN, Autoencoders .



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## **Course Name: Advanced Operating System**

**Course Code: MCA201A**

### **Course Objectives:**

1. To understand the OS role in the overall computer system
2. To study the operations performed by OS as a resource manager and the scheduling policies of OS
3. To understand the different memory management techniques
4. To understand process concurrency and synchronization
5. To understand the concepts of input/output, storage and file management and to study different OS and compare their features.

### **Syllabus**

#### **Unit – I**

**Introduction**-Operating system objectives, User view, System view, Operating system definition Types, Functions, Computer System Organization, Computer System Architecture, OS Structure, Operating System services, User and OS Interface, System Programs, Operating System Design and Implementation, OS Structure.

#### **Unit – II**

**Process and CPU Scheduling** – Process concepts, The Process, Process State, Process Control Block, Threads, Process Scheduling, Scheduling Criteria, Scheduling algorithms Scheduling Queues, Schedulers, Context Switch, Operations on Processes, System calls, Process Synchronization, The Critical Section Problem, Peterson's solution, Synchronization Hardware, Semaphores.

#### **Unit – III**

**Deadlocks**- Deadlock characterization, Methods of handling deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

**Memory Management** – Memory Management Strategies- Overlays and Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table, Virtual Memory

Management- Segmentation, Paging, Demand Paging, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing.

#### **Unit- IV**

**File System and Security** - File-System Structure, File-System Implementation , Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery, NFS, Organization of I/O Function, I/O Buffering, Disk Organization, Disk Scheduling, RAID, Operating Systems view of file system, Disk space management. System Security- The Security Problem, Program Threats, Policies, System and Network Threats, User Authentication, Security Models.

#### **Unit - V**

**Distributed Systems** :Distributed System definition , Architectures for distributed systems, Distributed Computing Models , Software concepts , Network Operating System , Distributed Operating System , Multiprocessor Time-sharing System , Comparison of operating systems , Issues in designing Distributed Systems , Client–Server Model , Case Studies  
Network Communication: LAN and WAN Technologies , Introduction to LAN and WAN , Classification of networks , Protocols for Network Systems , The ISO/OSI Reference Model , Internet Protocols , Asynchronous Transfer Mode , Protocols for distributed systems

#### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Apply optimization techniques for the improvement of system performance.

CO2: Ability to design and solve synchronization problems.

CO3 Learn about minimization of turnaround time, waiting time and response time and also maximization of throughput by keeping CPU as busy as possible.

CO4: Ability to change access controls to protect files.

CO5: Ability to compare the different operating systems.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF**

**PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H							M			
CO2				H								
CO3			H				M				M	
CO4			M									H
CO5		M			H					H		

H = Highly Related; M = Medium; L = Low

**Text Books**

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th edition, John Wiley Publications ,2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3<sup>rd</sup> edition, Pearson Education ,2007.

**Reference Books**

1. G. Nutt, Operating Systems: A Modern Perspective, 2<sup>nd</sup> edition Pearson Education ,1997.
2. W. Stallings, Operating Systems, Internals & Design Principles, 5<sup>th</sup> edition, Prentice Hall of India, 2008.
3. Operating Systems: Internals and Design Principles, William Stallings, Pearson

**Course Name: Software Engineering**

**Course Code: MCA 131B**

### **Course Objectives**

1. To provide a comprehensive overview of Software Engineering
2. To understand the full software development life cycle, including a thorough coverage of methods, tools, principles, and guidelines.
3. To understand software metrics, real-time software design, quality assurance, reliability, risk management, cost and schedule estimation, sizing, planning, test and integration process, technical management and human
4. To be able to work with software metrics (attributes) to measure properties of the software product as a means to evaluate and control the development process.
5. To understand the concept of planning and managing the software development.

### **Syllabus**

#### **Unit I**

**The software problem:** Learning objectives, Cost, schedule and quality, scale and changes.

**Software Processes:** Learning objectives, process and project, component software processes, software development process models, water fall model, prototyping, iterative development, rational unified process, time boxing model, Extreme programming and agile processes, using process models in a project, project management process.

#### **Unit II**

**Software requirement analysis and specification:** Learning objectives, values of good SRS, requirement processes, requirement specifications, desirable characteristics of an SRS, components of SRS, structure of a requirement document, functional specification with use cases, developing use cases, other approaches for analysis( Data flow diagram, Entity relationship diagrams) and validation.

#### **Unit III**

**Software Architecture:** Learning objectives, role of software architecture, architecture views, components and connector views, Architecture styles for C&C view, pipe and filters, shared data style, client server style, documenting architecture design, evaluating architecture.

**Planning software project:** Learning objectives, effort estimation, top down estimation approach, bottom up estimation approach, project schedule and staffing, quality planning, risk management planning, risk assessment, risk control, risk management planning approach, project monitoring plan, measurement, project monitoring and tracking and detailed scheduling.

**Unit IV Design:** Learning objectives, design concepts, coupling, cohesion, open cloud principle, function oriented design, structure charts, structure design methodology, object oriented design, OO concepts, Unified modeling language(UML) Design methodology, verification, Metrics( Complexity metrics for function oriented design, complexity metrics for OO design.

**Coding and unit testing:** Learning objectives, Programming principles and guidelines, structured programming, information hiding, some programming practices, coding standards, incremental developing code and coding process, Test driven development, pair programming, managing evolving code, source code control and build, refactoring, unit testing, testing procedural units, unit testing of classes, code inspection, planning, self review, group review meeting, metrics, size measures, complexity metrics.

## **Unit V**

**Testing :** Learning objectives, testing concepts, error, fault and failure, test case, test suite and test harness, psychology of testing, levels of testing, testing process, test plan, test case design, test case execution, Black box testing, equivalence class partitioning, boundary value analysis, pairwise testing, special cases, state-based testing, white box testing, control flow-based criteria, test case generation and tool support, metrics, coverage analysis, reliability, defect removal efficiency.

## **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Understanding of Basics of Software Engineering & Development.

CO2: Understanding of Different-2 models, Software Matrices and Estimation.

CO3: Understanding of Software Development across Workflows and Phases, languages & Architecture.

CO4: Understanding of different -3 testing strategies and tools.

CO5: Be exposed to World Wide Web and Enterprise Software Development.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course	Program Outcomes											
Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M				M				
CO2		M				M					M	
CO3	H						M					
CO4			H						M			L
CO5	M											

H = Highly Related; M = Medium; L = Low

### Text Books

1. Software Engineering Fundamentals, Oxford, Ali Behforooz and Frederick Hudson, October 2012.
2. Pressman, R.S., "Software engineering" A Practitioner's Approach", Third Edition



**Course Name: Programming in Python**

**Course Code: MCA144B**

**Course Objectives:**

1. To outline the basics of python programming, Features, history, data types and variables.
2. To able to solve real-world problems through python programming.
3. To be able to exploit problem solving approaches, programming languages, object oriented programming.
4. To constructs of Python language such as control statements, functions, strings, files, data structures.
5. To apply the concept of Classes and objects, functions and array in python.

**Syllabus**

**Unit I**

**Introduction to Procedural Programming:** Data types in Python: Comments in Python, identifiers, keywords, Integral Types, Integers, and Booleans Floating-Point Types: Floating-Point Numbers, Complex Numbers, Decimal Numbers, Strings, Comparing Strings, Slicing and Striding Strings, String Operators and Methods, Operators in Python, Input and Output

**Unit II**

**Collection Data Types:** Sequence Types, Tuples Named Tuples, Lists Set Types: Sets. Frozen Sets, Mapping Types: Dictionaries, Default Dictionaries, Ordered Dictionaries, Iterating and Copying Collections, Arrays in Python

**Unit III**

**Control Structures and Functions :**Control Structures .Conditional Branching, Looping, Exception Handling, Catching and Raising Exceptions Custom Exceptions Custom Functions Names and Docstrings Argument and Parameter Unpacking, Accessing Variables in the Global Scope, Lambda Functions.

**Unit IV**

**File handling:** Writing and Reading Binary Data, Pickles with Optional Compression, Raw Binary Data with Optional Compression, Writing and Parsing Text Files, Writing Text, Parsing

Text, Parsing Text Using Regular Expressions, Writing and Parsing XML Files, Element Trees DOM (Document Object Model), Manually Writing XML Parsing XML with SAX (Simple API for XML), Random Access Binary Files ,A Generic BinaryRecordFile Class.

## **Unit V**

**Object Oriented Programming:** The Object-Oriented Approach, Object oriented approach Custom Classes, Attributes and Methods, Inheritance and Polymorphism, Using Properties to Control Attribute Access, Creating Complete Fully Integrated Data Types, Custom Collection Classes, Creating Classes That Aggregate Collections, Creating Collection Classes Using Aggregation, creating Collection Classes Using Inheritance, Python's Database Connectivity, Libraries in python for Machine Learning: Panda, Numpy, Matplotlib, Scikit-learn, Tensorflow.

### **Course Outcomes (COs):**

### **COURSE OUTCOMES:**

**On completion of the course, students will be able to:**

CO1: Develop algorithmic solutions to simple computational problems

CO2: Develop and execute simple Python programs.

CO3: Implement programs in Python using conditionals and loops for solving problems.

CO4: Deploy functions to decompose a Python program. And process compound data using Python data structures.

CO6: Utilize Python packages in developing software applications.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H								M			
CO2	H		M									M
CO3				M						M		
CO4							H					
CO5		M			M			H				

H = Highly Related; M = Medium; L = Low

**Text Books**

1. Core Python Programming, Black Book-Dreamtech, Dr. R. Nageswara Rao, 2017
2. Python Programming, Oxford, ReemaThareja, June 2017

**Reference Books**

1. “Python Testing Cookbook” by Greg L Turnquist
2. “Head First Programming” by Paul Barry and David Griffiths
3. “Python Crash Course: A Hands-On, Project-Based Introduction to Programming” by Eric Matthes.

**Course Name: Advance Database Management System**

**Course Code: MCA118A**

### **Course Objectives**

1. To enhance the fundamentals knowledge of data models and to conceptualize and depict a database system using ER diagram.
2. To know fundamentals of Operations of Relational Algebra and calculus.
3. To know the fundamental concepts of normalization.
4. To justify the concept of transaction processing management, concurrency control techniques and recovery procedure.
5. To have an introductory knowledge about the Storage and Query processing Techniques.

### **Syllabus**

#### **Unit I**

**Data modeling:** Entity Relationship Model, Relational, Network, Hierarchical and object oriented models, Data Modeling using the Entity Relationship Model. Relational Constraints, Domain Constraints, Key Constraints Referential Integrity Constraints, Relational Algebra and Relational Calculus.

#### **Unit II**

**Database Design:** Integrity Constraints – Domain Constraints- Referential integrity – Functional Dependency- Normalization using Functional Dependencies, Normal forms based on primary keys- general definitions of Second and Third Normal Forms. Boyce Codd Normal Form– Multivalued Dependencies and Forth Normal Form – Join Dependencies and Fifth Normal Form.

#### **Unit III**

**Object Relational Databases:** Complex Data Types and Object Orientation, Structured Data Types and Inheritance in SQL, Table Inheritance, Array and Multiset Types in SQL, Object Identity and Reference Types in SQL, Implementing O-R Features, Persistent Programming Languages, Comparison of Object-Oriented and Object-Relational Database

## **Unit IV**

**Physical Database Design:** Overview of Physical Storage Media, Magnetic Disks, RAID, Tertiary Storage , Storage Access, File Organization, Organization of Records in Files, Data-Dictionary Storage, Storage Structures for Object-Oriented Databases, Basic Concepts, Ordered Indices , B<sup>+</sup>-Tree Index Files, B-Tree Index Files, Static Hashing, Dynamic Hashing , Comparison of Ordered Indexing and Hashing , Index Definition in SQL.

## **Unit V**

**Transaction Management:** Transaction Concept, ACID Properties, Transaction State, Implementation of ACID properties, Schedules and Serializability: Conflict Serializability, View Serializability. Concurrency Control: Need of concurrency control, Concurrency control techniques, Lock based protocols, binary lock, share and exclusive lock, two phase locking protocol. Introduction to recovery.

## **Course Outcomes (Cos)**

**After successfully completing this subject, students will be able to:**

CO1: Understand practical implications of transaction properties and concurrency control techniques.

CO2: Understand the fundamentals of Object Relational database and complex data types.

CO3: Gain about the fundamentals of physical storage media and indexing.

CO4: Enhance the fundamentals knowledge of data models and to conceptualize and depict a database system using ER diagram.

CO5: Contrast the concept of functional dependency, Norm forms, constraints and integrity

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H								M			
CO2	H		M									M
CO3				M						M		
CO4							H					
CO5		M			M			H				

H = Highly Related; M = Medium; L = Low

### Text Books

1. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson, 2008
2. A.Silberschatz, H. Korth and S. Sudarshan, Database System Concepts, 5th Edition, McGraw Hill.

### Reference Books

1. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
2. .
3. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, Tata McGraw Hill, 2010.
4. G.K.Gupta,”Database Management Systems”, Tata McGraw Hill, 2011.

**Course Name: Competitive Programming (Using C++)**

**Course Code: MCA 125A**

### **Course Objectives**

1. To explain the difference between object oriented programming and procedural programming and features of object oriented programming.
2. To be able to understand the program using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
3. To be able to build C++ classes using appropriate encapsulation, objects and functions.
4. To be able to apply operator overloading in different form.
5. To understand the working of files, templates and exception handling.

### **Syllabus**

#### **Unit I**

**Introduction to Object Oriented Programming:** Generation of Programming, Programming Paradigms, Features of Object Oriented Programming , Introduction to C++, History of C++, Structure, First Program, Compiling and Executing C++, Using Comments, Tokens, Character Set, Keywords, Identifiers, Data Types, Variables, Constants, Enumerators, Input and Output Statements, Operators in C++, Operator Precedence and Associability, Decision Control and Looping Statements.

#### **Unit II**

**Classes, Objects and Functions:** Introduction , Class, Creating Objects, Accessing Object Members, Nested Member Functions, Making a Member Function Inline, Memory Allocation for Class and Objects, Array of Objects, DMA, Objects as Function Arguments, Returning Objects, this pointer, Constant Parameters and Members, Pointers Within a Class , Empty Classes, Friend Classes, Constructor, Types of Constructors, Constructor with Arguments, Constructor Overloading, Destructors

#### **Unit III**

**Operator Overloading and Type Conversions:** Scope of Operator Overloading, Syntax, Not Overloading Operators, Implementing Operator, Overloading Unary Operators, Overloading Binary Operators, Overloading Special Operators, Type Conversions,

#### **Unit IV**

**Inheritance and Run-Time Polymorphism:** Defining Derived Classes, Access Specifiers, Inheritance, Types of Inheritance, Single Inheritance, Constructors and Destructors in Derived Class, Constructor in Multi-Level, Multi-Level Inheritance, Constructor in Multi-Level Inheritance, Multiple Inheritance, Hierarchical Inheritance, Multi-path Inheritance, Up- casting, Down- casting, and Cross-Casting, Run-time Polymorphism, Virtual Functions, Abstract Base Classes.

#### **Unit V**

**File Handling, Templates & Exception Handling:** Streams in C++, Classes for File Stream, Opening and Closing of Files, Detecting the End-of-File, Files Modes , File pointer, Use of Templates, Function Templates, Class Template, Class Templates and Friend Function, Templates and Static Variables in C++, Exception Handling, Multiple Catch Statements, Catch all Exceptions, Exceptions in Invoked Function

#### **Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Understand the features of C++ supporting object oriented programming

CO2: Be able to program using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.

CO3: Be able to apply operator overloading in different form.

CO4: Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism

CO5: Able to understand the working of files.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H									M		
CO2		M									M	
CO3			M					H				
CO4				M	H							M
CO5	H					M			L		M	

H = Highly Related; M = Medium; L = Low

**Text Books**

1. Let Us C: BalaGuruswamy, TATA McGraw Hill.
2. Object Oriented Programming with C++, Reema Thareja, Oxford University, August 2015.

**Reference Books**

1. Object Oriented Programming with C++, Sourav sahay, Oxford University, Sept 2012.
2. Robert Lafore, "Object-Oriented Programming in C++", Sams, Fourth Edition 2007
3. BjarneStroustrup, "The C++ Programming Language: Special Edition", Addison-Wesley, Third Edition 2000

## **Course Name: Statistical Computing Using R**

**Course Code: MCA206A**

### **Course Objectives**

1. To explain the key differences between the tasks of classification, clustering, regression, and dimensionality reduction
2. To identify the key differences between supervised and unsupervised learning paradigms
3. To explain how noisy observations affect the result of data mining methods.
4. To deal with missing data and Manipulate strings in R
5. To understand basic regular expressions in R and base R graphics

### **Syllabus**

#### **Unit I**

**Introduction to R:** Basics of R, R-Environment Setup, Installation of R, Rstudio, Installing and Configuring, RStudio in Windows, Installing and Configuring, RStudio in Linux, Programming with R, Basic Data Types, Vectors, Matrices, Arrays.

Factors and data Frames: Factor Levels, Data Frame, Creating a Data Frame, Sub setting of Data Frames, Extending Data Frames, Sorting Data Frames

#### **Unit II**

**List:** Creating a List, Creating a Named List, Lists Operations , Conditionals and Control Flow, Relational Operators, Relational Operators and Vectors, Logical Operators, AND Operator, OR Operator, NOT Operator, Logical Operators and Vectors, Conditional Statements

#### **Unit III**

**Iterative Programming & Function in R:** Iterative Programming : While Loop, For Loop, Looping Over List, Loops for Vectors, Loops for Matrices, Loops for Data Frames, Loops for Lists, Functions in r

Functions: Writing a Function in R, Nested Functions, Function Scoping, Function Environment, Function Scope, Default Values for Arguments, Returning Complex, Recursion, Loading an R

Package, Methods of Loading, Mathematical Functions in R, Cumulative Sums and Products, Calculus in R, Input and Output Operations

#### Unit IV

**Apply Family in R , Charts & Graphs:** Apply Family : Using apply in R, Using lapply in R, Using sapply in R, Using tapply in R, Using mapply in R. Charts & Graphs: Pie Chart, Bar Chart, Box Plot, Histogram, Line Graph, Scatter

#### Unit V

**Data Interfaces:** Introduction to Data interfaces, CSV Files, Excel Files, Binary Files , XML files, JSON files, Web Data, , Databases

#### Course Outcomes (Cos):

CO1: Students will able to explain Basics of R programming, Installation of R, Rstudio, Installing and Configuring, RStudio in Windows.

CO2: Students will able to estimate the effects data interfaces, Conditionals and Control Flow, Relational Operators and condition flow.

CO3: Able to design data mining experiments using R and existing data mining tools.

CO4: Students will be able to learn about data interfaces, CSV files, Excel files and XML files.

CO5: Able explain the working of lists in R and will be able working with bar and charts.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course	Program Outcome											
Outcome												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				H					M			
CO2		M		M						M		
CO3	M				M		L					M
CO4			L					M				
CO5	H				L				M			

H = Highly Related; M = Medium; L = Low

#### Text Books

1. Statistical Programming in R (Oxford) Srinivasa, Siddesh, Shetty and Sowmya, June 2017.
2. Lawrence Leemis. *Learning Base R*. Lightning Source, 2016

### Reference Books

1. VikramDayal. *An Introduction to R for Quantitative Economics: Graphing, Simulating and Computing*. Springer, 2015
2. Matthias Kohl. *Introduction to statistical data analysis with R*. bookboon.com, London, 2015.
3. Matthias Kohl. *Introduction to statistical data analysis with R*. bookboon.com, London, 2015

**Course Name: Internet security and Cryptography**

**Course Code: MCA207A**

### **Course Objectives**

1. To learn today's increasing network security threats and explain the need to implement a comprehensive security policy to mitigate the threats.
2. To provide extended security using authentication, Substitution Techniques, Transposition Techniques, Encryption and Decryption
3. To introduce security services for email and email protocols, Digital Certificates, Private Key Management, E-mail Security and Wireless Application Protocol (WAP) Security
4. To be aware about Prohibited actions on Cyber, Cyber Squatting Banking/Credit card related crime E-commerce.
5. To gain the knowledge about Cyber Crime and Prohibited actions on Cyber.

### **Syllabus**

#### **Unit I**

**Introduction to the Concepts of Security:** The need for security, Security Approaches, Principles of Security, Types of Attacks. Cryptographic Techniques: Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Key Range and Key Size, Possible Types of Attacks.

#### **Unit II**

**Computer-based Symmetric Key Cryptographic Algorithms:** Algorithm Types and Modes, An overview of Symmetric Key Cryptography, DES, International Data Encryption, Algorithm (IDEA), RC5, Blowfish, AES, Differential and Linear Cryptanalysis.

#### **Unit III**

**Computer-based Asymmetric Key Cryptography:** Brief History of Asymmetric Key Cryptography, An overview of Asymmetric Key Cryptography, The RSA Algorithm,

Symmetric and Asymmetric Key Cryptography Together, Digital Signatures, Knapsack Algorithm, Some other Algorithms.

## **Unit IV**

**Public Key Infrastructure:** Digital Certificates, Private Key Management, The PKIX Model, Public Key Cryptography Standards, XML, PKI and Security. Internet Security Protocols: Basic Concepts, Secure Socket Layer, SHTTP, Time Stamping Protocol, Secure Electronic Transaction, SSL versus SET, 3-D Secure Protocol, Electronic Money, E-mail Security, Wireless Application Protocol (WAP) Security, Security in GSM.

## **Unit V**

**Prohibited Actions on Cyber:** Pornography, IPR violations: software piracy, copyright infringement, trademarks violations, theft of computer source code, patent violations, Cyber Squatting Banking/Credit card Related crime E-commerce/ Investment Frauds, Defamation (Cyber smearing), Cyber Stacking

### **Course Outcomes (Cos):**

**Upon successful completion of this subject students should be able to:**

CO1: Demonstrate the threats in networks and security concepts, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption.

CO2: Apply authentication applications in different networks.

CO3: Understand security services for email, the RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together and Digital Signatures.

CO4: Know of Digital Certificates, Private Key Management, E-mail Security and Wireless Application Protocol (WAP) Security

CO5: Awareness of Prohibited actions on Cyber, Cyber Squatting Banking/Credit card related crime E-commerce.

**MAPPING COURSE OUTCOMES LEADING TO THE  
ACHIEVEMENT OF PROGRAM OUTCOMES  
AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				H						M		
CO2		H										
CO3							M					M
CO4	M				H						M	
CO5		H						M		L		

H = Highly Related; M = Medium; L = Low

**Text Books**

1. William Stallings, —Cryptography and Network Security, Prentice Hall, New Delhi, 2006.
2. Atul Kahate, Cryptography and Network Security, Mc Graw Hill Education, 3<sup>rd</sup> Edition.

**Reference Books**

1. Neal Krawetz, —Introduction to Network Security, Thomson Learning, Boston, 2007.
2. Bruce Schneier, —Applied Cryptography, John Wiley & Sons, New York, 2004.
3. Frontiers of Electronic Commerce Kalakota and Whinston Addison Wesley

<b>BDE083A</b>	<b>JEWELRY SKETCHING &amp; RENDERING</b>	<b>0-0-4 [32]</b>
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## AIM

This course will deal with sketching and rendering techniques. As a jewellery designer these skills will assist student a lot as you will be able to express your ideas in 2-dimensional and 3- dimensional forms. Student will able to represent ideas to clients with the help of rendered sketches of design helping the other person to visualize as how they will look like when crafted in any metal and as per specifications. The emphasis of this course is on learning basic practical skills and developing ideas. Students will learn to translate concepts into creative solutions. Principles and elements of applied design along with jewellery forming techniques, materials and forms will be introduced. This 3 credits theory course will carry equal weight age of both design and manufacturing components; students will be introduced to the conceptual and historical understanding of jewellery making, and thereby apply their own theoretical and creative understanding through theme based projects, as well as grasp the technical skills pertaining to basic jewellery manufacturing, as well as application of tools to particular techniques

## OBJECTIVE

- To acquire theoretical knowledge about the adornment of body through discussions, presentations and fieldwork.
- To develop skills with processes, techniques & materials through demonstrations and progressive exercises.
- To generate ideas particular to individual fields of study.
- To learn through review, appreciation and presentation of individual work.
- To practice and be aware of health and safety in the workplace.

## PREREQUISITE

<b>UNIT 1</b>	<b>PRACTICAL</b> – Gemstone –Drawing Of Gemstone Drawing And Faceting Method of A Round Brilliant Cut Stone. Oval, Pear, and Marquise Shaped Stone. Step Cut Stone Baguettes, Taper Baguettes, And A Single Cut, Kite Cut, Triangle Cut And Trilliant Step Cut Stone Drawing and of A Square, Cushion, And French Cut Stone. Gem Stone Shading And Rendering of Facetted, Cabochons Carved Stones, Pearl.
<b>UNIT 2</b>	<b>PRACTICAL</b> – Metal Forms – Representation Of Metal Colors For Yellow Gold, White Gold, Platinum, Silver. Types Of Textures- Like High Polish, Florentine, Matt Finish, Sandblasting, Tree Bark, Satin .Types Of Decoration –Like Granulation, Open And Close Filigree, Etching, Engraving, Repousse And Chasing, Embossing, Inlay, Enameling.
<b>UNIT 3</b>	<b>PRACTICAL</b> – Metal Forms – Representation Of Metal Colors For Yellow Gold, White Gold, Platinum, Silver. Types Of Textures- Like High Polish, Florentine, Matt Finish, Sandblasting, Tree Bark, Satin .Types Of Decoration –Like Granulation, Open And Close Filigree, Etching, Engraving, Repousse And Chasing, Embossing, Inlay, Enameling.
<b>UNIT 4</b>	<b>PRACTICAL</b> – Settings – Representation Of Different Types Of Setting Like Prong, Pave, Bezel, Channel, Fishtail, Invisible, Etc.



<b>UNIT 5</b>	<b>PRACTICAL – Chains, And Its Representation – Types Of Chain, Representation Of Chain, Clasps And Its Representation -Types Of Clasps, Representation Of Clasps</b>
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### COURSE OUTCOME (CO)

**At the end of this course students will have:**

- CO1: This unit has introduced you with the basic information about the tools and materials and their use. After understanding their use their application will become very easy to design jewelry and master the skills.
- CO2: After going through this unit you have learnt about the different metal surfaces and their representation in addition you have learnt to observe various textures around you and their use in Jewelry.
- CO3: You learnt about the Gemstones their drawing, shading and rendering. This will be helpful for you to identify different cuts, shapes and varieties in the gemstones. This unit has given you the complete idea of representation of different settings in a Jewelry piece. This unit gives you an exposure to the types of chains and the different types of closing mechanisms used in Jewelry.
- CO4: You have learnt metal rendering techniques and identifying the different metal colors. Be able to develop designs and communicate ideas


### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H			M	M	H	M						M	M			
CO2		H	M				M			H			M	M			M
CO3	M				M								M	M			M
CO4	H			M	M							M	H	H			H

H = Highly Related; M = Medium L = Low

### TEXT BOOKS/ WEBSITES

- [www.cutting-mats.net/2634.html](http://www.cutting-mats.net/2634.html)
- Hoke, C. M. (1940) *Refining precious metal wastes: gold – silver – platinum metals, a handbook for the jeweler, dentist and small refiner*. Metallurgical Publishing Co., New York.
- McCreight, Tim. (1997) *Jewelry: fundamentals of metalsmithing*. Hand Books Press, Madison, WI.
- The Jewelers' Directory of gemstones : Judith Crowe
- Techniques of jewelry illustration and coloring rendering by Dumatt Cor

  
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BDE086A	METARIAL EXPLORATION AND TECHNIQUES-I	0-0-4 [2]
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### AIM

This unit aims to develop learners' skills and understanding the properties of materials - physical, visual and creative qualities - for better criteria in the selection of these, considering the technical, environmental and economic importance of the projects

### OBJECTIVE

Jewelry has long existed as a form of adornment and as a perceived enhancement of beauty and, as such, has roots in all cultures. Contemporary jewelry designers have reconsidered the role of ornament and its relationship to the human body to create a design aesthetic that results from innovative manipulation of shape and form and continuous exploration of the potential of materials. The ability to skillfully manipulate and explore these materials and techniques to exploit their full potential within both expected and unexpected contexts is the backbone of any designer's work. An important aspect of this exploration is the continuous analysis and evaluation of results and use of the knowledge and understanding gained to inform further work.

<b>UNIT 1</b>	<b>Exploring Copper &amp; Brass</b> Leather Paper
<b>UNIT 2</b>	<b>Nature of Materials and Processes</b> Properties and usage of various materials Process of selection and applications of various materials for consumer product Design limitations and specific advantages of particular product and their processes
<b>UNIT 3</b>	<b>Conceive and Create:</b> Significance of form in structural strength of products Influence of materials and processes on product aesthetics Costing of various product material and their structure
<b>UNIT 4</b>	<b>Metallic Material Technologies -I</b> Measuring, checking and tracing apparatus Working benches Soldering Equipment Protective equipment (gloves, masks, glasses, etc.)
<b>UNIT 5</b>	<b>Metallic Material Technologies- II</b> Miscellaneous tools Drilling machine Sawing machines

**COURSE OUTCOME (CO):****At the end of this course students will:**

CO1: Understand and apply the characteristics of copper and brass, leather and paper on the jewelry context.

CO2: To know the methods of work and manipulation of the materials.

CO3: To know the technical characteristics of the types of tools used to manipulate each material. CO4: To plan and develop projects and products that involves different types of materials.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H			M	M	H			M	M		H			M		M
CO2	M			M		H	H		M		H				M		
CO3	M	H	H	H	H	M							H	H			
CO4	H	M		M	M				H	H	H		M		M		M

H = Highly Related; M = Medium L = Low

**TEXT BOOKS**

- Jones, J.C: Design methods: Seeds of human futures, Wiley inter science, London, 1992.
- Gail Greet Hannah, Elements of Design, Princeton Architectural Press, 2002
- Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997

<b>BDE087A</b>	<b>2D &amp; 3D DRAWING</b>	<b>0-0-4 [2]</b>
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### AIM

This unit will introduce the investigation of Isometric Drawing and Orthographic Drawing along with differentiates between them. Students will be able to create Drawings using the step-by-step process to create own Isometric & Orthographic Drawing of a given 2D and 3D object.

### OBJECTIVE

- Learn to provide people with a realistic view of what the object looks like.
- Learn to differentiate between an isometric drawing and an orthographic projection drawing.
- Learn to draw basic Orthographic & Isometric objects.
- Learn to convert drawings from isometric to orthographic projection.

<b>UNIT 1</b>	<b>Projections of Planes&amp; Solids:</b> Plane parallel, perpendicular and inclined to one reference plane. Plane inclined to both the reference planes. Projections of regular solids, cube, prisms, pyramids, tetrahedron, cylinder and cone, Axis inclined to both planes.
<b>UNIT 2</b>	<b>Sections and Sectional Views</b> Right Regular Solids – Prism, Cylinder, Pyramid, Cone – use of Auxiliary views.
<b>UNIT 3</b>	<b>Isometric Projections:</b> Principles of Isometric Projection – Isometric Scale, Isometric Views, Conventions – Band, Rings, Pendants and Earrings. Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of parts with Spherical surface.
<b>UNIT 4</b>	<b>Transformation of Projections:</b> Conversion of Isometric Views to Orthographic Views and Conversion of orthographic views to isometric views – Design projects


### COURSE OUTCOME (CO):

**At the end of this course students will:**

CO1: Make accurate isometric and orthographic views of various types of jewelry.

CO2: Draw various views of rings, pendants, earrings etc. for an accurate understanding of its shape and other details

CO3: Translate the manual orthographic and isometric views into CAD.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		M		M									M	H			M
CO2				M	H		H								H		
CO3	H	H	H	H				H					M				

H = Highly Related; M = Medium L = Low

**TEXT BOOKS**

- Engineering Drawing – Basant, Agrawal, TMH
- Engineering Drawing, N.D. Bhatt
- Engineering Graphics. P I Varghese Tata McGraw Hill Education Pvt. Ltd
- Drawing for jewellers (master classes in professional design) hardcover – 28 may 2012 by [maria josep forcadel](#) (author)
- Jewellery Illustration Spiral-bound – 10 Feb 2010

  
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<b>BDE088A</b>	<b>JEWELRY MANUFACTURING -I</b>	<b>0-0-4 [2]</b>
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### AIM

Understand the characteristics of light metals- their Visual, Tactile and Functional characteristics. Employ professional practice when working with light metals. Develop designs and communicate ideas. Use construction and finishing techniques to produce 3D outcomes.

### OBJECTIVE

- This unit has introduced you with the basic information about the tools and materials and their use. After understanding their use their application will become very easy to design jeweler and master the skills.
- After going through this unit you have learnt about the different metal surfaces and their representation in addition you have learnt to observe various textures around you and their used in Jewelry.

<b>UNIT 1</b>	Jewelry Making - A Brief History, Work Space & Tools, Materials Used In Jewelry Industry (Pre Civilization Era, Growth Of Civilization, Metals, Gem Stones, Natural Material, Man Made Material, Other Material Used In Jewellery Making)
<b>UNIT 2</b>	Basic Tool Kit For Jewelry, Essential Tools For Jewelry Manufacturing Recommended Tools For Jewelry Manufacturing
<b>UNIT 3</b>	Basic Techniques Of Jewelry Manufacturing ,Rolling Techniques Sawing, Piercing, Filling, Milling, Process On Sheet Metal – Repo usage, Chasing, Stamping, Stretching, Embossing, Blanking, Processes With Wire – Chains, Draw Plates, Cross Section, Wire Drawing, Bending, Cutting, Spirals, Forging, Jump-Rings, Chains, Twisting And Filigree. Shaping Doming Blocks , Dies Repousse And Chasing , Scoring And Bending
<b>UNIT 4</b>	Clips And Connections, Catches, Hinges, And Findings Different Types Closing Mechanisms Like Fold Over, Toggle, Lobster Claw, Springing, Box Tab Insert, Fish Hook, Hook And Eye, S-Hook, Barrel. Clips For Earring, Different Types Of Clasps And Locks – Box Clasps, Bead Lock, Tube Lock, Hinge Lock, Slide Lock, Connections With Half Ring For Settings, And With A Hinged Stud
<b>UNIT 5</b>	Surface Decoration & Ornamentation Techniques, Engraving, Scoring, Chip Carving, Metal Inlay, Etching, Granulation, Enameling), Texturing Metal, Texture And Surface Finishes


### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Understand the characteristics of light metals.

CO2: Be able to develop designs and communicate ideas.

CO3: Be able to use construction and finishing techniques to produce 3D outcomes CO4: Be able to employ professional practice when working with light metals.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H		M	H	M	H							M	H			M
CO2	M	H		H		H	M	M					M		M		
CO3	H	M	H	H	H	M		H					H		M		
CO4	M			M	M								H	H	H		L

H = Highly Related; M = Medium L = Low

**TEXT BOOKS**

- Untracht, Oppi. (1982) *Jewelry concepts and technology*. Doubleday & Co., Garden City, N.Y.
- Hoke, C. M. (1940) *Refining precious metal wastes: gold – silver – platinum metals, a handbook for the jeweler, dentist and small refiner*. Metallurgical Publishing Co., New York.
- Loosli, Fritz, Herbert Merz and Alexander Schaffner. (1982) *Practical jewelry making*. Berne, UBOS/SCRIPTAR, Switzerland.
- McCreight, Tim. (1997) *Jewelry: fundamentals of metalsmithing*. Hand Books Press, Madison, WI.
- Revere, Alan. (2011) *Professional jewelry making: a contemporary guide to traditional jewelry techniques*. Brynmorgen Press, Brunswick, ME.
- Jewellery manufacture and repair by Charles Jarvis
- Jewellery Making manual by Sylvia Wicks
- Jewellery making techniques book by Elizabeth oliver

  
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BDE089A	COMPUTER AIDED DESIGN I- (CORAL DRAW)	0-0-4 [2]
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### AIM

In this module you will learn how to convert Manual Design in Digital Form through Corel with Exact measurement. In this module you will learn creating variation and Orthography concept. And Also Learn applying 3d rendering Effect by Photoshop project.

### OBJECTIVE

- Students will learn the basics of Jewellery Design Software “Coral Draw”
- Each content will cover the meticulous research about the 2D design by using Coral Draw.
- Learning how to develop 2D drawings in multiple.
- Research and documentation of each project.
- Submissions: PowerPoint presentation with digital prints.

UNIT 1	Introduction To Corel Draw, Basic Tools In Coral Draw, Various Shapes.
UNIT 2	Drawing & Shaping Objects, Transforming Objects, Corel Draw Effects, Working With Layer, Design Development, Color Fills And Outlines Tools, Gold Color Creation.
UNIT 3	Motif Development To Make Jewelry, Interactive Blend Tool, Diamond With Measurement , Stone Setting, Creating Shapes & Painting
UNIT 4	Theme Based Designing-Earrings , Bracelets , Pendants , Rings, Brooch, Necklace
UNIT 5	Special Effects To Images-Backgrounds, Text Option, Detail Of Jewelry Piece


### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: The student will be able to make more than one Appropriate Variation compared to original CO2: The student will be able to learn Exact Orthography

CO3: The student will be able to apply 2D Rendering object

CO4: The student will be able to learn how to save Sampling Cost.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND  
PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H												M		M
CO2		H	H					M				L		M			
CO3		H	H					H							M		
CO4		H	H	H	H		H					M	H		M		L

H = Highly Related; M = Medium L = Low

**TEXT BOOKS/WEBSITE**

- <http://product.corel.com/help/CorelDRAW/540229932/Main/EN/User-Guide/CorelDRAW-X7.pdf>
- <http://howto.corel.com/>
- [http://www.insidegraphics.com/corel\\_basics/corel\\_draw\\_guidelines.asp](http://www.insidegraphics.com/corel_basics/corel_draw_guidelines.asp)
- An Introduction to computer aided design for jewelry casting by Lucian Taylor
- Corel Draw 11: the official guide dream tech publishers

  
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<b>BDE090A</b>	<b>DESIGN PROJECT-I (GOLD JEWELRY)</b>	<b>0-0-6 [3]</b>
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## **AIM**

After Understanding the About Gold, Different Jewelry Markets Of India and World, Characteristics of Light Metals Their Visual, Tactile and Functional Characteristics. Student Will Be Able To Develop Designs And Communicate Ideas Using Drawing, Rendering Finishing Techniques Application Of Inspiration Into A Jewelry Product. Make Product Range of All the Design like Pendant, Earring, Flexible Bracelet, Fixed Bracelet, Bangle, Ring and Necklace. Make Product Detail For All Designs. Choose Any 1 Design And Make Prototype Of Gold Jewelry In Your Jewelry Manufacturing Module. To Develop Learners' Skills Of Understanding Of Gold And Different Markets Of gold Jewelry, And Their Use So That Student Can Use His Knowledge For Industry Demand. Basic Knowledge Of Materials Used In Jewelry With Understanding Of How To Apply Them On Paper And Then Developing 3D Outcomes As Prototype Of The Design Project Gold Jewelry

## **OBJECTIVE**

- To look at designed objects, networks and environments more critically in our everyday life.
- To develop observational skills through which to investigate and understand Design.
- To develop drawing as a means of expression and communication of the creative process
- To develop creative problem solving through a variety of skills, techniques and processes
- To become familiar with researching, investigating and evaluating a wide range of materials and their properties.
- To have an informed opinion about Design and the design process and to be able to express those opinions.

## **PREREQUISITE**

- Visual Imagination.
- Eye on detail
- Intrapersonal Skills.
- Skills of Gemstone Rendering.
- Basic Knowledge of drawing and rendering.
- Basic knowledge of PowerPoint presentation.

<b>UNIT 1</b>	Inspiration Based Jewelry Design, What Is Inspiration, Why Do We Need Inspiration, Most Common Source Of Inspiration Like3 Natural Sources, Man- Made Sources, Historical Sources, Symbolic Sources, Other Sources Of Inspiration, Application Of Inspiration Into A Jewelry Product: Applying Design Elements And Principles To These Elements And Making As Many Variation And Options To Each Of The Chosen Elements. Line Placement /Repetition, Reduction And Enlargement, Grid Placement, Rotation, Skewing Or Twisting Or Folding.
<b>UNIT 2</b>	Selecting The Jewelry Forms / Styles Conceptualization: Concept Development, Generate Product Concepts; Select A Jewelry Concept, Rationale Behind Selecting A Form. Investigating The Inspiration To List The Motifs/ Elements Which Will Act As Forms For Developing Jewelry, Motifs And Its Types, Making Style Variations.
<b>UNIT 3</b>	Jewelry Design And Detailing: Design Detailing, Why Design Detailing Is Important, Steps Of Jewelry Design Detailing Process.
<b>UNIT 4</b>	Presentation Materials, Presentation Formats And Methods, Documentation And Compilation. Different Type Of Presentation Requirements And Allied Materials For It, Like Only For Designing, Manufacturing Specification, Marketing, / Branding / Promotion Why Documentation And Compilation Is Needed, Process Documentation , Documentation And Compilation For Marketing / Branding/ Promotion
<b>UNIT 5</b>	History Of Gold Jewelry In India, Analyzing Contemporary Gold Jewelry Trends In India, Traditional Indian Gold Smithing Techniques, Gold Appraisal, Market Identification, Culture Board, Jewelry Board, Client Board, Mood Board, Inspiration Board, Conceptualization And Form Generation, Final Design Development, Prototype Development, Portfolio. Inspiration Based Jewelry Design, Inspiration Board, Mood Board ,Client Board, Market Board, Brand Board Application Of Inspiration Into A Jewelry Product, Make Product Range Of All The Design Like Pendant, Earring , Flexible Bracelet , Fixed Bracelet, Bangle , Ring And Necklace, Make Product Detail For All Designs, Choose Any 1 Design And Make Prototype Of Gold Jewelry

\*On the completion of this task student will be able to prepare Jewelry Board, Client Board, Inspiration Board, Mood Board, and Inspiration board, Conceptualization and Form Generation, Final Design Development, Prototype Development & Portfolio.

## COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Understand the visual, tactile and decorative characteristics of gold materials.

CO2: Be able to create a jewelry collection and developing the portfolio in digital software. CO3: Be able to respond to design requirements.

CO4: Understand professional practice in gold jewelry making.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	M	H		H				H	M	M			
CO2	H	H		H		H	M	H			M	H	M		M		
CO3	H	M	H	H	H	M		H				H	M		M		
CO4	H	H		M	M			M				M	H	H	H		

H = Highly Related; M = Medium L = Low

## TEXT BOOKS/WEBSITE

- [www.worldgoldcouncil.com](http://www.worldgoldcouncil.com)
- [www.vogueindia.com](http://www.vogueindia.com)
- [www.reliancejewels.com](http://www.reliancejewels.com)
- [www.damas.com](http://www.damas.com)
- [www.vendorafa.com](http://www.vendorafa.com)
- Untracht, Oppi. (1982) *Jewelry concepts and technology*. Doubleday & Co., Garden City, N.Y.
- Hoke, C. M. (1940) *Refining precious metal wastes: gold – silver – platinum metals, a handbook for the jeweler, dentist and small refiner*. Metallurgical Publishing Co., New York.
- Loosli, Fritz, Herbert Merz and Alexander Schaffner. (1982) *Practical jewelry making*. Berne, UBOS/SCRIPTAR, Switzerland.
- McCreight, Tim. (1997) *Jewelry: fundamentals of metalsmithing*. Hand Books Press, Madison, WI.
- The Jewelers' Directory of gem stones : Judith Crowe
- Techniques of jewellery illustration and colouring rendering by dumatt corp.
- Indian History by ML Nigam

BDE092A	BUDGETING & COSTING	2-0-0 [2]
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### AIM

The brief of the course is to prepare the students to the use of budgets and cost in Jewelry industry. It aims to help students to set up and operate a budgetary control system through understanding of costing methods.

### OBJECTIVE

- Be able to understand the process and documentation required for export
- Be able to enhance marketing skills
- Be able to train industry professionals to enhance export growth
- Be able to understand the trends and emergence of Jewelry brands and brand building
- Develop an understanding of budgetary and planning issues of a business
- Apply the acquired knowledge to problem-solving and practical and personal situations

<b>UNIT 1</b>	<b>Introduction to process and documentation in export market.</b> Principal Documents. Auxiliary Documents. Documents for claiming Export Assistance
<b>UNIT 2</b>	<b>Study quality issues:</b> Study Quality standard & compliances Study Quality certification & hallmarking
<b>UNIT 3</b>	<b>Costing:</b> Jewelry pricing formula Cost Allocations Profit analysis
<b>UNIT 4</b>	<b>Budgeting:</b> Developing the budget Creating an invoice Customs Duty
<b>UNIT 5</b>	<b>GST</b> Jewelers Details Customer Details Sales Details Exchange Details Taxation and Billing Summary


### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Calculate the cost price, whole sale price and markup for jewelry CO2:

Understand hallmarking in jewelry.

CO3: Understand documentation for jewelry export.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND  
PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H		M	H	M	H						H	M	M			
CO2	H			H		H	M				M	H	M		H		
CO3	M	M	H	H	H	M	M	H				H	H		H		M

H = Highly Related; M = Medium L = Low

**TEXT BOOKS**

- Advanced *Cost Accounting*. Jain, S/ Narang, K.
- Project Management Accounting: *Budgeting*, Tracking, and Reporting Costs and Profitability (9780470044698): Kevin R. Callahan, Gary S. Stetz, Lynn M. Brooks

  
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BDE096A	DESIGN PROJECT- II (DIAMOND JEWELRY)	0-0-6 [3]
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### AIM

After understanding the about diamonds, different jewelry markets of India and world, characteristics of light metals their Visual, tactile and functional characteristics. Student will be able to develop designs and communicate ideas using drawing, rendering finishing techniques application of inspiration into a jewelry product. Make product range of all the design like pendant, earring, flexible bracelet, fixed bracelet, bangle, ring and necklace. Make product detail for all designs. Choose any 1 design and make prototype of gold jewelry in your jewelry manufacturing module.

### OBJECTIVE

- To develop learners' skills of independent enquiry by undertaking a sustained investigation of direct relevance to their vocational, academic and professional development.
- Understanding of diamond and different markets of diamond jewelry and their use so that student can use his knowledge for industry demand.
- Basic knowledge of materials used in Jewelry with understanding of how to apply them on paper.

UNIT 1	Diamond Introduction 5-C's Of The Diamond Sources Of Diamonds, Diamond Properties –Physical, Chemical, And Optical Optical Properties
UNIT 2	Analyzing Global Diamond Jewelry Brands, Analyzing Indian Diamond Jewelry Brands,
UNIT 3	Diamond Jewelry Manufacturing process, Diamond Jewelry Trend & Forecast,
UNIT 4	Market identification, Culture board, Jewelry board, Client board, Mood board, Inspiration board
UNIT 5	Conceptualization & Form Generation, Final Design Development,
UNIT 6	Cost assessment techniques, Prototype Development, Packaging, and Portfolio.

\*On the completion of this task student will be able to prepare Jewelry Board, Client Board, Inspiration Board, Mood Board, and Inspiration board, Conceptualization and Form Generation, Final Design Development, Prototype Development & Portfolio

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Understand the visual, tactile and decorative characteristics of Diamond.

CO2: Be able to create a diamond collection and developing the portfolio in digital software. CO3: Be able to respond to design requirements.

CO4: Understand professional practice in diamond jewelry making.

# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	M	H		H					M	M			
CO2	H	H		H		H	M	H					M		M		
CO3	H	M	H	H	H	M		H					M		M		
CO4	H	H		M	M			M					H	H	H		

H = Highly Related; M = Medium L = Low

## WEBSITE

- [www.gitanjalilifestyle.com](http://www.gitanjalilifestyle.com)
- [www.google.com](http://www.google.com)
- [www.youtube.com](http://www.youtube.com)
- [www.ddmas.com](http://www.ddmas.com)
- [www.debeers.com](http://www.debeers.com)
- [www.tanishq.com](http://www.tanishq.com)
- [www.chopard.com](http://www.chopard.com)
- [www.chanel.com](http://www.chanel.com)
- Facets
- J Q Magazine
- Couture International Jeweler
- Jewel regent beyond luxury

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BDE097A	JEWELLERY DESIGN TRENDS AND FORECAST	2-0-0 [2]
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### AIM

In this course you will develop and apply your skills and knowledge of theoretical methods and practical applications of trend forecasting to research and analyze trends that influence jewelry products for the industry and end consumers. You will investigate the specialized study and knowledge based application of micro environments, global, social and cultural issues and their impact on consumer behavior. You will incorporate strategic decision making in recognizing the patterns, cycles and dissemination of information. Your investigation will determine a framework to specifically apply creative and analytical skills in the trend forecasting process.

### OBJECTIVE

- In this course you will develop the following program learning outcomes: Critically analyze, synthesize and reflect on complex theories and recent developments, both local and international, at a micro and macro level, to extend and challenge knowledge and practice in fashion entrepreneurship.
- Professionally communicate propositions, processes and outcomes to address specialist and non- specialist audiences while working with cultural differences in an appropriate manner.
- Implement research methodologies and methods to design and execute substantial applied and research projects, evaluate the outcomes and contribute to the fashion and textiles profession and the field of knowledge in fashion entrepreneurship.
- Investigate emergent global entrepreneurial issues and strategically respond to their impact in the fashion and textiles industry.

<b>UNIT 1</b>	<p>Trend Materials &amp; jewelry Development: materials for research; Color Practice Interactions between colors and materials Briefing and mood board creation Materials Art buying Product development Jewelry design management</p>
<b>UNIT 2</b>	<p><b>Trend Design research, Transmission and interpretation</b> Fashion and jewelry trend terminology Trends in luxury jewelry x fast fashion jewelry The trend industry Nature of trends Trends in urban environment. Information Management Visualization techniques Argumentation strategies</p>
<b>UNIT 3</b>	<p><b>Fashion Jewelry market and marketing environment research</b> market research Trend research techniques research design &amp; data sources Sampling methods evaluating the collections Forecasting Fashion Market Segmentation marketing mix Jewelry consumer</p>
<b>UNIT 4</b>	<p><b>Trend Analysis</b> Evolution of jewelry trend Jewelry trend implications for design / retail decisions Consumer influence on market</p>
<b>UNIT 5</b>	<p><b>Jewelry Forecasting</b> Jewelry Forecasting Process Diffusion of Innovation Fashion Cycles Cultural Indicators Color Forecasting Metal alloy and Gemstones Forecasting Styling Forecasting Sales Forecasting Competitive Analysis</p>

## COURSE OUTCOME (CO)

At the end of this course students will:

- CO1: Able to assess and review the requirements and operational methods of the role of a trendforecaster relevant to jewelry entrepreneurship.
- CO2: Substantiate and apply appropriate research methodologies to identify and analyze alternative research sources for identifying global trend directions.
- CO3: Research and critically analyze the challenges and opportunities of translating trend scenarios into the development of jewelry products.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H		M	H	M	H		H					M				
CO2				H		H	H					H	M	M	M		
CO3	H	H	H	H	H	M		H				M			M		

H = Highly Related; M = Medium L = Low

## WEBSITE

- Jewelry Trendvision.com

<b>BDE101A</b>	<b>A. PHOTOGRAPHY (ELECTIVE)</b>	<b>0-0-4 [2]</b>
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### AIM

This unit aims to develop learners' skills and understanding in Product Photography. Students will get Knowledge of the history of the photographic medium and how it relates to the history of the other fine arts

### OBJECTIVE

Various aspects of photography including lighting for indoor & outdoor, handling of studio equipment and set planning & composition.

<b>UNIT 1</b>	Various aspects of photography including lighting for Indoor & Outdoor
<b>UNIT 2</b>	Handling of studio equipment
<b>UNIT 3</b>	Set planning
<b>UNIT 4</b>	Composition.
<b>UNIT 5</b>	Final Product Photography

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1 Be able to use space and equipment.

CO2 Be able to use sets, lights and backgrounds.

CO3: Apply the principles of lighting and color theory to a variety of photographic scenarios by measuring, evaluating, and adjusting light and color to create quality images.


### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	H	M	M	H				M			M		M		H
CO2	H	H	M		H								M	M			
CO3	H	H	M	H	M									M			

H = Highly Related; M = Medium L = Low

### TEXT BOOKS

- Understanding Exposure: How to Shoot Great Photographs with a Film or Digital Camera by [Bryan Peterson](#)
- The Photographer's Eye: Composition and Design for Better Digital Photos by [Michael Freeman](#)

  
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<b>BDE102A</b>	<b>B. LIFESTYLE ACCESSORY DESIGN (ELECTIVE)</b>	<b>0-0-4 [2]</b>
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### AIM

The Lifestyle Accessory Design (LAD) postgraduate program educates and trains professional designers to visualize and create lifestyle accessories and systems using different materials, processes and technologies.

### OBJECTIVE

- generate and evaluate design ideas for given briefs relevant to fashion accessories
- create a more integrated fashion look with an understanding of the role of accessories
- experiment with a variety of materials and techniques relevant to fashion accessories
- apply relevant millinery and costume jewelry skills
- present fashion accessories work in a professional manner

<b>UNIT 1</b>	Lacquer Craft Accessories
<b>UNIT 2</b>	Textile Craft Accessories
<b>UNIT 3</b>	Wood Craft Accessories
<b>UNIT 4</b>	Metal Craft Accessories
<b>UNIT 5</b>	Leather Craft &Packaging

### COURSE OUTCOME (CO)

At the end of this course students will:

CO1: Student will be able to understand about fashion accessories.

CO2: Student will be able to understand the techniques & process of fashion accessories.

CO3: Student will be able to understand the product development, quality & marketing aspects.


### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	H	M	M	H				M			M		M		H
CO2	H	H	M		H								M	M			
CO3	H	H	M	H	M									M			
CO4		H	H	M	M	H							M		M		

H = Highly Related; M = Medium L = Low

### TEXT BOOKS

- ANLEZARK, M., Hats on Heads. Kangaroo Press, Kenthurst NSW, 1991
- COULDRIDGE, A., The Hat Book. Ventura Publishing Ltd, London, 1980
- FOSTER, V., Bags & Purses Batsford, London 1982
- McDOWELL, C. Hats: Status, Style and Glamour. Thames & Hudson, London, 1992

  
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<b>BDE103A</b>	<b>DESIGN PROJECT III – KUNDAN MEENA</b>	<b>0-0-6 [3]</b>
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### AIM

After Understanding the About Enamels and Enameling, Different Jewelry Markets of India and World, Characteristics of Light Metals Their Visual, Tactile and Functional Characteristics. Student Will Be Able To Develop Designs And Communicate Ideas Using Drawing, Rendering Finishing Techniques Application Of Inspiration Into A Jewelry Product. Make Product Range of All the Design like Pendant, Earring, Flexible Bracelet, Fixed Bracelet, Bangle, Ring and Necklace. Make Product Detail For All Designs. Choose any one Design and Make Prototype of kundan meena Jewelry In Jewelry Manufacturing Module.

### OBJECTIVE

- This unit will enable learners to understand the factors relevant to product design, and to develop skills in planning and producing prototypes.
- To make understand the contrasting difference between casted jewelry and traditional Kundan- Meena jewelry.
- Understanding of traditional and contemporary Kundan Meena. Understanding the technique through practical demonstration.
- Understanding the process of traditional jewelry class in India. A comparative analysis of the past Kundan Jadau work as compared to the present.
- Range development using Kundan Meena technique according to jewelry trends and forecast


<b>UNIT 1</b>	History Of Kundan Meena Jewelry In India, Analyzing Contemporary Kundan Meena Jewelry Trends In India, Traditional Kundan Meena Jewelry Manufacturing Process, Market Identification, Culture Board, Jewelry Board, Client Board, Mood Board, Inspiration Board, Conceptualization And Form Generation, Final Design Development, Cost Assessment Techniques
<b>UNIT 2</b>	Analyzing Global Jewelry Brands, Analyzing Indian Jewelry Brands,
<b>UNIT 3</b>	Kundan Meena Jewelry Manufacturing Process, Jewelry Trend & Forecast,
<b>UNIT 4</b>	Market Identification, Culture Board, Jewelry Board, Client Board, Mood Board, Inspiration Board
<b>UNIT 5</b>	Conceptualization & Form Generation.
<b>UNIT 6</b>	Final Design Development, Prototype Development, Packaging, Portfolio.

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Understand the principles and characteristics of Kundan Meena.

CO2: Be able to create a Kundan Meena collection and developing the portfolio in digital software. CO3: Be able to respond to design requirements and get knowledge of History of Kundan Meena. CO4: Understand professional practice in Kundan Meena jewelry making.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND  
PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	M	H		H		M			M	M			H
CO2	H	H		H		H	M	H					M		M		
CO3	H	M	H	H	H	M		H					M		M	L	
CO4	H	H		M	M			M					H	H	H		

H = Highly Related; M = Medium L = Low

**WEBSITES**

- [Www.Renelalique.Com](http://www.Renelalique.Com)
- [Www.Birdhichandghanshyamdasjewelry.Com](http://www.Birdhichandghanshyamdasjewelry.Com)
- [Www.Sunitashekhawat.Com](http://www.Sunitashekhawat.Com)
- When Jewelry Speaks
- [KhannaJewellers.com](http://KhannaJewellers.com)
- [KalajeeJewellers.com](http://KalajeeJewellers.com)
- [HazoorlilalJewellers.com](http://HazoorlilalJewellers.com)
- When jewelry speaks by

  
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<b>BDE104A</b>	<b>MARKETING &amp; MERCHANDISING</b>	<b>3-0-0 [3]</b>
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### AIM

The brief of this unit to enable the student with an understanding of the essential elements of Jewelry merchandising and promotion & its role within the Jewellery industry.

### OBJECTIVE

- Learn the skills necessary to work as store buyers, market analysts or jewelry event planners.
- Learn about human relations
- Learn about product development and presentation
- Learn about local/global market

<b>UNIT 1</b>	<b>Significance of Jewelry industry</b> Overview of the Jewelry industry. Current scenario. Role of Jewelry industry in Indian economy.
<b>UNIT 2</b>	<b>Jewelry merchandising</b> Introduction to Jewelry merchandising. Role of merchandiser. Qualities of a merchandiser. Responsibility of the Jewelry merchandiser.
<b>UNIT 3</b>	<b>Visual merchandising and its elements</b> Visual merchandising and its advantages for the buyer and seller today. Jewelry calendar. The planning cycle. Merchandise planner.
<b>UNIT 4</b>	<b>Trend analysis and forecasting</b> Trend prediction. Sales forecasting. Product selection and mix, Distribution mix. Distribution channels, from producer to ultimate consumer. Jewelry supply chains. Buying calendar & Buying strategy.
<b>UNIT 5</b>	<b>Jewelry Retail</b> Role and responsibility of the retail Jewelry buyer. Customer identification, Supplier, Sourcing. Global sourcing, Range planning and range building.
<b>UNIT 6</b>	<b>E-Commerce</b> Market Research Variants on product pages (Which size, color, stone) Customization (Personal engraving, gift boxes) Recurring Billing



## COURSE OUTCOME (CO)

At the end of this course students will:

CO1: Be able to demonstrate the application of oral, written, and visual communication skills to present specifications/information and support decision making.

CO2: Understand the unique aspects of jewelry marketing and create strategic promotional plans in print, visual displays and online marketing.

CO3: Analyze the jewelry consumer and market trends.

CO4: Use research skills and analysis methods in order to produce a range of jewelry designs and product **MAPPING**

## COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	H	M			H		M			M	M			H
CO2	M	H	H	H				H					M		M		
CO3	H	H	H	H	H	M							M		M	L	
CO4	M	H	H	M	M			H					M	H			

H = Highly Related; M = Medium L = Low

## WEBSITES

- Case Studies in Marketing – Indian context - R.Srinivas
- Marketing Management Text And Cases in Indian Context-Dr.K.Karunakaran
- Marketing Management Text and Cases-Biplab Bose
- <https://www.visenze.com/blog/jewelry-e-commerce-learning-points-from-indias-leaders-caratlane-and-bluestone>
- <https://www.voylla.com/>
- <https://www.tribebyamrapali.com/>

<b>BDE105A</b>	<b>PROFESSIONAL PRACTICE</b>	<b>3-0-0 [3]</b>
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### AIM

The Objective Of This Course Is To Critically Look Into The Project And Office Management Practice Emphasizing On Professional Services And Professional Ethics As Well As Project Responsibilities. In This Module, Students Are Required To Demonstrate An Analytical And Methodical Approach To The Process Of Developing, Programming And Implementing Design Solutions. Students Must Reach And Comply With All Legal & Ethical Restrictions Relevant To Them, And Students Are Expected To Demonstrate A High Professional Standard Of Organizational And Time Management Skills, And The Ability To Price Their Services Competitively. It Includes Design Ethics, Principles, Practices, Typical Contract Document Formats, And Resumes Concepts Related To Professional Practice. Awareness of Current Legal Problems and Professional Ethics Relative To Handling Projects From Feasibility Studies Through Development Drawings, Contract Documents, Bidding, And Supervision. Investigation of Processes, Practices, And Ethics Involved In jewelry Design Profession. Course Emphasizes Integration Of Specifications, Cost Estimating, Office And Project Management, And Contract Writing Into The Design Process.

### OBJECTIVE

- Understand the scope of services and areas of responsibility that are encountered in theJewelry profession
- Learn about Pre-Design, Project and Office Administration
- Learn about Design methodology, cost analysis, budget formulation and pro forma procedures
- Learn about office management emphasizing professional service and ethics
- Learn about project management focusing on the Jewelry professional's responsibilities during a project


<b>UNIT 1</b>	<b>Quality and its Attributes</b> Quality standards and compliances Quality certification and hallmarking
<b>UNIT 2</b>	<b>IPR</b> Introduction to Intellectual property rights (IPR) issues. Overview & Importance; IPR in India and IPR abroad. Patents; their definition; granting; infringement; searching & filing. Copyrights; their definition; granting; infringement, searching & filing, distinction between related and copy rights.
<b>UNIT 3</b>	Goal setting, Career direction, Responsibilities. Family business approach / advantages and concerns.
<b>UNIT 4</b>	<b>Skills and development</b> Presentation skills, Personal development
<b>UNIT 5</b>	<b>Promotional opportunities.</b>

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: To be able to place themselves and their work in the context of their selected discipline.CO2: To understand their specialist area and the career opportunities available.

CO3: To understand how to promote themselves and their work professionally.

  
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## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	M	H	M			H		M			M	M			H
CO2	M	H	H	H			M	H					M		M		
CO3	M	H	H	H	H								M		M	L	

H = Highly Related; M = Medium L = Low

### TEXT BOOKS

- P.N. Cheremisinoff, R.P. Ouellette and R.M. Bartholomew, Biotechnology Applications and Research, Technomic Publishing Co., Inc. USA, 1985
- D. Balasubramaniam, C.F.A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman, Concepts in Biotechnology, University Press (Orient Longman Ltd.), 2002
- Bouragaize, Jewell and Buiser, Biotechnology: Demystifying the Concepts, Wesley Longman, USA, 2000.
- Ajit Parulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India Ltd, 2006
- B.L. Wadehra; Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000
- P. Narayanan; Law of Co

<b>BDE107A</b>	<b>COMPUTER AIDED DESIGN-IV (RHINO)</b>	<b>0-0-4 [2]</b>
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### AIM

In this module you will learn how to Create Jewelry Design through Advanced 3Design software and how to use 3Design in making master model & Mass Production with Exact measurement, Fine finishing, Real 3d Rendering & Creating Video of design And Learn how can we control gold weight also.

### OBJECTIVE

- Each content will cover the meticulous research about the 3D design by using “RHINO”
- Students will learn the process of manufacturing through CAM by visiting PCSIR and PGJDC
- Investigating different perceptions about jewellery including traditional and contemporary
- Learning how to develop 2D drawings in multiple 3D perspectives and execution of CAD
- Research and documentation of each project with the final 3D processing
- The Final outcome in result of CAM
- Submissions: PowerPoint presentation with digital prints and CAM processed prototypes to make mass production out of one piece

<b>UNIT 1</b>	Concept Of 3D & 3Design, Concept Of Surfacing,
<b>UNIT 2</b>	Stone Setting, Texture Concept, Text Surfacing
<b>UNIT 3</b>	Stone Setting, Texture Concept, Text Surfacing, Concept Of Scooping, Concept Of Beezal Creating
<b>UNIT 4</b>	Concept Of Gold Weight Controlling, Concept Of Human Design Creating By Shaper
<b>UNIT 5</b>	Real 3D Rendering, Video Creating, Concept Of Converting In Dye Formatting, Concept Of Casting Through CAD-CAM Process.

### COURSE OUTCOME (CO)


**At the end of this course students will:**

CO1: Able to develop 3D Design with Rendering. CO2:

Able to develop exact setting in Design. CO3:

Able to Gold Controlling.

CO4: Able to Create Master Model & Rubber Dye to Create Different Joints for flexibility.

  
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# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H							M				M			
CO2		H	H										M				
CO3		H	H											M			
CO4		H	H	H	H		H	H						M			

H = Highly Related; M = Medium L = Low

## WEBSITE

- [Cadd3designhelp/Guide/Tutorial](http://Cadd3designhelp/Guide/Tutorial).

  
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<b>BDE108A</b>	<b>A. VISUAL MERCHANDISING (ELECTIVE)</b>	<b>0-0-4 [2]</b>
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### AIM

This course would require the students to develop merchandising plan for the Jewelry Retail Showrooms. The basics of visual merchandising, display windows, planning etc., would be covered in this course.

### OBJECTIVE

- Be able to promote jewelry merchandise.
- Be able to understand the attraction of the customers.
- Be able to understand the retail store promotion.
- Student will get knowledge of creativity, technical and operational aspects of the business and merchandise.

<b>UNIT 1</b>	Merchandising concepts and theories tools
<b>UNIT 2</b>	Techniques for merchandise
<b>UNIT 3</b>	Display, windows
<b>UNIT 4</b>	Creative thinking for merchandise display
<b>UNIT 5</b>	Store layout, display, Jewelry retailing

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Present and coordinate merchandise so that related goods are shown in a unique, desirable, and salable manner.

CO2: Apply basic design principles and color theories to the construction of promotional displays and advertising.

CO3: Understand the basic functions of retail store operations including store location and layout, shopping center analysis, retail market segmentation and strategies, and the merchandising mix.

CO4: Prepare and execute displays for exhibitions and promotional events using the visual dynamics of light as a design element.


### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS O3	PS O4	PS O5
CO1		H	H	M	M	H				M			M		M		H
CO2	M	H	H	M		H								M	M	M	
CO3		H	H	M	H										M		
CO4		H	H	H	H								H	M	M		

H = Highly Related; M = Medium L = Low

### TEXT BOOKS

- Visual Merchandising 2nd edition Paperback – 19 Oct 2011 by Tony Morgan
- Jewellery Design: From Fashion to Fine Jewellery by [Elizabeth Galton](#)

  
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<b>BDE109A</b>	<b>B. E- COMMERCE (ELECTIVE)</b>	<b>0-0-4 [2]</b>
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### AIM

The aim of this unit is to develop understanding of the dynamics of online business and online buying behavior to create a consumer-oriented online business strategy along with holistic knowledge on product development for E-Commerce platform.

### OBJECTIVE

- Acquaint students with a fundamental understanding of the environment and strategies in the New Economy.
- Provide analytical tools to understand opportunities in unserved or underserved New Economy markets. Provide a fundamental understanding of the different types and key components on business models in the New Economy.
- Provide guiding principles behind the design and strategy of the customer web interface.
- Understand the traditional and new communication/marketing approaches that create competitive advantage in the New Economy.
- Provide insights on how to implement strategy in the New Economy.
- Understand the metrics that New Economy firms use to measure progress, customer satisfaction, and financial performance.
- Understand the fundamentals of financially valuing New Economy companies.
- Provide an overview of the hardware, software, servers, and the parts that make up the enabling "railroad" for the New Economy.


<b>UNIT 1</b>	Online Industry Appreciation and Business World, Fundamentals of Management, Creative Managerial Leadership,
<b>UNIT 2</b>	Market Dynamic, Jewelry Lifestyle accessories Products, and Fundamentals of E-commerce.
<b>UNIT 3</b>	Digital Marketing, Merchandising, Sourcing and Vendor management,
<b>UNIT 4</b>	Project Management, Long Industry Attachment, Specialisations, Customer Relations Management
<b>UNIT 5</b>	Advanced Data Analytics, Specialisation 2a Visual Communication, Specialisation 2b User Experience Design & Business Plan.

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Student will be able to understand global online business sensibilities. CO2: The student will be able to understand Global Online Business Industry.

CO3: The student will be able to understand with the knowledge and skills required to manage the online venture for a long period of sustainable profits, but will also challenge them to achieve career goals by fueling their passion. Student will be able to understand global online business sensibilities. CO4: The student will be able to understand with the knowledge and skills required to manage the online venture for a long period of sustainable profits, but will also challenge them to achieve career goals by fueling their passion.

  
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# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	H	M	M	H	M			M			M		M		H
CO2		H		M										M	M	M	
CO3	M	H	H	M		H		H									
CO4		H		H	H		M						H	M	M		

H = Highly Related; M = Medium L = Low

## TEXT BOOKS

- E-Commerce 10/e Paperback – 2016
- E - Commerce: An Indian Perspective Paperback – 2012



<b>BDE110A</b>	<b>DESIGN PROJECT-IV COUTURE JEWELLERY</b>	<b>0-0-6 [3]</b>
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### AIM

In economics, a luxury good is a good for which demand increases more than proportionally as income rises, and is a contrast to a "necessity good", for which demand increases proportionally less than income. Luxury goods are said to have high income elasticity of demand: as people become wealthier, they will buy more and more of the luxury good. This also means, however, that should there be a decline in income its demand will drop. Income elasticity of demand is not constant with respect to income, and may change sign at different levels of income. That is to say, a luxury good may become a normal good or even an inferior good at different income levels, e.g. a wealthy person stops buying increasing numbers of luxury cars for his automobile collection to start collecting airplanes (at such an income level, the luxury car would become an inferior good

### OBJECTIVE

- A brand is a philosophy of a designer transformed in to value added products. Generally, consumers recognize brands by names which could be logos or unique colors.
- A brand successfully makes recognition through coming up with distinct design features such as style, color or use of certain features unique to the brand.
- Here a student thinks about a very important variable of design called design philosophy which is unique and is thinking how to transform ones design philosophy into fashion and lifestyle products.
- Therefore this part of the project holds maximum importance in this assignment

<b>UNIT 1</b>	What Is Luxury Brand Global Luxury Brands Of Craft Product Influence Of Fashion In Luxury Craft Product Brands Trends And Influences Forecasting Analyzing Global Jewelry Brands, Analyzing Indian Jewelry Brands.
<b>UNIT 2</b>	Supply Chain Management Branding Packaging Visual Merchandising Case Study: Any One Luxury Craft Product Brand
<b>UNIT 3</b>	Collection Analysis Market Segmentation Client & Mood Board Inspiration Board Design Development
<b>UNIT 4</b>	Product Detailing Prototyping Product Photography & Portfolio

## COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Towards the completion of this unit a student would think about the luxury brand philosophy and development with above parameters

CO2: The student will be able to develop own luxury brand

CO3: Be Able To Use Technology to Produce Models, Prototypes and Presentation Materials. CO4:

Understand the Connections between Design Management and Manufacturing.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	M	H		M		M			M	M			H
CO2	M	H		M		H	M	H					M		H	M	
CO3	H	M	H	H	H	M		M					M		M		
CO4	H	H		M	M			M					H	H	H		

H = Highly Related; M = Medium L = Low

## TEXT BOOKS

- The Cult of the Luxury Brand – Radha Chadha & Paul Husband.
- Luxury Brand Management – A World Of Privilege – Michel Chevalier & Gerald Mazzalovo.

**OBJECTIVE:**

- To expose students to Historical, Vernacular and Contemporary architecture.

**OUTLINE:**

- ② Vacation Assignment/ Study tour is to be undertaken after the end of V semester exam and before the commencement of VI semester classes. This assignment could be a measured drawing and documentation of a noted building or a study tour for visiting places of architectural interest. The choice of the building to be documented and the places to be visited is left to the concerned department. The assignment may be given as group work (4 to 6 students per group). The students have to submit a report on the measured drawing or the study tour within 15 days from the beginning of the VI Semester. The reports are to be

<b>BDE112A</b>	<b>BRAND MANAGEMENT</b>	<b>2-0-0 [2]</b>
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### AIM

A brand is a philosophy of a designer transformed in to value added products. Generally, consumers recognize brands by names which could be logos or unique colors. A brand successfully makes recognition through coming up with distinct design features such as style, color or use of certain features unique to the brand. Here a student thinks about a very important variable of design called design philosophy which is unique and is thinking how to transform ones design philosophy into fashion and lifestyle products. Therefore this part of the project holds maximum importance in this assignment.

### OBJECTIVE

- The objective of this course is to learn fundamentals of Brand Management.
- The aim of brand Management Part is to make participants understand competition at product level as well as brand level. Two broadly important aspects namely brand Management from competition point of view and Product Management from New brand Development and Innovation point of view are to be covered.
- The objective of Brand Management is to make students understand principles of Branding, role of brands, elements and components of brands, brand equity etc.
- The main aim for Brand Management is to make sure that students understand implications of planning, implementing and evaluating Branding Strategies.

<b>UNIT 1</b>	<b>UNDERSTANDING BRAND</b> This module gives a basic overview of branding. It covers what a brand is, why brands matter, characteristics of strong brands, and other fundamental concepts of branding. This module aims to familiarize the students with the key conceptual foundations of developing and managing a strong brand.
<b>UNIT 2</b>	<b>DEVELOPING BRAND</b> This module introduces the process of crafting a brand. It covers ways of developing brand elements, creating brand associations, and introducing a new brand, and designing marketing/marketing communications programs that effectively communicate the desirable brand identity to target markets.

<b>UNIT 3</b>	<b>EVALUATING BRAND</b> This module reviews the methods of measuring and interpreting brand performance. It covers typical approaches of assessing brand equity, especially from a consumer perspective. It also offers both qualitative and quantitative tools for measuring brand image and strength.
<b>UNIT 4</b>	<b>MANAGING BRAND</b> The final module focuses on the stewardship and management of brands over time, geographic areas, and market segments. It covers the strategies for more established brands as they attempt to grow and stay relevant over time by examining the concepts/tools in brand extensions, consumer-brand relationships, strategic alliances, brand portfolios, global branding, and brand repositioning/revitalization.
<b>UNIT 5</b>	<b>CRAFTING BRAND</b> This module provides a view into what is involved in the formulation of the brand asset. The most important task in designing the brand is specifying the unique and relevant meaning the brand is to capture. This meaning must then be translated to reflect in the range of brand elements: brand name, logo, slogan, jingle, package design, retail space online space and overarching experience.

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Towards the completion of this unit a student would think about the brand philosophy and development with above parameters

CO2: The student will be able to develop own brand.


### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	M		M	H				M			M	H	H		H
CO2	M	M	M			H	M	H					M	M	H	M	

H = Highly Related; M = Medium L = Low

### TEXT BOOKS/ WEBSITES

- Strategic Brand Management (3rd edition), Kevin Lane Keller, Prentice Hall, 2008.
- Best Practice Cases in Branding (3rd edition), Kevin Lane Keller, Prentice Hall, 2008.
- [www.AdvertisingAge.com](http://www.AdvertisingAge.com)
- [www.adweek.com](http://www.adweek.com)
- [www.Americandemographics.com](http://www.Americandemographics.com)
- [www.brandchannel.com](http://www.brandchannel.com)
- [www.marketingpower.com](http://www.marketingpower.com)

  
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### AIM

The course will offer a broad perspective of Design thinking, LMC, idealization, data analytic, creating MVP, various digital tools for marketing, financial and pitch deck for the business.

### OBJECTIVE

- To enable the student to incorporate in the structuring and development of the project the concepts of project management, planning tools and controls.
- Economic feasibility of projects.
- Develop the project as a broad business process, covering the entire project life cycle.
- Conceptual phases, planning and organization, implementation and closure.

<b>UNIT 1</b>	<b>Introduction to Project management</b> Conceptualization and characteristics of projects: Project Life Cycle Phases of the project: conceptual, planning and organization, implementation, closure Project administration
<b>UNIT 2</b>	<b>Conceptual phases, planning and organization</b> Scope planning. Analytical structure of activities Structuring people in projects Costs and budget
<b>UNIT 3</b>	<b>Implementation</b> Project execution, monitoring and control Reviews and ratings
<b>UNIT 4</b>	<b>Introduction to Project management</b> Conceptualization and characteristics of projects: Project Life Cycle Phases of the project: conceptual, planning and organization, implementation, closure Project administration
<b>UNIT 5</b>	<b>Product packaging</b> Introduction Packaging Media Quality Assessment & Performance Evaluation: Package Printing: Package Graphics: Package Storage and Handling: Packaging & Environment:

<b>UNIT 6</b>	<b>Introduction to Entrepreneurship and Business Essentials</b> Who is an Entrepreneurs and Types of Businesses The Lean Approach Designing Thinking Lean Model Canvas / Business Model Canvas
<b>UNIT 7</b>	<b>Forecasting Demands and Acquiring Customers</b> Identifying the Target Audience / Customer Conducting Surveys Building an MVP based on the Survey Analyzing Competition
<b>UNIT 8</b>	<b>Brand Building and Establishing Brand Presence</b> Digital Marketing and Social Media Marketing Basics of PR and Importance of Digital Presence Building a Website – Tools and Techniques
<b>UNIT 9</b>	<b>Understanding Finance and Planning for Investment</b> Creating a Revenue Model Developing Sales Projects, Unit Economics, Investment Deck

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Approach the ideas through design thinking. CO2:

Identify the demand and its customers.

CO3: Analyze the data and obtain info like target market, market size, competition. CO4:

Management of the product development process.


CO5: Strategic product planning and Project planning and Detailed project.

CO6: Preparation of the production of the product and Product distribution and Evaluation of the product and process.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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CO1	M	H	M		M	H				M			M				
CO2	M	M	M			H	M							M			
CO3		H	H		H	M	H					H	M				M
CO4	H	M		M	M									H			
CO5	M	M	M			H						M					L

H = Highly Related; M = Medium L = Low

  
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## TEXT BOOKS

- The Lean startup by Eric Ries, Entrepreneurial Management by Robert J. Calvin
- A Guide to the Project Management Body of Knowledge: PMBOK® Guide (Sixth Edition)
- **The Automatic Startup** by David S. Rose Publication Date: 2016
- **A Dozen Lessons for Entrepreneurs by Tren Griffin** Publication Date: 2017



<b>BDE114A</b>	<b>PRODUCTION METHOD AND QUALITY CONTROL</b>	<b>2-0-0 [2]</b>
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### AIM

To develop knowledge of various production methods and evaluate various Jewelry manufacturing systems and equipment in the industry.

### OBJECTIVE

- To gain an understanding and appreciation of the principles and applications relevant to the planning, design, and operations of manufacturing.
- To develop skills necessary to effectively analyze and synthesize the many inter-relationships inherent in complex socio-economic productive systems.
- To reinforce analytical skills already learned, and build on these skills to further increase your "portfolio" of useful analytical tools for operations tasks.
- To gain some ability to recognize situations in a production system environment that suggests the use of certain quantitative methods to assist in decision making on operations management and strategy.
- To understand the managerial responsibility for Operations, even when production is outsourced, or performed in regions far from corporate headquarters.

<b>UNIT 1</b>	Introduction to Jewelry manufacturing industry.
<b>UNIT 2</b>	Study of Production Process and Planning in cutting, sewing & finishing.
<b>UNIT 3</b>	Management information systems & documentation procedures.
<b>UNIT 4</b>	Time & Motion study and its relevance: - an overview.
<b>UNIT 5</b>	Quality Department functions of a jewelry industry. Inspection systems from raw material to dispatch.

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Evaluate the principles of quality management and production method to explain how these principles can be applied within quality management systems.

CO2: Identify the key aspects of the quality and production improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.

CO3: Critically appraise the organizational, communication and teamwork requirements for effective quality and production management.

CO4: Critically analyze the strategic issues in quality and production management, including current issues and developments, and to devise and evaluate quality implementation plans.


**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M		M		H			M			M	M			
CO2	M	H		H	M	M							M	H			
CO3		M	M			H	M						M	M	M		
CO4	M		M		M		M	M					H	M			
CO5	M	M	M		M		H						M	M			

H- Highly Related; M = Medium L = Low

**TEXT BOOKS/ WEBSITES**

- Brepohl, Erhard (2001) the theory and practice of Gold Smithing. Portland, ME.
- Smith, Ernest A. (1980, 1933) working in precious metals. NAG Press, London.

  
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<b>BDE115A</b>	<b>JEWELLERY RETAIL AND EXPORT</b>	<b>2-0-0 [2]</b>
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### AIM

After studying this subject the students will understand marketing in domestic and international markets and their quota systems. It focuses attention on Gem and jewelry industry giving thorough knowledge of merchandising.

### OBJECTIVE

- To enhance the marketing and selling skills.
- To provide in-depth working knowledge of retail and export in Gem & jewelry industry.
- Techniques to maintain better customer relations.
- New development areas of retail stores and exports companies.
- Be able to respond to professional design requirements and to develop skills in planning and producing prototypes.
- To train professionally with a view to enhance retail and export growth.

<b>UNIT 1</b>	Basic Concept of retailing – definition need and functions
<b>UNIT 2</b>	Introduction to various terms Cost price, selling price, mark-ups, markdowns, distribution channel, wholesale, agent, broker, vendor, distributor
<b>UNIT 3</b>	Introduction to retail organizations Departmental store Discount stores Specialty stores Direct Retailing E- Retailing
<b>UNIT 4</b>	Concept of buying houses – definition, importance and types Retail Mix Concept of visual merchandising – definition, types of window display with examples
<b>UNIT 5</b>	Jewelry merchandising and export– definition, role of merchandiser, buyer – merchandiser interface, time and action sheet Consumer Buying Behavior – definition, consumer black box, decision making process.

### COURSE OUTCOME (CO)


**At the end of this course students will:**

CO1: Understand the role of merchandiser in export environment.

CO2: Understand the factors & principles relevant to Jewelry product e.g. concept, ergonomics, form, function, aesthetics, trends, end user, lifespan, materials, manufacturing methods, costing, level of finish, testing, sustainability.

CO3: Be able to respond to professional design requirements and to develop skills in planning and producing prototypes.

CO4: Understand the connections between Export and Retail market.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M		M		H			M			M	M			
CO2	M	H		H	M	M							M	H			
CO3		M	M			H	M						M	M	M		
CO4	M		M		M		M	M					H	M			
CO5	M	M	M		M		H						M	M			

H- Highly Related; M = Medium L = Low

**TEXT BOOKS/ WEBSITES**

- Export Import Management Paperback – 28 Oct 2013 by [Justin Paul](#) (Author), [Rajiv Aserkar](#) (Author)
- 50th annual report 2015-2016 the gem & jewelry export promotion council
- 49th annual report 2014-2015 the gem & jewelry export promotion council

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<b>BDE116A</b>	<b>FINAL PROJECT-I</b>	<b>0-0-12 [6]</b>
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### AIM

This subject purely concentrates on developing a collection based on all the previous areas covered in jewelry. This subject also aims at a thorough research on selected theme supported by a Design process to develop the whole range of jewelry collection. Students are required to research on the selected topic for the required aspects like demographics, psycho graphics etc. Students will develop the whole design process including mood board, story board, fabric development, design development, range development etc.

### OBJECTIVE

The objective of this unit is to further extend learner's knowledge creating the final collection putting all the knowledge and efforts students have gained so far and launch themselves as designers creating their own brand identity, and brand image.

<b>UNIT 1</b>	<b>Contextual research to identify potential areas of design research &amp; development</b> During this subject student are expected to gather information and visual materials in a field which has sufficient scope for design research and development.
<b>UNIT 2</b>	<b>Formulation of design brief, design concept, research methods and project schedule</b> The student will have to develop and negotiate a design brief by developing a concept based on a particular theme. At this stage student are expected to present their design concept based on a colloquium paper in front of a jury of faculty mentors. After the approval of their concept, student will be expected to meet their design mentor at scheduled times. Formative Feedback will be provided at each meeting and student will have to maintain a log book which shows their progress and gives evidence of following the design process. When student are in the process of design exploration.
<b>UNIT 3</b>	<b>Pricing &amp; Costing of Final products</b> The student will achieve optimum costs of production through an understanding of metal, design, concept development and finishing processes. They are also expected to do the pricing and costing of their final product.
<b>UNIT 4</b>	<b>Final submission and presentation</b> The Final Submission which will be supported by an oral presentation and submission of a design portfolio in front of a Jury, where the student will be expected to justify the validity/originality of their design process and findings. The student will be encouraged to do a self-evaluation, assessing their effectiveness of achieving set aims.
<b>UNIT 5</b>	<b>Reflective Journal &amp; Prototype and portfolio development</b> <ul style="list-style-type: none"> <li>• Additionally the student will be required to submit a Reflective Journal which represents their involvement and overall journey of learning and what specifically they reflected on. This will give evidence of whether they have fulfilled the initial aims that they had set.</li> <li>• To develop prototypes, student has to explore new and appropriate methods of jewelry making, jewelry product in relation to the relevant metal, stones.</li> </ul>

## COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: To understand strengths and weakness and create your brand, brand identity, image and logo. CO2: To identify the major types of idea sources in clothing design and provide information about each source. Recognize that these sources of inspiration help designers to create design elements and principles of individual designs. In order to foster originality, sources of inspiration play a powerful role throughout the creative stage of design process, and also in the early stages of jewelry research and strategic collection planning

CO3: To present research analysis to client groups.

CO4: To extend and apply skills in developing creative visual language.

CO5: To synthesize and critically evaluate experimentation in personal creative practice.


## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M		M		M					M			M	M	M		
CO2	M	H		M	M		H						M	H			
CO3	M	M			H	M							M				
CO4			M			H	M	M					H	M	H		
CO5													M	H			

H = Highly Related; M = Medium L = Low

## WEBSITES

- <http://worldofwearableart.com/>
- [www.style.com](http://www.style.com)
- [www.wgsn.com](http://www.wgsn.com)
- [www.promostyl.com](http://www.promostyl.com)
- [www.trendz.com](http://www.trendz.com)
- [www.wwd.com](http://www.wwd.com)
- [Trendvision.com](http://Trendvision.com)

  
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BDE117A	RESEARCH PROJECT & DISSERTATION	0-0-4 [2]
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### AIM

Sustainability is regarded as the future of Jewelry design sector. A student should have practice to implement sustainable strategies to their designing a collection for Jewelry Design. Now sustainability is a very complex concept when it comes to input it into jewelry industries on the whole. When it comes to Jewelry, the student shall concentrate on designing the PRODUCT.

### OBJECTIVE

- To enable the student to incorporate in the structuring and development of the project the concepts of project management, planning tools and controls.
- Economic feasibility of projects.
- Develop the project as a broad business process, covering the entire project life cycle.
- Conceptual phases, planning and organization, implementation and closure.

<b>UNIT 1</b>	This unit describes the extent of the project. It contains product development to the final process of marketing it to the consumer.
<b>UNIT 2</b>	Product Development
<b>UNIT 3</b>	Marketing the product
<b>UNIT 4</b>	Where to retail
<b>UNIT 5</b>	<b>Reflection on the Dissertation Writing Experience:</b> Dissertation Topic Dissertation Process Resources will be used in Dissertation with Discussion and Evaluation

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: The student will explore the fields of Research design, Research proposal development and the conduct of Research projects as applied to their dissertation topic.

CO2: Being able to critically evaluate the Jewelry Design work of others and provide constructive criticism for ongoing work.

CO3: Being able to deconstruct and reconstruct alternative collection developments from existing work.

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1			M	H	M	H							M	M	M		
CO2				H		H	M						M		H		
CO3		M	H	H	H	M							H	M	M		

H = Highly Related; M = Medium L = Low

**TEXT BOOKS/ WEBSITES**

- Barrett J. (2012). Designing Your Fashion Portfolio (From Concept to Presentation), Bloomsbury publishing, India.
- Kiper A. (2014). Fashion Portfolio. Batsford Ltd.
- Kothari C.R. Research Methodology: Methods and techniques. New Age International publishers
- <http://www.vogue.com/voguepedia/>
- <http://www.style.com>
- <http://www.purfe.com.au>

  
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BDE118A	FINAL PROJECT-II	0-0-18 [9]
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## AIM

This subject purely concentrates on developing a collection based on all the previous areas covered in jewelry. This subject also aims at a thorough research on selected theme supported by a Design process to develop the whole range of jewelry collection. Students are required to research on the selected topic for the required aspects like demographics, psycho graphics etc. Students will develop the whole design process including mood board, story board, fabric development, design development, range development etc.

## OBJECTIVE

The objective of this unit is to further extend learner's knowledge creating the final collection putting all the knowledge and efforts students have gained so far and launch themselves as designers creating their own brand identity, and brand image.

<b>UNIT 1</b>	<b>Contextual research to identify potential areas of design research &amp; development</b> During this subject student are expected to gather information and visual materials in a field which has sufficient scope for design research and development.
<b>UNIT 2</b>	<b>Formulation of design brief, design concept, research methods and project schedule</b> The student will have to develop and negotiate a design brief by developing a concept based on a particular theme. At this stage student are expected to present their design concept based on a colloquium paper in front of a jury of faculty mentors. After the approval of their concept, student will be expected to meet their design mentor at scheduled times. Formative Feedback will be provided at each meeting and student will have to maintain a log book which shows their progress and gives evidence of following the design process. When student are in the process of design exploration.
<b>UNIT 3</b>	<b>Pricing &amp; Costing of Final products</b> The student will achieve optimum costs of production through an understanding of metal, design, concept development and finishing processes. They are also expected to do the pricing and costing of their final product.
<b>UNIT 4</b>	<b>Final submission and presentation</b> The Final Submission which will be supported by an oral presentation and submission of a design portfolio in front of a Jury, where the student will be expected to justify the validity/originality of their design process and findings. The student will be encouraged to do a self-evaluation, assessing their effectiveness of achieving set aims.
<b>UNIT 5</b>	<b>Reflective Journal &amp; Prototype and portfolio development</b> <ul style="list-style-type: none"> <li>• Additionally the student will be required to submit a Reflective Journal which represents their involvement and overall journey of learning and what specifically they reflected on. This will give evidence of whether they have fulfilled the initial aims that they had set.</li> <li>• To develop prototypes, student has to explore new and appropriate methods of jewelry making, jewelry product in relation to the relevant metal, stones.</li> </ul>

## COURSE OUTCOME (CO)

At the end of this course students will:

CO1: To understand strengths and weakness and create your brand, brand identity, image and logo. CO2: To identify the major types of idea sources in jewelry design and provide information about each source. Recognize that these sources of inspiration help designers to create design elements and principles of individual designs. In order to foster originality, sources of inspiration play a powerful role throughout the creative stage of design process, and also in the early stages of jewelry research and strategic collection planning

CO3: To present research analysis to client groups.

CO4: To extend and apply skills in developing creative visual language.

CO5: To synthesize and critically evaluate experimentation in personal creative practice.


## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M		M		M								M	M	M		
CO2	M	H		M	M		H						M	H			
CO3	M	M			H	M							M				
CO4			M			H	M	M					H	M	H		
CO5			H			H	H	M					M	H			

H = Highly Related; M = Medium L = Low

## TEXT BOOKS/ WEBSITES

- <http://worldofwearableart.com/>
- [www.style.com](http://www.style.com)
- [www.wgsn.com](http://www.wgsn.com)
- [www.promostyl.com](http://www.promostyl.com)
- [www.trendz.com](http://www.trendz.com)
- [www.wwd.com](http://www.wwd.com)
- [Trendvision.com](http://Trendvision.com)

  
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<b>BDE119A</b>	<b>PORTFOLIO</b>	<b>0-0-6 [3]</b>
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### **AIM**

Design portfolio is the expression of student to translate themes into design. Here one gets inspired by different themes which could be art movements, sport, historic eras, music, dance culture, nature, traditions etc. And picks out tangible and intangible elements which are to be used as design elements in the collection. The ability of a designer to exhibit and use design elements is highlighted which is further on translated into projects. A portfolio is an exhibit of the overall knowledge of the student work which he/she has gained through the course of three years. The purpose lies in promoting the skills of students in a single format this course will help students enter the “real world”. It's structured around equipping students on skills of “self selling and presenting their portfolios”. The course is aimed at equipping them select “perfect fit” careers, find better jobs and become professional and street smart. It will give students a realistic picture of their future professional lives and provides tools on coping with it.

### **OBJECTIVE**

- Have the necessary professional communication skills. These include a wide array of tools like making CV's and presentations, preparing for job tests and interviews and the necessary computer skills to produce these.
- Knowledge about the local and international markets and their operations.
- Career planning, channels for job search, basics of entrepreneurship.
- The course will also assist students to be able to present their portfolios in various modern formats like USB's, digital photography, websites, CD's etc.
- Work ethics will also be touched upon to enable them to have long term and fruitful relations with employers.

### **COURSE OUTCOME (CO)**


**At the end of this course students will:**

CO1: Be able to place themselves and their work in the context of their selected discipline. CO2:

Understand their specialist area and the career opportunities available

CO3: Be able to develop and present a professional portfolio in an appropriate format Understand how to promote themselves and their work professionally.

CO4: A copy of portfolio has to be submitted with the department at the time of final Assessment.

  
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## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M		M	H	M	M	H						H	M			
CO2				H		H	H						H		H		
CO3	M	M			H	H	H						H		H		
CO4													H		H		

H = Highly Related; M = Medium L = Low

### COURSE OUTCOME (CO)


**At the end of this course students will:**

CO1: Be able to place themselves and their work in the context of their selected discipline. CO2:

Understand their specialist area and the career opportunities available

CO3: Be able to develop and present a professional portfolio in an appropriate format Understand how to promote themselves and their work professionally.

CO4: A copy of portfolio has to be submitted with the department at the time of final Assessment.

  
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<b>BDE120A</b>	<b>OFFICE TRAINING (INTERNSHIP)</b>	<b>0-0-26 [13]</b>
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### AIM

The Aim Of This Unit Is To Extend Learners' Knowledge Of Professional Practices Within Their Specialist Area And To Relate These To Personal Goals And Career Opportunities.

### OBJECTIVE

- To encourage students to work in with relevant industries.
- An avenue to enhance academics learning through hands on work experience.
- Get advice on career from knowledgeable and experienced professionals.
- Gain exposure to a professional work atmosphere.
- Be able to place themselves and their work in the context of their selected discipline
- Understand their specialist area and the career opportunities available
- Understand how to promote themselves and their work professionally.

### INTERNSHIP TRAINING

- In the VI semester , student will undergo a 12 weeks training in a jewelry designing industry /manufacturing unit/ jewelry export unit so that they can understand the existing working practices , conditions and acquire an in depth technical knowhow.
- The student shall prepare a report on the training given by the organization he/she will submit the report. The student has to submit the certificate regarding successful training with the organization.
- A copy of report has to be submitted with the department along with the performance certificate issued by the firm manager/ owner and one with the firm (where internship is pursued).
- After the internship, student has to appear in front of jury members for a presentation seminar, who will judge the performance based on their presentation, report & viva- voce and award marks to student

<b>UNIT 1</b>	<b>Weekly Teaching Plan</b> Week 1-2 How to assess your internship Week 3 writing an introduction Week 4 doing your research Week 5-6 locating the required area of research and analyzing it Week 7-8 writing down about the context of your report Week 9 linking the research to the context of your report Week 10 writing up the conclusion of the report and editing it Week 11 making a short, 'to the point' presentation Week 12-
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	14 working on the presentation Teaching & Learning Methods: Assessment and Evaluation: A Proposal
<b>UNIT 2</b>	<b>A Paper (minimum 2000 words)</b> Reason for particular Placement. Brief description of the context. Description of your duties. Findings. Diary of activities. Professional's report
<b>UNIT 3</b>	<b>A Presentation</b> (approx. 30 minutes) Over view of your paper. Visual support materials.
<b>UNIT 4</b>	<b>PROJECT REPORT</b> To Be Submitted ,Background of Industry, Number Of Employees Project Detail On Which Assisted, Manufacturing Process, Hand & Computer, Sketches, Experience ,Any Other Details

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: To identify business strategies for buying and selecting product of the company. CO2: To identify process and procedures for company purchases.


CO3: To explore the buying process, Increase skills in buying and merchandising. CO4: To identify business strategies for buying and selecting products.

CO5: To understand that how they write a report of their industry experience & develop written communication skills

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M		M	H	M	M	H						H	M			
CO2				H		H							H	M			
CO3	M	M			H	H	H						M	M			
CO4						M	M						H	M			
CO5	M				H				M	M	M		M	M	M		

H = Highly Related; M = Medium L = Low

  
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<b>BDE121A</b>	<b>PORTFOLIO SUBMISSION</b>	<b>0-0-6 [3]</b>
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### AIM


Design portfolio is the expression of student to translate themes into design. Here one gets inspired by different themes which could be art movements, sport, historic eras, music, dance culture, nature, traditions etc. And picks out tangible and intangible elements which are to be used as design elements in the collection. The ability of a designer to exhibit and use design elements is highlighted which is further on translated into projects. A portfolio is an exhibit of the overall knowledge of the student work which he/she has gained through the course of three years. The purpose lies in promoting the skills of students in a single format this course will help students enter the “real world”. It’s structured around equipping students on skills of “self selling and presenting their portfolios”. The course is aimed at equipping them select “perfect fit” careers, find better jobs and become professional and street smart. It will give students a realistic picture of their future professional lives and provides tools on coping with it.

### OBJECTIVE

- Have the necessary professional communication skills. These include a wide array of tools like making CV’s and presentations, preparing for job tests and interviews and the necessary computer skills to produce these.
- Knowledge about the local and international markets and their operations.
- Career planning, channels for job search, basics of entrepreneurship.
- The course will also assist students to be able to present their portfolios in various modern formats like USB’s, digital photography, websites, CD’s etc.
- Work ethics will also be touched upon to enable them to have long term and fruitful relations with employers.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M		M	H	M	M	H						H	M			
CO2				H		H	H						H		H		
CO3	M	M			H	H	H						H		H		
CO4													H		H		


  
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H = Highly Related; M = Medium L = Low

### **COURSE OUTCOME (CO)**

**At the end of this course students will:**

- CO1: Be able to place themselves and their work in the context of their selected discipline.CO2: Understand their specialist area and the career opportunities available
- CO3: Be able to develop and present a professional portfolio in an appropriate format Understand how to promote themselves and their work professionally.
- CO4: A copy of portfolio has to be submitted with the department at the time of final Assessment.

  
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<b>BDE004A</b>	<b>Material Exploration &amp; Sourcing</b>	<b>0-0-2 [1]</b>
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**PREREQUISITE OF THE COURSE** ---Basic knowledge of different material, Basic Textile (Fabric), Knowledge Market Survey

**LEARNING OBJECTIVE:**

The main objective is to develop understanding of skills in the application of materials for different end uses. Student will develop a visual and tactile understanding of textile raw materials and fabrics enabling to evaluate performance characteristics in fibers and fabrics in relation to commodity and processing costs. Student will be required to do data collection & sourcing of samples like knitwear, performance sportswear, natural fibers or technologically led fabrics from a variety of fiber manufacturers, wholesalers and retailers in and around Jaipur.

<b>UNIT 1</b>	<b>Introduction to Material Sourcing &amp; Data Collection</b> Introduction to basic material required for fashion and textile design. Identifying customers' requirements. Pricing, lead time and trade rules. Risk assessment of raw materials.
<b>UNIT 2</b>	<b>Understanding Markets for basic fabrics &amp; weaves</b> Market survey to find out basic fabric shops in and around Jaipur. Market survey to find out weaving centers in & around Jaipur. Create a swatch book of above mention fabrics with their market price.
<b>UNIT 3</b>	<b>Understanding Markets for Decorative, Complex fabrics, &amp; weaves</b> Market survey to find out complex and decorative fabric Shops in and around Jaipur. Market survey to find out weaving artisans and handicraft stores in and around Jaipur. List out all the fabric shops and handicraft centers in detail. Create a swatch book of above mention fabrics with their market price.
<b>UNIT 4</b>	<b>Understanding markets for Laces, Buttons, and others Fasteners</b> Market visit to find out various shops of laces, buttons and others detailing in and around Jaipur. List out all the names of the shops along with their address and complete details. Small collection book of above mention detailing items with price.
<b>UNIT 5</b>	<b>Understanding markets for Fashion and textile Accessories</b> Market survey to find out small to large fashion accessory shops in and around Jaipur. Prepare the list with name of the shop along with address. Small swatch book of accessories along with their price.

**COURSE OUTCOME (CO):**

At the end of this course students will have:

CO1: To understand the raw materials for various textile uses CO2:

To differentiate various materials

CO3: To surf the market according to the material and apply various materials according to the product CO4: To know famous markets and shops for material sourcing & data collection in and around Jaipur.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					L												
CO2					M												
CO3		M		M										H	M		
CO4					M											L	

**REFERENCE :**

- FABRIC STUDIES by KVP Singh Kalyani Publishers,
- Textiles-Fiber to Fabric by Bernard P. Corbman McGraw Hill
- Advanced Textile Design by William Watsons published by crafts and hobbies (2010)
- The students handbook of practical fabric structure by H.Neville published by Crafts and hobbies (2010)
- Designing with thread: from fiber to fabric by Irene Waller Published by crafts and hobbies (1973)
- Fiber & Fabric: A Record of American Textile Industries in the Cotton and Woolen Trade, Volume 49Published1909
- <http://books.google.co.in>
- <http://www.wgsn-edu.com>

<b>BDE005A</b>	<b>Fashion Illustration-I</b>	<b>0-0-4 [2]</b>
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**PREREQUISITE OF THE COURSE** ---Drawing skills, Use of different mediums

**LEARNING OBJECTIVE:**


A thorough foundation in fashion illustration is established in this course which covers the fashion figure and garment interpretation. Student's study and develop the basic structure unique to the fashion figure. Students will learn to interpret draping and surface texture of the fabric together with technical drawings.

<b>UNIT 1</b>	<b>Basic Human Anatomy</b> Basics of human anatomy, drawing of legs, feet, hands, arm etc. Practice of hands and feet, hair style and face analysis
<b>UNIT 2</b>	<b>Eight Head Theory and Stick Figure</b> Eight-head human figure, elongated eight-head human figures – 8 ½, 10 ½, and 11 ½ head. Stick figure and fleshing of the stick figure. Stylization of stick figure.
<b>UNIT 3</b>	<b>Medium Exploration and Fabric Rendering</b> Medium explorations –Color pencil shading, Charcoal, Watercolour, India Ink, Pastels, Marker. Fabric rendering – Cotton, Leather, Silk, Satin, Denim, Corduroy, wool, net, chiffon, organza and velvet. Embellishment and Prints.
<b>UNIT 4</b>	<b>Fashion Poses and Flat Drawing</b> Fashion poses, fashion figure in relation to fashion pose, drawing profile and ¾ figures. Background for the figures.
<b>UNIT 5</b>	Drawing flat sketches Developing range of women's wear for a concept

**COURSE OUTCOME (CO):**

At the end of this course students will have:

- CO1: Understand human figures proportion, movements and postures. CO2: To understand about the eight Head Theory and Stick Figure.
- CO3: To understand how to illustrate the idea of design with the skill of fashion illustration technique with different materials: charcoal, colour pencil, water colour, ink and pastels.
- CO4: Present a fashion Illustration Portfolio, identifying areas for further development and best practice.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					M												
CO2		L															
CO3					H								M				
CO4		M											H		L		M

**REFERENCE :**

- Abbing, Bina, (2007), Fashion Sketchbook, Fairchild Publications, New York.
- Allen, Anne & Seaman Julian,(2003),Fashion Drawing: The Basic Principles, Batsford Fashion Books, London.
- Barnes, Colin, (1994), Fashion Illustration: The Techniques of Fashion Drawing, Macdonald Orbis, UK.
- M.W. Bryant,(2011), Fashion Drawing –Illustration Techniques for Fashion Designers, Laurence King Publisher
- Ireland, P.J. (1993). Fashion Design Illustration: Womenswear, Oxford, Batsford.
- Ireland, P.J. (1993). Figure Templates for Fashion Illustration, Oxford, Batsford.
- Mc Kelvey, K. and Munslow, J. (2007). Illustrating Fashion,New Delhi, John Wiley & Sons.
- Drudi, E. and Paci, T. (2010). Figure Drawing for Fashion Design, Amsterdam, Pepin Press.
- Borrelli, L. (2000). Fashion Illustration Now, London, Thames & Hudson.
- Abbing, B. (2003). Model Drawing,New York, Fairchild Books.
- Drudi, E. (2011). Figure Drawing for Fashion Design, Amsterdam, Pepin Press.
- Riegelman, N. (2006). 9 Heads: A Guide to Drawing Fashion, London, Thames and Hudson.
- Riegelman, (2006). Colors for Modern Fashion: Drawing Fashion with Colored Markers, London, Thames and Hudson.
- Steven, S. (2010). Illustrating Fashion: Concept to Creation,New York, Fairchild Books.
- Endeavour, (2010). Modern Fashion Illustration,London, Endeavour.
- Tate, S. L. (1995). The Complete Book of Fashion Illustration,New York, Prentice Hall Publication.
- Beer, R. (1995). Designer Guide to Girls' and Junior Apparel,New York, Fairchild Books.
- Armstrong, W., et al. (2005). From Pencil to Pen Tool: Understanding and Creating the Digital Fashion Image, New York, Fairchild Books.
- Drudi, E. (2003). Wrap and Drape Fashion: History, Design and Drawing, Amsterdam, Pepin Press.

<b>BDE006A</b>	<b>Pattern Making &amp; Garment Construction-I</b>	<b>0-0-4 [2]</b>
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#### LEARNING OBJECTIVE:


The main objective of this module is to develop: (I) understanding of pattern making, based on body measurements, using industry standard signs and symbols. (II) To develop the understanding in the skills of garment construction techniques, creating toiles, demonstrating the safe use of equipment and relevant health and safety regulations.

<b>UNIT 1</b>	<b>Pattern Drafting</b> Introduction of Pattern Making Method of measuring body and dress form Tools of pattern making Common terms used in pattern development Method for drafting the basic pattern set (women/Kids) Torso Pattern Test fitting of patterns Dart manipulation - elementary and advanced dart manipulation. Variations of Sleeve, collar and skirt
<b>UNIT 2</b>	<b>Draping</b> Introduction to Basics of draping Grain line, preparation of muslin for draping Dress form, Key to abbreviations used in draping
<b>UNIT 3</b>	Basic Bodice Block – Front & Back Basic Skirt Block – Front & Back Skirt Variation Collar variation Yokes
<b>UNIT 4</b>	<b>Garments Construction Techniques</b> Sewing machine and parts Stitch practice. Types of stitches. Types of seams & seam finishes.
<b>UNIT 5</b>	<b>Garments Construction Techniques</b> Plackets, Pocket, Collar. Fitting a sleeve, Bodice Blocks. Darts & neckline finishes.

#### COURSE OUTCOME (CO):

At the end of this course students will have:

- CO1: To create and use a set of basic blocks and apply skills in dart and seam manipulation.
- CO2: To produce a full-scale pattern from creative designs and working drawings through Pattern making and draping technique.
- CO3: To make them familiar with sewing machine and to work proficiently on the sewing machine with the rectify simple problems of the machine.
- CO4: To understand the special skills and techniques used in the garment making with the understanding of various parts of the garment and construction of complete garment.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					L												
CO2					M												
CO3		M		M										H	M		
CO4		M		M										H	M		

**REFERENCE BOOKS**

- Armstrong, H.J. (2009), Pattern Making for Fashion Design, New York, Prentice Hall.
- Aldrich, W. (2008), Metric Pattern Cutting for Women's Wear, Oxford, Willey Blackwell Publication.
- Di Marco, S.M. (2010). Draping Basics, New York, Fairchild Books.
- Nakamichi, T. (2010). Pattern Magic, London, Lawrence King Publishing.
- Nakamichi, T. (2011). Pattern Magic- II, London, Lawrence King Publishing.
- Nakamichi, T. (2010). Pattern Magic- Stretch Fabrics, London, Lawrence King Publishing.
- Bolsner, Jane. (2010). Sewing machine basics: step by step course for first stitcher London UK. CICO books.
- Phillips, Charlene. (2011). The Sewing machine classroom: Learn the ins and outs of your machine. WI, USA. Krause publication.
- Kunkel, Karen .E. (1998). The Complete Sewing Machine Handbook. NY. USA. Sterling Publishers.
- Giordano, John. (1997). The Sewing Machine Guide. Newtown, CT. USA. Taunton Press.
- Editors of Readers Digest. (1997). Complete guide to Sewing (revised & updated). NY USA. Readers Digest Publication.
- Smith, Alison .(1999).Complete Book of Sewing. Dorling Kindersley.

**ONLINE RESOURCES**

- <http://www.vogue.com>
- <http://www.style.com>
- <http://www.wgsn-edu.com>
- <http://www.Craftsy.com>
- <http://www.Fiber2fashion.com>
- <http://www.wgsn-edu.com>

<b>BDE008A</b>	<b>Design Project –I</b>	<b>0-0-6 [3]</b>
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**Prerequisite of the Course** ---Elements of Design, Elements of Fashion, Process of Design, Fashion Illustration, Drawing Skills

**LEARNING OBJECTIVE:**

The main objective of this module is to develop a design intellect and basic design system. Hands-on experiences in the interpretation of image of fashion product/customer specifications, apparel design concept development, illustrations and technical drawings, design for prototyping, and manufacturing will be utilized in the instruction of the design process. Students will accurately document their fashion product design experience through design process in a notebook.


The course would require the students to carry out research on the major women wear designers and their brands along with the recognition of different women wear segments and their growth rate.

<b>UNIT 1</b>	<b>Design Development Process</b> Research Inspiration board Creating Mood boards- its application in designing apparels. Theme boards- its direct relation to creating designs of apparels. Client boards - the study of peculiar characteristics of a client to design special apparels for him/her.
<b>UNIT 2</b>	<b>Design Development Process</b> Illustration board - Fashion Illustrations according to themes. Accessory board
<b>UNIT 3</b>	<b>Design Development Process</b> Trim &Swatch (Fabric) boards- Use of Trims and swatches in surface texture of the designed apparels. Technical drawing - Flat sketch board / tech pack
<b>UNIT 4</b>	<b>Process of Fittings</b> Muslin fits (toile) Actualizing the garment
<b>UNIT 5</b>	<b>Process of Fittings</b> Costing Presentation

**COURSE OUTCOME (CO):**

At the end of this course students will have:

- CO1: To develop the design process through experimental ideas and applications CO2:  
To Present research analysis to client groups.  
CO3: To extend and apply skills in developing creative visual language.  
CO4: To synthesize and critically evaluate experimentation in personal creative practice.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H												L	M	M		
CO2					M											L	
CO3							H	L		L							
CO4							H	L		L						L	

**REFERENCE :**

- Encyclopedia of Fashion accessories by Phyllis Tortora Fairchild
- Fashion Sketchbook by Abbing Fairchild
- How Fashion Works by Gavin Waddell Blackwell
- Jones, J.C: Design methods: Seeds of human futures, Wiley inter science, London, 1992.
- Gail Greet Hannah, Elements of Design, Princeton Architectural Press, 2002
- Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997



<b>BDE012A</b>	<b>Fashion Illustration-II</b>	<b>0-0-4 [2]</b>
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**PREREQUISITE OF THE COURSE** ---Drawing Skills, Fashion Illustration of Women's

**LEARNING OBJECTIVE:**

Introducing students to illustrate figures with reference to eight-head figure and elongated eight-head figures. This subject is an extension of fashion illustration-I, where the students would be encouraged to sketch fashion figures, render the fabrics and work on fashion figures with reference to design aesthetics.

The course is a study of illustration of different garments for Women, Kids and Men.

<b>UNIT 1</b>	Illustration of men's/kids garments, different poses, importance of the background. Men's features- Face, hair, hands and feet. Illustrating men's figures in different mediums.
<b>UNIT 2</b>	Individual style in illustration for different looks.
<b>UNIT 3</b>	<b>Accessory designing and illustration</b> Illustration of Jewellery using various mediums like pearls, beads, gold and silver, diamonds, wood, wires, velvet, net, etc, Designing and illustration of head gears
<b>UNIT 4</b>	Designing and illustration of bags and belts using various mediums like leather, cane, pearls, beads, wires, velvet, net, etc. Designing and illustrating footwear of all types
<b>UNIT 5</b>	Designing and illustrating bows and ties on varied dresses. Illustrating hairstyles

**COURSE OUTCOME (CO):**

At the end of this course students will have:

- CO1: To understand how to illustrate the idea of design with the skill of fashion illustration technique. CO2: Understand human figures proportion, movements and postures.  
CO3: To understand the garment interpretation  
CO4: To understand about the accessory from a sketch.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1			H											M			
CO2			M														
CO3					H									M			H
CO4					H									M			H

#### **REFERENCE :**

- Abbing, Bina, (2007), Fashion Sketchbook, Fairchild Publications, New York.
- Allen, Anne & Seaman Julian, (2003), Fashion Drawing: The Basic Principles, Batsford Fashion Books, London.
- Barnes, Colin, (1994), Fashion Illustration: The Techniques of Fashion Drawing, Macdonald Orbis, UK.
- M.W. Bryant, (2011), Fashion Drawing – Illustration Techniques for Fashion Designers, Laurence King Publisher
- Ireland, P.J. (1993). Fashion Design Illustration: Womenswear, Oxford, Batsford.
- Ireland, P.J. (1993). Figure Templates for Fashion Illustration, Oxford, Batsford.
- Mc Kelvey, K. and Munslow, J. (2007). Illustrating Fashion, New Delhi, John Wiley & Sons.
- Drudi, E. and Paci, T. (2010). Figure Drawing for Fashion Design, Amsterdam, Pepin Press.
- Borrelli, L. (2000). Fashion Illustration Now, London, Thames & Hudson.
- Abbing, B. (2003). Model Drawing, New York, Fairchild Books.
- Drudi, E. (2011). Figure Drawing for Fashion Design, Amsterdam, Pepin Press.
- Riegelman, N. (2006). 9 Heads: A Guide to Drawing Fashion, London, Thames and Hudson.
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- Steven, S. (2010). Illustrating Fashion: Concept to Creation, New York, Fairchild Books.
- Endeavour, (2010). Modern Fashion Illustration, London, Endeavour.
- Tate, S. L. (1995). The Complete Book of Fashion Illustration, New York, Prentice Hall Publication.
- Beer, R. (1995). Designer Guide to Girls' and Junior Apparel, New York, Fairchild Books.
- Armstrong, W., et al. (2005). From Pencil to Pen Tool: Understanding and Creating the Digital Fashion Image, New York, Fairchild Books.
- Drudi, E. (2003). Wrap and Drape Fashion: History, Design and Drawing, Amsterdam, Pepin Press.

<b>BDE013A</b>	<b>Pattern Making &amp; Garment Construction-II</b>	<b>0-0-4 [2]</b>
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**PREREQUISITE OF THE COURSE** ---Basic Pattern Making of western garment and Knowledge of construction Techniques.

**LEARNING OBJECTIVE:**

The purpose of this module is to provide learners with the opportunity to develop skills in the principles of Indian wear pattern drafting and construction.

<b>UNIT 1</b>	<b>Pattern Drafting</b> Standardize concept of pattern making Direct Method Things to keep in mind while taking measurement Paper pattern of Salwar, Churidar, Plain kurta, Kalidar kurta Paper pattern of SareeBlouse, Choli blouse Marka-Making & Layouts Spec-Sheets of one designed garment <b>Documentation and Presentation of Work</b> In portfolio - All full-size patterns & 1/4 file document
<b>UNIT 2</b>	<b>Garments Construction</b> Construction of Salwar /Churidar Construction of plain kurta Construction of kalidar kurta Construction of plain blouse Construction of choli blouse <b>Documentation and Presentation of Work</b> In portfolio -- All women's wear garment construction with proper finish
<b>UNIT 3</b>	<b>Advance Draping</b> <u><b>Hands on:</b></u> Handling of new fabrics – georgette, chiffon, satin, knits, etc Asymmetric drapes Cowls – underarm, hip, etc. Draping of accents & emphasis – peplum, frills, flounces, etc. Conversion of Drapes in to flat patterns (developing of patterns from drapes) Conversion of drapes in to actual fabrics.
<b>UNIT 4</b>	<b>Garment Construction</b> Construction of mock-up garment from a chosen design. Construction of final garment from a chosen design
<b>UNIT 5</b>	<b>Documentation and Presentation of Work</b> In portfolio - Draping techniques, Pattern Making and Garment Construction

**COURSE OUTCOME (CO):**

At the end of this course students will have:

- CO1: In this module student will learn to take bodice measurement related to the Indian wear garment with different variation and produce them on drafting paper and create a full-scale pattern from creative designs and working drawings.
- CO2: To understand and appreciate the concept of fit and balance of garments
- CO3: Understanding of identify and differentiate between fabric varieties with understanding of different materials.
- CO4: To develop understanding on how to concealment of fabric joins within garment with advanced knowledge in draping, pattern cutting and construction for women's clothing.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1															L		M
CO2																	
CO3			L	M	H										H		H
CO4			L	M	H										H		H

**REFERENCE :**

- H. G. Armstrong (2009) Pattern Making for Fashion Design, Prentice Hall, New York.
- W. Aldrich, (2008), Metric Pattern Cutting for women's wear, Wiley Blackwell Publication.
- W. Aldrich, (2008), Metric Pattern Cutting for Menswear Wiley Blackwell Publication.
- Lynda Maynard, (2010) The Dressmaker's Handbook of couture Sewing Techniques: Essential step-by- step Techniques for professional Results, Interweave press.
- Claire Shaeffer, (2008) Claire Shaeffer's Fabric Sewing Guide, Krause Publications.
- Claire Shaeffer, (2001) High Fashion Sewing Secrets from the World's Best Designers. A Step-by-Step Guide to Sewing Stylish Seams Buttonholes, Pockets, collars, Hems and more, Rodale Books Publishers.
- (2011) Threads Sewing Guide A complete Reference from America's Best-Loved Sewing Magazine. Taunton Pr
- Dawn Cloake, "Fashion Design On The Stand" B T Bastford Ltd. London , First Published 1996.
- Claire Shaeffer, "Claire Shaeffer's Fabric Sewing Guide", Krause Publications Craft, 2008.
- Reader Digest, "New Complete Guide to Sewing", Reader Digest, 2002.
- ManmeetSodi "Drafting & draping

**ONLINE RESOURCES**

- <http://www.vogue.com>
- <http://www.style.com>
- <http://www.wgsn-edu.com>

<b>BDE014A</b>	<b>Computer Application – II</b>	<b>0-0-4 [2]</b>
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**PREREQUISITE OF THE COURSE** ---Basic coral draw and Photo Shop skills and Manual Illustration.

**LEARNING OBJECTIVE:**

The purpose of this module is to provide learners with the opportunity to develop skills in Draping and Rendering technique through coral & Photoshop with Exact measurement & Fine finishing with Real Looking & 3D Rendering and Draping

<b>UNIT 1</b>	<b>Croqui and 3D Rendering</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Drawing the Croqui through Curve tool.</li> <li>• Import croqui (JPG) in photoshop and apply 3D Rendering.</li> <li>• Import 3D Render Croqui in Corel.</li> </ul>
<b>UNIT 2</b>	<b>Draping</b> <ul style="list-style-type: none"> <li>• Draping Fabrics.</li> <li>• Concept of Design variation &amp; Color Variation.</li> <li>• Apply 3D Effect on Draped Design</li> <li>• Croqui Development with fabrics/ Texture/ Fleshing etc.</li> </ul>
<b>UNIT 3</b>	<b>Formatting</b> <ul style="list-style-type: none"> <li>• Concept of Page Setup.</li> <li>• Light Effect.</li> <li>• Concept of Page Margin.</li> </ul>
<b>UNIT 4</b>	<b>Formatting</b> <ul style="list-style-type: none"> <li>• Concept of Page Layout.</li> <li>• Setting of Document.</li> <li>• Formatting of Document.</li> </ul>
<b>UNIT 5</b>	<b>Formatting</b> <ul style="list-style-type: none"> <li>• Specification sheet.</li> <li>• Costing</li> </ul>

**COURSE OUTCOME (CO):**

At the end of this course students will have:

- CO1: Students learn to optimize and streamline their workflow and increase productivity, improve the quality and level of detail in the design.
- CO2: To be able to improve documentation communication and save time and be ready for the competition.
- CO3: To be able to improve accuracy, quality and decrease errors by practicing the software and achieve proficiency in professional presentations.
- CO4: To understand demonstrate ability to work with creative skills & present at ion technology.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					L												
CO2					M												
CO3		M		M										H	M		
CO4		M		M										H	M		

**REFERENCE :**

- Reference Book of Corel Draw X7: Corel DRAW X7: The Official Guide, Author Name of CorelDraw X7: The Official Guide: Gary David Bouton.
- Reference Book of Adobe Photoshop CC 2015 :- Adobe Photoshop CC Classroom in a Book (2015 release) Author Name of Adobe Photoshop CC Classroom in a Book (2015 release): Andrew Faulkner (Author), Conrad Chavez

<b>BDE015A</b>	<b>Design Project –II</b>	<b>0-0-4 [2]</b>
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**PREREQUISITE OF THE COURSE** ---Elements of Design, Elements of Fashion, Process of Design, Fashion Illustration, Drawing Skills

**LEARNING OBJECTIVE:**

The main objective of this module is to develop a design intellect and basic design system. Hands-on experiences in the interpretation of image of fashion product/customer specifications, apparel design concept development, illustrations, Draping and technical drawings, design for prototyping, and manufacturing will be utilized in the instruction of the design process. Students will accurately document their fashion product design experience through design process in a notebook.


The course would require the students to carry out research on the major women wear designers and their brands along with the recognition of different women wear segments and their growth rate.

<b>UNIT 1</b>	<b>Design Development Process</b> Research Inspiration board Creating Mood boards- its application in designing apparels. Theme boards- its direct relation to creating designs of apparels. Client boards - the study of peculiar characteristics of a client to design special apparels for him/her.
<b>UNIT 2</b>	<b>Design Development Process</b> Illustration board - Fashion Illustrations according to themes. Accessory board
<b>UNIT 3</b>	<b>Design Development Process</b> Trim & Swatch (Fabric) boards- Use of Trims and swatches in surface texture of the designed apparels. Technical drawing - Flat sketch board / tech pack
<b>UNIT 4</b>	<b>Process of Fitting</b> Muslin fits (toile) Actualizing the garment
<b>UNIT 5</b>	<b>Process of Fitting</b> Costing Presentation

**COURSE OUTCOME (CO):**

At the end of this course students will have:

- CO1: To develop the design process through experimental ideas and applications. CO2: To present research analysis to client groups.  
CO3: To extend and apply skills in developing creative visual language.  
CO4: To synthesize and critically evaluate experimentation in personal creative practice.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H		M	M				M					M				M
CO2															M		
CO3								M						H			
CO4								M						H			

**REFERENCE :**

- Encyclopedia of Fashion accessories by Phyllis Tortora Fairchild
- Fashion Sketchbook by Abbing Fairchild
- How Fashion Works by Gavin Waddell Blackwell
- Jones, J.C: Design methods: Seeds of human futures, Wiley inter science, London, 1992.
- Gail Greet Hannah, Elements of Design, Princeton Architectural Press, 2002
- Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997



BDE018A	Surface Design	0-0-4 [2]
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**PREREQUISITE OF THE COURSE** ---Knowledge of different fabric

**LEARNING OBJECTIVE:**

- This module is all about of dyes and Print style. In this module students will be able to understand about classes of dyes, dyestuffs, techniques, dye auxiliaries, printing and printing techniques, effects and defects of dyeing and printing.
- The module is to teach the basic and complicated techniques of surface embellishment to the students. A surface design technique makes the fabric beautiful by various methods. Surface design refers to the process of adding color, pattern, texture or design to fabric through the use of outside mediums such as dyeing, printing, batik, embroidery and many more.

<b>UNIT 1</b>	<b>Dyeing Theory</b> Theory of Dyeing – Application of various dyes dye-fiber interaction Classification of Dyes- Natural dyes and synthetic dyes. Direct dyes Reactive, vat, insoluble azoic, indigo sol, acid dyes, basic dyes, Sulphur dyes, disperse dyes, pigments. <b>Methods and Machinery</b> Methods and machinery for dyeing, Pre and after treatments of dyeing Defects of dyeing, Care of fabrics.
<b>UNIT 2</b>	<b>Application of Dyes</b> Practical application and swatch dyeing with direct, basic, reactive, sulfur, vat, mordant, pigment and acid dye. <b>Tie &amp; Dye</b> Introduction to tie and dye. Making samples of dye and dye with different dyes on different fabrics and product making. Creative exploration of dyeing techniques.
<b>UNIT 3</b>	<b>Different styles of Printing</b> Styles of printing: Direct, Discharge and Resist styles on cellulosic, Protein, manmade textiles and their blends, Solvent dyeing, foam dyeing, spray dyeing. After treatments: Steaming, curing, and ageing of Prints. <b>Printing methods</b> Hand block, machine, block, roller and Screen-printing methods, Advantages and drawbacks of all these printing methods, Printing paste: Constituents of print paste, Thickener and its types. Function of thickener, selection of thickener.
<b>UNIT 4</b>	<b>Resist style of Printing</b> <ul style="list-style-type: none"> <li>• Introduction to Batik.</li> <li>• Application of technique on various fabrics and product making.</li> </ul> <b>Printing Styles</b> <ul style="list-style-type: none"> <li>• Practical introduction to printing methods and application of block, stencil and screen printing</li> </ul>

<b>UNIT 5</b>	<b>Natural Prints</b> <ul style="list-style-type: none"> <li>● Application of Dabu print with product.</li> <li>● Application of Natural print (echo print) with product.</li> </ul>
	<ul style="list-style-type: none"> <li>● Application of Pigment print with product.</li> <li>● Practical application of Ice Dyeing with product</li> </ul>

#### **COURSE OUTCOME (CO):**

At the end of the course, students will be able to

- CO1: To Apply and select various dyes according to fabric, find Defects in dyeing and printing with. the process of tie and dye.
- CO2: To learn the various classes of dyes and auxiliaries used in dyeing through practical application and demonstrate Hand block, machine, block, roller and Screen-printing methods. Advantages and drawbacks of all these printing methods.
- CO3: To understand Direct, Discharge and Resist styles on cellulosic, Protein, manmade textiles and their blends and analyse Pre and after treatments: Steaming, curing, and ageing of Prints, printing process, history of printing, different style of printing preparation of printing paste practically.
- CO4: To learn basic and complex hand embroideries through needle and anchor threads and various surface design techniques according to the design requirement.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					L												
CO2					M												
CO3		M		M										H	M		
CO4		M		M										H	M		

#### **REFERENCE :**

- Textile Dyeing and Coloration(J. Richard Aspland)
- Textile Preparation and Dyeing(A K Roy Choudhury )
- Chemical Technology in the Pre-Treatment Processes of Textiles(S.R. Karmakar
- Dyeing and Screen-Printing on Textiles: Revised and updated Joanna Kinnarsly-Taylor
- Fabric printing and dyeing; a practical handbook David Green
- Fashion from concept to consumers – Frings 6th Ed.

<b>BDE021A</b>	<b>Pattern Making &amp; Garment Construction-III</b>	<b>0-0-4 [2]</b>
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**PREREQUISITE OF THE COURSE** ---Pattern Making and garment construction

**LEARNING OBJECTIVE:**

- The course is designed to inculcate the skills of making patterns for the men's/Kids wear with focus on fit and details which is expected to grow in Indian market in terms of exports and domestic market.
- Students would be encouraged to make their unique sketches and make the patterns for the same.
- To familiarize the students with the concept of grading for fashion

<b>UNIT 1</b>	<b>Size chart of menswear shirt &amp; Shirt terminology</b> Paper pattern of Shirt Paper pattern of Waist coat Collars- (shirt collar, stand collar, roll collar), cuffs, plackets. Standardization of measurements: fundamentals of grading and grading terminology.
<b>UNIT 2</b>	Size chart of menswear trouser & Trouser terminology Paper pattern of Trouser with zip fly.
<b>UNIT 3</b>	<b>Garment Construction</b> Men's Shirt with attachment of Collars, cuffs and plackets Men's Trouser with attachment of zip fly. Men's waist coat with lining attachment. Specification Sheet and Costing. Fabric selection and stitching.
<b>UNIT 4</b>	<b>Pattern making of Kids Wear</b> Basic Bodice Block Basic Skirt Block Basic Sleeve Block
<b>UNIT 5</b>	<b>Garment Construction</b> Construction of Basic patterns of Kids wear

**COURSE OUTCOME (CO):**

At the end of this course students will have:

- CO1: To understand the specialist skills and techniques used in the men's wear pattern making and understanding of size chart with making of basic shirt pattern with collar, placket, pocket & cuff.
- CO2: To understand how to make a basic trouser pattern with pocket, waist band & zipper fly and produce men's wear garment of pattern making to given specification.
- CO3: To understand the special skills and techniques used in the garment making and construction of Men's wear shirt, trouser & waist coat.
- CO4: To understand the specialist skills and techniques used in the kid's wear pattern and garment making.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M				M							H		L			M
CO2	M				M							H		L			M
CO3	M				M							H		L			M
CO4	M				M							H		L			M

**REFERENCE :**

1. Aldrich, W. (2010), Metric Pattern Cutting for Men's Wear, Oxford, Willey Blackwell Publishers.
2. Kershaw, G. (2013). Pattern Making for Mens Wear, London, Lawrence king Publishing.
3. Kim, I. and Kim, M. (2014). Pattern Making for Mens Wear: Classic to Contemporary, New York, Fairchild Books.
4. Coffin, D. (1998). Shirt Making: Developing Skills for Fine Sewing, Newton, Taunton Press.
5. Coffin, D. (1998). Making Trousers for Men and Women: A Multimedia Sewing Workshop, Newton, Taunton Press.
6. Doyle, M. and Rodgers, J. (2013). Essentials of Pattern Grading, Canada, Hanover Phist.
7. Price, J. (1996). Grading Techniques for Fashion Design, New York, Fairchild Books.
8. Moore, C. L. (2008). Concepts of Pattern Grading, New York, Fairchild Books.

<b>BDE022A</b>	<b>Computer Application – III</b>	<b>0-0-4 [2]</b>
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**PREREQUISITE OF THE COURSE** ---Coral draw and Photo Shop and Manual Illustration.

**LEARNING OBJECTIVE:**

To enhance Professional competence in Fashion & Textile. Providing a deep insight into the techniques for delivering effective presentations. Understanding of core aspects of Fashion Design Digitally. Presentation of Product display and views to market in Industry

<b>UNIT 1</b>	<b>Introduction to Illustrator</b> Introduction to Illustrator Interface Navigation and Viewing Introduction to Shape
<b>UNIT 2</b>	<b>Introduction to Illustrator</b> Line Segment, Selection, Scale, Rotate, Pen, Pencil, Eraser and Type Magic Wand & symbols. Brief about Swatch, Gradient & Align Panel
<b>UNIT 3</b>	<b>Digitizing the sketching</b> Understanding of Design process from Paper to Pixels, Understanding of Color Dock panel for mixing up the swatches, <u>Fill apparel sketches with colors and patterns</u> . Easier, manageable, preservable and shareable of output, Detail bubbles and callouts on illustration.
<b>UNIT 4</b>	<b>Pattern Making</b> Customised patterns, textures and Designs, Making combination for Different Patterns, Creating technical illustrations for Pattern making, Neat stitch lines and cut specifications. Create and modify textile designs, repeats and colorways, Models of garments can be presented in different fabric types with each fabric's typical material pattern.
<b>UNIT 5</b>	<b>Design &amp; Product Development</b> Improvisation of Design & Patterns, Digital presentations of Product Display

**COURSE OUTCOME (CO):**

At the end of this course students will have:

- CO1: Overview of Illustrator terminology  
CO2: Familiarization with the Digitally Product making and Coloring CO3:  
Develop skills in visual and textual analysis  
CO4: Overview of design and product development processes used in industry and how Illustrator fits into the design workflow

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					M												
CO2					M												
CO3					M												
CO4					M												M

**REFERENCE :**

- Reference Book of Corel Draw X7: Corel DRAW X7: The Official Guide, Author Name of CorelDraw X7: The Official Guide: Gary David Bouton.
- Reference Book of Adobe Photoshop CC 2015 :- Adobe Photoshop CC Classroom in a Book (2015 release) Author Name of Adobe Photoshop CC Classroom in a Book (2015 release): Andrew Faulkner (Author), Conrad Chavez

<b>BDE023A</b>	<b>Design Project –III</b>	<b>0-0-4 [2]</b>
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**Prerequisite of the Course** ---Knowledge of Design Process, Material understanding

**LEARNING OBJECTIVE:**

The course would require the students to carry out research on the major women's (Indian) wear designers and their brands along with the recognition of different women's (Indian) wear segments and their growth rate.

<b>UNIT 1</b>	<b>Design Development Process</b> Research Inspiration board Creating Mood boards- its application in designing apparels. Theme boards- its direct relation to creating designs of apparels. Client boards - the study of peculiar characteristics of a client to design special apparels for him/her.
<b>UNIT 2</b>	<b>Design Development Process</b> Illustration board - Fashion Illustrations according to themes. Accessory board Trim & Swatch (Fabric) boards- Use of Trims and swatches in surface texture of the designed apparels. Technical drawing - Flat sketch board / tech pack
<b>UNIT 3</b>	<b>Process of Fitting</b> Muslin fits (toile) Actualizing the garment
<b>UNIT 4</b>	<b>Process of Fitting</b> Costing Presentation

**COURSE OUTCOME (CO):**

At the end of this course students will have:


- CO1: To develop the design process through experimental ideas.  
CO2: To understand the applications and present research analysis to client groups. CO3: To extend and apply skills in developing creative visual language.  
CO4: To synthesize and critically evaluate experimentation in personal creative practice.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H		M	M				M					M				M
CO2															M		
CO3								M						H			
CO4								M						H			

**REFERENCE :**

- Encyclopedia of Fashion accessories by Phyllis Tortora Fairchild
- Fashion Sketchbook by Abbing Fairchild
- How Fashion Works by Gavin Waddell Blackwell
- Jones, J.C: Design methods: Seeds of human futures, Wiley inter science, London, 1992.
- Gail Greet Hannah, Elements of Design, Princeton Architectural Press, 2002
- Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997

  
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BDE027A	Computer Application IV	0-0-6 [3]
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**PREREQUISITE OF THE COURSE:** Coral Draw and Photo Shop

**LEARNING OBJECTIVE:**

The objective of this module is to learn advanced computer graphic competency and learn, how to Create Portfolio with help of Computer software.

<b>UNIT 1</b>	<b>Concept of Page margin</b> <ul style="list-style-type: none"> <li>● Concept of Page Margin.</li> <li>● Concept of Page Layout.</li> <li>● Setting of Document.</li> </ul>
<b>UNIT 2</b>	<b>Editing &amp; Formatting</b> <ul style="list-style-type: none"> <li>● Formatting of Document.</li> <li>● Digital Portfolio Development</li> <li>● Format of Portfolio.</li> </ul>
<b>UNIT 3</b>	<b>Projection of different board</b> Complete project with story board and Inspiration. Mood Board
<b>UNIT 4</b>	<b>Projection of different board</b> Color Board Client Profile.
<b>UNIT 5</b>	<b>Projection of different board</b> Concept of Choosing Paper. Concept of Resolution.

**COURSE OUTCOME (CO):**

At the end of this course students will have:


CO1: To develop Pages with exact margin and Formatting.

CO2: To understand setting of document, choosing paper and concept of resolution. CO3: To complete projects with story board, Inspiration.

CO4: To Complete project with Mood Board, Color Board, Client Board and Client profile


**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					M												M
CO2					M												M
CO3					M												M
CO4					M												M

  
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**REFERENCE :**

- Reference Book of Corel Draw X7: Corel DRAW X7: The Official Guide, Author Name of CorelDRAW X7: The Official Guide: Gary David Bouton.
- Reference Book of Adobe Photoshop CC 2015 :- Adobe Photoshop CC Classroom in a Book (2015 release) Author Name of Adobe Photoshop CC Classroom in a Book (2015 release): Andrew Faulkner (Author), Conrad Chavez

  
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<b>BDE030A</b>	<b>Design Project IV</b>	<b>0-0-6 [3]</b>
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**PREREQUISITE OF THE COURSE** ---Knowledge of Design Process, Material understanding

**LEARNING OBJECTIVE:**

The course would require the students to carry out research on the major men's wear designers and their brands along with the recognition of different men's wear segments and their growth rate.

<b>UNIT 1</b>	<b>Design Development Process</b> Research Inspiration board Creating Mood boards- its application in designing apparels. Theme boards- its direct relation to creating designs of apparels. Client boards - the study of peculiar characteristics of a client to design special apparels for him/ her.
<b>UNIT 2</b>	<b>Design Development Process</b> Illustration board - Fashion Illustrations according to themes. Accessory board
<b>UNIT 3</b>	<b>Design Development Process</b> Trim & Swatch (Fabric) boards- Use of Trims and swatches in surface texture of the designed apparels. Technical drawing - Flat sketch board / tech pack
<b>UNIT 4</b>	<b>Process of Fitting</b> Muslin fits (toile) Actualizing the garment
<b>UNIT 5</b>	<b>Process of Fitting</b> Costing Presentation

**COURSE OUTCOME (CO):**

At the end of this course students will have:

CO1: To develop the design process through experimental ideas. CO2:

To apply and present research analysis to client groups.

CO3: To extend and apply skills in developing creative visual language.

CO4: To synthesize and critically evaluate experimentation in personal creative practice.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H		M	M				M					M				M
CO2	H		M	M				M					M				M
CO3															M		
CO4								M						H			

**REFERENCE :**

- Encyclopedia of Fashion accessories by Phyllis Tortora Fairchild
- Fashion Sketchbook by Abling Fairchild
- How Fashion Works by Gavin Waddell Blackwell
- Jones, J.C: Design methods: Seeds of human futures, Wiley inter science, London, 1992.
- Gail Greet Hannah, Elements of Design, Princeton Architectural Press, 2002
- Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997

<b>BDE034A</b>	<b>Fashion Styling</b>	<b>0-0-8 [4]</b>
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**LEARNING OBJECTIVE:**

The course will teach students to become fashion stylist who selects each item appropriately so that they complement and harmonize with all the other components successfully. It is for this reason that fashion stylists have been called “Designers of Style”, setting the trends that everyone else follows.

<b>UNIT 1</b>	<p><b>Styling Elements</b></p> <p>understand the different roles of today's stylist working in various fields including styling designer collections, styling for magazines, styling for the individual</p> <p>use fashion forecasting to ensure the relevance of the styled product</p> <p>competently brief relevant people including the photographer, hair stylist and make-up artist on the required look both verbally and visually</p>
<b>UNIT 2</b>	<p><b>Styling Elements</b></p> <p>communicate effectively using a professional styling, hairstyling and make-up vocabulary</p> <p>compile relevant research on a range of period styles in history with an emphasis on the decades of the 20th and 21st centuries looking at clothing, hair and make-up</p> <p>understand the influence of trends and subcultures</p> <p>select all required items to put a look together including garments and accessories.</p>
<b>UNIT 3</b>	<p><b>Styling Elements</b></p> <p>compile relevant information on the items photographed/shown so that correct details and credits can be supplied</p> <p>explain the products and equipment used by professionals to style hair and apply make-up</p> <p>describe a selection of hair styling techniques and make-up techniques commonly used by hair stylists and make-up artists.</p> <p>Analyze the current trends in hair styling and make-up for advertising, publicity, show and session work</p> <p>understand the different requirements of make-up for photo shoots, catwalk shows.</p> <p>Select make-up including highlighting, shading and contouring techniques Describe preparation of the model including selection of bases and corrective make-up</p> <p>Demonstrate ideas for a range of catwalk hair and make-up looks and promotional photo shoot hair and make-up looks</p>
<b>UNIT 4</b>	<p><b>Photography and the Photo Shoot</b></p> <p>Outline the history of fashion photography and its role in promoting fashion in the 20th and 21st centuries.</p> <p>Understand the different types of lighting, both natural and artificial plan the photo shoot to fit the client's budget and deadline</p> <p>Direct the professional team producing the photo shoot</p> <p>Work on set/on location as part of a professional team</p>

<b>UNIT 5</b>	<b>Fashion PR and Fashion Journalism</b> Report fashion shows. Study and analyse the writing of contemporary fashion journalist Develop a fashion vocabulary suited to fashion journalism
	Write a fashion article for the print media Conduct an interview and write a profile

#### **COURSE OUTCOME (CO):**

At the end of this course students will have:

- CO1: Be able to understand about the Styling Elements.  
 CO2: Be able to understand how to handle Photography and the Photo Shoot  
 CO3: Be able to understand about the Fashion PR.  
 CO4: To understand about the Fashion Journalism

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1		L											L			M	M
CO2		L			M								L			L	M
CO3		L						M					L				L
CO4		L						M					L				L

#### **REFERENCE :**

- <http://worldofwearableart.com/>
- [www.style.com](http://www.style.com)
- [www.wgsn.com](http://www.wgsn.com)
- [www.promostyl.com](http://www.promostyl.com)
- [www.trendz.com](http://www.trendz.com)
- [www.wwd.com](http://www.wwd.com)

BDE035A	Project Management& Entrepreneurship	2-0-0 [2]
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#### AIM

The course will offer a broad perspective of Design thinking, LMC, idealization, data analytic, creating MVP, various digital tools for marketing, financial and pitch deck for the business.

#### OBJECTIVE

- To enable the student to incorporate in the structuring and development of the project the concepts of project management, planning tools and controls.
- Economic feasibility of projects.
- Develop the project as a broad business process, covering the entire project life cycle.
- Conceptual phases, planning and organization, implementation and closure.

<b>UNIT 1</b>	<b>Introduction to Project management</b> Conceptualization and characteristics of projects: Project Life Cycle Phases of the project: conceptual, planning and organization, implementation, closure Project administration
<b>UNIT 2</b>	<b>Conceptual phases, planning and organization</b> Scope planning. Analytical structure of activities Structuring people in projects Costs and budget <b>Implementation</b> Project execution, monitoring and control Reviews and ratings
<b>UNIT 3</b>	<b>Product packaging</b> Introduction Packaging Media Quality Assessment & Performance Evaluation: Package Printing: Package Graphics: Package Storage and Handling: Packaging & Environment <b>Introduction to Entrepreneurship and Business Essentials</b> Who is an Entrepreneurs and Types of Businesses. The Lean Approach Designing Thinking Lean Model Canvas / Business Model Canvas
<b>UNIT 4</b>	<b>Forecasting Demands and Acquiring Customers</b> Identifying the Target Audience / Customer Conducting Surveys Building an MVP based on the Survey Analysing Competition

<b>UNIT 5</b>	<b>Brand Building and Establishing Brand Presence</b> Digital Marketing and Social Media Marketing Basics of PR and Importance of Digital Presence Building a Website – Tools and Techniques <b>Understanding Finance and Planning for Investment</b>
	Creating a Revenue Model Developing Sales Projects, Unit Economics, Investment Deck

#### **COURSE OUTCOME (CO)**

**At the end of this course students will:**

- CO1: Approach the ideas through design thinking and create its LMC
- CO2: Identify the demand and its customers and analyze the data and obtain info like target market, market size, competition
- CO3: Management of the product development process and strategic product planning and Project planning and Detailed project
- CO4: Preparation of the production of the product and Product distribution and Evaluation of the product and process and the brand Building and Establishing Brand Presence and the Finance and Planning for Investment.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1						M									M		
CO2						M									M		
CO3						M									M		
CO4						M									M		

#### **TEXT BOOKS**

- The Lean startup by Eric Ries, Entrepreneurial Management by Robert J. Calvin
- A Guide to the Project Management Body of Knowledge: PMBOK® Guide (Sixth Edition)
- **The Automatic Startup** by David S. Rose Publication Date: 2016
- **A Dozen Lessons for Entrepreneurs by Tren Griffin** Publication Date: 2017



<b>BDE036A</b>	<b>Portfolio</b>	<b>0-0-8 [4]</b>
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**PREREQUISITE OF THE COURSE**---Knowledge of Computer Software (Coral Draw, Photo Shop, Illustrator.

**LEARNING OBJECTIVE:**

The ability of a designer to exhibit and use design elements is highlighted which is further on translated into garments. A portfolio is an exhibit of the overall knowledge of the student work which he/she has gained through the course of three years. The purpose lies in promoting the skills of students in a single format.

This course is devoted at developing a design portfolio for men's wear/women's wear/ Kids's wear. The design portfolio is an expression of a fashion designer involving his creativity, design ability, illustration and presentation skills.

**COURSE CONTENT:**

Research and theme based contextual project, design development, tech pack, flat sketch etc. compiled into a professional portfolio.

<b>UNIT 1</b>	<b>Outline of portfolio</b> Describe and speak articulately and critically about their work and the field of visual communications. Inspiration board Mood board Color board & trims Client board Style direction Illustration 6 croqui Specifications Cost sheet
<b>UNIT 2</b>	<b>Presentation</b> Produce work that demonstrates creative thinking in order to express a personal vision/point of view that communicates a personal voice. A-3 format. Landscape. Digital power point.
<b>UNIT 3</b>	<b>Analysis and realization of concept</b> Create art that incorporates the fundamental elements and principles of design and select materials that express issues such as content and subject matter. Apply and use analog and digital processes in the creation of their work. Decision making in choosing the concept.
<b>UNIT 4</b>	<b>Style direction Specification</b> Technical specification of garment construction and pattern. making has to be exhibited by the student in order to prove the viability of design. <b>Cost specification sheet</b> A basic costing of the garment of the collection has to be done in order to know the factory price of the garment
<b>UNIT 5</b>	<b>Design development</b> Development of the design through the elements which the student has visualized through the concept. The student will be evaluated on the precision of the format completion.

**COURSE OUTCOME (CO):**

At the end of this course students will have:

- CO1: To focus on personal development through the use of self-evaluation and reflection and reflect on artifacts as well as how they match goals and standards.
- CO2: To communicate with stakeholders (students, faculty, administrators, and employers) and increase learning effectiveness and identify students' strengths and weaknesses.
- CO3: To review, assess, and improve the effectiveness of curricular programs and provide useful administrative data that will expedite decision making.
- CO4: To model professionalism, and enhances information technology skills to allow for academic credits for learning beyond the classroom

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1												M					M
CO2												M					M
CO3												M					M
CO4												M					M

**REFERENCES:**

- <http://www.vogue.com/voguepedia/>
- <http://www.style.com>
- <http://www.littlefashiongallery.com/eu/>
- Drudi, E. (2011). Figure Drawing for Fashion Design, Amsterdam, Pepin Press.
- Bruke, S. (2006). Fashion Artist: Drawing Techniques to Portfolio Presentation, U.K., Burke Publishing.
- Riegelman, N. (2006). 9 Heads: A Guide to Drawing Fashion, London, Thames and Hudson.
- Riegelman, N. (2006). Colors for Modern Fashion: Drawing Fashion with Colored Markers, London, Thames and Hudson.
- Steven, S. (2010). Illustrating Fashion: Concept to Creation, New York, Fairchild Books.
- Tain, L. (1998). Portfolio Presentation for Fashion Designers, New York, Fairchild Books.
- Szkutnicka, B. (2010). Flats: Technical drawing for Fashion, London, Lawrence King Publishing

<b>BDE037A</b>	<b>Research Project &amp; Dissertation</b>	<b>0-0-6 [3]</b>
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#### LEARNING OBJECTIVE:

The main objective of this module is to compose a fashion research around a craft cluster or industry, including fashion collection designs, analysis & interpretation, materials & techniques consideration and presentation. This module will cover visual studies, trends, culture, aesthetic, intellectual property rights, technical translation and transformation, sample developments and technological support and reference.

In addition to dissertation the student will be creating a fashion portfolio composing of visual presentation and written materials in professional standard, design strategies, brand image and personal styles and understands the overall research process. The purpose of research is information generation. The study should seek to contextualize its findings within the larger body of research. The results of the study should have implications for policy and project implementation.

<b>UNIT 1</b>	Harvard referencing and Literature review. How to Research? Different approaches to research: Survey, Action Research, Experiments etc.
<b>UNIT 2</b>	Introduction to Research methodology. Collection of Data: Primary and Secondary.
<b>UNIT 3</b>	Analyzing and synthesizing the collected information. Visual referencing and documenting. Documentation and presentation skills in soft and hard cop
<b>UNIT 4</b>	Development of Project brief. Development of PDP. Experience and contribution as a design professional in an apparel organization / craft industry / research areas.
<b>UNIT 5</b>	Project development in chosen area of specialism will include: research and surveys, design development, client, material, trend research and exploration, fashion presentation, design sampling, and commercial applications. Further development of generic / cognitive skills

#### COURSE OUTCOME (CO):

At the end of this course students will have:

- CO1: To explore the fields of research design, research proposal development.
- CO2: To conduct of research projects as applied to their dissertation topic and critically evaluate the fashion design work of others and provide constructive criticism for ongoing work.
- CO3: To deconstruct and reconstruct alternative collection developments from existing work.
- CO4: To consider the target audience (instructor, peers, and employers). Sensitize with the craft cluster communities and provide solutions to the issues in the current fashion industry.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H						H									M	
CO2	H						H									M	
CO3	M						M									M	
CO4	M						M									M	

**REFERENCE :**

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<b>BDE038A</b>	<b>Brand Design Management</b>	<b>2-0-0 [2]</b>
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#### LEARNING OBJECTIVE:

Towards the completion of this unit a student would think about the brand philosophy and development with above parameters. The student will be able to develop own brand.

Student thinks about a very important variable of design called design philosophy which is unique and is thinking how to transform one's design philosophy into fashion and lifestyle products. Therefore this part of the project holds maximum importance in this assignment.

<b>UNIT 1</b>	Description of brand philosophy Development of logo using colors and shapes.
<b>UNIT 2</b>	Brand competitor studies and market research. Consumer profiling and market segmentation.
<b>UNIT 3</b>	Research about the various brands globally for your inspiration.
<b>UNIT 4</b>	Study of different brands and your own strengths and weakness and assessment of various Apparel Brand having similar Categories.
<b>UNIT 5</b>	Costs for Men or Women .create your brand name, brand story, image, identity, logo and give the Promotional Policies for the same.

#### COURSE OUTCOME (CO):

At the end of this course students will have:

- CO1: To make students understand of brand philosophy.  
CO2: Students will be understanding about the market segmentation. CO2:  
TO Understanding strengths and weakness.  
CO4: To create brand, brand identity, image and logo.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1									M						H		
CO2									M						H		
CO3												H				H	M
CO4												H				H	M

#### REFERENCE:

- Rethinking place branding, comprehensive brand development for cities and regions, autor Mihalios Kavaratzis – Gary Warnaby & Gregory J. Ashworth.
- Make a name for yourself Author Robin Fisher Roffer.

<b>BDE039A</b>	<b>Final Project- I</b>	<b>0-0-22 [11]</b>
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#### LEARNING OBJECTIVE:

The objective of this module is to further extend learner's knowledge creating the final collection putting all the knowledge and efforts students have gained so far and launch themselves as designers creating their own brand identity, and brand image.

<b>UNIT 1</b>	Research about the various brands globally for your inspiration. Do a complete study of different brands and their collection Concepts inspired with a complete understanding of design process and finally Select one concept. Only extensive research enables designers to stay fresh and keep up to date with developments.
<b>UNIT 2</b>	Judgments and develop your own style with experimentation in personal creative practice through explorations in design and surfaces.
<b>UNIT 3</b>	The design process along with difference between different categories like avant- garde and prêt wear.
<b>UNIT 4</b>	Sketches, fabrics, trims and other detailing. Technical part of the sketches and final test fits
<b>UNIT 5</b>	Produce the final collection completely accessorized. Publicize work in the best visual way through styling and photo shoot.

#### COURSE OUTCOME (CO):

At the end of this course students will have:

- CO1: Be able to present research analysis to client groups and extend and apply skills in developing creative visual language.
- CO2: Identify the major types of idea sources in clothing design and provide information about each source. Recognize that these sources of inspiration help designers to create design elements and principles of individual designs. In order to foster originality, sources of inspiration play a powerful role throughout the creative stage of design process, and also in the early stages of fashion research and strategic collection planning.
- CO3: To synthesize and critically evaluate experimentation in personal creative practice. CO4: To present a complete collection with photo shoots.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H													M	M	M	M
CO2							M							M	M	M	M
CO3							M	M		M	M	H		H	M	M	M
CO4							M	M		M	M	H		H	M	M	M

## **REFERENCE :**

- Look at work of designers from around the globe ex – Jum Nakao, Issey Miyake and other
- Look at the different costumes and art/ culture of countries and get inspired by them
- Look around nature and other sources like discovery, national geography, BBC etc to get inspired, which is the original source of inspiration for everything.
- <http://worldofwearableart.com/>
- [www.style.com](http://www.style.com)
- [www.wgsn.com](http://www.wgsn.com)
- [www.promostyl.com](http://www.promostyl.com)
- [www.trendz.com](http://www.trendz.com)
- [www.wwd.com](http://www.wwd.com)

<b>BDE040A</b>	<b>Office Training (Internship)</b>	<b>0-0-26 [13]</b>
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#### LEARNING OBJECTIVE:

This course will prepare students to enter into full-time employment in their area of specialization upon graduation. It will provide students with the opportunity to test their career aptitude and aid them adjusting from college to full-time employment. It will present students with the opportunity to develop attitudes conducive to effective interpersonal relationships, increase their sense of responsibility, and help them acquire good work habits. It will offer the opportunity for students to understand informal organizational interrelationships and provide in-depth knowledge of the formal functional activities of a participating organization.

<b>UNIT 1</b>	First hand exposure to an apparel organization, designer or Export House and their working structures and systems.
<b>UNIT 2</b>	Specific project on the job to sharpen skills required for chosen area of specialism. Further development of generic/cognitive skills.
<b>UNIT 3</b>	Identification of industry for internship with student's career path in mind.
<b>UNIT 4</b>	Internship log book: is a tool to help you record your daily activities along with a reflection on the same. Reflective writing enables the documentation experiences, thoughts questions, ideas and conclusions that signpost the learning journey.
<b>UNIT 5</b>	Internship report: will focus on study of the organizational structure & development objective of the internship. Personal design philosophy & career path linked to learning in the internship. Learning process and its analysis as internship progresses through detailed processes and projects undertaken. Report should be a reflection of the internship experience of the personal & professional development.


#### COURSE OUTCOME (CO):

At the end of this course students will have:

- CO1: To identify business strategies for buying and selecting product. CO2:  
To identify process and procedures for company purchases.
- CO3: To explore the buying process, Increase skills in buying and merchandising.
- CO4: To understand that how they write a report of their industry experience and develop written communication skills

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1		M			M	M						M					
CO2		M			M	M						M					
CO3		M			M	M						M					
CO4		M			M	M						M					

  
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<b>BDE041A</b>	<b>Portfolio</b>	<b>0-0-4 [2]</b>
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**PREREQUISITE OF THE COURSE** --- Knowledge of Computer Software (Coral Draw, Photo Shop, Illustrator).

**AIM:**

Design portfolio is the expression of student to translate themes into design collections. Here one gets inspired by different themes which could be art movements, sport, historic eras, music, dance, culture, nature, traditions etc. and picks out tangible and intangible elements which are to be used as design elements in the collection. The ability of a designer to exhibit and use design elements is highlighted which is further on translated into garments. A portfolio is an exhibit of the overall knowledge of the student work which he/she has gained through the course of four years. The purpose lies in promoting the skills of students in a single format.

**OBJECTIVE**

Students will present a portfolio of all the files/ folders/ projects created during the course of study in I to III year. The portfolio should include projects, industrial visit reports, any other projects made during the academic session. The external examiner will evaluate the portfolio and take a viva of the student.

  
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<b>BDE047A</b>	<b>Architectural Planning Studio</b>	<b>0-8-0 [4]</b>
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### **Objective**

- To Familiarize Students With Theoretical Basis and Design Process Through Observation Comparison, Analysis With The Help of Prototypes, Model And Drawings.
- To understand the Anthropometric & Ergonomics data and its importance & relation in interior design.
- To introduce the elements; principles and objective in orientation to Architectural Design.
- To introduce the basics of designing for retail interiors and to develop skills required for the same.
- Introduce to the basics of designing for Residential interiors and to develop skills required for the same.

<b>UNIT 1</b>	Anthropometric & Ergonomics Structural Dimensions, Functional Dimensions, Human Dimensions, and Generalized Heights. Accessibility and Barrier free codes: Manoeuvring Clearances, Seating, Living Space, Dining Space, and Sleeping Space.
<b>UNIT 2</b>	Introduction to the Basic Design features
<b>UNIT 3</b>	Introduction & formulation of concept & Zoning
<b>UNIT 4</b>	Design Project-I Residential Planning- Introduction, Designing of a Model Residence Case Study, Design Project
<b>UNIT 5</b>	Design Project-II Case Study, Design Project for a Retail Store or Office building

### **Course Outcome (CO):**

At the end of this course students will have:

CO1: Understand the project studies, case studies of various related topics for interiors will be used.

Presentation of data collected will be done by means of seminars / visits / books / visuals.

CO2: Understand about the Anthropometric & Ergonomics

CO3: Understand the specific requirements of exhibition and retail design CO4:

Understand how to work in a professional context.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1		H					M		M			H	M		H
CO2	H			M							H				
CO3		M				M					L		M		H
CO4								L							

**Reference Books :**

1. Time Savers Standards for Interior Design & Space Planning by Joseph Dechiara, Julius Panero & Martin Zelink.
2. Time Savers Standards for Architectural Design by Michael J. Crosbie & Donald Watson
3. Human Dimension and Interior Space: A source book of Design reference

  
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<b>BDE048A</b>	<b>Photography Workshop</b>	<b>0-2-0 [1]</b>
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### **Objective**

- To Develop Photographic Skills, to understand Simple Architectural Forms, Joinery and Construction Details Through Field Exercises and Model Making.
- To develop observations through the different material workshops.
- To develop skills and understanding of learners who intend to follow careers as model makers in the architectural, interior design, industrial design, media or entertainment industries.

<b>UNIT 1</b>	Introduction to Photography
<b>UNIT 2</b>	Components & working of Compact & SLR Camera, Peripheral equipment like cables, lights, flashguns, lenses, filters, tripods etc. Assignments oriented towards using camera, Indoor & outdoor photography.
<b>UNIT 3</b>	Techniques of using camera, basics in optics, light, exposure, focus, depth of field, aperture. Dark room techniques, digital printing. Assignments oriented towards using camera, Indoor & outdoor photography.
<b>UNIT 4</b>	Reading a photograph, Understanding subject in a photograph, composition basics, light, exposure to various types of photography like nature, portraits, wildlife, sports, documentation, journalism etc. Assignments oriented towards using photography for presentations.
<b>UNIT 5</b>	Photographic investigation of a location and situation. Assignments culminating into a small presentation investigating a case.

### **Course Outcome (CO):**

At the end of this course students will have:

- CO1: Student should be able to Using Photography as a means of communication and Documentation; a tool to demonstrate concepts and ideas, document situations, & objects in general; get familiar with camera, film, digital technology & techniques and understand aesthetics of photography, composition and light.
- CO2: Be able to use space and equipment
- CO3: Be able to use sets, lights and backgrounds.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

	PO1	PO2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1			M		L		M		M				M		H
CO2	H			L							H	H			
CO3		M				M					M		M		H

**Reference books:**

1. Point view- The art of architectural photography , E.Manny A Ballan, VNR 2.Professional
2. photography –photographing buildings, David Wilson, Rotovisio.

<b>BDE052A</b>	<b>Product Design</b>	<b>0-4-0 [2]</b>
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### **Objective**

- To create awareness about the design process and various ways of designing products for user needs and requirements. To learn about the integration of design, manufacturing process, marketing etc. in the design of products.

<b>UNIT 1</b>	Concepts like design research, human factors, form, ergonomics, design processes, sustainable design.
<b>UNIT 2</b>	Understanding of compatibility with diverse cultures, technologies, user needs and cognitive and physical conditions.
<b>UNIT 3</b>	Application of materials and uses, sustainable approach towards product designing.
<b>UNIT 4</b>	Exploration of the design language, form and values from traditional and contemporary design platform.
<b>UNIT 5</b>	Design Exercise: To develop an innovative design solution for a given problem by synthesizing the trends, socio-cultural factors and design language.

### **Course Outcome (CO):**

At the end of this course students will have:

CO1: To be able to analyze current user behavior and trends for product development and understand the user and spatial relationship.

CO2: Be able to becoming familiar with basic traditional and modern joinery. CO3:

Be able to Understand Different material Specifications and their uses. CO4: Apply design thinking and process to solve problem creatively.

CO5: Perceive the design language, form and values while designing a product.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO
CO1		L			L		M		M			H	
CO2	H		M	L					M			H	
CO3	H	M				M					M		M
CO4							M						
CO5			H						H			L	

**Reference Books :**

- John Kolko ,Well-Designed: How to Use Empathy to Create Products People Love Don Norman ,The Design of Everyday Things.
- John Maeda ,The Laws of Simplicity (Simplicity: Design, Technology, Business, Life) Kenya Hara ,Designing Design.
- William Lidwell, Kritina Holden and Jill Butler ,Universal Principles of Design.
- William McDonough and Michael Braungart ,Cradle to Cradle: Remaking the Way We Make Things Edward De Bono ,Lateral Thinking: Creativity Step by Step.
- Jennifer Hudson, Process: 50 Product Designs from Concept to Manufacture

<b>BDE055A</b>	<b>Model Making Workshop</b>	<b>0-2-0 [1]</b>
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**PURPOSE**

To introduce the students to basics of Model making with various materials.

**INSTRUCTIONAL OBJECTIVES**

Acquisition of hands on experience in model - building.

<b>UNIT 1</b>	<b>INTRODUCTION TO MODEL MAKING</b> Introduction to concepts of model making and various materials used for model making Drawing settings - Limits, D settings, Units
<b>UNIT 2</b>	<b>BLOCK MODELLING</b> Preparation of base for models using wood or boards Introduction to block models of buildings (or 3D Compositions) involving the usage of various materials like Thermocol, Soap/Wax, Boards, Clay etc.
<b>UNIT 3</b>	<b>DETAILED MODELLING 20</b> Making detailed models which includes the representation of various building elements like Walls, Columns, Steps, Windows/glazing, Sunshades, Handrails using materials like Mountboard, Snow- white board, acrylic sheets. Representing various surface finishes like brick/stone representation, stucco finish etc. Various site elements – Contour representation, Roads/Pavements, Trees/Shrubs, Lawn, Water bodies, Street furniture, Fencing etc.
<b>UNIT 4</b>	<b>INTERIOR MODELS OF INTERIOR SPACES</b> Making models of the various interior spaces such as <ul style="list-style-type: none"> <li>• Residences</li> <li>• Offices</li> <li>• Retail Spaces</li> <li>• Recreational Spaces Scaled models of furniture.</li> </ul>
<b>UNIT 5</b>	<b>CARPENTRY</b> Introducing the techniques of planning, chiselling & jointing in timber to learn the use of hand tools. Exercise involving the design of simple furniture and making a model of the same.

  
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**Course Outcome (CO):**

At the end of this course students will have:

- CO1: Understand the technological principles of model making in a commercial context CO2: Be able to Relate the geometrical volumes into building models.  
 CO3: Be able to Understand the volumes in relation to space and experience 3D quality of volumes.  
 CO4: Analyze the various possibilities for representing the models and use the various methods of model building.  
 CO5: Design and create models conceptually with functional and aesthetic values.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H				L		M		M			H			H
CO2			M	L								H			H
CO3		M				M			L		M		M		
CO4	M							H							M
CO5				H									H		

**REFERENCE BOOKS**

1. BENN, The book of the House, Ernest Benn Limited, London
2. Jannsen, Constructional Drawings & Architectural models, Karl Kramer Verlag Stuttgart, 1973.
3. Harry W.Smith, The art of making furniture in miniature, E.P.Dutton Inc., New York, 1982.

<b>BDE058A</b>	<b>INTERIOR DESIGN STUDIO – II (Office Spaces)</b>	<b>0-6-0 [3]</b>
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### **Objective**


- Explore to a preliminary level basic spatial and material design concepts.
- This unit intends to equip the students with concept and principles of Basic Design pertaining to office design.
- To develop the skills in elements of design, color, texture, anthropometrics, planning of a office.
- To understand the basic function of the office, which are required in planning of the interior of office.

<b>UNIT 1</b>	<b>Office design</b> Introduction to work space design; Requirement of a work space; Types of Office system-Open Office, Closed cabin system; Planning of an Office; Ambience of an office; Office layout Patterns- Grid & random. Office Spaces - General Offices & Workstation and Planning Data; Different types of Workstations; Different types of Conferences Layouts; general offices & Multiple Workstation Planning Data.
<b>UNIT 2</b>	<b>Office Design Procedure:</b> Design on Paper and Practical Approach- Visiting the site, Preparing Personal Data Card, Making out Requirements, Designing, and Evaluating.
<b>UNIT 3</b>	<b>Interiors of Office:</b> Colour Schemes; Use of Colour Scheme; Factors Influencing the colour Scheme- Individual choice, Utility, Direction Wise, Region Wise. Light- Open Light & Concealed Light; Factors influencing Lighting- Position, Movability, Adaptability, Adjustability, State, Purpose, Direction, Architectural, Application; Layout of Lighting- Chessboard, Perimeter, Diagonal, Neutral, Square; Principles of Lighting. Material Selection- Selection Criteria in an Workspace.
<b>UNIT 4</b>	<b>Design project-I</b> Architect's/ Designer's Office- Planning, Interior Designing- Inspiration, Theme, Concept, Functional Requirements, Working Drawings & Presentation Drawing and Material Specification.
<b>UNIT 5</b>	<b>Design Project-II:</b> Parlour Design- Planning, Interior Designing- Inspiration, Theme, Concept, Functional Requirements, Working Drawings & Presentation Drawing and Material Specification.

### **Course Outcome (CO):**

At the end of this course students will have:

- CO1: An ability to understand the Design Process Through Observation Comparison, Analysis With the Help of Prototypes, Model and Drawings.
- CO2: An ability to understand the different areas and their anthropometrics in office design.
- CO3: An ability to understand the project studies, case studies of various related topics for interiors will be used. Presentation of data collected will be done by means of seminars / visits / books / visuals. Motivation of inspiration through the works of renowned designers and architects. Critical observation of interior projects for their merits and demerits by means of reading, study of drawings, interpretation and discussion.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2	H		M	L					M			H			H
CO3		M				M							M		

**Reference Books:**

1. Time Saver Standards for Interior design & Space Planning by Joseph Dechiara, Julius Panero
2. Martin Zelnik.
3. Lighting for Interior Design by Lighting for Interior Design.

<b>BDE061A</b>	<b>W.d. &amp; Estimation</b>	<b>0-4-0 [2]</b>
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### **Objective**

- This unit intends to equip the students with all the procedures of estimation & costing principles of estimating all works of interior design project.

<b>UNIT 1</b>	<b>Estimating &amp; Costing</b> Introduction to Estimating & Costing; Importance; Units of Measurements; Types of estimates- Preliminary or Approximate Estimate or Abstract Estimate, Plinth area estimate for building, Cube Rate Estimate for Building Renovation, Approximate Quantity Method Estimate, Detailed Estimate or Item Rate Estimate, Revised Estimate, Supplementary Estimate, Annual Repair or Maintenance Estimate; General principle of approximate method of costing; Approximate Methods of Costing for Various Interior Works
<b>UNIT 2</b>	<b>Specifications</b> Introduction; Objects of Specifications; Importance of Specifications; Types of Specifications; Brief specifications; Detailed specifications; Principles of Specifications; Typical Specifications.
<b>UNIT 3</b>	<b>Taking Out Quantities</b> Introduction; Essentials of an Estimation; Requirements of an Estimation; Methods of Taking out Quantities; English method of taking out quantities; Units of Measurements; Modes and Unit of Measurement For Different Types Of Trades; General rules for measurements.
<b>UNIT 4</b>	<b>Tenders</b> Introduction; Invitation to Tender; Tender Notice- Essentials of Tender Notice; Opening of Tender; Acceptance of Tender; Tender Document; Types of Tender- Item Rate, Lump Sum, Lump Sum Plus Percentage, Cost Plus Percentage, Cost Plus Fixed Fee, Cost Plus Fixed Fee with Bonus/Penalty, Labor Tender, Demolition Tender.
<b>UNIT 5</b>	Detailed working drawing of a project

### **Course Outcome (CO):**

At the end of this course students will have:

- CO1: Student will be able to know the procedure of estimation & costing CO2: Student will be able to plan a project using the estimation & costing CO3: Student will be able to prepare bills, contracts, agreements etc.  
 CO4: Understand the different grammar of the drawings. CO5: Develop drawings that are used for execution

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2			M	L					M			H			H
CO3		M				M				L			M		
CO4							H				L				
CO5	H		M		L										

**Reference Books:**

1. Estimating & Costing in Civil Engineering by B.N.Dutta
2. Estimating & Costing- by G.S. Birdie

<b>BDE066A</b>	<b>Elective-I (A. Marketing Techniques)</b>	<b>3-0-3 [3]</b>
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## **A. MARKETING TECHNIQUES**

### ***Objective***

- To understand the need of market supply and Marketing Position with exposure to various fixtures and fittings, water supply and sanitary installations at work sites.
- To expose the students to the basic principles of Organizational capabilities..

<b>UNIT 1</b>	<b>WHAT IS MARKETING?</b> Introduction, definition, Organizational conditions and USP, Environmental factors, marketing concept – marketing strategy – marketing tactics, Planning, operation and Implementation.
<b>UNIT 2</b>	<b>FORMULATING A MARKETING STRATEGY</b> Competitive settings, marketing decisions in a competitive setting, formulating overall marketing strategy, factors in selecting marketing inputs, the three C's of a marketing strategy, Components of a product/market strategy, hierarchy of strategies, how to develop a product/market strategy, finding a suitable market strategy.
<b>UNIT 3</b>	<b>UNDERSTANDING CUSTOMERS</b> How marketing influences society – economic aspects, buyers behavior, the environment, how society influences marketing – public opinion and political pressure, legislative action, pitfalls of neglecting customers, management mistakes, benefits of understanding customers, types of benefits, feature Vs benefits.
<b>UNIT 4</b>	<b>MANAGING VALUE</b> Components of perceived value, perceived value analysis, measuring perceived value, customer management, role of perceived value in competition, strategic themes, increasing perceived value.
<b>UNIT 5</b>	<b>ORGANISATIONAL CAPABILITIES AND MARKETING POSITIONING</b> Analysing competitors, capabilities and market strategies, types of capabilities, evaluating capabilities, competitive advantage and benefit advantage, macro trends, market segmentation, characteristics of market segment, determining a target market, role of segments and target market in marketing strategy, segment identification analysis, segments and decision making, market selection criteria, types of market segments, what is positioning, competitive advantage analysis, determining positioning, positioning and perceived value.

### **Course Outcome (CO):**

At the end of this course students will have:

CO1: An ability to understand the Marketing strategies and its components. CO2:

An ability to understand the different Marketing challenges.

CO3: An ability to understand the ORGANISATIONAL CAPABILITIES AND MARKETING POSITIONING

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M		H		M		H
CO2		L													
CO3			M			M					M		M		H

**REFERENCE BOOKS**

1. Marketing 101, Don Senton, Wiley.
2. Fundamentals of Modern marketing, Edward w. cundiff, Richard R.Still, Norman A.P Goroni, PHI.
3. Marketing Management, Phillip Kotter, PHI.

BDE067A	Elective (B. Entrepreneurial Development)	3-0-3 [3]
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### **B. Entrepreneurial Development**

#### **Objective**

- To enable the students to Develop entrepreneurial skills.
- To enable the students to Analyze the environment related to small scale industry and business.
- Understand the process and procedures of setting up small enterprises.
- To Develop Management skills for entrepreneurship development.

<b>UNIT 1</b>	Entrepreneurship - Entrepreneur, Enterprise and Entrepreneurship - meaning, need, transition from income generation to self employment and Entrepreneurship, qualities of a good entrepreneur, problems of entrepreneurs.
<b>UNIT 2</b>	Factors influencing entrepreneurial development - Economic, Legal, Socioeconomic, Psychological and Environmental factors.
<b>UNIT 3</b>	Agencies supporting entrepreneurial Development Programme - SIDCO, DIC, TILC, EDII, SIPCOT, KVIC. Institutional Finance to Entrepreneurs – IDBI, ICICI, RBI, LIC,
<b>UNIT 4</b>	Project identification and classification - Meaning of Projects, Project identification, Project Classification, internal and external constraints, Project objectives.
<b>UNIT 5</b>	Project formulation – Concept, need, elements. Project selection, appraisal format, check list for feasibility report, planning commission guidelines.


#### **Course Outcome (CO):**

At the end of this course students will have:

CO1: Student will be able to understand about entrepreneurship and evolution of entrepreneurship. CO2: Student will be able to understand creating and starting the venture.  
CO3: Student will be able to understand managing, growing and ending the new venture. CO4: Student will be able to understand entrepreneurship Development and Government.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					L		M		M			H	M		H
CO2	H		M	L					M			H			
CO3		M				M							M		
CO4	H							M				L			H

  
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**RELATED EXPERIENCE:**

1. Visit to SIDCO, DIC and TIIC.
2. Case study of an enterprise and two entrepreneurs.
3. Preparation of a project proposal for funding.

**REFERENCES:**

1. Gupta C.B, and Srinivasan N.P, Entrepreneurship development in India, Sultan Chand & Sons, New Delhi, 2004.
2. Chunawalla S.A, Sales Management, Himalayan Publishing House, New Delhi, 1991.
3. Vasant Desai, Project Management and entrepreneurship, Himalaya Publishing House, New Delhi, (2000).
4. David H.Moll, Entrepreneurship, Prentice Hall of India, New Delhi, 1999. Frank Jerkins, Advertising, Prentice Hall of India, New India, 2000.

<b>BDE074A</b>	<b>Research Project &amp; Dissertation</b>	<b>0-6-0 [3]</b>
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In this semester the learner is introduced to basic research principles and research methods, report writing skills and dissertation writing. Students are expected to choose their own topic of research on a specific area/field after consultation with the dissertation guide/subject coordinator.

He / She are also required to do the following before the end of the semester:-

- finalize the topic and guide,
- set the aim-objectives and scope of study,
- conduct research and review related literature,
- identify and conduct related case studies and project reviews,
- collect data and critically analyze the data,
- finalize the Interior Design brief/programme and
- Identify and finalize the site for design.

**Note:** Continuous assessment of sessional work may consist of the above in the given time frame as set by the guide/subject coordinator.

At the end of the Semester each Student is required to submit the final printed two copies of the dissertation volume supplemented with finished, rendered drawings to suitable scale with related detailing, all certified by the guide/subject coordinator and Principal which may be presented for final Viva-voce examination.

#### **Course Outcome (CO):**

At the end of this course students will have:


CO1: Be able to formulate a project.

CO2: Be able to implement the project within agreed procedures and to specification. CO3: Be able to evaluate the project outcomes.

CO4: Be able to present the project outcomes.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2			M	L											H
CO3	H	M				M			M		H		M		
CO4			M												

  
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<b>BDE065A</b>	<b>INTERIOR DESIGN STUDIO – III (Public &amp; Commercial Spaces)</b>	<b>0-8-0 [4]</b>
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### **Objective**

- The course concentrates on larger scale spaces with an emphasis on planning commercial spaces.
- The main aim is to develop visually literate students who are proficient at analytical thinking, conceptualization and the problem-inquiry, solution cycle. The course also examines the connection between abstract design principles and the physical and visual environments.

<b>UNIT 1</b>	<b>OPS</b> Planning for retail activity – anthropometrics – types of Shop layouts Modular units. Materials used in counters, shelves, worktops, their comparative study. Lighting & colour scheme – natural & artificial light.
<b>UNIT 2</b>	<b>COMMERCIAL SPACES</b> The art of selling-displays/products/marketing, design of display units, design of boutiques, showrooms. Concepts in modern day Retail interiors – materials & finishes – colour, texture & pattern.
<b>UNIT 3</b>	<b>SHOPPING MALLS</b> Product display – windows/ internal displays/ hierarchy of product display/ power of visual communication/ graphics Exhibition spaces – display for exhibition Lighting design for commercial spaces – task/ display/ atmospheric/ focal lighting Colouring commercial spaces – coding/ decoding/ visual communication Design of commercial Environments such as Malls, Shopping Arcades Etc.

### **Course Outcome (CO):**

At the end of this course students will have:

- CO1: An ability to understand the Design Process Through Observation Comparison, Analysis With the Help of Prototypes, Model and Drawings.
- CO2: An ability to understand the Demonstrate knowledge of commercial interior design fundamentals.
- CO3: An ability to understand the project studies, case studies of various related topics for interiors will be used. Presentation of data collected will be done by means of seminars / visits / books/ visuals.
- CO4: Motivation of inspiration through the works of renowned designers and architects. Critical observation of interior projects for their merits and demerits by means of reading, study of drawings, interpretation and discussion.
- CO5: Apply design thinking and process to develop creative designs and demonstrate through relevant communication skills.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1					L		M		M			H	M		H
CO2			M	L					M			H			H
CO3	H	M				M		L					M		
CO4	H				M						M				
CO5			M											L	

**Suggested Readings:**

1. The Design Hotels Book: Edition 2015 by Design Hotels (Editor)
2. Hotels: Architecture & Design by Carles Broto
3. The Best of Hospitality Architecture and Design by Cindy Allen (Editor)

<b>BDE068A</b>	<b>Exhibition &amp; Retail Design</b>	<b>0-4-0 [2]</b>
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### **Objective**

- Understanding theory of exhibition design and their principles..
- To understand the construction details of Retail design.
- To study about the various lighting and graphics.

<b>UNIT 1</b>	<b>Exhibition Design</b> Introduction, History of Exhibition Design, Principles of Exhibition Design.
<b>UNIT 2</b>	<b>Retail Design</b> Importance of Retail Design; Types of Retail Stores- Department Stores, Boutiques, Outlet Store, Specialty Shops, Jewellery, Hyper Markets & Super Markets, Shopping Centre/ Malls; Elements of Retail Store- Space, Spatial Organization, Store Layout, Presentation of Merchandise, Design of Store, Lighting, In-Store Graphics.
<b>UNIT 3</b>	<b>Construction &amp; Material Selection</b> Selection of material for Exhibition, Designing & Construction of Exhibitions Stands/Kiosks.
<b>UNIT 4</b>	<b>Lighting &amp; Graphics</b> Lighting for Exhibition- Lighting Plan of an Exhibition, Environment Light, Exhibit Focused Lighting, Feature Lighting, Color Lighting, Lighting for comfort; Lighting Specifications; Do's & Don'ts for Exhibition Lighting. Graphics for Exhibition- Importance of Graphics in Exhibition; Stand Alone Installation; Approaches to exhibition Graphics- Legibility, Readability; Printing of Graphics- Vinyl text, Rubdown/Dry Transfer, Cut-Outs, Inkjet Printing, Digital Printing, Mounting Techniques; Outdoor Application; Dos & Don'ts of Graphic for exhibitions.
<b>UNIT 5</b>	<b>Design Project</b> Designing of Exhibition stands one of each category - Commercial & Non- Commercial Category- Planning, Designing- Concept & Functional Needs, Working Drawings, Wall Finishes with Material Specification. Services detail. Designing of Retail Stores any two categories – Planning, Designing- Concept & Functional Needs, Working Drawings, Presentation Drawing, Wall Finishes with Material Specification. Services detail.

### **Course Outcome (CO):**

At the end of this course students will have:

CO1: Demonstrate knowledge of design fundamentals of exhibition and retail design. CO2: Be able to Identify issues and concerns contextually through comparative study.

CO3: An ability to Elaborate conceptual development through relevant communication skills. CO4: An ability to understand a design program through an analysis of data & case study.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1					L		M		M				M		H
CO2	H		M	L								H			H
CO3		M				M				M			M		
CO4			H		M							L			

**Suggested Readings:**

1. Creating Exhibitions: Collaboration in the Planning, Development, and Design by Janet Kamien and Polly
2. McKenna-Cress
3. Exhibition Design by Philip Hughes.

<b>BDE075A</b>	<b>TEXTILE DESIGN</b>	<b>0-4-0 [2]</b>
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### **OBJECTIVE**

- To gain knowledge and understanding of the functional and aesthetic requirements of textiles for a range of applications
- To familiarize the students of Interior Design on textile materials used in interior.

<b>UNIT 1</b>	<b>INTRODUCTION TO FABRICS</b> Fabric, yarn and fibre structure, Fabric structure- woven- warp, weft, selvedge ,knitted- course, non- woven, Fabric types and classification- woven, including plain, twill, satin, Jacquard, crepe and pile weaves, knitted- including single knit, double knit, tricot knit, pile knit, lace and net ,non-woven-including felts webs and films, identification and properties of fabrics, yarns and fibers.
<b>UNIT 2</b>	<b>APPLICATION OF ELEMENTS AND PRINCIPLES</b> Application of elements and principles of design across a range of textiles. Describe and analyze elements and principles of design -furnishings, textile arts, non-apparel. Functional and aesthetic requirements and features of textile range
<b>UNIT 3</b>	<b>COLOUR ON FABRICS</b> Fabric coloration and decoration- Principles of applying color to fabrics. Textile arts and crafts in interiors, traditional and modern materials and methods. Preparing samples on tie and die printing, batik printing, appliqué, macramé and braiding.
<b>UNIT 4</b>	<b>FURNISHINGS</b> Furnishings-classification, types of curtain, curtain construction, selection criteria relation to backgrounds in walls , floors and ceilings. Slip covers , cushion covers , bed linen and table linen Floor coverings -rugs and carpets, types selection , care and maintenance, installation of floor coverings
<b>UNIT 5</b>	<b>OTHER NATURAL MATERIALS</b> Jute or hessian – dyed jute fabric and its applications – various kinds of processed leather, its application in interior design.

### **Course Outcome (CO):**

At the end of this course students will have:


CO1: An ability to understand the different fabrics and their application. CO2: An ability to understand the different colours on fabrics and furnishing. CO3: An ability to understand the elements and principle of fabrics.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1					L		M		M			H	M		H
CO2	H		M	L						M		H			H
CO3		M				M					H		M		

**REFERENCE BOOKS**

1. Inside today's home, Faulkner, R. and Faulkner 1987, Rinehart Winston, New York
2. Interior Design & Decoration, Sherril Whiton, Prentice Hall
3. Introduction to home furnishings, Stepat, D.D, 1991, The macmillan company, New York.
4. The themes and Hudson manual of textile printing, Storey joyce, 1992, London
5. Colour in interior Design Jhon, F.P, 1997, Mc Graw Hill Company

  
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<b>BDE078A</b>	<b>Thesis Project</b>	<b>0-22-0 [11]</b>
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### **OBJECTIVE**

- To demonstrate an ability to comprehend the nature of Interior problem and create a brief which sets the frame work for design.
- To demonstrate an advanced level design ability to convert the brief set forth earlier into a speculative proposition of design.
- To articulate and delineate the propositions of design into an architectural & Interior solution addressing all the dimensions


### **Outline:**

Interior Design projects can be of any scale and size (in terms of built areas) as long as the required rigor and depth is demonstrated by the student to merit consideration as a final project. Very large campus projects can be avoided as the work tends to be repetitive and more often ends with a large number of Structures but with minimal variations and content. It is expected that all genre of projects (study or design) would end with a design solution; in fact all projects should be grounded in some kind of critical enquiry. The maximum weight age for study will be 25% in the case of a Study + Design Project. The depth of enquiry can be extended and the time spent on design can be reduced in a specific case, but such a project should demonstrate clarity in terms of research design. The following stages have been identified as a generic model of the studio. The stages can be fine tuned depending on the resources. It is expected that this project will be run as a studio with individual guidance under a project coordinator.

**1. Pre-Project** – This stage should ideally be accomplished in the previous semester. The work involves students to discuss with the faculty to identify an area of interest or specific types of buildings. The pre project stage should end with a project proposal giving routine information on site, location, need, broad requirements and scale. In addition, the proposal should clearly indicate the “project question” or an area (or areas) of interest.

**2. Project seminar** – Student shall present a seminar on the project topic which would include the following; 1. Precedents of similar projects, either actual visit to such projects or through literature reviews. 2. Cultural, contextual, historical, technological, programmatic concerns of the project. 3. Prevalent or historical models of architectural approach to such projects and a critique of such models and 4. A rhetorical or a speculative statement that would be the basis of further investigation. (For example: Interiors in the information age: Design of libraries in the new virtual reality regime). Documentation which is a part of this presentation shall be taken as completion of “case study” part of the final requirement.

**3. Mid Review** – There shall be a review to clarify the conceptual statements and assumptions of the students. Students shall present a clearly articulated response to context, programme and users. Conceptual framework and preliminary architectural scheme shall be the end products of this stage.

  
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**4. Final Review** – Final review should consist of all the works which would be presented at the viva. Mode of presentation shall be tentative. Number of sheets shall be limited to maximum of 15 plus two case study sheets. Study Models are expected to be presented. The final output shall include a report, all drawings, study models and a presentation model.

The report in typed or computer printed form shall discuss the programme, site- analysis, literature review, case studies, design criteria, concept and detailed design. Three copies of the reports shall be submitted along with drawing and models.

Note –

1) The requirements pertaining to the handicapped and elderly people and children are to be addressed in design and detailing.

2) At the time of Viva examination, the student shall show to the jurors the portfolio containing the evolution of his/her design from the beginning to the final output. All the drawings and reports shall be certified by the Head of the Department as bonafid work carried out by the student during the semester

#### **Course Outcome (CO):**

At the end of this course students will have:

CO1: An ability to understand that how to handle a live project design. CO2:

An ability to Outline the thesis topic in domains of their interests.

CO3: An ability to Examine and research with the help of case examples and best practices in the identified domain.

CO4: Design of the project with conceptualization and demonstration of research as an application. CO5:

Develop the study into practical details of the project.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H				L		M				H	H	M		H
CO2	H		M	L					M			H			H
CO3		M				M		H					M		
CO4			H												
CO5								H							M

  
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<b>BDE079A</b>	<b>Project Management &amp; Entrepreneurship</b>	<b>4-0-4 [4]</b>
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**OBJECTIVE**

- To expose the students to the currently prevalent techniques in the planning, programming and management of a project.
- Knowledge about the methodology of executing a Project greatly enhances the professional ability of an Interior Designer.

<b>UNIT 1</b>	<b>INTRODUCTION</b> Project planning and project scheduling and project controlling, Role of Decision in project management, Method of planning and programming, Human aspects of project management, work breakdown structure, Life cycle of a project, disadvantages of traditional management system
<b>UNIT 2</b>	<b>ELEMENTS OF NETWORK</b> Event, activity, dummy, network rules, graphical guidelines for network, numbering of events
<b>UNIT 3</b>	<b>CRITICAL PATH METHOD AND PERT ANALYSIS</b> CPM network analysis & PERT time estimates, time computation & network analysis
<b>UNIT 4</b>	<b>PROJECT TIME REDUCTION AND OPTIMIZATION</b> Project cost, Indirect project cost, direct project cost, slope of the direct cost curve, total project cost and optimum duration, contracting the network for cost optimization, steps in cost-time optimization
<b>UNIT 5</b>	<b>PROJECT UPDATING AND ALLOCATION</b> When to update? Data required for updating, steps in the process of updating Resource usage profile: Histogram, Resource smoothing and Resource levelling, Computer applications in project management.

**Course Outcome (CO):**

At the end of this course students will have:

CO1: An ability to understand the project planning and project scheduling

CO2: An ability to understand the different method for calculate the project time. CO3: An ability to understand the cost optimization of the project.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H				L		M				H	H	M		H
CO2	M		M	L					M			H			H
CO3		M				M		H					M		

**TEXT BOOK**

1. Dr. B.C.Punmia et al. Project planning and control with PERT and CPM, Laxmi Publications,

**REFERENCE BOOKS**

1. Jerome D.Wiest and Ferdinand K.Levy, A Management Guide to PERT, CPM, prentice Hall of India Pub, Ltd., New Delhi, 1982
2. R.A. Burgess and G.White, Building production and project Management, The construction press, London, 1975

<b>BDE080A</b>	<b>Professional Practice &amp; Management</b>	<b>4-0-4 [4]</b>
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**OBJECTIVE**

- To enable the students to plan residential interiors and commercial interiors Gain knowledge in estimating and costing understand the preparation of quotation and tenders.

<b>UNIT 1</b>	<b>Residential Interiors</b> – Space planning for residential interiors – living room, dining room, kitchen, bedroom.
<b>UNIT 2</b>	<b>Commercial interiors</b> – Space planning for office interiors – cabinets, conference rooms open office systems.
<b>UNIT 3</b>	<b>Estimating</b> – Definition of estimates, types, unit and mode of measurement, quantity surveying –systems adopted, analysis of rates, schedule of items, schedule of rates, schedule of quantities.
<b>UNIT 4</b>	<b>Specifications</b> – definition, uses, importance, types, requirements, points to be included in the specifications.
<b>UNIT 5</b>	<b>Tenders and quotations</b> – Tenders – meaning types, preparation of tenders, quotations, contracts.

**Course Outcome (CO):**

At the end of this course students will have:

CO1: An ability to understand the calculation of a project cost. CO2: An ability to understand the process of tendering.

CO3: An ability to understand the project scheduling and estimating.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2	M		M	L							M	H			H
CO3		M				M				M			M		

**REFERENCES:**

1. Deshpande, R.S. (1995) ; Modern ideal Homes for India, Deshpande Publication, Poona Tessie, A., (1986), The House, its plan and use, J.B. Lippincett, New York.
2. Day P.G. (1982), A guide to professional architectural and industrial scale model building, Eagle wood cliffs, N.J. Prentice Hall.
3. Indian Standards Institutions (1983), National building code of India ISI rol, 1 New Delhi, Marak Bhavan.
4. Arulmanickam A.P. and T.K. Palaniappan (1993), Estimating and costing, Pratheebea Publishers, Coimbatore.

<b>BDE081A</b>	<b>INTERNSHIP</b>	<b>0-24-0 [12]</b>
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### **Aim**

In this semester the learner will be equipped with knowledge and skills needed such as management of office along with current practices, codes of conduct required to enhance skills and techniques of managing small and large scale residential and commercial interior projects.

### **OBJECTIVE**

- To encourage students to work in with relevant industries.
- An avenue to enhance academics learning through hands on work experience.
- Get advice on career from knowledgeable and experienced professionals.
- Gain exposure to a professional work atmosphere.

Be able to place themselves and their work in the context of their selected discipline

Understand their specialist area and the career opportunities available Understand how to promote themselves and their work professionally.

The aim of this unit is to extend learners' knowledge of professional practices within their specialist area and to relate these to personal goals and career opportunities.

### **INTERNSHIP TRAINING**

- In the VI semester, student will undergo a internship of 20 Weeks Duration in an Interior designing or Architectural firm and form a project report about his/her practical experience gained by working on various projects worked under the supervision of a professional designer, so that they can understand the existing working practices, conditions and acquire an in depth technical knowhow.
- The student has to submit a certificate regarding their successful training with the firm.
- A Copy of Report needs to be submitted with the department along with the performance certificate issued by the firm Manager/ Owner and one with the Firm (where internship is pursued).
- After the Internship, student needs to appear in front of jury members for a presentation seminar, who will judge the performance based on their presentation, report, and Viva-voce and award marks to student.
- PROJECT REPORT to be submitted
  - Background of industry
  - Number of employees
  - Project detail on which assisted
  - Manufacturing process
  - Hand & Computer sketches
  - Experience
  - Any other details

### **Course Outcome (CO):**

CO1: Student will be able to understand about entrepreneurship and evolution of entrepreneurship. CO2:

Student will be able to understand creating and starting the venture.


CO3: Student will be able to understand managing, growing and ending the new venture. CO4:

Student will be able to understand entrepreneurship Development and Government.

  
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MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES  
AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2	H		M	L					M			H			H
CO3		M				M				M	L		M		
CO4	M							L							

  
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<b>BVI001A</b>	<b>Dimensional Practice</b>	<b>0-0-6[3]</b>
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### AIM

In this unit student would learn introduction of Graphic Design industry through understanding of Graphic and Career Opportunities and working process in Graphic Industry with the role of Graphic Designer. Students will also get the exposure of different Graphic Categories with their Components of a craft.

### OBJECTIVE

- Students demonstrate their knowledge of key sculptural techniques and formal ideas through hands-on workshops and experimentation using a variety of materials and three-dimensional assignments.
- Strong communicative verbal and written skills accompany these explorations as students learn how to conceptualize, evaluate and defend their creative work.
- Students develop collaborative skills and come to understand how the visual and plastic arts inform broader social realities involving economic, political, and technological change.
- Adoption of a basic vocabulary of terms related to the field is gained through research, writing assignments and audio-visual classroom presentations.
- A sketchbook of written ideas and drawings is also mandatory and is used as the basis for class presentations, group evaluations, and final critiques of all student work.

<b>UNIT 1</b>	Explain to students to the fundamental context of sculpture and three-dimensional design. Basic techniques, concepts, and materials found in the sculptural arts through assignments that investigate particular spatial problems requiring both creative expressivities as well as focused research into the history and social context of this important art form.
<b>UNIT 2</b>	Traditional art-based skills as molding, carving and three-dimensional fabrication.
<b>UNIT 3</b>	Appreciation of creative work while learning to resolve technical, cognitive and expressive problems at both the individual and collaborative level.
<b>UNIT 4</b>	German Bauhaus School and pivotal art movement of the 1920s. Carving .Plaster /cement block.
<b>UNIT 5</b>	Demonstration of 3D Printing technology and discuss ways to incorporate this technology into projects. complete the Project (during one half of class depending on when the 3D printer demo is scheduled.).

### Course Outcome (CO):


At the end of this course students will have:

- CO1: An ability to Introduce to the world of making and thinking in three dimensions. Study of this unit will involve undertaking basic skills and techniques,
- CO2: An ability to Identify and discuss the functional units of sculptures, identify the various mediums and methods.
- CO3: An ability to develop an understanding of conceptual and formal trends in contemporary sculpture through lectures, images and other means
- CO4: An ability to Learn the sculptural basics of carving, casting and fabrication in relation to original art work.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M	L	L	H			L		L	M	L	H	M	L		H
CO2	H	M	M	M	M	L		L	L	M	M			M	L	L	M
CO3	L	L	M	M	L	L	L	M	M	H	H	H	H	M	L	M	
CO4	L	L	M		H	L	L			L	H	M	L	H	L	L	H

  
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<b>BVI004A</b>	<b>Rendering Techniques</b>	<b>0-6-0[3]</b>
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### Objective

- Student will be able to understand the perceptual and cognitive processes associated with the evolution of the human mind and its essential relationship to Rendering as an art form.
- Ability to Compare and contrast different uses of Rendering in art.
- Show a fundamental proficiency in the current technology and understanding of the materials, methods and techniques.
- To develop a portfolio that enables the graduate to showcase his/her abilities while reflecting the individual personality of the designer.

<b>Unit 1</b>	Introduce drawing Shading Techniques - geometric figures Accent Lines. Power lines and adding elements i.e. dramatic sky, flowers, landscaping.
<b>Unit 2</b>	Rendering in pen and ink, or colored pencil, in marker & stipple.
<b>Unit 3</b>	The art of Ink Line Drawings, Sepia Washes using ink, graphite, chalk, charcoal, or crayon.
<b>Unit 4</b>	Patch Pattern Rendering Technique, Blending Rendering Technique and Monochrome Rendering Technique.
<b>Unit 5</b>	Isometric Drawings, Multiple Orthographic Views, Perspective Projections, Depth Cueing, Depth Clipping, Illumination and Transparency and Reflection.

### Course Outcome (CO):


At the end of this course students will have:

- CO1: An ability to Gain a broad-based knowledge and understanding of art and its histories.
- CO2: An ability to develop your understanding of the production, circulation, and interpretation of visual culture in specific historical contexts.
- CO3: An ability to Gain awareness of the role of the visual arts within different cultures and societies, both Western and non-Western.
- CO4: An ability to Gain awareness of the role of museums and galleries in the production and reproduction of cultural values.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1		M	L		L							M		H	L		
CO2	M	M	H										M	M	L		M
CO3				L		H	H	H	H	L						M	M
CO4	H					M	M	M	M	L					M	L	L

H = Highly Related; M = Medium L = Low

  
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### Reference Books

- Principles of Form and Design by Wucius Wong John Wiley & Sons, New York
- Principles of Color Design by Wucius Wong.
- Principles of Two-Dimensional Design, Wucius Wong.
- Action Anatomy by Takashi Iijima.
- The World of my illustrations by Ravi Paranjpe

<b>BVI005A</b>	<b>GRAPHIC PRINT</b>	<b>0-4-0[2]</b>
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### Objective

- Student will be able to Exercise and demonstrate use and mastery of the elements of design
- Use materials, tools and processes from a variety of media (printmaking)
- Handle materials effectively.

<b>Unit 1</b>	Introduction: Relief printmaking is a form of printmaking in which the image to be printed is raised from the surface. This creates a surface similar to a stamp and is sometimes referred to as "block printing".
<b>Unit 2</b>	Linoleum cut and wood cut. Beginning printmakers -.Calligraphy, Linoleum allows the printmaker (student) to easily carve curved lines and is able to accept impressions from sharp objects. Lay outting & drawing.
<b>Unit 3</b>	A pointed tool, such as pen or pencil, is used to trace the lines of the drawing, forcing the soft graphite on the back of the drawing on to the linoleum surface. Material (Calligraphy / linoleum, wood, or rubber).
<b>Unit 4</b>	Creating a relief print. Handling tools a variety of blades called gouges. Each gouge is designed to remove linoleum at different widths. Smaller gouges remove less material, but are more precise. Larger gouges remove more of the material, but are far less precise.
<b>Unit 5</b>	Inking process is demonstrated. Tray, ink, and brayer aroused. Over-inked or under-inked, or uneven inking solutions during the burnishing process.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to create professional Graphics and illustrations, and graphic prints.
- CO2: Ability to Transforming objects, Drawing, Working with Tools and Materials i.e. Lino and Wood.
- CO3: An ability to Recognize and evaluate basic elements of design (color, line, form, texture, rhythm, etc.)
- CO4: An ability to acquire a working vocabulary associated with the analysis and interpretation of works and architecture.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:


Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M			M		L			L	M	M		M		L	L
CO2	M		M	L	H	L	L	L		L	L	M	M	L		L	
CO3				L	H	L	L	M	L	L			L				M
CO4	M	M			M				L				M	L	M	M	H

H = Highly Related; M = Medium L = Low

  
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### Reference Books

- The Print Making ideas book Frances Stanfield, LuryMcGeown
- Print Matters – Modern Print making by Sylvie Coney
- Perspectives on Contemporary Printmaking: Critical Writing Since 1986 by Ruth PlezerMontada

  
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BVI006A	Computer Graphic I	0-6-0[3]
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### Objective

- Corel draw is a graphic design software coral draw enables users to create professional Illustrations for newsletters, brochures logos and web graphics.
- Provides training about illustration program that can be used for print, multimedia, and online graphics. Whether you plan to design or illustrate multimedia artwork illustrator offers all the tools needed to produce professional and quality results for even a beginner.
- Photoshop provides hands-on with creative image designing techniques. Photoshop is the leading digital image editing application for the internet, print, and other new media disciplines.
- Important tool for graphic artists, print designers, visual communicators, and other regular peoples.

<b>Unit 1</b>	Introduction of Raster and vector Software' show they used in different scenario of digital platform. Introduction of software's and user interface.
<b>Unit 2</b>	Making sketches in Photoshop, customize the workspace, create projects, Basic tools settings and brush options, Color theory and light painting, Selection tools and cropping images, Image manipulation process pipeline. Raster vs. Vector.
<b>Unit 3</b>	Introduction of layer, Use the Layers Panel, Layer Dexterity, Fast Alignments Layer Types Explained, Manipulate Layers in Photoshop, Use Blending Modes, Find out how art boards can help you, Creating and resizing art boards, Introduction Photoshop vs. Illustrator, Tools explained and making digital paintings.
<b>Unit 4</b>	Introduction Of art boards, Difference Raster and vector, Resolutions formats, Creating vector illustrations, Turning photographs into vector artwork, Vector zing and coloring traced hand drawings, Learn useful keyboard shortcuts and best practices.
<b>Unit 5</b>	Colour correction images, Image Manipulation, Digital painting concepts, Matte painting process, Different Ways to Paint, Background and Final Effects.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to create professional Graphics and illustrations for newsletters, brochures logos and web graphics. CO2: An ability to Transforming objects, Drawing, Coloring and Painting, Working with Type, Layers, Brushes, Using Effects, Appearance Attributes and Graphic Styles
- CO3: An ability to Working with Symbols Expected Outcome This being a job-oriented course.
- CO4: An ability to creative image designing techniques. Photoshop is the leading digital image editing application for the internet, print, and other new media disciplines, color manipulations, levels, curves dust and scratches, seeing color accurately

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M	L	M				M	M	L	H	H	L	M	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

- Fluid Simulation for Computer Graphics –Robert Bridson
- Computer Graphics – Nobuhiko Mukai
- Design, Animate & Create with Computer Graphics –by Max Wainewright



BVI007A	TYPOGRAPHY	0-4-0[2]
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### Objective

- Student will be able to Create and evaluate typographical designs for audience, meaning, and effectiveness.
- Explain the importance of appearance in effective layout design. Demonstrate the ability to control the reader's eye in layout design.
- Use typography in layout design. Basic design principles in layout creation.
- Create and modify typefaces. Use color in an effective manner in layout design

Unit 1	Introduce Typography (letterform, layout, grouping and hierarchy).
Unit 2	Conceptual development, verbal articulation of visual solutions, research, production, and visual, verbal and written presentation skills.
Unit 3	Structure of Design: Visual Elements: Line, Shape, Light and dark, Color, Texture, Perspective and depth and Organization of the Elements. Techniques: Contrast, Tone, Shape, Juxtaposition, Harmony, Balance, Opacity, Singularity, Flatness, Repetition and regularity.
Unit 4	Principles of Typography: Origins of the alphabet Pictograms, Ideographs, Phoenician, Greek and Roman alphabets, Sans Serif, Serif, Script, Families of type, Color of type, Personalities of type. Visual change between type over time Garamond, Baskerville and Bodoni, Century Expanded and Helvetica, Display type, Roman and Egyptian, Sans Serif and Script Widows and orphans Designing with type, Function of type: Ornate type Creating moods with type Altering of characteristics of existing fonts. Anatomy of a Page – Terminology, Feelings duotones-quad tones, without black, White space, Bleeds, Drop shadows Methods: Repetition, Grids/Headlines.
Unit 5	Kern Type: The Kerning Game Better Web Typography In a Few Simple Steps. Helvetica - A Documentary About the Most Ubiquitous Typeface in The World Game Bonus.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to explain the fundamental role that typography plays in developing legibility for the reading audience. CO2: An ability to explain Analyze the cultural significance of typography as a means to convey messages.
- CO3: An ability to explain Compare and contrast different typographic approaches and how they influence and change meaning.
- CO4: An ability to explain Apply a range of typographic approaches in response to specific design problems. Different typographical approaches for a range of media and audiences.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M	L	M				M	M	L	H	H	L	M	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

- Rookledge's Handbook of Type Designers: A Biographical Directory from the 15th Century by Ron Easton, Sarah Rookledge, Phil Baines
- Type & Typography 2<sup>nd</sup> Edition, by Phil Baines
- Thinking with Type by Ellen Lupton
- The visual History of Type – Paul McNeil
- Typography, by G.M. Rege, Mumbai

BVI009A	PHOTOGRAPHY I	0-4-0[2]
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### Objective

- Develop knowledge of principles of aesthetics and visual communication and integrate these principles creatively in still and motion based images and in new media storytelling.
- Demonstrate thorough knowledge and application of DSLR camera techniques for capture of both still, time and video based imagery.
- Develop a thorough and adaptable knowledge of software used in digital imaging and new media storytelling.
- Develop complete digital imaging workflow that includes capture, post processing, ethical considerations of digital techniques based on genre and asset management techniques from image capture to image archive.

<b>Unit 1</b>	Introduction to Photography. History of Photography - the evolution, journey and advancement of photographic techniques and usage in context to development.
<b>Unit 2</b>	The Camera prototype. Introduction and handling of camera. Basics of DSLR Camera. Understanding of Optics & Lenses, and their usage.
<b>Unit 3</b>	Principles of Photography - Understanding of rhythm, balance, pattern, emphasis, contrast, unity and movement. The knowledge about balance and colour patterns.
<b>Unit 4</b>	Study of lights– Taking control over lights, capturing Dramatics from day to night. Natural & Studio light study. Shoot in One light source, Multi-light sources, understanding of Shadow, Silhouette and Exposure.
<b>Unit 5</b>	Composition basics – elements and ideations. Framing, crop factor and introduction to editing.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to understanding of professional practices, communications, organizations and career opportunities in the field of professional photography.
- CO2: An ability to identify the primary working methods (conceptual and illustrative vs. journalistic and found moment) within different genres of photography in order to understand ethically acceptable images.
- CO3: An ability to apply effective lighting techniques in natural, artificial and mixed lighting in a variety of photographic areas including product, still life and portraiture.
- CO4: An ability to Develop a professional body of work and appropriate support material such as website and marketing materials, to showcase personal vision and technical skills.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M	L	M				M	M	L	H	H	L	M	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Understanding Exposure: by [Bryan Peterson](#).
2. The Beginner's Photography Guide by Chris Gatcum
3. The History of Photography by Beaunaut Menhaul
4. A History of Photography: From 1839 to the Present, edited by Therese Mulligan and David Wooters

<b>BVI010A</b>	<b>PRODUCTION DESIGN</b>	<b>0-4-0[2]</b>
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### Objectives

1. Student will be able to understand basics of production design, and film language.
2. Develop a skill for visualization and conceptualization.
3. To make miniature with diagram, and basic mold making.
4. Pre production skill development.
5. Understand design principals of moving images.

<b>Unit 1</b>	Introduction to Production Design, basic understanding of Film Language.
<b>Unit 2</b>	Visualization & Foundation. Developing empathetic approach for working. Set Illustration, Narrative and Décor in context to it.
<b>Unit 3</b>	Set completion – complete visualization, miniature set design, (diagram based model) Basic molding workshop.
<b>Unit 4</b>	Light design in context to Production. Location Scouting trip. Design principles of moving images.
<b>Unit 5</b>	Submission on basis of Virtual Set Design. The informative interaction for the same.

### Course Outcome

At the end of this course students will have

CO1 An ability to understand basics of production design, and film language. CO2

An ability to develop skill for visualization and conceptualization.

CO3 An ability to develop skill to make miniature sets with diagram, and basic mould making. CO4 An ability to develop plan and execution pre-production.

CO5 An ability to develop understand design principals of moving images.


### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M	L	M				M	M	L	H	H	L	M	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. The Art of Illusion, by Tery Auckland Snow & Wendy Laybourn
2. Manufacturing – Design, Production, Automation & Integration, by BenoBenhabibs
3. Dream Worlds -by Hans Bacher
4. Production Design for Screen: Visual Storytelling in Film and Television, by Jane Barnwell
5. Vision – Colour& Composition for films by Hans Bacher

  
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<b>BVI011A</b>	<b>WORKSHOP I – MATERIAL EXPLORATION</b>	<b>0-4-0[2]</b>
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### Objective

- 1 Basic study of forms, shapes,
- 2 Deformation, and model making
- 3 To enhance the brief knowledge of design methodology and steps of the design process.
- 4 Learn and apply the basic knowledge of tools and techniques according to the material to be used.
- 5 Interpreting the natural environment and creating a design with realistic approach.

<b>Unit 1</b>	Basic study of design & shapes in Model making & understanding of new dimensions.
<b>Unit 2</b>	Brief on Design Methodology – the process of development. Design conceptualization in perspective of executional details.
<b>Unit 3</b>	Creating the Miniature forms. The study of objects and subject shaping. Understanding of tools and usage in different variants accordingly.
<b>Unit 4</b>	Creating Natural Environmental Scenario. Application, molding & execution of different segments for creating it on realistic manner.
<b>Unit 5</b>	The finalized submission with proper models and usage of different techniques. Play with variety of materials like Textile, Leather, Clay, Thermacol, Fiber, Paper and Hardboard.

### Course Outcome

At the end of this course students will have:

- CO1 An ability to understand Basic knowledge about forms, shapes,  
CO2 An ability to develop skill for deformation, and model making with concepts.  
CO3 An ability to apply Knowledge of design methodology and steps of the design process. CO4 An ability to apply Basic knowledge of tools and techniques according to the material.  
CO5 An ability to apply advance knowledge of creating design and concepts to more approachable to the real time.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H		L	H	L			L	L	M				M	L		
CO2	H		L	H	L			L	L	M				M	L		
CO3	H		L	H	L			L	L	M				M	L		
CO4	H		L	H	L			L	L	M				M	L		

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Material Culture & Texts, The Art of Ambiguity by Christopher Tilley
2. Why Material Matter, by Seetal Solanki

**Journals**

1. Materials & Design, Editor-in-Chief: Alexander M. Korsunsky,



<b>BVI012A</b>	<b>COMPUTER GRAPHIC –II</b>	<b>0-6-0[3]</b>
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### Objective

- Student will be able to Navigate premiere pro, create and open projects, work with files
- Import media into premiere pro, organize your media once it's imported, use the timeline for video and audio tracks
- Create and work with key frames, add animation and other effects, add transitions, use the colour-correction tools, sync clips from multiple cameras, add text, shapes, and logos to your project, work with audio in the audio workspace, export media from premiere pro, create and edit closed captions
- Produce professional quality print material, Manage documents effectively Indesign is Pro Software in Industry.

<b>Unit 1</b>	Getting Started with lightroom, Lightroom classic library module, Image Manipulation, Organization, Develop Module.
<b>Unit 2</b>	Colorize images manipulation with advanced technique in Photoshop tools, color grading, Advanced tricks for Healing Brush for retouching in Photoshop, clone Tool Stamp in Photoshop, vanishing point to mocking up designs, How to edit video in Adobe Photoshop, Parallax effect.
<b>Unit 3</b>	How to setup a file ready for web UI designing, How to export your web design UI project for Dreamweaver.
<b>Unit 4</b>	Make 3D text & 3D logos, Adding lights & casting shadows using Photoshop 3D, How make a reusable mock-up in Photoshop using smart objects, How to make a simple UI app web design mock-up using Photoshop.
<b>Unit 5</b>	An Overview of Adobe Premiere Pro, An Overview Of The Entire Workflow. Optimizing Your Hardware, Navigating Within The Workspace Customizing Your Workspace, Trimming Clips In Advance - Project Panel And Source Monitor, Animate Workflow.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to describe what adobe premiere pro is and how it can help you with your video making needs. CO2: An ability to Demonstrate installing, setting up, and working with media in adobe premiere.
- CO3: An ability to apply this In-Design training will make familiar with easily manipulating text by setting different font styles, weights and other properties and then saving the style you created to apply to other desired text within the document.
- CO4: An ability to acquire Better job opportunities, quick career growth.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M	L	M				M	M	L	H	H	L	M	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Fluid Simulation for Computer Graphics –Robert Bridson
2. Computer Graphics – Nobuhiko Mukai
3. Design, Animate & Create with Computer Graphics –by Max Wainewright

<b>BVI013A</b>	<b>Design Project I - Storyboard Design</b>	<b>0-6-0[3]</b>
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### Objective

- Student will be able to serves as an outline of the design approach.
- It defines the elements that need to go on each page or movie frame.
- Students will be able to critical study of cinema inform their filmmaking and that the study and practice of film production enhance their work as film scholars and analysts.
- Students will be able to understand the pre-production, production, and postproduction filmmaking process.

<b>Unit 1</b>	Introduction to Story board design, brief on manual process of development. Difference of the Basic Templates and understanding the utility in animation video.
<b>Unit 2</b>	Manual Designing and composition. Importance of Color/BW. The usage of Light & Shadow. Illustrating the actions in accordance to storyboard design.
<b>Unit 3</b>	Conventions of the Camera movements. Shot Selections and understanding. Methods of Montage, Edit and Dynamic Design.
<b>Unit 4</b>	The Sequencing of frame wise design & time management. Introduction and merger of Special Effects. Dialogue based content development.
<b>Unit 5</b>	UX based design thinking & execution. Story Board for interaction design.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to present a clear picture of what will be happening throughout the entire site, what each page will look like, and what each team member/developer will do.
- CO2: An ability to draw detailed information on graphics, text, video, sound, audience interaction, colour, type fonts, type size, etc.
- CO3: An ability to conduct film research and compose cogent, persuasive, and valid essays about film.
- CO4: An ability to demonstrate the relationship between film form and aesthetic effect through both film analysis and the creation of motion pictures.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H		L	H	L			L	L	M				M	L		
CO2	H		L	H	L			L	L	M				M	L		
CO3	H		L	H	L			L	L	M				M	L		
CO4	H		L	H	L			L	L	M				M	L		

H = Highly Related; M = Medium L = Low

**Recommended Text:**

1. Story: Substance, Structure, Style and the Principles of Screenwriting by Robert McKee
2. The Way of the Storyteller by Ruth Sawyer

**Reference Books:**

1. Comic Book Design: The Essential Guide to Creating Great Comics and Graphic Novels Gary Spencer Millidge
2. Storyboard Design Course: Principles, Practice, and Techniques; book by Giuseppe Cristiano

<b>BVI014A</b>	<b>Strategic Communication &amp; Consumer Behavior</b>	<b>2-0-0[2]</b>
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### Objective

- 1- Student will develop Market understanding and understand consumer behavior.
- 2- Understanding the deference between needs, wants and demands.
- 3- How to plan strategically according to the consumer behavior.
- 4- Learn how to create a design in way it triggers impulsive buying.
- 5- Study top business models and their insides which triggers the consumer behavior.

<b>Unit 1</b>	Introduction to the types of market, knowing the Consumer & Target Audience. Understanding the demand and supply chain for expected buyers.
<b>Unit 2</b>	The Strategic planning, Variations according to the business module. The mode of communication for influencing consumer decisions. Research and Development for expected buyers knowing the inflow and limitations. Key factors of Consumer Behavior impacted by communication strategy; Awareness, Choice, Preference, Accountability and Personalization.
<b>Unit 3</b>	Approaches of Consumer Behavior .Models of Consumer Behavior. Study of the Buying Behavior of consumer– Routine response, Limited Decision Making, Extreme Decision Making and Impulsive Buying.
<b>Unit 4</b>	Relationship between customers and business by communication skills. Defining communication as a core driving force for emerging business modules. Persuasive Communication and its types – Ethos, Logos & Pathos.
<b>Unit 5</b>	The channels of communication in an organization, Personal, Broadcast Media, Mobile, Electronic and written. Building strategic communication for “Business to Business” model & “Business to Customer” model.

### Course Outcome

At the end of this course students will have:

- 1- An ability to understand markets and consumers.
- 2- An ability to develop an understanding between needs, wants and demands.
- 3- An ability to plan strategically according to the consumer behavior.
- 4- An ability to create a design in a way it triggers impulsive buying.
- 5- An ability to understand top business models and their insides which triggers the consumer behavior.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	M	M										M				M
CO2	L	M	M										M				M
CO3	L	M	M										M				M
CO4	L	M	M										M				M

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Strategic Communications for PR, Social Media and Marketing, by Laurie J. Wilson, Joseph Ogden
2. Strategic Integrated Marketing Communications, 2<sup>nd</sup> Edition, by Lary Percy
3. Strategic Integrated Marketing Communications, 3<sup>rd</sup> Edition, by Lary Percy
4. Integrated Marketing Communication: Creative Strategy from Idea to Implementation, by Robyn Blakeman

BVI015A	Photography II	0-4-0[2]
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#### Objective

- Student will be able to Develop knowledge of principles of aesthetics and visual communication and integrate these principles creatively in still and motion based images and in new media storytelling.
- Demonstrate thorough knowledge and application of DSLR camera techniques for capture of both still, time and video based imagery.
- Develop a thorough and adaptable knowledge of software used in digital imaging and new media storytelling.
- Develop complete digital imaging workflow that includes capture, post processing, ethical considerations of digital techniques based on genre and asset management techniques from image capture to image archive.

Unit 1	Advance features of camera operating. Module based photo-shoot. Portrait photography: manipulation in techniques & skills.
Unit 2	Learning Subjective photography – Macro, Figure, Nature, Fashion, Sports & action, Still & Moving, Architectural Product etc. with technical advancements in camera techniques.
Unit 3	Lenses variation in photography – procedure of Multiple Lense and fix Lense photography. Flash light study in day & night shoot, its limitations & benefits. Understanding Image Sensors.
Unit 4	Panoramic Photography technique. Nightscapes and light trails- long exposure photography. Panning and motion capture style. Controlling the Tonal Balance according to color temperature, Light source & its angels and the exposure value.
Unit 5	Understanding the grading according to the production. The Generation loss adjustments and reproduction techniques. Advance Gadgets and their understanding according to the utility.

#### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to understand professional practices, communications, organizations and career opportunities in the field of professional photography.
- CO2: An ability to identify the primary working methods (conceptual and illustrative vs. journalistic and found moment) within different genres of photography in order to understand ethically acceptable images.
- CO3: An able to apply effective lighting techniques in natural, artificial and mixed lighting in a variety of photographic areas including product, still life and portraiture.
- CO4: Develop a professional body of work and appropriate support material such as website and marketing materials, to showcase personal vision and technical skills.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H		L	H	L			L	L	M				M	L		
CO2	H		L	H	L			L	L	M				M	L		
CO3	H		L	H	L			L	L	M				M	L		
CO4	H		L	H	L			L	L	M				M	L		

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Understanding Exposure: by [Bryan Peterson](#).
2. The Beginner's Photography Guide by Chris Gatcum
3. The History of Photography by Beaumont Newhall
4. A History of Photography: From 1839 to the Present, edited by Therese Mulligan and David Wooters



BVI016A	Motion Graphics- I	0-4-0[2]
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### Objectives

- Student will be able to learn and use adobe illustrator tools and techniques.
- Student will be able to Learn to create charts, icons and 3D typography.
- To learn to create animated stories with a basic knowledge of after effects, Layers, exporting, animation techniques.
- Understand how to create graphics for Information of the Brands
- Deliver process of Product with minimalist information
- Create and work with key frames, add animation and other effects

<b>Unit 1</b>	Advanced Pen Tool Tricks, create icons and typography with Advanced Pen Tool Tricks and Live Shape Effects, multiple strokes to a path, 3D in Adobe Illustrator CC, Semi flat 3D icons & UI design using Adobe Illustrator.
<b>Unit 2</b>	How to make a pie chart line graph & bar graph, Linocut effect, 3D gradient lettering, 3D Ribbon, Puppet Warp Tool settings.
<b>Unit 3</b>	Animated GIF using Adobe Illustrator, Character designing, Mascots, Scenes developing export techniques.
<b>Unit 4</b>	Introduction to after effects, Layer management, exporting, Basic animation techniques.
<b>Unit 5</b>	Create animated story, animation with puppet tool, exporting animation and editing with adobe premiere, sound recording and cleaning process with adobe audition.

### Course Outcome (CO)

At the end of this course students will have:

- CO1: An ability to communicate with the viewer, and add depth to the story by linking text with graphics for better visualization  
CO2: An ability to demonstrate installing, setting up, and working with media in adobe after effects  
CO3: An ability to bring brand to life by using your colors, visuals, & Brand Policies.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M		M				M	M	L	H	H	L	M	L		
CO3	H	M		M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. The Theory and Practice of Motion Design: Critical Perspectives and Professional Practice, by R. Brian Stone & Leah Wahlin
2. Motion Graphics, Principles & Practices from Ground up, by Ian crook & Peter Beare
3. The History of Motion Graphics; from Avant-Garde to Industry in United States, by Michael Betancourt

<b>BVI017A</b>	<b>Advertising Film Making</b>	<b>0-4-0[2]</b>
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### Objectives

- 1-Student will be able to learn the tools and techniques of adobe Premier.
- 2- Student will be able to learn importing and after effects.
- 3- Student will be able to learn editing
- 4- Student will be able to learn sound compilation
- 5- Student will be able Basic understanding of color grading and lumetric color and LUT's

<b>Unit 1</b>	Introduction to Adobe Premier
<b>Unit 2</b>	Importing footage to Premier, understanding the use of after effects with Premier for Video Compositing
<b>Unit 3</b>	Video Editing for Documentary
<b>Unit 4</b>	Taking footage to the sequence for Ad making with sound compilation
<b>Unit 5</b>	Giving final touch by Color Grading and understanding of Lumetric Color and LUT's

### Course Outcome (CO)

At the end of this course students will have:

- CO 1 An ability to, understand the use of after effects with Premier for Video Compositing. CO 2 An ability to demonstrate their knowledge on video editing in their projects.
- CO 3 An ability to develop taking footage to the sequence for Ad making. CO 4 An ability to develop final touch by Color Grading.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1		L	L			H	H			L	M	H		L	L		L
CO2	H		L	M				M	M	L	H	H	L	M	L		
CO3		M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Hope for Film, by Ted Hope with Anthony Kaufman
2. David Mamet on Directing Film
3. The Filmmaker's Handbook: A Comprehensive Guide for the Digital Age, by Ascher, Steven, Pincus, Edward

<b>BVI018A</b>	<b>3D (Modeling &amp; illustration)</b>	<b>0-6-0[3]</b>
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**Objective –**

- Student will be able to develop the skill & knowledge in 3D Modeling & illustration.
- Students will understand the knowhow and can function either as an entrepreneur or can take up jobs in the multimedia and animation industry, video studios, edit set-up and other special effects sectors.

<b>Unit 1</b>	3DS MAX UI, Viewport navigation, Create versus modify objects, Selections, Transformations, Pivot Point, Transformation settings, Object duplication, Basic scene management.
<b>Unit 2</b>	Modifiers for modify objects, Layer management, Snapping, Align objects, Arrays,
<b>Unit 3</b>	Introduction to splines, Spline vertex types, Spline modification, Spline Boolean operation, Cross-insert and weld, product modeling with spline
<b>Unit 4</b>	Primitive versus editable objects, Introduction to editable poly, Sub-object selection, Edge modeling techniques, Cut and slice techniques, Polygon modeling techniques.
<b>Unit 5</b>	Modeling product, packaging, branding and Basics of Character design with poly modeling.

**Course Outcome (CO)**

Student will be able to

CO 1 -

CO 2-

CO 3-

CO 4-

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. 3D Animation Essentials by Andy Beane
2. 3D Art Essentials by Ami Chopine

**Reference Books:**

1. Understanding 3D Animation Using Maya by John Edgar Park
2. Basics Animation: Digital Animation by Andrew Chong

<b>BVI019A</b>	<b>Design Project- II Branding &amp; Corporate Identity</b>	<b>0-6-0[3]</b>
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### Objective

- The course will help the students to explore how communication strategies and branding programs are developed and executed in contemporary design practice, which include their extension across a range of applications.
- In this subject, students learn to assess the goals, initiatives, missions and values of a client and communicate the essence of their business visually through signs, symbols, typography, colour and design.
- In addition to creating a corporate identity, they learn to create a brand identity system
- Students learn about the functions of branding through the study of companies' visual identity system that communicates the characteristics of the organisation.

<b>Unit 1</b>	Indicative content. Foundations of branding and evolution of branding concept.
<b>Unit 2</b>	Brand development process; role of insight; understanding values, positioning and essence; brand equity communicating the brand; emotional approaches; communication tools.
<b>Unit 3</b>	Managing the brand portfolio; brand architecture and hierarchy. Brand identity design process; corporate brand identity; role of design; communicating differences. Developing brand touch points; names; packaging; logos.
<b>Unit 4</b>	Brand identity analysis; interpreting the visual manifestation of brand identity. Brand extension; rationale, benefits and risks; distancing techniques; co-branding.
<b>Unit 5</b>	Luxury branding; Veblen effects; communicating values. Services and retail branding; managing the environment. Why branding is important in marketing.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to identify the value of brand strategies.
- CO2: An ability to differentiate branding projects with different forms of identity applications.
- CO3: An ability to generate a branding strategy for a branding program, apply creativity and critical thinking ability on input of new ideas to create a corporate identity system.
- CO4: An ability to demonstrate the ability to handle a range of extended branding applications.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2		M	L	M					M		H	H	L	M	L		
CO3		M	L	M					M		H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. [Brand Bible: The Complete Guide to Building, Designing and Sustaining Brands](#) by Debbie MillmanEditor
2. [Designing Brand Identity, 4th Edition](#), byAlina Wheeler
3. [How Brands Become Icons](#), byDouglas B. Holt

<b>BVI021A</b>	<b>Packaging Design</b>	<b>4-0-0[2]</b>
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### Objectives

- 1- The student will be able to get detailed knowledge of packaging design, and skills like patterns, prints and styles of packaging, and basic understanding of value & position of tags & labels.
- 2- To be able to create story and information of the product on packaging.

<b>Unit 1</b>	Introduction to Packaging Design. Logical thinking about the patterns & style of packaging. Creative process Expressions. Introduction to Tags & Labels design, and their utility.
<b>Unit 2</b>	Understanding of Mass versus Prestige packaging. Tangible Visual Marketing – mode & types. Pattern Design.
<b>Unit 3</b>	Typography choice in Packaging .Testing the selected Design. Choosing a form for communicating the Brand. Utility and viability of using Eco-friendly material in packaging. Branding and packaging –Types of packaging .Stock versus Custom Packaging.
<b>Unit 4</b>	Material, Textures & finishes, Shelf appeal & consumer response. Illustration and Photography.
<b>Unit 5</b>	Branding Product line. Ultimate Project submission, Presentation & final layout with Labels and Tags for it.

### Course Outcome (CO)

At the end of this course students will have:

CO1: An ability to develop an understanding of packaging design. CO2: An

ability to Learn skills like patterns, prints, lay outing.

CO3: An ability to learn value & position of tags & labels.

CO4: An ability to take decision upon typography & material of the packaging according to the product and develop a sense for sustainable model of packaging.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L			M		M	L			L	M	H		L	L		L
CO2	H	M	L	M				M	H	L	M	H	L	H	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

  
 DEAN  
 Jaipur School of Design  
 JECRC University JAIPUR



### Reference Books

1. What is Packaging Design? BY Giles Calver /RotoVision, 2004
2. Package Design Workbook: The Art and Science of Successful Packaging BY Steven DuPuis, John Silva / Rockport Publishers
3. 1,000 Package Designs: A Comprehensive Guide to Packing It In BY Grip / Rockport Publishers
4. Basic Packaging / Advance Packaging / Complex Packaging published by Pepin Press
5. The Big Book of Packaging Prototype, by Edward Denison and Richard Cawthroy

<b>BVI022A</b>	<b>Motion Graphics II</b>	<b>0-6-0[3]</b>
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### Objectives

- 1- To learn and use Animation tools and techniques.
- 2- Learn to create charts, icons and 3D subject & object.
- 3- To learn to create animated stories with a basic knowledge of after effects, Layers, exporting, animation techniques.

<b>Unit 1</b>	How to work with Text on Path, How to Animate Text on Path, How to Create Per Character Animation, Multi-line pre-sets, Presets Practice Activity ,The Concept and Properties of Masks, Using the Mask Properties, Animating Masked Layers.
<b>Unit 2</b>	Intro and Setting up the workspace for 3D work, Using the 3D Rotation Property, Using the Null Object in 3D, Beyond the Camera, Random with Orientation.
<b>Unit 3</b>	How to create a Camera Layer - Properties and Presets, Understanding the Lights Properties.
<b>Unit 4</b>	How to Create and Save Your Animation Presets, Basics of camera tracking technique, Motion Graphics Template editing workflow.
<b>Unit 5</b>	Plugins character animation and advanced animation with expressions, exporting your Composition as GIF and movie sequences. E-learning videos flow chart.

### Course Outcome (CO)

At the end of this course students will have:

- CO 1 - An ability to use Animation tools and techniques for creating charts, icons and 3D Object. CO 2- An ability to Make GIF, with the basic motion & movie sequences.
- CO 3- An ability to learn camera tracking & create animated stories.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1		M	L			L	L			L	M	H		L	L		L
CO2	M	L	L	M				M		L		H	L	M	L		
CO3	H		L	H					M	L	H	H		M	L		
CO4	L	M	M	L	M			L		L		L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. The Theory and Practice of Motion Design: Critical Perspectives and Professional Practice, by R. Brian Stone & Leah Wahlin
2. Motion Graphics, Principles & Practices from Ground up, by Ian crook & Peter Beare
3. The History of Motion Graphics; from Avant-Garde to Industry in United States, by Michael Betancourt

<b>BVI024A</b>	<b>3D (Texturing &amp; Rendering)</b>	<b>0-6-0[3]</b>
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### Objectives

- Provides an introduction to creating, editing, and analyzing 3D models.
- Develops foundational skills to work with, and navigate the digital 3D modeling workspace to create 3D objects. Examines basic elements of the 3D development of modeling, texturing, lighting, animating, and rendering.

<b>Unit 1</b>	Introduction of material editor, UVW mapping, Unwrapping technique and texture painting with Photoshop.
<b>Unit 2</b>	Materials types, advanced ray tracing techniques,
<b>Unit 3</b>	Introduction of light types, 3 point lighting theory, Render engines, types of light in 3d max, Parameters and 3d environment visualization
<b>Unit 4</b>	Image based Lighting, Rendering techniques, Daylight system, Global illumination and Final gathering pixel in mental ray.
<b>Unit 5</b>	Render Passes, Compositing workflow, Format exporting frame types.

### Course Outcome (CO)

At the end of this course students will have:

- CO1: An ability to Work with and navigate the unique features of the digital 3D modeling workspace to create 3D objects.  
CO2: An ability to Identify characteristics of rendering 3D objects for optimal system processing and analysis. CO3: An ability to Create a 3D environment featuring lighting and textures.  
CO4: An ability to Create basic 3D models and animations.  
CO5: An ability to Evaluate digital 3D projects, identify items for improvement, and implement changes.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1			L	M		L	H				M	H		M	L		L
CO2	H	M	L			L		M	M			H	L	M	L		
CO3	H	M		M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Recommended Text:**

1. Animation: The Whole Story- Howard Beckerman
2. The Illusion of Life: Disney Animation, Ollie Johnston and Frank Thomas, Publisher: Disney Editions; ISBN-10: 0786860707

**Reference Books:**

1. Animation Book, Kit Laybourne, Three Rivers Press, ISBN-10: 0517529467
2. The Animation Book: A Complete Guide to Animated Filmmaking--From Flip-Books to Sound Cartoons to 3- D Animation, Three Rivers Press; ISBN-10: 051788602
3. The Animator's Survival Kit, A Manual of Methods, Principles and Formulas for Classical, Computer, Games, Stop Motion and Internet Animators, Richard Williams, Publisher: Faber & Faber; ISBN-10: 0571238343, ISBN-13: 978- 0571238347
4. Animation Art: From Pencil to Pixel, the world of Cartoon Anime and CGI- Jerry Beck

BVI027A	Web Designing	0-4-0[2]
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### Objective

- Student will gain the skills and project-based experience needed for entry into web design and development careers.
- Student will be able to use a variety of strategies and tools to create websites.
- Student will develop awareness and appreciation of the many ways that people access the web, and will be able to create standards-based websites that can be accessed by the full spectrum of web access technologies.

Unit 1	Introduction to HTML Language, Web applications, Web Structure, About the software, Workflow in Dreamweaver, User interface, About views, Browser, references, Text, Formatting's HTML Styles, About tags, Tag inspector, Code view, About paths, Absolute path, Images, Image Mapping.
Unit 2	Tables, Table properties – table size, Headers, Insert ,delete rows/columns, Split & Merge cells, Cascading style sheets ( CSS Styles), Types of styles, Rule Definition – category wise, CSS Styles, Text, Paragraph, Image, Frameset- Page from sample, Frameset, Frameset Properties, Saving Frames, Linking Framesets, Forms, Text field, Checkbox, Radio Button, Labels, List/Menu, Submit, Other applications, Insert Media, Flash files, fly files, Sound files, Snippets - snippets panel, Adding new snippets, Making a web page with snippets, Spry Assets, Types of spry assets, Making web pages using spry assets, Behaviours, Actions and events, adding behaviours and testing, Layout pages - Div tag, Define CSS rules for div tag, Use Templates , About AP elements, Working with AP Elements, Links, Text, email Links, Anchor link, Image, Image maps.
Unit 3	Testing web site, Defining local server, Creating local web address using IIS, Installing IIS, Creating virtual folder, setting the local path and home page. Defining FTP Server, Uploading websites, Updating websites , Assets Panel , site panel, Project work- Make websites, Mobiles, Educational organizations, Restaurants& for Companies, Project
Unit 4	<b>Web fundamentals</b> - Platform issues (Windows, Mac), Web standards and the end user (size, colour, etc), HTML fundamentals. <b>Features of the product</b> - The Interface (workspace), Previewing in browsers, Validate HTML Code and Check browser compatibility, The Toolbars, The Panels, The Property Inspector, The document window. <b>Site creation and management</b> - Defining the Local site, The Files panel and the Site Window, Remote and Local site view and management, Put and Get files (uploading and downloading), Check in and Check out as part of management strategies.

<b>Unit 5</b>	<p><b>Web pages creation and basic definition</b> - Creating a new page, Page Properties, Colour in Dreamweaver (the colour palette), Document type (DTD), The Head content.</p> <p><b>Page composition</b> - Working with text in Dreamweaver, Basic formatting with the Property inspector, HTML and CSS mode for text formatting, Text with CSS and the CSS panel, Creating, editing and managing CSS styles, Ordered and unordered Lists, Text indent and outdent, Special characters.</p> <p><b>Navigation</b> - Links and URL (absolute versus relative links), Local, External and Email links, Vertical navigation with name anchors in Dreamweaver, Targeting links.</p> <p><b>Working with graphics</b> - Image formats, Inserting images in Dreamweaver, Image properties, Images and text blocks, Titling with the Alt text box (accessibility attributes).</p> <p><b>Navigating with Graphic elements</b> - Images as buttons, Rollover effects, and Image maps. <b>Working with tables</b> - Inserting tables, Table properties, and Cell, column and row properties, Tables as layout strategy, Inserting and managing content inside tables.</p> <p><b>AP Elements / Layers</b> - AP Elements panel, Drawing/inserting AP Elements on page, AP Elements properties inspector, Layouts with AP Elements.</p> <p><b>Working with Assets</b> - The Assets panel, Categories in the Assets panel, Favourites in the Assets panel, placing content from the Assets panel into pages, Reusable items (The</p>
	<p>Library, Creating, and managing and editing library items.</p> <p><b>Templates</b> - About Templates, The Templates panel, creating basic templates, Assigning editable regions, Inserting content into templates, creating documents based on existing templates, Using and editing templates.</p>

### Course Outcome (CO)

At the end of the course students will have:

- CO1 AN Ability to develop an understanding of the formalistic (aesthetic) aspects of design and visual communication. CO2 AN Ability to demonstrate cross-platform (web, mobile, broadcast, print) storytelling skills.
- CO3 AN Ability to become familiar with graphic design and/or game theory and be able to apply this theory to real world projects.
- CO4 AN Ability to develop and understanding of information design and usability as it applies to interactive media projects.


### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
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CO1	M		H	M		L	H	M			L	H		M	L		M
CO2	H	M				L		M	H			H	L	M	L		
CO3	H	M		M				M		L	H		L	M	L		
CO4	L	M		L	M			L		L	M				M	H	H

H = Highly Related; M = Medium L = Low

### Reference Books

1. Web Designing, by HirdeshBharadwaj
2. The Principles of Beautiful Web Design, by Jason Beard& James George
3. Fundamental Web Design & Development Skills, by Rachel Andrew, Crystal Waters &Chris Ullman

  
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BVI035A	Entrepreneurship	2-0-0[2]
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#### Objective

- Be able to apply problem solving approaches to work challenges and make decisions using sound Design methodologies
- Be able to apply a systematic design approach to commercial projects and have strong design and research skills in the chosen discipline specialization
- Communicate effectively across all modes: listen, speak, write and draw
- Balance the technical, economic, social and ethical demands of a problem in sustainable and culturally sensitive ways.

<b>Unit 1</b>	Introduction to Entrepreneurship -Entrepreneur- meaning, importance, Qualities, nature, types, traits, culture, similarities and economic differences between Entrepreneur and entrepreneur. Entrepreneurship development, its importance, Role of Entrepreneurship, entrepreneurial environment.
<b>Unit 2</b>	Evolution of Entrepreneurs - Entrepreneurial promotion, Training and developing motivation factors, mobility of Entrepreneurs, Entrepreneurial change, occupational mobility factors in mobility, Role of consultancy organizations in promoting Entrepreneurs, Forms of business for entrepreneurs.
<b>Unit 3</b>	Creating and starting the venture - Steps for starting a small industry- selection of types of organizations. Managing, growing and ending the new venture - Preparing for the new venture launch-early management decisions Managing early growth of the new venture-new, venture expansion strategies and issues, going public ending the venture.
<b>Unit 4</b>	Entrepreneurship Development and Government - Role of Central Government and State Government in promoting Entrepreneurship, Introduction to various incentives, subsidies and grants, Export Oriented Units. Fiscal and Tax concessions available. Women Entrepreneurs Reasons for Low/no women Entrepreneurs, their Role, Problems and Prospects
<b>Unit 5</b>	Project Management – Introduction to project management, principles of management, establishment and financial implications, project resourcing, time management

#### Course Outcome (CO):

At the end of this course students will have:

CO1: An ability to describe product/project development and the associated business processes. CO2: An ability to describe team operation and its dynamics.

CO3: An ability to communicate effectively in writing (both textually and graphically). CO4: An ability to undertake self-directed study.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M	L	L	H			L		L	M	L	H	M	L		H
CO2	H	M	M	M	M	L		L	L	M	M			M	L	L	M
CO3	L	L	M	M	L	L	L	M	M	H	H	H	H	M	L	M	
CO4	L	L	M		H	L	L			L	H	M	L	H	L	L	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Entrepreneur development of small business by Poornima Charatimath
2. General theory of Entrepreneurship by Shane and Scott
3. Entrepreneurship, starting, developing and managing a new enterprise by Peters-Hisrich
4. NICMAR Construction Machines & Equipment, 1990
5. James D Steven, Techniques for Construction Network Scheduling, McGraw Hill Book Co.
6. R.I. Peurifoy, Construction Planning Equipment and Methods, McGraw Hill, 2007
7. L.S. Srinath "Pert and CPM" Orient Longman.
8. Construction Management and Accounts – S.P. Chandola

BVI037A	Portfolio Development	0-6-0[3]
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#### Objective

- Design portfolio is the expression of student to translate themes into design. Here one gets inspired by different themes which could be art movements, sport, historic eras, music, dance, culture, nature, traditions etc. and picks out tangible and intangible elements which are to be used as design elements in the collection. The ability of a designer to exhibit and use design elements is highlighted which is further translated into projects. A portfolio is an exhibit of the overall knowledge of the student work which he/she has gained through the course of four years. The purpose lies in promoting the skills of students in a single format.

<b>UNIT 1</b>	Students will present a portfolio of all the files/ folders/ projects created during study in I to III year. The portfolio should include projects, industrial visit reports, any other projects made during the academic session. The external examiner will evaluate the portfolio and take a viva of the student. A Copy of Portfolio must be submitted with the department at the time of final assessment.
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#### Course Outcome (CO):

At the end of this course students will have:

- CO1 Students will present a portfolio of all the files/ folders/ projects created during the course of study in I to III year. The portfolio should include projects, industrial visit reports, any other projects made during the academic session. The external examiner will evaluate the portfolio and take a viva of the student.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M	L	L	H			L		L	M	L	H	M	L		H
CO2	H	M	M	M	M	L		L	L	M	M			M	L	L	M
CO3	L	L	M	M	L	L	L	M	M	H	H	H	H	M	L	M	
CO4	L	L	M		H	L	L			L	H	M	L	H	L	L	H

H = Highly Related; M = Medium L = Low

#### Reference Books

  
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<b>BVI040A</b>	<b>OFFICE TRAINING (INTERNSHIP)</b>	<b>0-26-0[13]</b>
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#### **OBJECTIVE**

- To encourage students to work in with relevant industries.
- An avenue to enhance academics learning through hands on work experience.
- Get advice on career from knowledgeable and experienced professionals.
- Gain exposure to a professional work atmosphere.

<b>UNIT 1</b>	<p>In the VI semester, student will undergo a 12 weeks training in a Graphics designing industry /manufacturing unit/ Graphics export unit so that they can understand the existing working practices, conditions and acquire an in depth technical knowhow.</p> <p>The student shall prepare a report on the training given by the organization He/she will submit the report. The student has to submit the certificate regarding successful training with the organization.</p> <p>A Copy of Report has to be submitted with the department along with the performance certificate issued by the firm Manager/ Owner and one with the Firm (where internship is pursued).</p> <p>After the Internship, student has to appear in front of jury members for a presentation seminar, who will judge the performance based on their presentation, report &amp; Viva-voce and award marks to student.</p> <p>Project Report to be submitted</p> <p>Background of industry Number of employees</p> <p>Project detail on which assisted Task and deadlines Manufacturing process</p> <p>Hand &amp; Computer sketches</p> <p>Experience</p> <p>Any other details</p>
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#### **Course Outcome (CO):**

At the end of this course students will have:

CO1: An able to place themselves and their work in the context of their selected discipline CO2: An understand their specialist area and the career opportunities available

CO3: An understand how to promote themselves and their work professionally.

CO4: The aim of this unit is to extend learners' knowledge of professional practices within their specialist area and to relate these to personal goals and career opportunities.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M		H	M		L	H	M			L	H		M	L		M
CO2	H	M				L		M	H			H	L	M	L		
CO3	H	M		M				M		L	H		L	M	L		
CO4	L	M		L	M			L		L	M				M	H	H

H = Highly Related; M = Medium L = Low

<b>BVI034A</b>	<b>Intellectual Property and Protection</b>	<b>3-0-0 [3]</b>
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#### OBJECTIVE

- This paper is designed to introduce students to the Intellectual Property and its protection along with the registration process.
- The aim is to provide comprehensive knowledge of different types of Intellectual Property and its management.
- To aware about current trends in IPR and Govt. steps in fostering IPR

UNIT 1	Unit 1 – Introduction to IP - Historical and philosophical background of Intellectual Property – Industrial Property, Artistic and Literary Property, Need for IPR. Rationales for protection of IPR, IPR in India – Genesis and Development, International IPR - Organisations, Agencies and Treaties.
UNIT 2	Unit 2 – Patents - Trips Definition, Kind of inventions protected by Patent – Patentable and Non Patentable inventions, Process and product patent, double patent- patent addition, Legal requirements for patents, Granting of patents – Rights of a Patent Exclusive Right. Patent Application Process: Searching a patent, Drafting, Filing a patent. Types of Patent Applications – Patent Document: Specification and Claims. Commercial Exploitation of IP – Assignment, licensing, infringement.
UNIT 3	Unit 3 – Trademarks – Trademarks and Industrial Designs for increasing the power of marketing - The value of a brand, create brands through trademark. Strengthening brands through industrial design, How to protect trademark and industrial design - The value of registration, Basic steps for registration, Multi-protection. Trademark management – Trade Mark Audit.
UNIT 4	Unit 4 – Copyrights – Rights and Protections covered by copyright. Law of Copyright : Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publically, copyright ownership issues, obtaining copyright registration. Infringement of copyright under copyright act.
UNIT 5	Unit 5 – Industrial Designs- Design Patents - Protection, kinds of Protection is provided by industrial designs, integrated circuits, Patentable and Non Patentable Industrial Designs, Design patents vs. Utility Patents Advantages & Disadvantages of Design patent, The Industrial Design Patent Application Process.
UNIT 6	Trade Secrets – Trade Secret Law, Determination of a trade secrete status, liability for misappropriations of trade secrets, protection of submission. Trade Secret Litigations.
UNIT 7	Institutional Capacity – IP Policy Making and Legislation, IPR Administration and Institutions, Examination versus Registration systems, Regional and International Co-operation, The Cost of IP System, Meeting the Costs, Technical Assistance & Capacity Building, International Standard Setting: WIPO and WTO

### COURSE OUTCOME (CO)

At the end of this course students will be able to :

- CO1 Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems and analyse the social impact of intellectual property law and policy.
- CO2 Analyse ethical and professional issues which arise in the intellectual property law context CO3 To catch up Intellectual Property (IP) as a career option
- R&D IP Counsel
  - Government Jobs – Patent Examiner
  - Private Jobs
  - Patent agent and Trademark agent
  - Entrepreneur
- CO4 Will be able to differentiate between the original and duplicate work on the basis of ownership of the IP. CO5 Protect the originality of the assignments and will be able to generate better revenues with IP ownership.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	H				L		M		M			H	M		H
CO2	H		M	L								H			H
CO3		M				M		M			H		M		
CO4									H		H				M
CO5	M					M			H						

H = Highly Related; M = Medium L = Low

### Text Books

- Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited.
- Neeraj, P., &Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.

### E-resources

- Subramanian, N., &Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from <http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf>
- World Intellectual Property Organisation. (2004). WIPO Intellectual property Handbook. Retrieved from [https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo\\_pub\\_489.pdf](https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf)

### Useful Website

- Cell for IPR Promotion and Management (<http://cipam.gov.in/>)
- World Intellectual Property Organisation (<https://www.wipo.int/about-ip/en/>)
- Office of the Controller General of Patents, Designs & Trademarks (<http://www.ipindia.nic.in/>)

GDD001A	DESIGN FOUNDATION	0-0-8[4]
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#### PREREQUISITE OF THE COURSE ---Drawing skills

#### AIM

To make students see, make and appreciate the basic design concepts. The first level includes the vocabulary of design and principles of composition. This level includes 3D composition and study of Volumes. The aim of this course is to understand the method of visualizing and drawing from nature, cast and product drawing. Learners will be introduced to a brief history and introduction to 3D materials, tools and processes and made aware of the range of possibilities of different materials in their 2D and 3D application to design. This may be done through lectures / ppt presentations / swatches/ samples. The aim of this unit is to enable learners to develop knowledge and understanding of the issues that have informed debate on the purposes and processes of design. This unit aims to give learners opportunities to develop skills and knowledge in the development of new products or services in design pathways.

#### OBJECTIVE

- Know the phases of the design development cycle
- Skill in color mixing and fine color-discernment.
- Know in principle the physics of color (light), the chemistry of color (pigment), and the impact of color (psychology).
- Practice and develop rendering and presentation techniques in design presentations.
- Recognize the relationship between lighting, surface and perception.
- Student will be able to understand design & principles of composition & 3D compositions
- Student will be able to understand the methods & techniques of visualization & drawing.
- The student would be exposed to appreciation of drawing different products.
- Student will be able to understand basics of design concepts

**UNIT 1**      **THEORY-** Elements of Design- Point, Line, Characteristic of Line, Types of Line, Shapes, Categories of Shape, Space, Categories .  
**PRACTICAL-** Elements of design- Types of Lines, Line Compositions, Different types of Shapes- Geometric, Organic, Free-form, Natural, and Shape, composition, Positive & Negative. Textures- Physical & Visual, Texture Composition, Form Space-Positive & Negative.

**UNIT 2**      **THEORY-** Principle of Design- Balance, Types of Balance, Emphasis, Unity, Repetition, Rhythm, Pattern, Harmony, Proportion, Contrast, Functionality. Gestalt and his Concepts- Closures, Continuance, Similarity, Proximity, Alignment.  
**PRACTICAL-** Principle of design- Balance, types of balance emphasis, unity, repetition (rhythm, pattern), harmony, proportion (scale), variety (alteration), contrast, functionality.



- UNIT 3** **THEORY-** Color- Introduction to Color, Color Theory, Color Harmonies, Color Schemes, Color Wheel, Tint, Tone, Shades. Different Mediums in Art.  
**PRACTICAL-** Color- Color Wheel and color chart, Color Exploration, Color Interaction. Primary colors- Color Wheel, Color Composition, Secondary colors- Color Wheel, Color Composition, Tertiary colors- Color Wheel, Color Composition Color schemes- Monochromatic, Achromatic, Complimentary, Split Complimentary, Double-Split Complimentary Polychromatic. Tint, tone & shades- Application of Gray Scale and Black & White. Mediums in art- Pencil, Charcoal, Pastels, Water & Poster.
- UNIT 4** **THEORY/PRACTICAL-** What is Design, Philosophies and Studies of Design, Approaches to Design, Philosophies for Methods of Designing, Philosophies for the Purpose of Design, Design as a Process, Defining a Design Process, Typical Steps or Stages of the Design Process, Design and Art, Design and Engineering, Design and Production, Process Design?
- UNIT 5** **THEORY/PRACTICAL** - Drawing, Nature-drawing Composition, Free-Hand Sketching. Object drawing-2D & 3D, Human drawing- Outline Sketches, Shades & Shadow Composition, Light- Dark Tone Composition, positive and negative spaces, Product drawings; method of representing
- UNIT 6** **THEORY-** Composition, Principle of Organization, View Point Compositional Techniques, Rules of Thirds, Odds, Space, Simplification, Limiting Focus, Geometry and Symmetry  
**PRACTICAL** –View- Perspective, Isometric, Geometry- Lines & Angle bisecting, Constructing Regular & Semi Regular Tessellation, Constructing 3D Tessellation

#### COURSE OUTCOME (CO)

**At the end of this course students will have:**

- CO1: An ability to color mixing and fine color-discernment.
- CO2: An ability to know in principle the physics of color (light), the chemistry of color (pigment), and the impact of color (psychology).
- CO3: An ability to rendering and presentation techniques in design presentations. CO4: An ability to recognize the relationship between lighting, surface and perception.


#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1			H		M											M	M
CO2			H		M											M	M
CO3			M		M				L							M	M
CO4			M		M				L							M	M

  
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### TEXT BOOKS

1. Broomer, Gerald F., (1974), Elements of Design: Space, Davis Publications Inc. Worcester, Massachusetts.
2. Bruce D. Kurty, (1987), Visual imagination- An introduction of Art, Prentice Hall, New Jers.

  
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<b>GDD002A</b>	<b>BASIC ART &amp; DESIGN</b>	<b>0-0-8(4)</b>
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**Prerequisite of the Course** ---Drawing skills

#### **AIM**

Art and design stimulates creativity and imagination. It provides visual, tactile and sensory experiences and a special way of understanding and responding to the world. It enables students to communicate what they see, feel and think through the use of color, texture, form, pattern and different materials and processes. Students become involved in shaping their environments through art and design activities. They learn to make informed judgments and aesthetic and practical decisions. They explore ideas and meanings through the work of artists and designers. Through learning about the roles and functions of art, they can explore the impact it has had on contemporary life and that of different times and cultures. The appreciation and enjoyment of the visual arts enriches all our lives

#### **OBJECTIVE**

- To understand of the social, psychological, cultural, historical and commercial factors.
- Development of Graphic Skills, Ability and Comprehension. Establishing Significance of Art.
- To understand the influences on art and design activities.

<b>UNIT 1</b>	Introduction to History of Art, Design and Architecture – Pre History To Ancient Civilization, Mesopotamia, Egypt, Indus Valley, China.
<b>UNIT 2</b>	Introduction to Indian folk Art- Worli, Fadd, Madhubani, Modern Art, Blue Pottery, Fresco, Meenakari , glass mosaic, Miniature Art, Kalamkari, Inlay-Work.
<b>UNIT 3</b>	<b>Techniques &amp; Process</b> Material exposure ranging from POP, Fly-ash, Terracotta & Ceramics Clay, Wood, metal, etc.,) Techniques, Processes terminology and tools.
<b>UNIT 4</b>	<b>Techniques &amp; Process</b> Material exposure ranging from Leather, Resin, Paper, Fabric, Tissues, foil etc.) Techniques, Processes terminology and tools.
<b>UNIT 5</b>	Introduction to Photography for documentation

#### **COURSE OUTCOME (CO)**

**At the end of this course students will have:**

CO1: An ability to understand influences on art and design activities.

CO2: To understand outcomes through the interpretation and analysis of information. CO3: An ability to be able to assess, interpret and evaluate information.

CO4: An ability to be able to evaluate and present conclusions.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	M	M										M				M
CO2	L	M	M										M				M
CO3	L	M	M										M				M
CO4	L	M	M										M				M

**TEXT BOOKS**

1. Broome F. Gerald, (1974), Elements of Design, Space, Davis Publications Inc., Worcester, Massachusetts.
2. Dodson B., (1990), Keys to Drawing, North Light Publications, Cincinnati.
3. Mark W., Mary W. (1999), Drawing for Absolute Beginner, F&W Publications, Cincinnati.
4. Davis M.L. (1996), Visual Design in Dress, Prentice Hall, Canada.  
Graves M., (1951). The Art of Colour and Design, McGraw-Hill Book Company



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DEN001A	Communication Skills	Credits 2-0-2(3)
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### Course Objectives

- To enhance English language competence in reading, writing, listening and speaking.
- Switch the approach from teacher-centred to student-centred one.
- Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
- Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
- To link communication skills with the organizational behaviour.
- To inculcate skills that are very much required for employability and adjust in the professional Environment.

### Course Outcomes (CO):

**At the end of this course students will have:**

- CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
- CO2: Ability to analyze the usage of English words in different contexts. CO3: An understanding of technical and academic articles' comprehension.
- CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

### Syllabus: Theory

- UNIT 1 Basics of Organizational Communication:**  
Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
- UNIT 2 Basic Writing Skills:** Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
- UNIT 3 Composition:**, Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
- UNIT 4 Vocabulary Building:** Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
- UNIT 5 Professional and Technical Communication :** Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

### Syllabus: Lab

- UNIT 1 Basics of Organizational Communication:** Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time- management, Following Deadlines etc

  
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- UNIT 2**      **Write Dialogue from the different contexts of corporate culture:**  
Employee and Employer, Customer and Service Provider, Customer and Product Review,  
How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
- UNIT 3**      **Composition:**, Letter Writing, Email Writing, Précis Writing, Essay Writing,  
Practice sessions by using Ms Word- Following the process of Drafting-Redrafting, Proof  
Reading, Editing etc
- UNIT 4**      **Vocabulary Building:** Word Formation from one word form to another, Origin of  
Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find  
out the difference between words, similarity between words, origin of words, neologism  
concepts etc
- UNIT 5**      **Professional and Technical Communication :** Drafting                  a CV/Resume,      Practice  
Sessions on Telephonic      Interview and      Online Interview, Presenting      projects,  
proposals etc through PPT Making,

#### **Methodology for Evaluation**

- |   |   |          |
|---|---|----------|
| 1. Internal Assessment (Theory)         |   |          |
| a) Home Assignments: One from each Unit | : | 15 Marks |
| b) In Semester Tests (Minimum two)      | : | 30 Marks |
| c) Attendance                           | : | 05 Marks |
| 2. Term End (Theory)                    | : | 50 Marks |
| 3. Internal Assessment (Lab)            |   |          |
| (a) Daily Performance in the Lab        | : | 50 Marks |
| 4. Term End (Lab)                       | : | 50 Marks |

#### **Suggested Reading:**

1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
8. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006
9. More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.
10. The BBC and British Council online resources

<b>GDD071A</b>	<b>Material Exploration &amp; Sourcing</b>	<b>0-0-4 [2]</b>
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**Prerequisite of the Course** ---Basic knowledge of different material, Basic Textile (Fabric), Knowledge Market Survey

**Learning Objective:**

The main objective is to develop understanding of skills in the application of materials for different end uses. Student will develop a visual and tactile understanding of textile raw materials and fabrics enabling to evaluate performance characteristics in fibers and fabrics in relation to commodity and processing costs. Student will be required to do data collection & sourcing of samples like knitwear, performance sportswear, natural fibers or technologically led fabrics from a variety of fiber manufacturers, wholesalers and retailers in and around Jaipur.

<b>UNIT 1</b>	<b>Introduction to Material Sourcing &amp; Data Collection</b> Introduction to basic material required for fashion and textile design. Identifying customers' requirements. Pricing, lead time and trade rules. Risk assessment of raw materials.
<b>UNIT 2</b>	<b>Understanding Markets for basic fabrics &amp; weaves</b> Market survey to find out basic fabric shops in and around Jaipur. Market survey to find out weaving centers in & around Jaipur. Create a swatch book of above mention fabrics with their market price.
<b>UNIT 3</b>	<b>Understanding Markets for Decorative, Complex fabrics, &amp; weaves</b> Market survey to find out complex and decorative fabric Shops in and around Jaipur. Market survey to find out weaving artisans and handicraft stores in and around Jaipur. List out all the fabric shops and handicraft centers in detail. Create a swatch book of above mention fabrics with their market price.
<b>UNIT 4</b>	<b>Understanding markets for Laces, Buttons, and others Fasteners</b> Market visit to find out various shops of laces, buttons and others detailing in and around Jaipur. List out all the names of the shops along with their address and complete details. Small collection book of above mention detailing items with price.
<b>UNIT 5</b>	<b>Understanding markets for Fashion and textile Accessories</b> Market survey to find out small to large fashion accessory shops in and around Jaipur. Prepare the list with name of the shop along with address. Small swatch book of accessories along with their price.

**Course Outcome (CO):**

At the end of this course students will have:

CO1: To understand the raw materials for various textile uses CO2:  
To differentiate various materials

CO3: To surf the market according to the material and apply various materials according to the product CO4:  
To know famous markets and shops for material sourcing & data collection in and around Jaipur.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					L												
CO2					M												
CO3		M		M										H	M		
CO4					M											L	

**Reference:**

- FABRIC STUDIES by KVP Singh Kalyani Publishers,
- Textiles-Fiber to Fabric by Bernard P. Corbman McGraw Hill
- Advanced Textile Design by William Watsons published by crafts and hobbies (2010)
- The students handbook of practical fabric structure by H.Neville published by Crafts and hobbies (2010)
- Designing with thread: from fiber to fabric by Irene Waller Published by crafts and hobbies (1973)
- Fiber & Fabric: A Record of American Textile Industries in the Cotton and Woolen Trade, Volume 49Published1909
- <http://books.google.co.in>
- <http://www.wgsn-edu.com>



<b>GDD072A</b>	<b>Fashion Illustration-I</b>	<b>0-0-4 [2]</b>
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**Prerequisite of the Course** ---Drawing skills, Use of different mediums

**Learning Objective:**

A thorough foundation in fashion illustration is established in this course which covers the fashion figure and garment interpretation. Student's study and develop the basic structure unique to the fashion figure. Students will learn to interpret draping and surface texture of the fabric together with technical drawings.

<b>UNIT 1</b>	<b>Basic Human Anatomy</b> Basics of human anatomy, drawing of legs, feet, hands, arm etc. Practice of hands and feet, hair style and face analysis
<b>UNIT 2</b>	<b>Eight Head Theory and Stick Figure</b> Eight-head human figure, elongated eight-head human figures – 8 ½, 10 ½, and 11 ½ head. Stick figure and fleshing of the stick figure. Stylization of stick figure.
<b>UNIT 3</b>	<b>Medium Exploration and Fabric Rendering</b> Medium explorations –Color pencil shading, Charcoal, Watercolour, India Ink, Pastels, Marker. Fabric rendering – Cotton, Leather, Silk, Satin, Denim, Corduroy, wool, net, chiffon, organza and velvet. Embellishment and Prints.
<b>UNIT 4</b>	<b>Fashion Poses and Flat Drawing</b> Fashion poses, fashion figure in relation to fashion pose, drawing profile and ¾ figures. Background for the figures.
<b>UNIT 5</b>	Drawing flat sketches Developing range of women's wear for a concept

**Course Outcome (CO):**

At the end of this course students will have:

- CO1: Understand human figures proportion, movements and postures. CO2: To understand about the eight Head Theory and Stick Figure.
- CO3: To understand how to illustrate the idea of design with the skill of fashion illustration technique with different materials: charcoal, colour pencil, water colour, ink and pastels.
- CO4: Present a fashion Illustration Portfolio, identifying areas for further development and best practice.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					M												
CO2		L															
CO3					H								M				
CO4		M											H		L		M

**Reference :**

- Abing, Bina, (2007), Fashion Sketchbook, Fairchild Publications, New York.
- Allen, Anne & Seaman Julian,(2003),Fashion Drawing: The Basic Principles, Batsford Fashion Books, London.
- Barnes, Colin, (1994), Fashion Illustration: The Techniques of Fashion Drawing,MacdonaldOrbis, UK.
- M.W. Bryant,(2011), Fashion Drawing –Illustration Techniques for Fashion Designers, Laurence King Publisher
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- Mc Kelvey, K. and Munslow, J. (2007). Illustrating Fashion,New Delhi, John Wiley & Sons.
- Drudi, E. and Paci, T. (2010). Figure Drawing for Fashion Design, Amsterdam, Pepin Press.
- Borrelli, L. (2000). Fashion Illustration Now, London, Thames & Hudson.
- Abing, B. (2003). Model Drawing,New York, Fairchild Books.
- Drudi, E. (2011). Figure Drawing for Fashion Design, Amsterdam, Pepin Press.
- Riegelman, N. (2006). 9 Heads: A Guide to Drawing Fashion, London, Thames and Hudson.
- Riegelman, (2006). Colors for Modern Fashion: Drawing Fashion with Colored Markers, London, Thames and Hudson.
- Steven, S. (2010). Illustrating Fashion: Concept to Creation,New York, Fairchild Books.
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- Tate, S. L. (1995). The Complete Book of Fashion Illustration,New York, Prentice Hall Publication.
- Beer, R. (1995). Designer Guide to Girls' and Junior Apparel,New York, Fairchild Books.
- Armstrong, W., et al. (2005). From Pencil to Pen Tool: Understanding and Creating the Digital Fashion Image, New York, Fairchild Books.
- Drudi, E. (2003). Wrap and Drape Fashion: History, Design and Drawing, Amsterdam, Pepin Press.

<b>GDD073A</b>	<b>Pattern Making &amp; Garment Construction-I</b>	<b>0-0-4 [2]</b>
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**Learning Objective:**

The main objective of this module is to develop: (I) understanding of pattern making, based on body measurements, using industry standard signs and symbols. (II) To develop the understanding in the skills of garment construction techniques, creating toiles, demonstrating the safe use of equipment and relevant health and safety regulations.

<b>UNIT 1</b>	<b>Pattern Drafting</b> Introduction of Pattern Making Method of measuring body and dress form Tools of pattern making Common terms used in pattern development Method for drafting the basic pattern set (women/Kids) Torso Pattern Test fitting of patterns Dart manipulation - elementary and advanced dart manipulation. Variations of Sleeve, collar and skirt
<b>UNIT 2</b>	<b>Draping</b> Introduction to Basics of draping Grain line, preparation of muslin for draping Dress form, Key to abbreviations used in draping
<b>UNIT 3</b>	Basic Bodice Block – Front & Back Basic Skirt Block – Front & Back Skirt Variation Collar variation Yokes
<b>UNIT 4</b>	<b>Garments Construction Techniques</b> Sewing machine and parts Stitch practice. Types of stitches. Types of seams & seam finishes.
<b>UNIT 5</b>	<b>Garments Construction Techniques</b> Plackets, Pocket, Collar. Fitting a sleeve, Bodice Blocks. Darts & neckline finishes.

**Course Outcome (CO):**

At the end of this course students will have:

- CO1: To create and use a set of basic blocks and apply skills in dart and seam manipulation.
- CO2: To produce a full-scale pattern from creative designs and working drawings through Pattern making and draping technique.
- CO3: To make them familiar with sewing machine and to work proficiently on the sewing machine with the rectify simple problems of the machine.
- CO4: To understand the special skills and techniques used in the garment making with the understanding of various parts of the garment and construction of complete garment.

  
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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					L												
CO2					M												
CO3		M		M										H	M		
CO4		M		M										H	M		

**REFERENCE BOOKS**

- Armstrong, H.J. (2009), Pattern Making for Fashion Design, New York, Prentice Hall.
- Aldrich, W. (2008), Metric Pattern Cutting for Women's Wear, Oxford, Willey Blackwell Publication.
- Di Marco, S.M. (2010). Draping Basics, New York, Fairchild Books.
- Nakamichi, T. (2010). Pattern Magic, London, Lawrence King Publishing.
- Nakamichi, T. (2011). Pattern Magic- II, London, Lawrence King Publishing.
- Nakamichi, T. (2010). Pattern Magic- Stretch Fabrics, London, Lawrence King Publishing.
- Bolsner, Jane. (2010). Sewing machine basics: step by step course for first stitcher London UK. CICO books.
- Phillips, Charlene. (2011). The Sewing machine classroom: Learn the ins and outs of your machine. WI, USA. Krause publication.
- Kunkel, Karen .E. (1998). The Complete Sewing Machine Handbook. NY. USA. Sterling Publishers.
- Giordano, John. (1997). The Sewing Machine Guide. Newtown, CT. USA. Taunton Press.
- Editors of Readers Digest. (1997). Complete guide to Sewing (revised & updated). NY USA. Readers Digest Publication.
- Smith, Alison .(1999).Complete Book of Sewing. Dorling Kindersley.

**ONLINE RESOURCES**

- <http://www.vogue.com>
- <http://www.style.com>
- <http://www.wgsn-edu.com>
- <http://www.Craftsy.com>
- <http://www.Fiber2fashion.com>
- <http://www.wgsn-edu.com>

<b>GDD074A</b>	<b>Computer Application – I</b>	<b>0-0-4 [2]</b>
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**Prerequisite of the Course** ---Basic Computer skills

**Learning Objective:**

The main objective of this unit is to learn how to Use Computer with User friendly. Student will learn documentation, spreadsheet, presentation and web surfing with security.

They will learn the technique of Creating Mood Board, Color Board, Picture placement and Picture blending by Photoshop and Corel Draw.

They will also understand how to create Flat drawing and specification sheet.

<b>UNIT 1</b>	<b>Basic Computer</b> Features of windows. Word processing. Spreadsheet. Presentation Graphics. Securing Computer Data.
<b>UNIT 2</b>	<b>Basic Corel</b> <ul style="list-style-type: none"> <li>• Introduction to Corel Draw</li> <li>• Concept vecto based drawing.</li> <li>• Used corel Draw in garments.</li> </ul>
<b>UNIT 3</b>	<ul style="list-style-type: none"> <li>• Flat Drawing through Corel.</li> <li>• Specification Sheet Formation.</li> <li>• Measurement of garments &amp; stitch line.</li> <li>• Draw single stitch / Overlock stitch / Flat lock stitch.</li> </ul>
<b>UNIT 4</b>	<b>Basic Photoshop</b> <ul style="list-style-type: none"> <li>• Introduction to photoshop/ pixed based vs vector.</li> <li>• Tool Box</li> </ul>
<b>UNIT 5</b>	<b>Basic Photoshop</b> <ul style="list-style-type: none"> <li>• Drop downs functions.</li> <li>• Image sizing/ Resolution/ Page Size</li> </ul>

**Course Outcome (CO):**

At the end of this course students will have:

- CO1: Student will be able to work with windows utility, documentation.
- CO2:To create spreadsheet and make presentation and web surfing.
- CO3:Students will be able to convert Manual Design in Digital Form through Corel with Exact measurement with creating design variations.
- CO4: Students will be able to understand photoshop/ pixed based vs vector and functions.

  
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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					L												
CO2					M									M			
CO3					M										M		
CO4					M									M			

**Reference :**

- Gary David Bouton, Corel DRAW X7: The Official Guide.
- Corel Corporation, CorelDraw X7 User Guide  
<http://product.corel.com/help/CorelDRAW/540229932/Main/EN/User-Guide/CorelDRAW-X7.pdf>
- Video Tutorials on CorelDraw, [www.lynda.com](http://www.lynda.com)
- Adobe (2018), Adobe Photoshop CC Help  
[https://helpx.adobe.com/pdf/photoshop\\_reference.pdf](https://helpx.adobe.com/pdf/photoshop_reference.pdf)
- Perkins, C. (2009) How to do everything: Adobe Photoshop CS4. McGraw-Hill Companies
- Adobe Photoshop CS6 Tutorials.  
<http://www.marquette.edu/ctl/e-learning/documents/PhotoshopPDF.pdf>
- Dayle, B. & Dayley, D. (2012) Adobe Photoshop CS6 Bible. Wiley.
- [Andrew Faulkner](#), [Conrad Chavez \(2015\)](#) Adobe Photoshop CC Classroom in a Book, the official creator of video training for CorelDraw X4, X5, and X6.

<b>GDD075A</b>	<b>Design Project –I</b>	<b>0-0-6 [3]</b>
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**Prerequisite of the Course** ---Elements of Design, Elements of Fashion, Process of Design, Fashion Illustration, Drawing Skills

**Learning Objective:**

The main objective of this module is to develop a design intellect and basic design system. Hands-on experiences in the interpretation of image of fashion product/customer specifications, apparel design concept development, illustrations and technical drawings, design for prototyping, and manufacturing will be utilized in the instruction of the design process. Students will accurately document their fashion product design experience through design process in a notebook.


The course would require the students to carry out research on the major women wear designers and their brands along with the recognition of different women wear segments and their growth rate.

<b>UNIT 1</b>	<b>Design Development Process</b> Research Inspiration board Creating Mood boards- its application in designing apparels. Theme boards- its direct relation to creating designs of apparels. Client boards - the study of peculiar characteristics of a client to design special apparels for him/ her.
<b>UNIT 2</b>	<b>Design Development Process</b> Illustration board - Fashion Illustrations according to themes. Accessory board
<b>UNIT 3</b>	<b>Design Development Process</b> Trim & Swatch (Fabric) boards- Use of Trims and swatches in surface texture of the designed apparels. Technical drawing - Flat sketch board / tech pack
<b>UNIT 4</b>	<b>Process of Fittings</b> Muslin fits (toile) Actualizing the garment
<b>UNIT 5</b>	<b>Process of Fittings</b> Costing Presentation

**Course Outcome (CO):**

At the end of this course students will have:

- CO1: To develop the design process through experimental ideas and applications
- CO2: To Present research analysis to client groups.
- CO3: To extend and apply skills in developing creative visual language.
- CO4: To synthesize and critically evaluate experimentation in personal creative practice.

  
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Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H												L	M	M		
CO2					M											L	
CO3							H	L		L							
CO4							H	L		L						L	

**Reference :**

- Encyclopedia of Fashion accessories by Phyllis Tortora Fairchild
- Fashion Sketchbook by Abbing Fairchild
- How Fashion Works by Gavin Waddell Blackwell
- Jones, J.C: Design methods: Seeds of human futures, Wiley inter science, London, 1992.
- Gail Greet Hannah, Elements of Design, Princeton Architectural Press, 2002
- Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997



DEN002A	Professional Skills	Credits 2-0-2(3)
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### Course Objectives

- To enhance Professional competence in reading, writing, listening and speaking.
- Switch the approach from providing information about the language to use the language.
- Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
- Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
- Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
- Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

### Course Outcomes (CO):

**At the end of this course students will have:**

- CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
- CO2: Ability to analyze the usage of English words in professional scenario. CO3: An understanding of technical and academic articles' comprehension.
- CO4: The ability to present oneself at multinational levels as per the demand of the corporate culture

### Syllabus: Theory

- UNIT 1 Professional Grooming and Professional Culture:**  
Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management
- UNIT 2 Advanced Grammar:** Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents
- UNIT 3 Composition:**, Memo, Notice, Circular, Book Review, Research Article, Reports
- UNIT 4 Vocabulary Building:** Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms
- UNIT 5 Reading Comprehension:** Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction,

  
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<b>GDD079A</b>	<b>Fashion Illustration-II</b>	<b>0-0-6 [3]</b>
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**Prerequisite of the Course** ---Drawing Skills, Fashion Illustration of Women's

**Learning Objective:**

Introducing students to illustrate figures with reference to eight-head figure and elongated eight-head figures. This subject is an extension of fashion illustration-I, where the students would be encouraged to sketch fashion figures, render the fabrics and work on fashion figures with reference to design aesthetics.

The course is a study of illustration of different garments for Women, Kids and Men.

<b>UNIT 1</b>	Illustration of men's/kids garments, different poses, importance of the background. Men's features- Face, hair, hands and feet. Illustrating men's figures in different mediums.
<b>UNIT 2</b>	Individual style in illustration for different looks.
<b>UNIT 3</b>	<b>Accessory designing and illustration</b> Illustration of Jewellery using various mediums like pearls, beads, gold and silver, diamonds, wood, wires, velvet, net, etc, Designing and illustration of head gears
<b>UNIT 4</b>	Designing and illustration of bags and belts using various mediums like leather, cane, pearls, beads, wires, velvet, net, etc. Designing and illustrating footwear of all types
<b>UNIT 5</b>	Designing and illustrating bows and ties on varied dresses. Illustrating hairstyles

**Course Outcome (CO):**

At the end of this course students will have:

- CO1: To understand how to illustrate the idea of design with the skill of fashion illustration technique. CO2: Understand human figures proportion, movements and postures.
- CO3: To understand the garment interpretation
- CO4: To understand about the accessory from a sketch.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1			H											M			
CO2			M														
CO3					H									M			H
CO4					H									M			H

**Reference:**

- Abbing, Bina, (2007), Fashion Sketchbook, Fairchild Publications, New York.
- Allen, Anne & Seaman Julian, (2003), Fashion Drawing: The Basic Principles, Batsford Fashion Books, London.
- Barnes, Colin, (1994), Fashion Illustration: The Techniques of Fashion Drawing, MacdonaldOrbis, UK.
- M.W. Bryant, (2011), Fashion Drawing –Illustration Techniques for Fashion Designers, Laurence King Publisher
- Ireland, P.J. (1993). Fashion Design Illustration: Womenswear, Oxford, Batsford.
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- Borrelli, L. (2000). Fashion Illustration Now, London, Thames & Hudson.
- Abbing, B. (2003). Model Drawing, New York, Fairchild Books.
- Drudi, E. (2011). Figure Drawing for Fashion Design, Amsterdam, Pepin Press.
- Riegelman, N. (2006). 9 Heads: A Guide to Drawing Fashion, London, Thames and Hudson.
- Riegelman, (2006). Colors for Modern Fashion: Drawing Fashion with Colored Markers, London, Thames and Hudson.
- Steven, S. (2010). Illustrating Fashion: Concept to Creation, New York, Fairchild Books.
- Endeavour, (2010). Modern Fashion Illustration, London, Endeavour.
- Tate, S. L. (1995). The Complete Book of Fashion Illustration, New York, Prentice Hall Publication.
- Beer, R. (1995). Designer Guide to Girls' and Junior Apparel, New York, Fairchild Books.
- Armstrong, W., et al. (2005). From Pencil to Pen Tool: Understanding and Creating the Digital Fashion Image, New York, Fairchild Books.
- Drudi, E. (2003). Wrap and Drape Fashion: History, Design and Drawing, Amsterdam, Pepin Press.

<b>GDD080A</b>	<b>Pattern Making &amp; Garment Construction-II</b>	<b>0-0-6 [3]</b>
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**Prerequisite of the Course** ---Basic Pattern Making of western garment and construction Techniques.

**Learning Objective:**

The purpose of this module is to provide learners with the opportunity to develop skills in the principles of Indian wear pattern drafting and construction.

<b>UNIT 1</b>	<b>Pattern Drafting</b> Standardize concept of pattern making Direct Method Things to keep in mind while taking measurement Paper pattern of Salwar, Churidar, Plain kurta, Kalidar kurta Paper pattern of Saree Blouse, Choli blouse Marka-Making & Layouts Spec-Sheets of one designed garment <b>Documentation and Presentation of Work</b> In portfolio - All full-size patterns & 1/4 file document
<b>UNIT 2</b>	<b>Garments Construction</b> Construction of Salwar /Churidar Construction of plain kurta Construction of kalidar kurta Construction of plain blouse Construction of choli blouse <b>Documentation and Presentation of Work</b> In portfolio -- All women's wear garment construction with proper finish
<b>UNIT 3</b>	<b>Advance Draping</b> <u>Hands on:</u> Handling of new fabrics – georgette, chiffon, satin, knits, etc Asymmetric drapes Cowls – underarm, hip, etc. Draping of accents & emphasis – peplum, frills, flounces, etc. Conversion of Drapes in to flat patterns (developing of patterns from drapes) Conversion of drapes in to actual fabrics.
<b>UNIT 4</b>	<b>Garment Construction</b> Construction of mock-up garment from a chosen design. Construction of final garment from a chosen design
<b>UNIT 5</b>	<b>Documentation and Presentation of Work</b> In portfolio - Draping techniques, Pattern Making and Garment Construction

<b>UNIT 6</b>	<b>Size chart of menswear shirt &amp; Shirt terminology</b> Paper pattern of Shirt Paper pattern of Waist coat Collars- (shirt collar, stand collar, roll collar), cuffs, plackets. Standardization of measurements: fundamentals of grading and grading terminology.
<b>UNIT 7</b>	<b>Size chart of menswear trouser &amp; Trouser terminology</b> Paper pattern of Trouser with zip fly.
<b>UNIT 8</b>	<b>Garment Construction</b>
	Men's Shirt with attachment of Collars, cuffs and plackets Men's Trouser with attachment of zip fly. Men's waist coat with lining attachment. Specification Sheet and Costing. Fabric selection and stitching.
<b>UNIT 9</b>	<b>Pattern making of Kids Wear</b> Basic Bodice Block Basic Skirt Block Basic Sleeve Block
<b>UNIT 10</b>	<b>Garment Construction</b> Construction of Basic patterns of Kids wear


#### Course Outcome (CO):

At the end of this course students will have:

- CO1: In this module student will learn to take bodice measurement related to the Indian and men's wear garment with different variation and produce them on drafting paper and create a full-scale pattern from creative designs and working drawings.
- CO2: To understand and appreciate the concept of fit and balance of garments
- CO3: Understanding of identify and differentiate between fabric varieties with understanding of different materials.
- CO4: To develop understanding on how to concealment of fabric joins within garment with advanced knowledge in draping, pattern cutting and construction for women's clothing.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1															L		M
CO2																	
CO3			L	M	H										H		H
CO4			L	M	H										H		H

  
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**Reference :**

- H. G. Armstrong (2009) Pattern Making for Fashion Design, Prentice Hall, New York.
- W. Aldrich, (2008), Metric Pattern Cutting for women's wear, Willey Blackwell Publication.
- W. Aldrich, (2008), Metric Pattern Cutting for Menswear Willey Blackwell Publication.
- Lynda Maynard, (2010) The Dressmaker's Handbook of couture Sewing Techniques: Essential step-by-step Techniques for professional Results, Interweave press.
- Claire Shaeffer, (2008) Claire Shaeffer's Fabric Sewing Guide, Krause Publications.
- Claire Shaeffer, (2001) High Fashion Sewing Secrets from the World's Best Designers. A Step-by-Step Guide to Sewing Stylish Seams Buttonholes, Pockets, collars, Hems and more, Rodale Books Publishers.
- (2011) Threads Sewing Guide A complete Reference from America's Best-Loved Sewing Magazine. Taunton Pr
- Dawn Cloake, "Fashion Design On The Stand" B T Bastford Ltd. London , First Published 1996.
- Claire Shaeffer, "Claire Shaeffer's Fabric Sewing Guide", Krause Publications Craft, 2008.
- Reader Digest, "New Complete Guide to Sewing", Reader Digest, 2002.
- ManmeetSodi "Drafting & draping

**ONLINE RESOURCES**

- <http://www.vogue.com>
- <http://www.style.com>
- <http://www.wgsn-edu.com>

<b>GDD081A</b>	<b>Computer Application – II</b>	<b>0-0-4 [2]</b>
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**Prerequisite of the Course** ---Basic coral draw and Photo Shop skills and Manual Illustration.

**Learning Objective:**

The purpose of this module is to provide learners with the opportunity to develop skills in Draping and Rendering technique through coral & Photoshop with Exact measurement & Fine finishing with Real Looking & 3D Rendering and Draping

<b>UNIT 1</b>	<b>Croqui and 3D Rendering</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Drawing the Croqui through Curve tool.</li> <li>• Import croqui (JPG) in Photoshop and apply 3D Rendering.</li> <li>• Import 3D Render Croqui in Corel.</li> </ul>
<b>UNIT 2</b>	<b>Draping</b> <ul style="list-style-type: none"> <li>• Draping Fabrics.</li> <li>• Concept of Design variation &amp; Color Variation.</li> <li>• Apply 3D Effect on Draped Design</li> <li>• Croqui Development with fabrics/ Texture/ Fleshing etc.</li> </ul>
<b>UNIT 3</b>	<b>Formatting</b> <ul style="list-style-type: none"> <li>• Concept of Page Setup.</li> <li>• Light Effect.</li> <li>• Concept of Page Margin.</li> </ul>
<b>UNIT 4</b>	<b>Formatting</b> <ul style="list-style-type: none"> <li>• Concept of Page Layout.</li> <li>• Setting of Document.</li> <li>• Formatting of Document.</li> </ul>
<b>UNIT 5</b>	<b>Formatting</b> <ul style="list-style-type: none"> <li>• Specification sheet.</li> <li>• Costing</li> </ul>

**Course Outcome (CO):**

At the end of this course students will have:

- CO1: Students learn to optimize and streamline their workflow and increase productivity, improve the quality and level of detail in the design.
- CO2: To be able to improve documentation communication and save time and be ready for the competition.
- CO3: To be able to improve accuracy, quality and decrease errors by practicing the software and achieve proficiency in professional presentations.
- CO4: To understand demonstrate ability to work with creative skills & presentation technology.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					L												
CO2					M												
CO3		M		M										H	M		
CO4		M		M										H	M		

**Reference :**

- Reference Book of Corel Draw X7: Corel DRAW X7: The Official Guide, Author Name of CorelDraw X7: The Official Guide: Gary David Bouton.
- Reference Book of Adobe Photoshop CC 2015 :- Adobe Photoshop CC Classroom in a Book (2015 release) Author Name of Adobe Photoshop CC Classroom in a Book (2015 release): Andrew Faulkner (Author), Conrad Chavez



GDD082A	Surface Design	0-0-6 [3]
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**Prerequisite of the Course** ---Knowledge of different fabric.

**Learning Objective:**

- This module is all about of dyes and Print style. In this module students will be able to understand about classes of dyes, dyestuffs, techniques, dye auxiliaries, printing and printing techniques, effects and defects of dyeing and printing.
- The module is to teach the basic and complicated techniques of surface embellishment to the students. A surface design technique makes the fabric beautiful by various methods. Surface design refers to the process of adding color, pattern, texture or design to fabric through the use of outside mediums such as dyeing, printing, batik, embroidery and many more.

<b>UNIT 1</b>	<p><b>Dyeing Theory</b> Theory of Dyeing – Application of various dyes dye-fiber interaction Classification of Dyes- Natural dyes and synthetic dyes. Direct dyes Reactive, vat, insoluble azoic, indigo sol, acid dyes, basic dyes, Sulphur dyes, disperse dyes, pigments.</p> <p><b>Methods and Machinery</b> Methods and machinery for dyeing, Pre and after treatments of dyeing Defects of dyeing, Care of fabrics.</p>
<b>UNIT 2</b>	<p><b>Application of Dyes</b> Practical application and swatch dyeing with direct, basic, reactive, sulfur, vat, mordant, pigment and acid dye.</p> <p><b>Tie &amp; Dye</b> Introduction to tie and dye. Making samples of dye and dye with different dyes on different fabrics and product making. Creative exploration of dyeing techniques.</p>
<b>UNIT 3</b>	<p><b>Different styles of Printing</b> Styles of printing: Direct, Discharge and Resist styles on cellulosic, Protein, manmade textiles and their blends, Solvent dyeing, foam dyeing, spray dyeing. After treatments: Steaming, curing, and ageing of Prints.</p> <p><b>Printing methods</b> Hand block, machine, block, roller and Screen-printing methods, Advantages and drawbacks of all these printing methods, Printing paste: Constituents of print paste, Thickener and its types. Function of thickener, selection of thickener.</p>

<b>UNIT 4</b>	<b>Resist style of Printing</b> <ul style="list-style-type: none"> <li>● Introduction to Batik.</li> <li>● Application of technique on various fabrics and product making.</li> </ul> <b>Printing Styles</b>
	<ul style="list-style-type: none"> <li>● Practical introduction to printing methods and application of block, stencil and screen printing</li> </ul>
<b>UNIT 5</b>	<b>Natural Prints</b> <ul style="list-style-type: none"> <li>● Application of Dabu print with product.</li> <li>● Application of Natural print (echo print) with product.</li> <li>● Application of Pigment print with product.</li> <li>● Practical application of Ice Dyeing with product</li> </ul>

**Course Outcome (CO):**

At the end of the course, students will be able to

- CO1: To Apply and select various dyes according to fabric, find Defects in dyeing and printing with. the process of tie and dye.
- CO2: To learn the various classes of dyes and auxiliaries used in dyeing through practical application and demonstrate Hand block, machine, block, roller and Screen-printing methods. Advantages and drawbacks of all these printing methods.
- CO3: To understand Direct, Discharge and Resist styles on cellulosic, Protein, manmade textiles and their blends and analyse Pre and after treatments: Steaming, curing, and ageing of Prints, printing process, history of printing, different style of printing preparation of printing paste practically.
- CO4: To learn basic and complex hand embroideries through needle and anchor threads and various surface design techniques according to the design requirement.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					L												
CO2					M												
CO3		M		M										H	M		
CO4		M		M										H	M		

**Reference :**

- Textile Dyeing and Coloration(J. Richard Aspland)
- Textile Preparation and Dyeing(A K Roy Choudhury )
- Chemical Technology in the Pre-Treatment Processes of Textiles(S.R. Karmakar
- Dyeing and Screen-Printing on Textiles: Revised and updated Joanna Kinnersly-Taylor
- Fabric printing and dyeing; a practical handbook David Green
- Fashion from concept to consumers – Frings 6th Ed.

<b>GDD083A</b>	<b>Photography</b>	<b>0-0-2 [1]</b>
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#### AIM

This unit aims to develop learners' skills and understanding in Product Photography Students will get Knowledge of the history of the photographic medium and how it relates to the history of the other fine arts

#### OBJECTIVE

Various aspects of photography including lighting for indoor & outdoor, handling of studio equipment and set planning & composition.

<b>UNIT 1</b>	Various aspects of photography including lighting for Indoor & Outdoor
<b>UNIT 2</b>	Handling of studio equipment
<b>UNIT 3</b>	Set planning
<b>UNIT 4</b>	Composition.
<b>UNIT 5</b>	Final Product Photography

#### COURSE OUTCOME (CO)

**At the end of this course students will:**

- CO1: Be able to use space and equipment.  
CO2: Be able to use sets, lights and backgrounds.  
CO3: Apply the principles of lighting and color theory to a variety of photographic scenarios by measuring, evaluating. CO4: To adjusting light and color to create quality images.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					M												
CO2					M												
CO3					M												M
CO4					M												M

#### TEXT BOOKS

- Understanding Exposure: How to Shoot Great Photographs with a Film or Digital Camera by [Bryan Peterson](#)
- The Photographer's Eye: Composition and Design for Better Digital Photos by [Michael Freeman](#)

<b>GDD085A</b>	<b>Trend Forecast and Analysis</b>	<b>2-0-0 [2]</b>
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**Learning Objective:**

- Critically analyze, synthesize and reflect on complex theories and recent developments, both local and international, at a micro and macro level, to extend and challenge knowledge and practice in fashion entrepreneurship.
- Investigate emergent global entrepreneurial issues and strategically respond to their impact in the fashion and textiles industry.
- Identify, evaluate and communicate the potential impact of cultural, social, economic and technological components in the trend forecasting process.

<b>UNIT 1</b>	<b>Trend Materials &amp; Fashion Development</b> Materials for research Color practice Interactions between colors and materials Briefing and mood board creation Materials are buying Product development
<b>UNIT 2</b>	<b>Trend Design research, Transmission and interpretation</b> Fashion trend terminology The trend industry Nature of trends Trends in urban environment Information Management Visualization techniques Argumentation strategies
<b>UNIT 3</b>	<b>Fashion market and marketing environment research</b> Market research Trend research techniques Research design & data sources Sampling methods Evaluating the collections Forecasting Fashion Market Segmentation marketing mix Fashion consumer
<b>UNIT 4</b>	<b>Trend Analysis</b> Evolution of fashion trend Fashion trend implications for design/retail decisions Consumer influence on market

<b>UNIT 5</b>	<b>Fashion Forecasting</b> Fashion Forecasting Process Diffusion of Innovation Fashion Cycles Cultural Indicators Color Forecasting
	Textile Forecasting Styling Forecasting Sales Forecasting Competitive Analysis

**Course Outcome (CO):**

At the end of this course students will have:

- CO1: To assess and review the requirements and operational methods of the role of a trend forecaster relevant to fashion and textiles entrepreneurship.
- CO2: To understand the Trend Design research, Transmission and interpretation of fashion and understand the Fashion market and marketing environment research.
- CO3: To substantiate and apply appropriate research methodologies to identify and analyze alternative research sources for identifying global trend directions.
- CO4: To research and critically analyze the challenges and opportunities of translating trend scenarios into the development of textile and fashion products.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1						L							M				
CO2						L							M		H		
CO3															H		
CO4							H										

**Reference :**

- Elaine Stone, "Fashion Merchandising", Blackwell Science Ltd., 2000.
- Eundeok Kim, Ann Marie Fiore, Hyejeong Kim, "Fashion Trends Analysis and Forecasting", Berg Publishers, 2011.

<b>BGDD086A</b>	<b>Final Project-</b>	<b>0-0-6 [3]</b>
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**Prerequisite of the Course** ---They have to apply all the knowledge of all previous semester in the final project

**Learning Objective:**

The objective of this module is to further extend learner's knowledge creating the final collection putting all the knowledge and efforts students have gained so far and launch themselves as designers creating their own brand identity, and brand image.

<b>UNIT 1</b>	Research about the various brands globally for your inspiration. Do a complete study of different brands and their collection Concepts inspired with a complete understanding of design process and finally Select one concept. Only extensive research enables designers to stay fresh and keep up to date with developments.
<b>UNIT 2</b>	Judgments and develop your own style with experimentation in personal creative practice through explorations in design and surfaces.
<b>UNIT 3</b>	The design process along with difference between different categories like avant- garde and prêt wear.
<b>UNIT 4</b>	Sketches, fabrics, trims and other detailing. Technical part of the sketches and final test fits
<b>UNIT 5</b>	Produce the final collection completely accessorized. Publicize work in the best visual way through styling and photo shoot.

**Course Outcome (CO):**

At the end of this course students will have:

- CO1: Be able to present research analysis to client groups and extend and apply skills in developing creative visual language.
- CO2: Identify the major types of idea sources in clothing design and provide information about each source. Recognize that these sources of inspiration help designers to create design elements and principles of individual designs. In order to foster originality, sources of inspiration play a powerful role throughout the creative stage of design process, and also in the early stages of fashion research and strategic collection planning.
- CO3: To synthesize and critically evaluate experimentation in personal creative practice. CO4: To present a complete collection with photo shoots.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H													M	M	M	M
CO2							M							M	M	M	M
CO3							M	M		M	M	H		H	M	M	M
CO4							M	M		M	M	H		H	M	M	M

**Reference :**

- Look at work of designers from around the globe ex – Jum Nakao, Issey Miyake and other
- Look at the different costumes and art/ culture of countries and get inspired by them
- Look around nature and other sources like discovery, national geography, BBC etc to get inspired, which is the original source of inspiration for everything.
- <http://worldofwearableart.com/>
- [www.style.com](http://www.style.com)
- [www.wgsn.com](http://www.wgsn.com)
- [www.promostyl.com](http://www.promostyl.com)
- [www.trendz.com](http://www.trendz.com)
- [www.wwd.com](http://www.wwd.com)



<b>GDD087A</b>	<b>Portfolio</b>	<b>0-0-4 [2]</b>
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**Prerequisite of the Course** ---Coral Draw, Photo Shop

**AIM:**

Design portfolio is the expression of student to translate themes into design collections. Here one gets inspired by different themes which could be art movements, sport, historic eras, music, dance, culture, nature, traditions etc. and picks out tangible and intangible elements which are to be used as design elements in the collection. The ability of a designer to exhibit and use design elements is highlighted which is further on translated into garments. A portfolio is an exhibit of the overall knowledge of the student work which he/she has gained through the course of four years. The purpose lies in promoting the skills of students in a single format.

**OBJECTIVE**

Students will present a portfolio of all the files/ folders/ projects created during the course of study in I to III year. The portfolio should include projects, industrial visit reports, any other projects made during the academic session. The external examiner will evaluate the portfolio and take a viva of the student.

  
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<b>GDD088A</b>	<b>Office Training (Internship)</b>	<b>0-0-16 [8]</b>
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### **Learning Objective:**

This course will prepare students to enter into full-time employment in their area of specialization upon graduation. It will provide students with the opportunity to test their career aptitude and aid them adjusting from college to full-time employment. It will present students with the opportunity to develop attitudes conducive to effective interpersonal relationships, increase their sense of responsibility, and help them acquire good work habits. It will offer the opportunity for students to understand informal organizational interrelationships and provide in-depth knowledge of the formal functional activities of a participating organization.

<b>UNIT 1</b>	First hand exposure to an apparel organization, designer or Export House and their working structures and systems.
<b>UNIT 2</b>	Specific project on the job to sharpen skills required for chosen area of specialism. Further development of generic/cognitive skills.
<b>UNIT 3</b>	Identification of industry for internship with student's career path in mind.
<b>UNIT 4</b>	Internship log book: is a tool to help you record your daily activities along with a reflection on the same. Reflective writing enables the documentation experiences, thoughts questions, ideas and conclusions that signpost the learning journey.
<b>UNIT 5</b>	Internship report: will focus on study of the organizational structure & development objective of the internship. Personal design philosophy & career path linked to learning in the internship. Learning process and its analysis as internship progresses through detailed processes and projects undertaken. Report should be a reflection of the internship experience of the personal & professional development.

### **Course Outcome (CO):**


At the end of this course students will have:

- CO1: To identify business strategies for buying and selecting product. CO2:  
To identify process and procedures for company purchases.
- CO3: To explore the buying process, Increase skills in buying and merchandising.
- CO4: To understand that how they write a report of their industry experience and develop written communication skills

  
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Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1		M			M	M						M					
CO2		M			M	M						M					
CO3		M			M	M						M					
CO4		M			M	M						M					

  
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<b>GDD001A</b>	<b>DESIGN FOUNDATION</b>	<b>0-0-8[4]</b>
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### AIM

To make students see, make and appreciate the basic design concepts. The first level includes the vocabulary of design and principles of composition. This level includes 3D composition and study of Volumes. The aim of this course is to understand the method of visualizing and drawing from nature, cast and product drawing. Learners will be introduced to a brief history and introduction to 3D materials, tools and processes and made aware of the range of possibilities of different materials in their 2D and 3D application to design. This may be done through lectures / ppt presentations / swatches/ samples. The aim of this unit is to enable learners to develop knowledge and understanding of the issues that have informed debate on the purposes and processes of design. This unit aims to give learners opportunities to develop skills and knowledge in the development of new products or services in design pathways.

### OBJECTIVE

- Know the phases of the design development cycle
- Skill in color mixing and fine color-discernment.
- Know in principle the physics of color (light), the chemistry of color (pigment), and the impact of color (psychology).
- Practice and develop rendering and presentation techniques in design presentations.
- Recognize the relationship between lighting, surface and perception.
- Student will be able to understand design & principles of composition & 3D compositions
- Student will be able to understand the methods & techniques of visualization & drawing.
- The student would be exposed to appreciation of drawing different products.
- Student will be able to understand basics of design concepts

<b>UNIT 1</b>	<b>THEORY-</b> Elements of Design- Point, Line, Characteristic of Line, Types of Line, Shapes, Categories of Shape, Space, Categories . <b>PRACTICAL-</b> Elements of design- Types of Lines, Line Compositions, Different types of Shapes- Geometric, Organic, Free-form, Natural, and Shape, composition, Positive & Negative. Textures- Physical & Visual, Texture Composition, Form Space-Positive & Negative.
<b>UNIT 2</b>	<b>THEORY-</b> Principle of Design- Balance, Types of Balance, Emphasis, Unity, Repetition, Rhythm, Pattern, Harmony, Proportion, Contrast, Functionality. Gestalt and his Concepts- Closures, Continuance, Similarity, Proximity, Alignment. <b>PRACTICAL-</b> Principle of design- Balance, types of balance emphasis, unity, repetition (rhythm, pattern), harmony, proportion (scale), variety (alteration), contrast, functionality.
<b>UNIT 3</b>	<b>THEORY-</b> Color- Introduction to Color, Color Theory, Color Harmonies, Color Schemes, Color Wheel, Tint, Tone, Shades. Different Mediums in Art. <b>PRACTICAL-</b> Color- Color Wheel and color chart, Color Exploration, Color Interaction. Primary colors- Color Wheel, Color Composition, Secondary colors- Color Wheel, Color Composition, Tertiary colors- Color Wheel, Color Composition Color schemes- Monochromatic, Achromatic, Complimentary, Split Complimentary, Double-Split Complimentary Polychromatic. Tint, tone & shades- Application of Gray Scale and Black & White. Mediums in art- Pencil, Charcoal, Pastels, Water & Poster.

<b>UNIT 4</b>	<b>THEORY/PRACTICAL</b> - What is Design, Philosophies and Studies of Design, Approaches to Design, Philosophies for Methods of Designing, Philosophies for the Purpose of Design, Design as a Process, Defining a Design Process, Typical Steps or Stages of the Design Process, Design and Art, Design and Engineering, Design and Production, Process Design?
<b>UNIT 5</b>	<b>THEORY/PRACTICAL</b> - Drawing, Nature-drawing Composition, Free-Hand Sketching. Object drawing- 2D & 3D, Human drawing- Outline Sketches, Shades & Shadow Composition, Light- Dark Tone Composition, positive and negative spaces, Product drawings; method of representing
<b>UNIT 6</b>	<b>THEORY-</b> Composition, Principle of Organization, View Point Compositional Techniques, Rules of Thirds, Odds, Space, Simplification, Limiting Focus, Geometry and Symmetry <b>PRACTICAL</b> –View- Perspective, Isometric, Geometry- Lines & Angle bisecting, Constructing Regular & Semi Regular Tessellation, Constructing 3D Tessellation

### COURSE OUTCOME (CO)

**At the end of this course students will have:**

- CO1: An ability to color mixing and fine color-discernment.  
CO2: An ability to know in principle the physics of color (light), the chemistry of color (pigment), and the impact of color (psychology).  
CO3: An ability to rendering and presentation techniques in design presentations. CO4: An ability to recognize the relationship between lighting, surface and perception.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1			H		M											M	M
CO2			H		M											M	M
CO3			M		M				L							M	M
CO4			M		M				L							M	M

### TEXT BOOKS

- Broomer, Gerald F., (1974), Elements of Design: Space, Davis Publications Inc. Worcester, Massachusetts.
- Bruce D. Kurty, (1987), Visual imagination- An introduction of Art, Prentice Hall, New Jers.

<b>GDD002A</b>	<b>BASIC ART &amp; DESIGN</b>	<b>0-0-8(4)</b>
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#### AIM

Art and design stimulates creativity and imagination. It provides visual, tactile and sensory experiences and a special way of understanding and responding to the world. It enables students to communicate what they see, feel and think through the use of color, texture, form, pattern and different materials and processes. Students become involved in shaping their environments through art and design activities. They learn to make informed judgments and aesthetic and practical decisions. They explore ideas and meanings through the work of artists and designers. Through learning about the roles and functions of art, they can explore the impact it has had on contemporary life and that of different times and cultures. The appreciation and enjoyment of the visual arts enriches all our lives

#### OBJECTIVE

- To understand of the social, psychological, cultural, historical and commercial factors.
- Development of Graphic Skills, Ability and Comprehension. Establishing Significance of Art.
- To understand the influences on art and design activities.

<b>UNIT 1</b>	Introduction to History of Art, Design and Architecture – Pre History To Ancient Civilization, Mesopotamia, Egypt, Indus Valley, China.
<b>UNIT 2</b>	Introduction to Indian folk Art- Worli, Fadd, Madhubani, Modern Art, Blue Pottery, Fresco, Meenakari , glass mosaic, Miniature Art, Kalamkari, Inlay-Work.
<b>UNIT 3</b>	Techniques & Process Material exposure ranging from POP, Fly-ash, Terracotta & Ceramics Clay, Wood, metal, etc.,) Techniques, Processes terminology and tools.
<b>UNIT 4</b>	Techniques & Process Material exposure ranging from Leather, Resin, Paper, Fabric, Tissues, foil etc.) Techniques, Processes terminology and tools.
<b>UNIT 5</b>	Introduction to Photography for documentation


#### COURSE OUTCOME (CO)

**At the end of this course students will have:**

CO1: An ability to understand influences on art and design activities.

CO2: To understand outcomes through the interpretation and analysis of information. CO3: An ability to be able to assess, interpret and evaluate information.

CO4: An ability to be able to evaluate and present conclusions.


  
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Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	M	M										M				M
CO2	L	M	M										M				M
CO3	L	M	M										M				M
CO4	L	M	M										M				M

**TEXT BOOKS**

5. Broome F. Gerald, (1974), Elements of Design, Space, Davis Publications Inc., Worcester, Massachusetts.
  6. Dodson B., (1990), Keys to Drawing, North Light Publications, Cincinnati.
  7. Mark W., Mary W. (1999), Drawing for Absolute Beginner, F&W Publications, Cincinnati.
  8. Davis M.L. (1996), Visual Design in Dress, Prentice Hall, Canada.
- Graves M., (1951). The Art of Colour and Design, McGraw-Hill Book Company

  
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DEN001A	Communication Skills	Credits 2-0-1 [3]
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#### Course Objectives

- To enhance English language competence in reading, writing, listening and speaking.
- Switch the approach from teacher-centred to student-centred one.
- Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
- Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
- To link communication skills with the organizational behaviour.
- To inculcate skills that are very much required for employability and adjust in the professional Environment.

#### Course Outcomes (CO):

At the end of this course students will have:

- CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
- CO2: Ability to analyze the usage of English words in different contexts. CO3: An understanding of technical and academic articles' comprehension.
- CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

#### Syllabus: Theory

UNIT 1	<b>Basics of Organizational Communication:</b> Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
UNIT 2	<b>Basic Writing Skills:</b> Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
UNIT 3	<b>Composition:</b> , Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
UNIT 4	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
UNIT 5	<b>Professional and Technical Communication :</b> Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation



## Syllabus: Lab

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time-management, Following Deadlines etc
<b>UNIT 2</b>	<b>Write Dialogue from the different contexts of corporate culture:</b> Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
<b>UNIT 3</b>	<b>Composition:</b> , Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting-Redrafting, Proof Reading, Editing etc
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

### Methodology for Evaluation

- |   |   |          |
|---|---|----------|
| 5. Internal Assessment (Theory)         |   |          |
| d) Home Assignments: One from each Unit | : | 15 Marks |
| e) In Semester Tests (Minimum two)      | : | 30 Marks |
| f) Attendance                           | : | 05 Marks |
| 6. Term End (Theory)                    | : | 50 Marks |
| 7. Internal Assessment (Lab)            |   |          |
| (b) Daily Performance in the Lab        | : | 50 Marks |
| 8. Term End (Lab)                       | : | 50 Marks |

### Suggested Reading:

11. Practical English Usage. Michael Swan. OUP. 1995
12. Remedial English Grammar. F.T. Wood. Macmillan. 2007
13. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
14. On Writing Well. William Zinsser. Harper Resource Book. 2001
15. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
16. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
17. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
18. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006
19. More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.
20. The BBC and British Council online resources

<b>GDD047A</b>	<b>MATERIALS &amp; CONSTRUCTION-I</b>	<b>0-4-0 [2]</b>
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### **Objective**

Understanding the basic components of the buildings envelope for small buildings

- Foundations
- Walls
- Openings
- Roofs
- Understanding simple roof & floor finishes

<b>UNIT 1</b>	<b>INTRODUCTION TO MATERIALS</b> Wood - Soft and hardwood, plywood, laminated wood and particle boards – properties, manufacture & uses. Synthetic Materials – Different types of Glass, their properties, manufacturing processes and uses. Plastics – injection molding& other manufacturing methods, etc. Fabrics – textile, Jute, leather etc. different types and their uses
<b>UNIT 2</b>	<b>BUILDING COMPONENTS</b> Drawings of the components of a building indicating Foundation – brick footing, stone footing &rcc column footing concrete flooring, plinth beam & floor finish superstructure- brickwork with sill, lintel, windows & sunshade Flat rcc roof with weathering course, parapet & coping.
<b>UNIT 3</b>	<b>Doors &amp; Windows-</b> Introduction; Location of Door & Windows; Technical Terms; Standard Sizes; Types of doors- Battened Ledged & Braced Door, Battened Ledged & Framed Door, Paneled Door, Framed & Paneled Door, Glazed & Sash Door, Flush Door, Louvered Door, Sliding Door, Swing Door, Revolving Door; Types of Windows- Fixed Window, Pivoted Window, Sliding Window, Sash Window, Louvered Window, Bay Window, Corner Window, Metal Window, Dormer Window, Gable Window, Lantern Window; Skylight, Ventilators; Joinery & Fixing of Doors & Windows
<b>UNIT 4</b>	<b>STRUCTURAL SYSTEMS</b> Structures – Components of a load bearing wall &rcc slab roof system - rcc beams, columns and framed structure
<b>UNIT 5</b>	<b>Staircase</b> Introduction; Technical Terms; Requirement of Good Staircase; Dimensions; Classification based on design- Half Turn, Quarter Turn, Three Quarter Turn, Bifurcated, Continuous; Staircase design

**Course Outcome (CO):**

The Implementation Strategy will consist of various methods like problem identification and alternative solution, self-study, demonstration and actual site visits with discussion.

- CO1: After successful completion of this course, student should be able to Explore and Work with different Materials & carpentry joinery through models.
- CO2: Understanding the limitations and properties of different materials to be able to prepare working models of the designs and also to visualize the final product.
- CO3: Study of subject and of materials museum and use of the same in the practice, preferably during actual site visits.
- CO4: Collecting and studying for deeper understanding of the details of interior construction related various hardware and their proper applications with uses.
- CO5: Market survey, study and understanding of construction techniques and practice in interior design.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H						M		M			H			H
CO2		H	M	L					M			H			H
CO3		M				M					M		M		
CO4									H						
CO5			H								L				M

**TEXT BOOKS**

1. S. C. Rangwala - Engineering materials - Charotar Publishing, Anandz
2. Francis D. K. Ching - Building Construction Illustrated, VNR, 1975

**REFERENCE BOOKS**

1. Bindra, S.P. and Arora, S.P. Building Construction: Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub., New Delhi, 2000.
2. Moxley, R. Mitchell's Elementary Building Construction, Technical Press Ltd.
3. Rangwala, S.C. Building Construction 22nd ed. Charota Pub. House Anand, 2004.
4. Sushil Kumar. T.B. of Building Construction 19th ed. Standard Pub. Delhi, 2003.
5. Chowdary, K.P. Engineering Materials used in India, 7th ed. Oxford and IBH, New Delhi, 1990.
6. Rangwala, S.C. Building Construction: Materials and types of Construction, 3rd ed. John Wiley and Sons, Inc., New York, 1963.
- Francis D. Ching, Building Construction Illustrated, Wiley publishers, 2008.
7. Building Construction by Dr B.C. Punmia.
8. Building Construction by Ashok Kumar Jain
9. Building Construction by Arun Kumar Jain
10. W.B. Mckay – Building construction Vol1 – Longmans, UK 1981
11. W.B. Mckay – Building construction Vol 3 – Longmans, UK

  
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<b>GDD048A</b>	<b>Art &amp; Design</b>	<b>0-6-0 [3]</b>
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### **Objective**

- This course offers knowledge and experience about the classic drawing and sketching techniques and develops the appropriate skills for visualization and representation to facilitate effective visual communication.

<b>UNIT 1</b>	INTRODUCTION TO FREE HAND DRAWING Basic exercises, Still life, Basic forms, effect of lines to represent textures - Understanding of different types of perspective views using vanishing points, Shading exercises etc.
<b>UNIT 2</b>	Introduction to drawing equipment, familiarization, use and handling; Expression and exploration of point, lines, planes and volumes.
<b>UNIT 3</b>	Proportions of the human body, the expressions of colour, the importance of light and shadow through various exercises.
<b>UNIT 4</b>	Typography Fundamentals; Principle of composition; Concept of forms and form development; Colour Theory.
<b>UNIT 5</b>	Rendering Technique: Pencil rendering, colour rendering –pencils, pastels, watercolours etc.
<b>UNIT 6</b>	Representation of Architectural symbols; Measuring and drawing to scale; Orthographic projections, Isometric & Perspective drawing of Simple objects

### **Course Outcome (CO):**

At the end of this course students will have:

- CO1: An ability to understand the basics concept of Hand drafting .
- CO2: An ability to Develop Drawing Skills As a Thinking Tool, Visualization, And Representation of Design.
- CO3: An ability to use graphic systems, including the plan, section, axonometric, and perspective, and drawing techniques to represent outline, tone, texture, shade, and shadow.
- CO4: An ability to develop sketching concepts.
- CO5: Comprehension of Freehand drawing of simple objects and the fundamental techniques of concept and presentation sketches

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H						M						M		H
CO2			M	L					M			H			
CO3		M				M					L				
CO4				M						M			H		L
CO5		H				M					H				

**Reference Books :**

1. Stephen Klimment, Architectural Sketching and Rendering: Techniques for Designers and Artists, Watson Guptill, 1984.
2. Ivo.D. Drpic, Sketching and Rendering of Interior Space, Watson- Guptill, 1988. Maureen Mitton, Interior Design Visual Presentation: A Guide to graphics, models and presentation techniques, 3rd edition, wiley publishers, 2007
3. MogaliDelgadeYanes and Ernest Redondo Dominquez, Freehand drawing for Architects and Interior Designers, ww.Norton& co., 2005
4. Francis D.Ching, Design Drawing, Wiley publishers Francis D. Ching – Architectural Graphics , Wiley publishers, 2002 Moris, I.H.Geometrical Drawing for Art Students.
5. Thoms, E.French. Graphics Science and Design, New York: MC Graw Hill. Nichols, T.B. and Keep, Norman.Geometry of Construction, 3rd ed. Cleaver – Hume Press Ltd., London, 1959.
6. Bhatt, N.D. and PanchalV.M.Engineering Drawing: Plane and Solid Geometry, 42nd ed. Charotar Pub., Anand, 2000.

<b>GDD049A</b>	<b>Architectural Planning Studio</b>	<b>0-8-0 [4]</b>
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### **Objective**


- To Familiarize Students With Theoretical Basis and Design Process Through Observation Comparison, Analysis With The Help of Prototypes, Model And Drawings.
- To understand the Anthropometric & Ergonomics data and its importance & relation in interior design.
- To introduce the elements; principles and objective in orientation to Architectural Design.
- To introduce the basics of designing for retail interiors and to develop skills required for the same.
- Introduce to the basics of designing for Residential interiors and to develop skills required for the same.

<b>UNIT 1</b>	<b>Anthropometric &amp; Ergonomics</b> Structural Dimensions, Functional Dimensions, Human Dimensions, and Generalized Heights. Accessibility and Barrier free codes: Manoeuvring Clearances, Seating, Living Space, Dining Space, and Sleeping Space.
<b>UNIT 2</b>	Introduction to the Basic Design features
<b>UNIT 3</b>	Introduction & formulation of concept & Zoning
<b>UNIT 4</b>	<b>Design Project-I</b> Residential Planning- Introduction, Designing of a Model Residence Case Study, Design Project
<b>UNIT 5</b>	<b>Design Project-II</b> Case Study, Design Project for a Retail Store or Office building

### **Course Outcome (CO):**

At the end of this course students will have:

- CO1: Understand the project studies, case studies of various related topics for interiors will be used. Presentation of data collected will be done by means of seminars / visits / books / visuals.
- CO2: Understand about the Anthropometric & Ergonomics
- CO3: Understand the specific requirements of exhibition and retail design CO4:  
Understand how to work in a professional context.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		H					M		M			H	M		H
CO2	H			M							H				
CO3		M				M					L		M		H
CO4								L							

**Reference Books :**

1. Time Savers Standards for Interior Design & Space Planning by Joseph Dechiara, Julius Panero& Martin Zelink.
2. Time Savers Standards for Architectural Design by Michael J. Crosbie& Donald Watson
3. Human Dimension and Interior Space: A source book of Design reference

  
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<b>GDD050A</b>	<b>Photography Workshop</b>	<b>0-2-0 [1]</b>
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**Objective**

- To Develop Photographic Skills, to understand Simple Architectural Forms, Joinery and Construction Details Through Field Exercises and Model Making.
- To develop observations through the different material workshops.
- To develop skills and understanding of learners who intend to follow careers as model makers in the architectural, interior design, industrial design, media or entertainment industries.

<b>UNIT 1</b>	Introduction to Photography
<b>UNIT 2</b>	Components & working of Compact & SLR Camera, Peripheral equipment like cables, lights, flashguns, lenses, filters, tripods etc. Assignments oriented towards using camera, Indoor & outdoor photography.
<b>UNIT 3</b>	Techniques of using camera, basics in optics, light, exposure, focus, depth of field, aperture. Dark room techniques, digital printing. Assignments oriented towards using camera, Indoor & outdoor photography.
<b>UNIT 4</b>	Reading a photograph, Understanding subject in a photograph, composition basics, light, exposure to various types of photography like nature, portraits, wildlife, sports, documentation, journalism etc. Assignments oriented towards using photography for presentations.
<b>UNIT 5</b>	Photographic investigation of a location and situation. Assignments culminating into a small presentation investigating a case.

**Course Outcome (CO):**

At the end of this course students will have:

- CO1: student should be able to Using Photography as a means of communication and Documentation; a tool to demonstrate concepts and ideas, document situations, & objects in general; get familiar with camera, film, digital technology & techniques and understand aesthetics of photography, composition and light.
- CO2: Be able to use space and equipment
- CO3: Be able to use sets, lights and backgrounds.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			M		L		M		M				M		H
CO2	H			L							H	H			
CO3		M				M					M		M		H

**Reference books:**

1. Point view- The art of architectural photography ,E.Manny A Ballan, VNR 2.Professional
2. photography –photographing buildings, David Wilson, Rotovisio.

**Contact Hours (L-T-P): 2-0-2**

<b>DEN002A</b>	<b>Professional Skills</b>	<b>Credits 2-0-1 [3]</b>
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**Course  
Object**

**ives**

- To enhance Professional competence in reading, writing, listening and speaking.
- Switch the approach from providing information about the language to use the language.
- Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
- Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
- Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
- Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

**Course Outcomes (CO):**

**At the end of this course students will have:**

- CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
- CO2: Ability to analyze the usage of English words in professional scenario. CO3: An understanding of technical and academic articles' comprehension.
- CO4: The ability to present oneself at multinational levels as per the demand of the corporate culture

**Syllabus: Theory**

<b>UNIT 1</b>	<b>Grooming and Professional Culture:</b> Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management
<b>UNIT 2</b>	<b>Advanced Grammar:</b> Common errors related to prepositions, articles, models , Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents
<b>UNIT 3</b>	<b>Composition:</b> , Memo, Notice, Circular, Book Review, Research Article, Reports
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms
<b>UNIT 5</b>	<b>Reading Comprehension:</b> Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction,

  
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GDD053A	INTERIOR DESIGN STUDIO – I (Residential Design)	0-6-0 [3]
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### Objective

- To develop understanding of the scale, function and options existing when designing small-scale spaces in residences such as toilets, kitchens, living, bedrooms etc.
- Development of ideas with regard to false ceiling, wall paneling, flooring, floor coverings, curtains, windows, doors and other elements of residential interiors.

<b>UNIT 1</b>	<b>KITCHENS</b> Work triangle, planning for activity – anthropometrics – types of kitchen- Modular kitchens. Materials used in counters, shelves, worktops, washing areas & their comparative study. Lighting & colour scheme – natural & artificial light.
<b>UNIT 2</b>	<b>TOILETS</b> Anthropometry – various types of sanitary ware and their use – types of layouts – concepts in modern day toilet interiors – materials & finishes – colour, texture & pattern.
<b>UNIT 3</b>	<b>BEDROOMS &amp; LIVING ROOMS</b> Concepts in bedroom & living room interiors – various layout of these spaces – the use of furniture and accessories to create a certain type of ambience – materials & finishes – lighting, colour & texture.
<b>UNIT 4</b>	<b>RESIDENCE</b> Holistic concepts in residential interiors – ability to integrate various individual spaces into one theme – treatment of patios, courtyards, verandahs & other semi sheltered spaces – integration of built form and open spaces.

### Course Outcome (CO):

At the end of this course students will have:

CO1: Be able to manipulate interior environments to meet design requirements

CO2: Be able to respond to the aesthetic and functional requirements of an interior design brief CO3: Be able to employ technical processes to respond to an interior design brief.

CO4: Demonstrate knowledge of residential interior design fundamentals.


### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H			
CO2			M	L					M		H		M		H
CO3		M				M				L			M		
CO4					L										L

  
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#### **REFERENCE BOOKS**

1. Interior Design by Ahmed A. Kasu
2. Standards by Julius Panero& Martin Zelnik

  
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<b>GDD054A</b>	<b>Product Design</b>	<b>0-4-0 [2]</b>
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### **Objective**

- To create awareness about the design process and various ways of designing products for user needs and requirements. To learn about the integration of design, manufacturing process, marketing etc. in the design of products.

<b>UNIT 1</b>	Concepts like design research, human factors, form, ergonomics, design processes, sustainable design.
<b>UNIT 2</b>	Understanding of compatibility with diverse cultures, technologies, user needs and cognitive and physical conditions.
<b>UNIT 3</b>	Application of materials and uses, sustainable approach towards product designing.
<b>UNIT 4</b>	Exploration of the design language, form and values from traditional and contemporary design platform.
<b>UNIT 5</b>	Design Exercise: To develop an innovative design solution for a given problem by synthesizing the trends, socio-cultural factors and design language.

### **Course Outcome (CO):**

At the end of this course students will have:

- CO1: To be able to analyze current user behavior and trends for product development and understand the user and spatial relationship.
- CO2: Be able to becoming familiar with basic traditional and modern joinery. CO3: Be able to Understand Different material Specifications and their uses. CO4: Apply design thinking and process to solve problem creatively.
- CO5: Perceive the design language, form and values while designing a product .

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		L			L		M		M			H			H
CO2	H		M	L					M			H			H
CO3	H	M				M					M		M		
CO4							M								
CO5			H						H			L			H

**Reference Books :**

- John Kolko ,Well-Designed: How to Use Empathy to Create Products People Love Don Norman ,The Design of Everyday Things.
- John Maeda ,The Laws of Simplicity (Simplicity: Design, Technology, Business, Life) Kenya Hara ,Designing Design.
- William Lidwell, Kritina Holden and Jill Butler ,Universal Principles of Design.
- William McDonough and Michael Braungart ,Cradle to Cradle: Remaking the Way We Make Things Edward De Bono ,Lateral Thinking: Creativity Step by Step.
- Jennifer Hudson, Process: 50 Product Designs from Concept to Manufacture.

GDD055A	MATERIALS & CONSTRUCTION II	0-4-0 [2]
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### Objective

- To understand the construction of basic elements of an interior space such as walls & partitions, floors & roofs.

<b>UNIT 1</b>	<b>WALLS- TYPES OF MASONRY</b> Different types - Stone walls – random rubble, coursed rubble, square rubble, polygonal rubble & Ashlar etc Brick masonry -Types of bonds - single & double Flemish bond, header bond, stretcher bond, rat trap bond, ornamental bonding.
<b>UNIT 2</b>	<b>FLOORS</b> Floor coverings- - softwood, hardwood- resilient flooring - linoleum, asphalt tile, vinyl, rubber, cork tiles - terrazzo , marble & granite – properties, uses & laying. Floor tiles- ceramic glazed, mosaic and cement tiles- properties, uses and laying, details for physically handicapped.
<b>UNIT 3</b>	<b>FALSE CEILING</b> Construction of various kinds of false ceiling such as thermacol, plaster of paris, gypboard, metal sheets, glass and wood Construction of domes, vaults, & other special ceilings
<b>UNIT 4</b>	<b>WALL PANELING</b> Paneling – Using wooden planks, laminated plywood, cork sheets, fibre glass wool & fabric for sound insulation and wall paneling for thermal insulation.
<b>UNIT 5</b>	<b>FINISHES</b> Paints- enamels, distempers, plastic emulsions, cement based paints- properties, uses and applications- painting on different surfaces – defects in painting , clear coatings & strains- varnishes, lacquer, shellac, wax polish & strains- properties, uses and applications. Special purpose paints- bituminous, luminous, fire retardant and resisting paints- properties, uses and applications

### Course Outcome (CO):

At the end of this course students will have:

CO1: Ability to understand and draft the construction details.


CO2: An ability to understand the different Building Materials and Elements and their Details. CO3: An ability to understand the properties and use of protective finishes, floors and its products.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	H				L		M		M			H	M		H
CO2	H		M	L							M	H			H
CO3		M				M							M		

**Reference Books**

- Bindra, S.P. and Arora, S.P. Building Construction: Planning Techniques and Methods of Construction, 19th ed. Dhanpat Rai Pub., New Delhi, 2000.
- Moxley, R. Mitchell's Elementary Building Construction, Technical Press Ltd.
- Rangwala, S.C. Building Construction 22nd ed. Charota Pub. House Anand, 2004.
- Sushil Kumar. T.B. of Building Construction 19th ed. Standard Pub. Delhi, 2003.
- Chowdary, K.P. Engineering Materials used in India, 7th ed. Oxford and IBH, New Delhi, 1990.
- Rangwala, S.C. Building Construction: Materials and types of Construction, 3rd ed. John Wiley and Sons, Inc., New York, 1963.
- Francis D. Ching, Building Construction Illustrated, Wiley publishers, 2008.
- Building Construction by Dr B.C. Punmia.
- Building Construction by Ashok Kumar Jain.

  
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<b>GDD056A</b>	<b>Digital Modelling</b>	<b>0-4-0 [2]</b>
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**Objective**

- The course shares fundamental knowledge on digital software to enable the student to make effective audio visual presentations, create two dimensional drawings and three dimensional visualization of interiors.
- This unit intends to equip the students with concepts and principle of CAD pertaining to Interior Design using software like AUTOCAD and similar ones.

<b>UNIT 1</b>	Fundamentals of Photo editing and presentation skills with Adobe Photoshop /CorelDraw .
<b>UNIT 2</b>	2D drawings with AutoCAD
<b>UNIT 3</b>	3D modelling through Sketch up
<b>UNIT 4</b>	Rendering with V-ray
<b>UNIT 5</b>	3D drawings- Introduction to 3D 3D forms Material application Rendering Tools &Techniques Project Setting up plotters and print

**Course Outcome (CO):**


the end of this course students will have:

CO1: Knowledge on basic software required for Design presentations.

CO2: An ability to understand the total use of all commands relate to windows and AutoCAD for making designs,

CO3: An ability to understand the 2D drawings Line compositions to be taken Color compositions, painting in windows,

CO4: An ability to understand the Drawing simple geometry objects and drafting of room give building / apartment / flat and Bungalows.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M					H	M		H
CO2	H		M	L						H		H			
CO3		M				M			M				M		
CO4									M						H

**Reference Books:**

1. Beginning AutoCAD 2016 by Cheryl R. Shrock
2. Autocaddhelp/guide/tutorial
3. Adobe Creative Team, Adobe Photoshop CS (Class Workbook)
4. Droblas, Adele Greenberg, Fundamental Photoshop: A Complete Introduction.
5. Adele CroblasGreenberg, Fundamental Photoshop: A complete introduction .
6. Teyapoovan. T.,Engineering Drawing with Auto CAD 2000. Vikas Pub House Pvt Ltd, New Delhi, 2000.
7. Parker, Daniel and Rice, Habert. Inside Auto CAD Daniel, 1987.Georgeomura, Auto CAD, Release 2000.
8. Oscar RieraOjed ,Lucast Guerre, Hyper realistic Computer Generated Architectural Renderings.
9. GiulianoZampi Conway Lloyd Morgan, Virtual Architecture.
10. Aidan Chopra, Rebecca Huehls, SketchUpFor Dummies Bonnie Roskes, Modeling with SketchUp for Interior Design Daniel Tal, Rendering in SketchUp

<b>GDD057A</b>	<b>Model Making Workshop</b>	<b>0-2-0 [1]</b>
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**PURPOSE**

To introduce the students to basics of Model making with various materials.

**INSTRUCTIONAL OBJECTIVES**

Acquisition of hands on experience in model - building.

<b>UNIT 1</b>	<b>INTRODUCTION TO MODEL MAKING</b> Introduction to concepts of model making and various materials used for model making Drawing settings - Limits, D settings, Units
<b>UNIT 2</b>	<b>BLOCK MODELLING</b> Preparation of base for models using wood or boards Introduction to block models of buildings (or 3D Compositions) involving the usage of various materials like Thermocol, Soap/Wax, Boards, Clay etc.
<b>UNIT 3</b>	<b>DETAILED MODELLING 20</b> Making detailed models which includes the representation of various building elements like Walls, Columns, Steps, Windows/glazing, Sunshades, Handrails using materials like Mountboard, Snow- white board, acrylic sheets. Representing various surface finishes like brick/stone representation, stucco finish etc. Various site elements – Contour representation, Roads/Pavements, Trees/Shrubs, Lawn, Water bodies, Street furniture, Fencing etc.
<b>UNIT 4</b>	<b>INTERIOR MODELS OF INTERIOR SPACES</b> Making models of the various interior spaces such as Residences Offices Retail Spaces Recreational Spaces Scaled models of furniture.
<b>UNIT 5</b>	<b>CARPENTRY</b> Introducing the techniques of planning, chiselling & jointing in timber to learn the use of hand tools. Exercise involving the design of simple furniture and making a model of the same.

**Course Outcome (CO):**

At the end of this course students will have:

CO1: Understand the technological principles of model making in a commercial context CO2: Be able to Relate the geometrical volumes into building models.

CO3: Be able to Understand the volumes in relation to space and experience 3D quality of volumes.

CO4: Analyze the various possibilities for representing the models and use the various methods of model building. CO5: Design and create models conceptually with functional and aesthetic values.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H			H
CO2			M	L								H			H
CO3		M				M			L		M		M		
CO4	M							H							M
CO5				H									H		

**REFERENCE BOOKS**

1. BENN, The book of the House, Ernest Benn Limited, London
2. Jannsen, Constructional Drawings & Architectural models, Karl Kramer Verlag Stuttgart, 1973.
3. Harry W.Smith, The art of making furniture in miniature, E.P.Dutton Inc., New York, 1982.

**Contact Hours (L-T-P): 1-0-2**

<b>DEN003A</b>	<b>Life Skill-1(personality Development)</b>	<b>Credits 1-0-1 [2]</b>
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**Object ives**

1. To prepare the students as per the industry demands.
2. Switching to Activity and Task based Teaching modules.
3. To focus on the linguistic aspects in relation to life situations.
4. Facilitating the aspects of behavioural skills in language.
5. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
6. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

**Course Outcomes (CO):**

**At the end of this course students will have:**

- CO1: Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields.
- CO2: Ability to learn by doing it practically in the classroom.
- CO3: Ability to learn by creating an environment and adapting to the environment.
- CO4: The ability to prepare the students as per the need of the Multi-cultural scenario around.

**Syllabus: Theory**

<b>UNIT 1</b>	Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion Basics of Narrating and describing things
<b>UNIT 2</b>	Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview CV/Resume Drafting and HR Interview advance theory Basics of Video Interviews and Video Profiles for Job
<b>UNIT 3</b>	Types of listening, advantages and disadvantages
<b>UNIT 4</b>	Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report
<b>UNIT 5</b>	Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self- esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc.

<b>GDD060A</b>	<b>INTERIOR DESIGN STUDIO – II (Office Spaces)</b>	<b>0-6-0 [3]</b>
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### **Objective**

- Explore to a preliminary level basic spatial and material design concepts.
- This unit intends to equip the students with concept and principles of Basic Design pertaining to office design.
- To develop the skills in elements of design, color, texture, anthropometrics, planning of an office.
- To understand the basic function of the office, which are required in planning of the interior of office.

<b>UNIT 1</b>	<b>Office design</b> Introduction to work space design; Requirement of a work space; Types of Office system-Open Office, Closed cabin system; Planning of an Office; Ambience of an office; Office layout Patterns- Grid & random. Office Spaces - General Offices & Workstation and Planning Data; Different types of Workstations; Different types of Conferences Layouts; general offices & Multiple Workstation Planning Data.
<b>UNIT 2</b>	<b>Office Design Procedure:</b> Design on Paper and Practical Approach- Visiting the site, Preparing Personal Data Card, Making out Requirements, Designing, and Evaluating.
<b>UNIT 3</b>	<b>Interiors of Office:</b> Colour Schemes; Use of Colour Scheme; Factors Influencing the colour Scheme- Individual choice, Utility, Direction Wise, Region Wise. Light- Open Light & Concealed Light; Factors influencing Lighting- Position, Movability, Adaptability, Adjustability, State, Purpose, Direction, Architectural, Application; Layout of Lighting- Chessboard, Perimeter, Diagonal, Neutral, Square; Principles of Lighting. Material Selection- Selection Criteria in an Workspace.
<b>UNIT 4</b>	<b>Design project-I</b> Architect's/ Designer's Office- Planning, Interior Designing- Inspiration, Theme, Concept, Functional Requirements, Working Drawings & Presentation Drawing and Material Specification.
<b>UNIT 5</b>	<b>Design Project-II:</b> Parlour Design- Planning, Interior Designing- Inspiration, Theme, Concept, Functional Requirements, Working Drawings & Presentation Drawing and Material Specification.

### **Course Outcome (CO):**

At the end of this course students will have:

- CO1: An ability to understand the Design Process Through Observation Comparison, Analysis Withthe Help of Prototypes, Model and Drawings.
- CO2: An ability to understand the different areas and their anthropometrics in office design.
- CO3: An ability to understand the project studies, case studies of various related topics for interiors will be used. Presentation of data collected will be done by means of seminars / visits / books / visuals. Motivation of inspiration through the works of renowned designers and architects. Critical observation of interior projects for their merits and demerits by means of reading, study of drawings, interpretation and discussion.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2	H		M	L					M			H			H
CO3		M				M							M		

**Reference Books:**

1. Time Saver Standards for Interior design & Space Planning by Joseph Dechiara, Julius Panero
2. Martin Zelnik.
3. Lighting for Interior Design by Lighting for Interior Design.

GDD061A	W.d. & Estimation	0-4-0 [2]
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### Objective

- This unit intends to equip the students with all the procedures of estimation & costing principles of estimating all works of interior design project.

<b>UNIT 1</b>	<b>Estimating &amp; Costing</b> Introduction to Estimating & Costing; Importance; Units of Measurements; Types of estimates- Preliminary or Approximate Estimate or Abstract Estimate, Plinth area estimate for building, Cube Rate Estimate for Building Renovation, Approximate Quantity Method Estimate, Detailed Estimate or Item Rate Estimate, Revised Estimate, Supplementary Estimate, Annual Repair or Maintenance Estimate; General principle of approximate method of costing; Approximate Methods of Costing for Various Interior Works
<b>UNIT 2</b>	<b>Specifications</b> Introduction; Objects of Specifications; Importance of Specifications; Types of Specifications; Brief specifications; Detailed specifications; Principles of Specifications; Typical Specifications.
<b>UNIT 3</b>	<b>Taking Out Quantities</b> Introduction; Essentials of an Estimation; Requirements of an Estimation; Methods of Taking out Quantities; English method of taking out quantities; Units of Measurements; Modes and Unit of Measurement For Different Types Of Trades; General rules for measurements.
<b>UNIT 4</b>	<b>Tenders</b> Introduction; Invitation to Tender; Tender Notice- Essentials of Tender Notice; Opening of Tender; Acceptance of Tender; Tender Document; Types of Tender- Item Rate, Lump Sum, Lump Sum Plus Percentage, Cost Plus Percentage, Cost Plus Fixed Fee, Cost Plus Fixed Fee with Bonus/Penalty, Labor Tender, Demolition Tender.
<b>UNIT 5</b>	Detailed working drawing of a project

### Course Outcome (CO):

At the end of this course students will have:

- CO1: Student will be able to know the procedure of estimation & costing CO2:  
Student will be able to plan a project using the estimation & costing CO3:  
Student will be able to prepare bills, contracts, agreements etc.  
CO4: Understand the different grammar of the drawings. CO5:  
Develop drawings that are used for execution



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2			M	L					M			H			H
CO3		M				M				L			M		
CO4							H				L				
CO5	H		M		L										

**Reference Books:**

1. Estimating & Costing in Civil Engineering by B.N.Dutta
2. Estimating & Costing- by G.S. Birdie

<b>GDD064A</b>	<b>Furniture Design</b>	<b>0-4-0 [2]</b>
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### **Objective**

- To acquire practices of craftsmanship and sensitize the student's visual perception of furniture as a single form through the study and presentation of precedent works - both historical and contemporary & to cultivate the ability necessary to design by understanding the user-activity, structural concepts of furniture, materials and their essential attributes.
- To Provide the students knowledge on furniture design and its various aspects.
- To understand about the various anthropometric aspects, human factors and other design criteria involved in the design of furniture's.
- To make the students understand about the various materials & Technology involved in the making of the furniture's.

<b>UNIT 1</b>	Sitting Furniture: Executive Chair, Sofa Chair, Lounge, Deck/ Outdoor Chair, Bar Chair/Stool - Designing, Working Drawings with Material & hardware. Tables: Reception desk, Manager's table, Drafting Table, Trolley Table - Designing, Working Drawings with Material & hardware
<b>UNIT 2</b>	Sleeping Furniture: Day Bed, Canopy Bed, Poster Beds, Infant Bed- Designing, Working Drawings with Material & hardware. Storage Furniture : Display Islands, Book Case/ Racks, Chester drawers- - Designing, Working Drawings with Material & hardware.
<b>UNIT 3</b>	Multipurpose Furniture: Sofa Cum Bed, Office Work Stations with storage, Bar Counters cum storage- Designing, Working Drawings with Material & hardware.
<b>UNIT 4</b>	Furniture Detailing and Construction- Introduction to different materials, joinery details and manufacturing methods most frequently adopted in furniture design such as Injection Molding, investment casting, sheet metal work, die casting, blow-molding, vacuum - forming etc.
<b>UNIT 5</b>	Design Problem - Exercise oriented by innovative explorations, observation and constrains, to design a furniture, by providing measured drawing – plan, elevation and detailing on full scale, supported by prototype.

**Course Outcome (CO):**

At the end of this course students will have:

- CO1: To Impart the knowledge of various styles, systems and products available in the market. Enhances the knowledge of ergonomics, materials, design and working parameters in designing furniture.
- CO2: Be able to Relate various design fundamentals and ergonomics with existing day to day furniture. CO3: Be able to becoming familiar with basic traditional and modern joinery of furniture.
- CO4: Be able to Analyze the user and space relationship in terms of Furniture Design by studying different built spaces. CO5: Apply design thinking and process to create a new Furniture Design.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2			M	L					M			H			H
CO3		M				M					M				
CO4	H									L					M
CO5			M		L								L		

**Reference Books:**

1. Furniture Design by Graves (Garth).
2. Joseph Aronson, The Encyclopedia of Furniture: Third Edition ,1961
3. Bradley Quinn, Mid-Century Modern: Interiors, Furniture, Design Details, Conran Octopus Interiors, 2006.
4. Jim Postell, Furniture Design, Wiley publishers, 2007.
5. Edward Lucie-Smith , Furniture: A Concise History (World of Art) , Thames and Hudson, 1985 Robbie. G. Blakemore, History of Interior Design and Furniture: From Ancient Egypt to Nineteenth- Century Europe, Wiley publishers, 2005.
6. John.F. Pile, Interior Design, 2nd edition, illustrated, H.N.Abrams, 1995.

  
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<b>GDD065A</b>	<b>Digital Modelling-II</b>	<b>0-4-0 [2]</b>
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**Objective**

- This unit intends to equip the students with concepts and principle of CAD pertaining to Interior Design using software like AUTOCAD and similar ones.
- This unit intends to equip the students with throughout Knowledge of application of Computer in interiors and efficient working in 3D & 3D Animation and Walk Through.

<b>UNIT 1</b>	<b>Module 1:</b> Introduction - About Max System Configuration Max Interface Customize Viewports Standard Primitives Creating objects using Keyboard Entry Setting projec Creating Extended Primitives Defining Object Name &Color Using Manipulator Using Navigation Tools Transforms [Move, Rotate, and Scale with short-cut keys] Using Absolute / Relative Transform Type-in dialog box Restrict to X, Y, Z, XY, YZ, ZX with short-cut keys Using Clone (Copy option only)
<b>UNIT 2</b>	<b>Module 2:</b> Selection Regions Selection Types Select by Name dialog box Group & Sub menus Assembly Shading type in Viewports Co-Ordinate System Unit Setup Using 3D Snap Angular Snap Percent Snap Using Grid & Snap Settings dialog box Align Tool, Clone and Align Tool, Mirror Tool, Quick Align

<b>UNIT 3</b>	<b>Module 3:</b> Applying basic 3D Modifiers – Bend, Taper, Twist, Noise ,Relax, Skew. Applying basic 3D Modifiers-Affect Region, Displace, Lattice, Mirror, Push, Ripple, Stretch, Squeeze, and Spherify, Shell, Slice and Wave. 2D-Shapes, About Start New Shape. Editing Line Object 2D Modifiers - Edit Spline Modifier, Lathe, Extrude, Bevel, Bevel Profile,Sweep, Fillet/Chamfer Compound Objects – Boolean AEC Extended Objects – Foliage, Railing, and Wall, Stair, Doors, Windows.
<b>UNIT 4</b>	<b>Module 4:</b> Introduction to lights - Standard Lights – Omni Target Spot, and Free Spot Target Direct, Free Direct, Sky Light, , Photometric Lights –Target Point, Free Point, Target Linear, Free Linear, Target Area, Free Area. Copying Objects – Clone, Instance, Reference, Array, Spacing Tool, Normal Align, and Align view, Align Camera. Working with Shape Boolean Edit-Spline Compound object- Loft Deforming Loft Objects – Scale, Twist, Teeter, Bevel, Fit - Modifying Objects
<b>UNIT 5</b>	<b>Module 5:</b> Introduction to Material Editor, Tools in M.E, ign Material to selection, assigning 2D maps, t Material, Save Material Library, Maps Rollout, terial / Map Navigation, Rendering Map ended Parameters meras – Target, Free Rendering basics - Output image sizes, ort as JPEG, File handling – Save, Save as, Save Copy as, Save selected, Archive, Summary Info, View Image File, Hold, Fetch, Undo/Redo ject.

#### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to understand the total use of all commands relate to windows and AutoCAD formaking designs.
- CO2: An ability to understand the 3D drawings Line compositions to be taken Color compositions, painting in windows. CO3: An ability to understand the Implementation Strategies will include use and regular practice of all related commands of AUTOCAD 3D, 3D studio, Photoshop, Walk through Animations. The generation of drawings and animation should satisfy theclient’s requirements and it should ease the planning, design and execution of the interior work.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2	H		M	L					M			H			H
CO3		M				M							M		

**Reference Books:**

1. Creating and Rendering Exterior Visualizations In 3ds Max Video Tutori
2. Kelly L. Murdock's Autodesk 3ds Max 2015 Complete reference guideInside 3D Studio MAX 2, Volume 1by Stylin Elliott & Philip Miller
3. <http://shadowmysticstudios.daportfolio.com>

GDD066A	Portfolio	0-6-0 [3]
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**Objective:**

- To assess the performance of student in the practical training, a final jury will be conducted in the month of January, after commencement of the new session.
- The student have to be present in the jury along with their training reports (properly binded), on the basis of which marks for VI sem. will be awarded.
- The jury will be taken on the Training Report & not on the sheets.

**Course Outcome (CO):**

CO1: Understand the different attributes of portfolio design.

CO2: Illustrate reflecting their accomplishments, skills, designs, values, and attributes. CO3:

Develop a portfolio showcasing various aspects of Projects.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2	M		M	L							M	H			H
CO3		M				M				M			M		

**Note:** Students has to follow the instructions as guided in the training manual.

<b>GDD067A</b>	<b>Summer Office Training (Internship)</b>	<b>0-8-0 [4]</b>
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### **Aim**

In this semester the learner will be equipped with knowledge and skills needed such as management of office along with current practices, codes of conduct required to enhance skills and techniques of managing small and large scale residential and commercial interior projects.

### **OBJECTIVE**

- To encourage students to work in with relevant industries.
- An avenue to enhance academics learning through hands on work experience.
- Get advice on career from knowledgeable and experienced professionals.
- Gain exposure to a professional work atmosphere.

Be able to place themselves and their work in the context of their selected discipline

Understand their specialist area and the career opportunities available Understand how to promote themselves and their work professionally.

The aim of this unit is to extend learners' knowledge of professional practices within their specialist area and to relate these to personal goals and career opportunities.

### **INTERNSHIP TRAINING**

- In the Summer break after IV semester, student will undergo an internship of 4 Weeks Duration in an Interior designing or Architectural firm and form a project report about his/her practical experience gained by working on various projects worked under the supervision of a professional designer, so that they can understand the existing working practices, conditions and acquire an in depth technical knowhow.
- The student has to submit a certificate regarding their successful training with the firm.
- A Copy of Report needs to be submitted with the department along with the performance certificate issued by the firm Manager/ Owner and one with the Firm (where internship is pursued).
- After the Internship, student needs to appear in front of jury members for a presentation seminar, who will judge the performance based on their presentation, report, and Viva-voce and award marks to student.
- PROJECT REPORT to be submitted
  - Background of industry
  - Number of employees
  - Project detail on which assisted
  - Manufacturing process
  - Hand & Computer sketches
  - Experience
  - Any other details

### **Course Outcome (CO):**

CO1: Student will be able to understand about entrepreneurship and evolution of entrepreneurship. CO2:

Student will be able to understand creating and starting the venture.

CO3: Student will be able to understand managing, growing and ending the new venture. CO4:


Student will be able to understand entrepreneurship Development and Government.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course	Program Outcome												Program Specific Outcome		
Outcome															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L		M		M			H	M		H
CO2	H		M	L					M			H			H
CO3		M				M				M	L		M		
CO4	M							L							

  
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GDD001A	DESIGN FOUNDATION	0-0-8[4]
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### AIM

To make students see, make and appreciate the basic design concepts. The first level includes the vocabulary of design and principles of composition. This level includes 3D composition and study of Volumes. The aim of this course is to understand the method of visualizing and drawing from nature, cast and product drawing. Learners will be introduced to a brief history and introduction to 3D materials, tools and processes and made aware of the range of possibilities of different materials in their 2D and 3D application to design. This may be done through lectures / PPT presentations / swatches/ samples. The aim of this unit is to enable learners to develop knowledge and understanding of the issues that have informed debate on the purposes and processes of design. This unit aims to give learners opportunities to develop skills and knowledge in the development of new products or services in design pathways.

### OBJECTIVE

- Know the phases of the design development cycle
- Skill in color mixing and fine color-discernment.
- Know in principle the physics of color (light), the chemistry of color (pigment), and the impact of color (psychology).
- Practice and develop rendering and presentation techniques in design presentations.
- Recognize the relationship between lighting, surface and perception.
- Student will be able to understand design & principles of composition & 3D compositions
- Student will be able to understand the methods & techniques of visualization & drawing.
- The student would be exposed to appreciation of drawing different products.
- Student will be able to understand basics of design concepts

<b>UNIT 1</b>	<p><b>THEORY-</b> Elements of Design- Point, Line, Characteristic of Line, Types of Line, Shapes, Categories of Shape, Space, Categories .</p> <p><b>PRACTICAL-</b> Elements of design- Types of Lines, Line Compositions, Different types of Shapes- Geometric, Organic, Free-form, Natural, and Shape, composition, Positive &amp; Negative. Textures- Physical &amp; Visual, Texture Composition, Form Space-Positive &amp; Negative.</p>
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<b>UNIT 2</b>	<p><b>THEORY-</b> Principle of Design- Balance, Types of Balance, Emphasis, Unity, Repetition, Rhythm, Pattern, Harmony, Proportion, Contrast, Functionality. Gestalt and his Concepts- Closures, Continuance, Similarity, Proximity, Alignment.</p> <p><b>PRACTICAL-</b> Principle of design- Balance, types of balance emphasis, unity, repetition (rhythm, pattern), harmony, proportion (scale), variety (alteration), contrast, functionality.</p>
<b>UNIT 3</b>	<p><b>THEORY-</b> Color- Introduction to Color, Color Theory, Color Harmonies, Color Schemes, Color Wheel, Tint, Tone, Shades. Different Mediums in Art.</p> <p><b>PRACTICAL-</b> Color- Color Wheel and color chart, Color Exploration, Color Interaction. Primary colors- Color Wheel, Color Composition, Secondary colors- Color Wheel, Color Composition, Tertiary colors- Color Wheel, Color Composition Color schemes- Monochromatic, Achromatic, Complimentary, Split Complimentary, Double-Split Complimentary Polychromatic. Tint, tone &amp; shades- Application of Gray Scale and Black &amp; White. Mediums in art- Pencil, Charcoal, Pastels, Water &amp; Poster.</p>
<b>UNIT 4</b>	<p><b>THEORY-</b> What is Design, Philosophies and Studies of Design, Approaches to Design, Philosophies for Methods of Designing, Philosophies for the Purpose of Design, Design as a Process, Defining a Design Process, Typical Steps or Stages of the Design Process, Design and Art, Design and Engineering, Design and Production, Process Design?</p> <p><b>PRACTICAL</b> –Drawing, Nature-drawing Composition, Free-Hand Sketching. Object drawing-2D &amp; 3D, Human drawing- Outline Sketches, Shades &amp; Shadow Composition, Light- Dark Tone Composition, positive and negative spaces, Product drawings; method of representing</p>
<b>UNIT 5</b>	<p><b>THEORY-</b> Composition, Principle of Organization, View Point Compositional Techniques, Rules of Thirds, Odds, Space, Simplification, Limiting Focus, Geometry and Symmetry</p> <p><b>PRACTICAL</b> –View- Perspective, Isometric, Geometry- Lines &amp; Angle bisecting, Constructing Regular &amp; Semi Regular Tessellation, Constructing 3D Tessellation</p>

## COURSE OUTCOME (CO)

**At the end of this course students will have:**

CO1: An ability to color mixing and fine color-discernment.

CO2: An ability to know in principle the physics of color (light), the chemistry of color (pigment), and the impact of color (psychology).

CO3: An ability to rendering and presentation techniques in design presentations. CO4: An ability to recognize the relationship between lighting, surface and perception.

# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
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CO1	H		M	H	M	M							M	H			
CO2	H			H		H				H			M				M
CO3	H		H	H	H	M	H						H				M
CO4	H			M	M							M	H	H			H

H = Highly Related; M = Medium L = Low

## TEXT BOOKS

1. Broomer, Gerald F., (1974), Elements of Design: Space, Davis Publications Inc. Worcester, Massachusetts.
2. Bruce D. Kurty, (1987), Visual imagination- An introduction of Art, Prentice Hall, NewJersey.

  
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<b>GDD002A</b>	<b>BASIC ART &amp; DESIGN</b>	<b>0-0-8(3)</b>
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### **Prerequisite of the Course ---Drawing skills AIM**

Art and design stimulate creativity and imagination. It provides visual, tactile and sensory experiences and a special way of understanding and responding to the world. It enables students to communicate what they see, feel and think through the use of color, texture, form, pattern and different materials and processes. Students become involved in shaping their environments through art and design activities. They learn to make informed judgments and aesthetic and practical decisions. They explore ideas and meanings through the work of artists and designers. Through learning about the roles and functions of art, they can explore the impact it has had on contemporary life and that of different times and cultures. The appreciation and enjoyment of the visual arts enriches all our lives

### **OBJECTIVE**

- To understand of the social, psychological, cultural, historical and commercial factors.
- Development of Graphic Skills, Ability and Comprehension. Establishing Significance of Art.
- To understand the influences on art and design activities.

<b>UNIT 1</b>	Introduction to History of Art, Design and Architecture – Pre History To Ancient Civilization, Mesopotamia, Egypt, Indus Valley, China.
<b>UNIT 2</b>	Introduction to Indian folkArt- Worli, Fadd, Madhubani, Modern Art, Blue Pottery, Fresco, Meenakari , glass mosaic, Miniature Art, Kalamkari, Inlay-Work.
<b>UNIT 3</b>	<b>Techniques &amp; Process</b> Material exposure ranging from POP, Fly-ash, Terracotta & Ceramics Clay, Wood, metal, etc.,) Techniques, Processes terminology and tools.
<b>UNIT 4</b>	<b>Techniques &amp; Process</b> Material exposure ranging from Leather, Resin, Paper, Fabric, Tissues, foiletc.) Techniques, Processes terminology and tools.
<b>UNIT 5</b>	Introduction to Photography for documentation

### **COURSE OUTCOME (CO)**

**At the end of this course students will have:**

CO1: An ability to understand influences on art and design activities.

CO2: To understand outcomes through the interpretation and analysis of information. CO3: An ability to be able to assess, interpret and evaluate information.

CO4: An ability to be able to evaluate and present conclusions.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	M	M										M				M
CO2	L	M	M										M				M
CO3	L	M	M										M				M
CO4	L	M	M										M				M

**TEXT BOOKS**

1. Broomer F. Gerald, (1974), Elements of Design, Space, Davis Publications Inc., Worcester, Masschusetts.
2. Dodson B., (1990), Keys to Drawing, North Light Publications, Cincinnati.
3. Mark W., Mary W. (1999), Drawing for Absolute Beginner, F&W Publications, Cincinnati.
4. Davis M.L. (1996), Visual Design in Dress, Prentice Hall, Canada.  
Graves M., (1951). The Art of Colour and Design, McGraw-Hill Book Company

GDD025A	JEWELRY SKETCHING & RENDERING	0-0-6 [3]
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## AIM

This course will deal with sketching and rendering techniques. As a jewellery designer these skills will assist student a lot as you will be able to express your ideas in 2-dimensional and 3- dimensional forms. Student will be able to represent ideas to clients with the help of rendered sketches of design helping the other person to visualize as how they will look like when crafted in any metal and as per specifications. The emphasis of this course is on learning basic practical skills and developing ideas. Students will learn to translate concepts into creative solutions. Principles and elements of applied design along with jewellery forming techniques, materials and forms will be introduced. This 3 credits theory course will carry equal weightage of both design and manufacturing components; students will be introduced to the conceptual and historical understanding of jewellery making, and thereby apply their own theoretical and creative understanding through theme based projects, as well as grasp the technical skills pertaining to basic jewellery manufacturing, as well as application of tools to particular techniques.

## OBJECTIVE

- To acquire theoretical knowledge about the adornment of body through discussions, presentations and fieldwork.
- To develop skills with processes, techniques & materials through demonstrations and progressive exercises.
- To generate ideas particular to individual fields of study.
- To learn through review, appreciation and presentation of individual work.
- To practice and be aware of health and safety in the workplace.

<b>UNIT 1</b>	<b>PRACTICAL</b> – Gemstone –Drawing Of Gemstone Drawing And Faceting Method of A Round Brilliant Cut Stone. Oval, Pear, and Marquise Shaped Stone. Step Cut Stone Baguettes, Taper Baguettes, And A Single Cut, Kite Cut, Triangle Cut And Trilliant Step Cut Stone Drawing and of A Square, Cushion, And French Cut Stone. Gem Stone Shading And Rendering of Facetted, Cabochons Carved Stones, Pearl.
<b>UNIT 2</b>	<b>PRACTICAL</b> – Metal Forms – Representation Of Metal Colors For Yellow Gold, White Gold, Platinum, Silver. Types Of Textures- Like High Polish, Florentine, Matt Finish, Sandblasting, Tree Bark, Satin .Types Of Decoration –Like Granulation, Open And Close Filigree, Etching, Engraving, Repousse And Chasing, Embossing, Inlay, Enameling.
<b>UNIT 3</b>	<b>PRACTICAL</b> – Metal Forms – Representation Of Metal Colors For Yellow Gold, White Gold, Platinum, Silver. Types Of Textures- Like High Polish, Florentine, Matt Finish, Sandblasting, Tree Bark, Satin .Types Of Decoration –Like Granulation, Open And Close Filigree, Etching, Engraving, Repousse And Chasing, Embossing, Inlay, Enameling.
<b>UNIT 4</b>	<b>PRACTICAL</b> – Settings – Representation Of Different Types Of Setting Like Prong, Pave, Bezel, Channel, Fishtail, Invisible, Etc.
<b>UNIT 5</b>	<b>PRACTICAL</b> – Chains, And Its Representation – Types Of Chain, Representation Of Chain, Clasps And Its Representation -Types Of Clasps, Representation Of Clasps

## COURSE OUTCOME (CO)

### At the end of this course students will have:

- CO1: This unit has introduced you with the basic information about the tools and materials and their use. After understanding their use their application will become very easy to design jeweler and master the skills.
- CO2: After going through this unit you have learnt about the different metal surfaces and their representation in addition you have learnt to observe various textures around you and their used in Jewelry.
- CO3: You learnt about the Gems stones their drawing, shading and rendering. This will be helpful for you to identify different cuts, shapes and varieties in the gem stones. This unit has given you the complete idea of representation of different settings in a Jewelry piece. This unit gives you an exposure to the types of chains and the different types of closing mechanisms used in Jewelry.
- CO4: You have learnt metal rendering techniques and identifying the different metal colors. Be able to develop designs and communicate ideas

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H			M	M	H	M						M	M			
CO2		H	M				M			H			M	M			M
CO3	M				M								M	M			M
CO4	H			M	M							M	H	H			H

H = Highly Related; M = Medium L = Low

## TEXT BOOKS/ WEBSITES

- [www.cutting-mats.net/2634.html](http://www.cutting-mats.net/2634.html)
- Hoke, C. M. (1940) *Refining precious metal wastes: gold – silver – platinum metals, a handbook for the jeweler, dentist and small refiner*. Metallurgical Publishing Co., New York.
- McCreight, Tim. (1997) *Jewelry: fundamentals of metalsmithing*. Hand Books Press, Madison, WI.
- The Jewelers' Directory of gem stones : Judith Crowe
- Techniques of jewelry illustration and coloring rendering by dumatt corp
- . jewellery illustration and design: techniques for achieving professional results paperback – 1oct 2018



DEN001A	COMMUNICATION SKILLS	2-0-1	[ 3]
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### OBJECTIVE

- To enhance English language competence in reading, writing, listening and speaking.
- Switch the approach from teacher-centered to student-centered one.
- Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
- Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student- centered learning rather than on the teacher-centered learning.
- To link communication skills with the organizational behavior.
- To inculcate skills that is very much required for employability and adjusts in the professional Environment.

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
<b>UNIT 2</b>	<b>Basic Writing Skills:</b> Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
<b>UNIT 3</b>	<b>Composition:</b> , Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
<b>UNIT 5</b>	<b>Professional and Technical Communication</b> :Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation


### COURSE OUTCOME (CO)

#### At the end of this course students will have:

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in different contexts. CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels knowing the type of different standards of English.

  
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## TEXT BOOKS

- Practical English Usage. Michael Swan. OUP. 1995
- Remedial English Grammar. F.T. Wood. Macmillan. 2007
- Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw HillPub. Co. New Delhi. 2005. Tenth Edition.
- On Writing Well. William Zinsser. Harper Resource Book. 2001
- Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
- Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
- Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
- Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006

GDD026A	METALLURGY	2-0-0 [2]
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### AIM

This unit aims to develop learners' skills and understanding common to the broad area of 3D design and the potential design implications of selected materials. In this unit learner will know about Characteristics and properties of metals Classification of Metal group -Ferrous, Non-Ferrous, Alloys, Ores, origin, mining and methods, introduction to physical properties. In this unit learner will know about the techniques practiced in getting a final 3d product. Cutting and shaping of different types of metals with maintaining the quality and standards.

### OBJECTIVE

- To impart the knowledge of metals & the use of various laboratory equipment and other instruments used in Jewelry manufacturing lab.
- To acquire a thorough knowledge of all precious and semi precious metals and the ways in which they are used in Jewelry.
- To understand the different metals and their implementation.
- To learn various Standard Weights and Measures.

<b>UNIT 1</b>	Characteristics and properties of metals applicable in jewelry industry –ductility, malleability surface tension and absorption.
<b>UNIT 2</b>	Classification of Metal group -Ferrous, Non-Ferrous, Alloys, Ores. Mining and Techniques-Surface Mining, Subsurface Mining and types
<b>UNIT 3</b>	Basic Techniques of Jewelry Making- Measurement, Layout, Sawing, Drilling, Filing etc. Solders And Soldering – Meaning, Solders, Flux Basic Soldering Techniques Methods, Electronic Component, Pipe/Mechanical Soldering, Stained Glass Soldering.
<b>UNIT 4</b>	Precious Metals and their Mining, Methods of Refinement & Recovery, Application in Jewellery, Quality Control –Lowering or Raising Metal Quality, Hallmarking, Standard Weights and Measures.
<b>UNIT 5</b>	Manufacturing Process- Different Types Of Manufacturing Process, Handmade Jewelry, Advantages And Disadvantages. Stamping - Advantages And Disadvantages Modeling- Advantages And Disadvantages Casting Electroforming Process, Electroplating.

## COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Be able to understand how to cut and shape metals

CO2: Understand and apply the characteristics of metal used in jewellery design.

CO3: Be able to demonstrate the use of metal in specific contexts. Be able to understand about quality certification of metal

CO4: Understand how to use metal to meet intentions.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H		M		H	H							M	M			
CO2	M				M	M	H			H			M		M		M
CO3		M	H		H	M	M						M		M		M
CO4	M		M	H	M			H				M	H	H	H		

H = Highly Related; M = Medium L = Low

## TEXT BOOKS

Materials Science and Engineering : An Introduction by W.D. Callister

Physical Metallurgy Principles by R. Abbaschian and R.E. Reed Hill

Introduction to Materials Science for Engineers by James F. Shackelford

- Powder Metallurgy : Science, Tech & Materials PB (English), ANISH UPADHYAYA ; GOPAL SHANKAR, 2010, ORIENT BLACKSWAN PVT LTD.-NEW DELHI
- Metallurgical Thermodynamics Kinetics and Numericals PB (English) 1st Edition, Dutta S K, 2011, S. CHAND & COMPANY LTD-NEW DELHI
- Untracht, Oppi. (1982) *Jewelry concepts and technology*. Doubleday & Co., Garden City, N.Y.
- Hoke, C. M. (1940) *Refining precious metal wastes: gold – silver – platinum metals, a handbook for the jeweler, dentist and small refiner*. Metallurgical Publishing Co., New York.
- Loosli, Fritz, Herbert Merz and Alexander Schaffner. (1982) *Practical jewelry making*. Berne, UBOS/SCRIPTAR, Switzerland.
- McCreight, Tim. (1997) *Jewelry: fundamentals of metalsmithing*. Hand Books Press, Madison, WI.
- Revere, Alan. (2011) *Professional jewelry making: a contemporary guide to traditional jewelry techniques*. Brynmorgen Press, Brunswick, ME.

GDD027A	GEMOLOGY	2-0-0 [2]
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### AIM

This unit aims to develop learners' skills and understanding common to the broad area of 3D design and the potential design implications of selected materials. In this unit learner will know about definition, value of gemstone, classification and types, Geological occurrences, formation, origin, mining and methods, history and folklore, introduction to physical properties. Cutting and shaping of different types of gemstones, with maintaining the quality and standards.

### OBJECTIVE

- To impart the knowledge of gemology & the use of various laboratory equipment such as the gemological microscope, dichroscope, polar scope and other instruments used in Gem identification.
- To acquire a thorough knowledge of all precious and semi precious stones and the ways in which they are used in jewelry.

<b>UNIT 1</b>	Definition , Value Of Gemstone , Introduction To Gemology, Instruments Used In Gemology , Moh's Scale Of Hardness, Geological Occurrences, Formation Of Gemstone, Origin Of Gemstone, And Mining Of Gemstone.
<b>UNIT 2</b>	Classification Of Gemstones, Visual Observation, Crystallography, Physical Properties, Optical Properties, Refractive Index , Sources , Hardness ,Chemical Composition Of Gemstone, Crystals Structures And Crystallography Determining RI Magnification , Use Of Characteristics Inclusions As A Means Of Gem Identification.
<b>UNIT 3</b>	Organic Gemstones, Synthesis, Synthetics, Imitation & Composite, Enhancement. Manufacture Of Synthetics Gemstone, Types Of Stimulants. Identification Of Stimulants With Help Of Instruments
<b>UNIT 4</b>	Gem Species 1.4 To 1.6, Gem Species 1.6 To 1.8, Gem Species Over 1.80,
<b>UNIT 5</b>	Gem Stone Processing Cabs: (Shapes) (Sawing, Shaping, Doping, Polishing), Gem Stone Processing Cut Stones (Shapes) (Sawing, Shaping, Doping, Cutting & Polishing),.

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Be able to understand how to cut and shape cabochon and cut gemstones.CO2:

Understand and apply the characteristics of 3D used in jewelry materials.

CO3: Be able to demonstrate the use of 3D materials in specific contexts. Be able to understand about quality certification.

CO4: Understand how to use 3D materials to meet intentions.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES  
AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	M	H	H							H	H			M
CO2	M		H		M	M	H			H				H			
CO3		M	H	M	H	H	M	M							M		
CO4				H	M			H				M	H	M			M

H = Highly Related; M = Medium L = Low

**TEXT BOOKS**

- Hall, Cally (2000) *Gemstones*. Dorling Kindersley, London; New York.
- Anderson, Basil W., and James Payne. (1998) *The Spectroscope and Gemmology*. Gem Stone Press, Woodstock, VT.
- Campbell Pedersen, Maggie. (2010) *Gem and Ornamental Materials of Organic Origin*. NAGPress, London.
- *Gem Reference Guide* (1993). Gemological Institute of America, Santa Monica, CA.
- Davies, Gordon. (1984) *Diamond*. A. Hilger, Bristol.
- Field, J.E., ed. (1992) *Properties of natural and synthetic diamond*. Academic Press, London, New York.
- *Gems: Their Sources, Description and Identification*. (2006) 6<sup>th</sup> Ed. by Michael O'Donoghue. Butterworth-Heinemann, Boston.
- Hall, Cally (2000) *Gemstones*. Dorling Kindersley, London; New York.
- O'Donoghue, Michael and Louise Joyner. (2003) *Identification of gemstones*. Butterworth Heinemann, Oxford.

  
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GDD028A	METARIAL EXPLORATION AND TECHNIQUES-I	0-0-2 [1]
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## AIM

This unit aims to develop learners' skills and understanding the properties of materials - physical, visual and creative qualities - for better criteria in the selection of these, considering the technical, environmental and economic importance of the projects

## OBJECTIVE

Jewelry has long existed as a form of adornment and as a perceived enhancement of beauty and, as such, has roots in all cultures. Contemporary jewelry designers have reconsidered the role of ornament and its relationship to the human body to create a design aesthetic that results from innovative manipulation of shape and form and continuous exploration of the potential of materials. The ability to skillfully manipulate and explore these materials and techniques to exploit their full potential within both expected and unexpected contexts is the backbone of any designer's work. An important aspect of this exploration is the continuous analysis and evaluation of results and use of the knowledge and understanding gained to inform further work.

<b>UNIT 1</b>	<b>Exploring Copper &amp; Brass Leather Paper</b>
<b>UNIT 2</b>	<b>Nature of Materials and Processes</b> Properties and usage of various materials Process of selection and applications of various materials for consumer product Design limitations and specific advantages of particular product and their processes
<b>UNIT 3</b>	<b>Conceive and Create:</b> Significance of form in structural strength of products Influence of materials and processes on product aesthetics Costing of various product material and their structure
<b>UNIT 4</b>	<b>Metallic Material Technologies -I</b> Measuring, checking and tracing apparatus Working benches Soldering Equipment Protective equipment (gloves, masks, glasses, etc.)
<b>UNIT 5</b>	<b>Metallic Material Technologies- II</b> Miscellaneous tools Drilling machine Sawing machines

**COURSE OUTCOME (CO):****At the end of this course students will:**

CO1: Understand and apply the characteristics of copper and brass, leather and paper on the jewelry context.

CO2: To know the methods of work and manipulation of the materials.

CO3: To know the technical characteristics of the types of tools used to manipulate each material. CO4: To plan and develop projects and products that involves different types of materials.


**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H			M	M	H			M	M		H			M		M
CO2	M			M		H	H		M		H				M		
CO3	M	H	H	H	H	M							H	H			
CO4	H	M		M	M				H	H	H		M		M		M

H = Highly Related; M = Medium L = Low

**TEXT BOOKS**

- Jones, J.C: Design methods: Seeds of human futures, Wiley inter science, London, 1992.
- Gail Greet Hannah, Elements of Design, Princeton Architectural Press, 2002
- Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997

  
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GDD029A	2D & 3D DRAWING	0-0-4 [2]
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### AIM

This unit will introduce the investigation of Isometric Drawing and Orthographic Drawing along with differentiates between them. Students will be able to create Drawings using the step-by-step process to create own Isometric & Orthographic Drawing of a given 2D and 3D object.

### OBJECTIVE

- Learn to provide people with a realistic view of what the object looks like.
- Learn to differentiate between an isometric drawing and an orthographic projection drawing.
- Learn to draw basic Orthographic & Isometric objects.
- Learn to convert drawings from isometric to orthographic projection.

<b>UNIT 1</b>	<b>Projections of Planes&amp; Solids:</b> Plane parallel, perpendicular and inclined to one reference plane. Plane inclined to both the reference planes. Projections of regular solids, cube, prisms, pyramids, tetrahedron, cylinder and cone, Axis inclined to both planes.
<b>UNIT 2</b>	<b>Sections and Sectional Views</b> Right Regular Solids – Prism, Cylinder, Pyramid, Cone – use of Auxiliary views.
<b>UNIT 3</b>	<b>Isometric Projections:</b> Principles of Isometric Projection – Isometric Scale, Isometric Views, Conventions – Band, Rings, Pendants and Earrings. Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of parts with Spherical surface.
<b>UNIT 4</b>	<b>Transformation of Projections:</b> Conversion of Isometric Views to Orthographic Views and Conversion of orthographic views to isometric views – Design projects


### COURSE OUTCOME (CO):

**At the end of this course students will:**

CO1: Make accurate isometric and orthographic views of various types of jewelry.

CO2: Draw various views of rings, pendants, earrings etc. for an accurate understanding of its shape and other details

CO3: Translate the manual orthographic and isometric views into CAD.

  
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## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		M		M									M	H			M
CO2				M	H		H								H		
CO3	H	H	H	H				H					M				

H = Highly Related; M = Medium L = Low

### TEXT BOOKS

- Engineering Drawing – Basant, Agrawal, TMH
- Engineering Drawing, N.D. Bhatt
- Engineering Graphics. P I Varghese Tata McGraw Hill Education Pvt. Ltd
- Drawing for jewellers (master classes in professional design) hardcover – 28 may 2012 by [maria josep forcadell](#) (author)
- Jewellery Illustration Spiral-bound – 10 Feb 2010

  
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GDD030A	JEWELRY MANUFACTURING -I	0-0-4 [2]
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### AIM

Understand the characteristics of light metals- their Visual, Tactile and Functional characteristics. Employ professional practice when working with light metals. Develop designs and communicate ideas. Use construction and finishing techniques to produce 3D outcomes.

### OBJECTIVE

- This unit has introduced you with the basic information about the tools and materials and their use. After understanding their use their application will become very easy to design jeweler and master the skills.
- After going through this unit you have learnt about the different metal surfaces and their representation in addition you have learnt to observe various textures around you and their used in Jewelry.

<b>UNIT 1</b>	Jewelry Making - A Brief History, Work Space & Tools, Materials Used InJewelry Industry (Pre Civilization Era, Growth Of Civilization, Metals, Gem Stones, Natural Material, Man Made Material, Other Material Used InJewellery Making)
<b>UNIT 2</b>	Basic Tool Kit For Jewelry, Essential Tools For Jewelry ManufacturingRecommended Tools For Jewelry Manufacturing
<b>UNIT 3</b>	Basic Techniques Of Jewelry Manufacturing ,Rolling Techniques Sawing, Piercing, Filling, Milling, Process On Sheet Metal – Repo usage, Chasing, Stamping, Stretching, Embossing, Blanking, Processes With Wire – Chains, Draw Plates, Cross Section, Wire Drawing, Bending, Cutting, Spirals, Forging, Jump-Rings, Chains, Twisting And Filigree. Shaping Doming Blocks , Dies Repousse And Chasing , Scoring And Bending
<b>UNIT 4</b>	Clips And Connections, Catches, Hinges, And Findings Different Types Closing Mechanisms Like Fold Over, Toggle, Lobster Claw, Springing, Box Tab Insert, Fish Hook, Hook And Eye, S-Hook, Barrel. Clips For Earring, Different Types Of Clasps And Locks – Box Clasps, Bead Lock, Tube Lock, Hinge Lock, Slide Lock, Connections With Half Ring For Settings, And With A Hinged Stud
<b>UNIT 5</b>	Surface Decoration & Ornamentation Techniques, Engraving, Scoring, Chip Carving, Metal Inlay, Etching, Granulation, Enameling), Texturing Metal,Texture And Surface Finishes

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Understand the characteristics of light metals.

CO2: Be able to develop designs and communicate ideas.

CO3: Be able to use construction and finishing techniques to produce 3D outcomesCO4: Be able to employ professional practice when working with light metals.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H		M	H	M	H							M	H			M
CO2	M	H		H		H	M	M					M		M		
CO3	H	M	H	H	H	M		H					H		M		
CO4	M			M	M								H	H	H		L

H = Highly Related; M = Medium L = Low

### TEXT BOOKS

- Untracht, Oppi. (1982) *Jewelry concepts and technology*. Doubleday & Co., Garden City, N.Y.
- Hoke, C. M. (1940) *Refining precious metal wastes: gold – silver – platinum metals, a handbook for the jeweler, dentist and small refiner*. Metallurgical Publishing Co., New York.
- Loosli, Fritz, Herbert Merz and Alexander Schaffner. (1982) *Practical jewelry making*. Berne, UBOS/SCRIPTAR, Switzerland.
- McCreight, Tim. (1997) *Jewelry: fundamentals of metalsmithing*. Hand Books Press, Madison, WI.
- Revere, Alan. (2011) *Professional jewelry making: a contemporary guide to traditional jewelry techniques*. Brynmorgen Press, Brunswick, ME.
- Jewellery manufacture and repair by Charles Jarvis
- Jewellery Making manual by Sylvia Wicks
- Jewellery making techniques book by Elizabeth oliver

GDD031A	COMPUTER AIDED DESIGN I- (CORAL DRAW)	0-0-6 [3]
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### AIM

In this module you will learn how to convert Manual Design in Digital Form through Corel with Exact measurement. In this module you will learn creating variation and Orthography concept. And Also Learn applying 3d rendering Effect by Photoshop project.

### OBJECTIVE

- Students will learn the basics of Jewellery Design Software “Coral Draw”
- Each content will cover the meticulous research about the 2D design by using Coral Draw.
- Learning how to develop 2D drawings in multiple.
- Research and documentation of each project.
- Submissions: PowerPoint presentation with digital prints.

<b>UNIT 1</b>	Introduction To Corel Draw, Basic Tools In Coral Draw, Various Shapes.
<b>UNIT 2</b>	Drawing & Shaping Objects, Transforming Objects, Corel Draw Effects, Working With Layer, Design Development, Color Fills And Outlines Tools, Gold Color Creation.
<b>UNIT 3</b>	Motif Development To Make Jewelry, Interactive Blend Tool, Diamond With Measurement , Stone Setting, Creating Shapes & Painting
<b>UNIT 4</b>	Theme Based Designing-Earrings , Bracelets , Pendants , Rings, Brooch, Necklace
<b>UNIT 5</b>	Special Effects To Images-Backgrounds, Text Option, Detail Of Jewelry Piece

### COURSE OUTCOME (CO)

**At the end of this course students will:**

- CO1: The student will be able to make more than one Appropriate Variation compared to original  
CO2: The student will be able to learn Exact Orthography  
CO3: The student will be able to apply 2D Rendering object  
CO4: The student will be able to learn how to save Sampling Cost.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H												M		M
CO2		H	H					M				L		M			
CO3		H	H					H							M		
CO4		H	H	H	H		H					M	H		M		L

H = Highly Related; M = Medium L = Low

**TEXT BOOKS/WEBSITE**

- <http://product.corel.com/help/CorelDRAW/540229932/Main/EN/User-Guide/CorelDRAW- X7.pdf>
- <http://howto.corel.com/>
- [http://www.insidegraphics.com/corel\\_basics/corel\\_draw\\_guidelines.asp](http://www.insidegraphics.com/corel_basics/corel_draw_guidelines.asp)
- An Introduction to computer aided design for jewelry casting by Lucian Taylor
- Corel Draw 11: the official guide dream tech publishers

  
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GDD032A	DESIGN PROJECT-I (GOLD JEWELRY)	0-0-8 [4]
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## AIM

After Understanding the About Gold, Different Jewelry Markets Of India and World, Characteristics of Light Metals Their Visual, Tactile and Functional Characteristics. Student Will Be Able To Develop Designs And Communicate Ideas Using Drawing, Rendering Finishing Techniques Application Of Inspiration Into A Jewelry Product. Make Product Range of All the Design like Pendant, Earring, Flexible Bracelet, Fixed Bracelet, Bangle, Ring and Necklace. Make Product Detail For All Designs. Choose Any 1 Design And Make Prototype Of Gold Jewelry In Your Jewelry Manufacturing Module. To Develop Learners' Skills Of Understanding Of Gold And Different Markets Of gold Jewelry, And Their Use So That Student Can Use His Knowledge For Industry Demand. Basic Knowledge Of Materials Used In Jewelry With Understanding Of How To Apply Them On Paper And Then Developing 3D Outcomes As Prototype Of The Design Project Gold Jewelry

## OBJECTIVE

- To look at designed objects, networks and environments more critically in our everyday life.
- To develop observational skills through which to investigate and understand Design.
- To develop drawing as a means of expression and communication of the creative process
- To develop creative problem solving through a variety of skills, techniques and processes
- To become familiar with researching, investigating and evaluating a wide range of materials and their properties.
- To have an informed opinion about Design and the design process and to be able to express those opinions.

## PREREQUISITE

- Visual Imagination.
- Eye on detail
- Intrapersonal Skills.
- Skills of Gemstone Rendering.
- Basic Knowledge of drawing and rendering.
- Basic knowledge of PowerPoint presentation.

<b>UNIT 1</b>	Inspiration Based Jewelry Design, What Is Inspiration, Why Do We Need Inspiration, Most Common Source Of Inspiration Like 3 Natural Sources, Man- Made Sources, Historical Sources, Symbolic Sources, Other Sources Of Inspiration, Application Of Inspiration Into A Jewelry Product: Applying Design Elements And Principles To These Elements And Making As Many Variation And Options To Each Of The Chosen Elements. Line Placement /Repetition, Reduction And Enlargement, Grid Placement, Rotation, Skewing Or Twisting Or Folding.
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<b>UNIT 2</b>	Selecting The Jewelry Forms / Styles Conceptualization: Concept Development, Generate Product Concepts; Select A Jewelry Concept, Rationale Behind Selecting A Form. Investigating The Inspiration To List The Motifs/ Elements Which Will Act As Forms For Developing Jewelry, Motifs And Its Types, Making Style Variations.
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<b>UNIT 3</b>	Jewelry Design And Detailing: Design Detailing, Why Design Detailing Is Important, Steps Of Jewelry Design Detailing Process.
<b>UNIT 4</b>	Presentation Materials, Presentation Formats And Methods, Documentation And Compilation. Different Type Of Presentation Requirements And Allied Materials For It, Like Only For Designing, Manufacturing Specification, Marketing, / Branding / Promotion Why Documentation And Compilation Is Needed, Process Documentation , Documentation And Compilation For Marketing / Branding/ Promotion
<b>UNIT 5</b>	History Of Gold Jewelry In India, Analyzing Contemporary Gold Jewelry Trends In India, Traditional Indian Gold Smithing Techniques, Gold Appraisal, Market Identification, Culture Board, Jewelry Board, Client Board, Mood Board, Inspiration Board, Conceptualization And Form Generation, Final Design Development, Prototype Development, Portfolio. Inspiration Based Jewelry Design, Inspiration Board, Mood Board ,Client Board, Market Board, Brand Board Application Of Inspiration Into A Jewelry Product, Make Product Range Of All The Design Like Pendant, Earring , Flexible Bracelet , Fixed Bracelet, Bangle , Ring And Necklace, Make Product Detail For All Designs, Choose Any 1 Design And Make Prototype Of Gold Jewelry

\*On the completion of this task student will be able to prepare Jewelry Board, Client Board, Inspiration Board, Mood Board, and Inspiration board, Conceptualization and Form Generation, Final Design Development, Prototype Development & Portfolio.

### **COURSE OUTCOME (CO)**

**At the end of this course students will:**

CO1: Understand the visual, tactile and decorative characteristics of gold materials.

CO2: Be able to create a jewelry collection and developing the portfolio in digital software.CO3: Be able to respond to design requirements.

CO4: Understand professional practice in gold jewelry making.


## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	M	H		H				H	M	M			
CO2	H	H		H		H	M	H			M	H	M		M		
CO3	H	M	H	H	H	M		H				H	M		M		
CO4	H	H		M	M			M				M	H	H	H		

H = Highly Related; M = Medium L = Low

### TEXT BOOKS/WEBSITE

- [www.worldgoldcouncil.com](http://www.worldgoldcouncil.com)
- [www.vogueindia.com](http://www.vogueindia.com)
- [www.reliancejewels.com](http://www.reliancejewels.com)
- [www.damas.com](http://www.damas.com)
- [www.vendorafa.com](http://www.vendorafa.com)
- Untracht, Oppi. (1982) *Jewelry concepts and technology*. Doubleday & Co., Garden City, N.Y.
- Hoke, C. M. (1940) *Refining precious metal wastes: gold – silver – platinum metals, a handbook for the jeweler, dentist and small refiner*. Metallurgical Publishing Co., New York.
- Loosli, Fritz, Herbert Merz and Alexander Schaffner. (1982) *Practical jewelry making*. Berne, UBOS/SCRIPTAR, Switzerland.
- McCreight, Tim. (1997) *Jewelry: fundamentals of metalsmithing*. Hand Books Press, Madison, WI.
- The Jewelers' Directory of gem stones : Judith Crowe
- Techniques of jewellery illustration and colouring rendering by dumatt corp.
- Indian History by ML Nigam

  
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DEN002A	PROFESSIONAL SKILLS	2-0-1 [3]
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### OBJECTIVE

- To enhance Professional competence in reading, writing, listening and speaking.
- Switch the approach from providing information about the language to use the language.
- Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
- Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student- centered learning rather than on the teacher-centered learning.
- Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
- Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

<b>UNIT 1</b>	<b>Professional Grooming and Professional Culture:</b> Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management
<b>UNIT 2</b>	<b>Advanced Grammar:</b> Common errors related to prepositions, articles, models , Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents
<b>UNIT 3</b>	<b>Composition:</b> , Memo, Notice, Circular, Book Review, Research Article, Reports
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms
<b>UNIT 5</b>	<b>Reading Comprehension:</b> Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc- Skimming and Scanning-Inference and Deduction


### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in professional scenario. CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels as per the demand of the corporate culture.

  
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### **TEXT BOOKS/WEBSITE**

- FelixaEskey. Tech Talk, University of Michigan. 2005
- Michael Swan. Practical English Usage, Oxford University Press. 2005
- Anderson, Paul. Technical Communication: A Reader Centered Approach, V Edition, Hercourt, 2003.
- Thampi, G. Balamohan. Meeting the World: Writings on Contemporary Issues. Pearson, 2013.
- Lynch, Tony. Study Listening. New Delhi: CUP, 2008.
- Kenneth, Anderson, Tony Lynch, Joan Mac Lean. Study Speaking. New Delhi: CUP, 2008.
- Marks, Jonathan. English Pronunciation in Use. New Delhi: CUP, 2007.

GDD035A	METARIAL EXPLORATION AND TECHNIQUES-II	0-0-2 [1]
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### AIM

This unit aims to develop learners' skills and understanding the properties of materials - physical, visual and creative qualities - for better criteria in the selection of these, considering the technical, environmental and economic importance of the projects

### OBJECTIVE

Jewelry has long existed as a form of adornment and as a perceived enhancement of beauty and, as such, has roots in all cultures. Contemporary jewelry designers have reconsidered the role of ornament and its relationship to the human body to create a design aesthetic that results from innovative manipulation of shape and form and continuous exploration of the potential of materials. The ability to skillfully manipulate and explore these materials and techniques to exploit their full potential within both expected and unexpected contexts is the backbone of any designer's work. An important aspect of this exploration is the continuous analysis and evaluation of results and use of the knowledge and understanding gained to inform further work.

### PREREQUISITE

- Visual Imagination.
- Eye on detail
- Understanding the tools with safety.
- Basic Knowledge of drawing and rendering.

<b>UNIT 1</b>	<b>Exploring:</b> Silver Fabric Lacquer Enamel
<b>UNIT 2</b>	<b>Nature of Materials and Processes:</b> Properties and usage of various materials Process of selection and applications of various materials for consumer product Design limitations and specific advantages of particular product and its processes
<b>UNIT 3</b>	<b>Conceive and Create:</b> Significance of form in structural strength of products Influence of materials and processes on product aesthetics Costing of various product material and their structure
<b>UNIT 4</b>	<b>Material Technologies I</b> Measuring, checking and tracing apparatus Working benches Soldering Equipment Filling Machines

<b>UNIT 5</b>	<b>Material Technologies II</b> Protective equipment (gloves, masks, glasses, etc.) Miscellaneous tools Drilling machine Sawing machines
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### COURSE OUTCOME (CO):

**At the end of this course students will:**

CO1: Understand and apply the characteristics of Silver, Fabric, Lacquer, and Enamel on the jewelry context;

CO2: To know the methods of work and manipulation of the materials;

CO3: To know the technical characteristics of the types of tools used to manipulate each material; CO4: To plan and develop projects and products that involves different types of materials


### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H			M	M	H							M	M			
CO2	M			M		H	H				M		M		H		
CO3	M	H	H	H	H	M											
CO4	H	M		M	M								H	H	H		

H = Highly Related; M = Medium L = Low

### TEXT BOOKS

- Jones, J.C: Design methods: Seeds of human futures, Wiley inter science, London, 1992.
- Gail Greet Hannah, Elements of Design, Princeton Architectural Press, 2002
- Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997
- <https://www.jewelleryschoolonline.com/the-silver-jewellery-workshop/>
- <http://www.londonjewelleryschool.co.uk/certification-classes/silver-jewellery-5-day-intensive/>

  
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GDD036A	JEWELLERY MANUFACTURING -II	0-0-6 [3]
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### AIM

Learn to choose when to use a specific tool or manufacturing process. Convert and represent different types of surfaces and finishes, shading three dimensional surfaces and translate a two- dimensional surface into three dimensional forms. This unit aims to develop learners' practical skills and understanding when working with light metals and in translating designs into 3D outcomes.

### OBJECTIVE

- This unit has introduced you with the basic information about the tools and materials and their use. After understanding their use their application will become very easy to design jeweler and master the skills.
- After going through this unit you have learnt about the different metal surfaces and their representation in addition you have learnt to observe various textures around you and their used in Jewelry.
- Understand the characteristics of light metals.

### PREREQUISITE

- Visual Imagination.
- Eye on detail.
- Basic Knowledge of metals.
- Understanding the tools with safety.
- Basic Knowledge of drawing and rendering.

UNIT 1	Develop a Personal Design from a Gold design project
UNIT 2	Use Previously Learned Techniques to Showcase Personal Style and Artistic Discovery
UNIT 3	Application of Advanced Techniques in Soldering, Cold-Connections, Piercing, and Use of Alternative Media
UNIT 4	Conceptualization & Form Generation, Final Design Development,
UNIT 5	Creating Visual Harmony in Design Elements

### COURSE OUTCOME (CO):

**At the end of this course students will:**

CO1: Be able to develop designs and communicate ideas

CO2: Be able to use construction and finishing techniques to produce 3D outcomes  
CO3: Be able to employ professional practice when working with light metals.

CO4: Understand how to use metal to meet intention

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H		M	H	M	H							M	H			
CO2	M	H		H		H	M	M			M		M		M		
CO3	H	M	H	H	H	M		H			M		H		M		
CO4	M			M	M								H	H	H		

H = Highly Related; M = Medium L = Low

**SUGGESTED READING**

- [www.gemstonejewellerydesigns.co.uk](http://www.gemstonejewellerydesigns.co.uk)
- [www.angara.com](http://www.angara.com)
- [www.jewellerygemstone.com](http://www.jewellerygemstone.com)
- [www.cutting-mats.net/2634.html](http://www.cutting-mats.net/2634.html)
- Untracht, Oppi. (1982) *Jewelry concepts and technology*. Doubleday & Co., Garden City, N.Y.
- Hoke, C. M. (1940) *Refining precious metal wastes: gold – silver – platinum metals, a handbook for the jeweler, dentist and small refiner*. Metallurgical Publishing Co., New York.
- Loosli, Fritz, Herbert Merz and Alexander Schaffner. (1982) *Practical jewelry making*. Berne, UBOS/SCRIPTAR, Switzerland.
- McCreight, Tim. (1997) *Jewelry: fundamentals of metalsmithing*. Hand Books Press, Madison, WI.
- Revere, Alan. (2011) *Professional jewelry making: a contemporary guide to traditional jewelry techniques*. Brynmorgen Press, Brunswick, ME.



GDD037A	COMPUTER AIDED DESIGN-II (RHINO)	0-0-8 [4]
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### AIM

RHINO module III leads to the practice of advance tools and terminologies of Rhino software. It includes processing of the design for the wax modelling, export and import in different file formats, estimation of the design, product making and cost reduction. Learning of how to advertise the product through catalogues and branding.

Power point presentations /handouts about design development and basic terminologies use in CAD/CAM course will be presented as per required

### OBJECTIVE

- Students will learn the advance level of tools by learning Jewellery Design Software “RHINO”
- Each content will cover the meticulous research about the 3D design by using Rhino
- Students will learn the process of manufacturing through CAM by visiting PCSIR and PGJDC
- Investigating different perceptions about jewellery including traditional and contemporary
- Learning how to develop 3D perspectives and execution of CAD.
- Research and documentation of each project with the final 3D processing
- The Final outcome in result of CAM.
- Submissions: PowerPoint presentation with digital prints and CAM processed prototypes to make mass production out of one piece.

### PREREQUISITE

- Visual Imagination.
- Basics of colour balance, rhythm, contrast etc.
- Eye on detail.
- Skill of 2D Software
- Basic knowledge of orthographic & Isometrics.
- Basic knowledge of PowerPoint presentation.

UNIT 1	Introduction To Rhino, Surfacing ,Stone Setting ,Texture
UNIT 2	Text Surfacing , Scooping , Creating Gallery & J-Bag,
UNIT 3	Gold Weight Controlling,
UNIT 4	Creating Human Figure In Rhino
UNIT 5	Converting In To Dye Format, Casting Through CAD-CAM Process.

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Understand use of specialist 3D technology and processes in chosen pathway CO2: Be able to apply understanding of specialist processes to produce design work CO3: Be able to produce outcomes using specialist 3D technology and processes CO4: Be able to evaluate own work

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS O3	PS O4	PS O5
CO1	M	H	H							M				M			H
CO2		H	H										M				
CO3		H	H											M			
CO4		H	H	H	H		H	H						M			

H = Highly Related; M = Medium L = Low

**TEXT BOOK**

- Rhino for Jewelry Paperback – 2 Jul 2010 by [Dana Buscaglia](#) (Author)

GDD038A	PHOTOGRAPHY	0-0-4 [2]
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### AIM

This unit aims to develop learners' skills and understanding in Product Photography. Students will get Knowledge of the history of the photographic medium and how it relates to the history of the other fine arts

### OBJECTIVE

Various aspects of photography including lighting for indoor & outdoor, handling of studio equipment and set planning & composition.

<b>UNIT 1</b>	Various aspects of photography including lighting for Indoor & Outdoor
<b>UNIT 2</b>	Handling of studio equipment
<b>UNIT 3</b>	Set planning
<b>UNIT 4</b>	Composition.
<b>UNIT 5</b>	Final Product Photography

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1 Be able to use space and equipment.

CO2 Be able to use sets, lights and backgrounds.

CO3: Apply the principles of lighting and color theory to a variety of photographic scenarios by measuring, evaluating, and adjusting light and color to create quality images.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	H	M	M	H				M			M		M		H
CO2	H	H	M		H								M	M			
CO3	H	H	M	H	M									M			

H = Highly Related; M = Medium L = Low

### TEXT BOOKS

- Understanding Exposure: How to Shoot Great Photographs with a Film or Digital Camera by [Bryan Peterson](#)  
The Photographer's Eye: Composition and Design for Better Digital Photos by [Michael Freeman](#)

  
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GDD040A	COMPUTER AIDED DESIGN-III (RHINO)	0-0-4 [2]
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### AIM

RHINO module III leads to the practice of advance tools and terminologies of Rhino software. It includes processing of the design for the wax modelling, export and import in different file formats, estimation of the design, product making and cost reduction. Learning of how to advertise the product through catalogues and branding.

Power point presentations /handouts about design development and basic terminologies use in CAD/CAM course will be presented as per required

### OBJECTIVE

- Students will learn the advance level of tools by learning Jewellery Design Software “RHINO”
- Each content will cover the meticulous research about the 3D design by using Rhino
- Students will learn the process of manufacturing through CAM by visiting PCSIR and PGJDC
- Investigating different perceptions about jewellery including traditional and contemporary
- Learning how to develop 3D perspectives and execution of CAD.
- Research and documentation of each project with the final 3D processing
- The Final outcome in result of CAM.
- Submissions: PowerPoint presentation with digital prints and CAM processed prototypes to make mass production out of one piece.

### PREREQUISITE

- Visual Imagination.
- Basics of colour balance, rhythm, contrast etc.
- Eye on detail.
- Skill of 2D Software
- Basic knowledge of orthographic & Isometrics.
- Basic knowledge of PowerPoint presentation.

UNIT 1	Introduction To Rhino, Surfacing ,Stone Setting ,Texture
UNIT 2	Text Surfacing , Scooping , Creating Gallery & J-Bag,
UNIT 3	Gold Weight Controlling,
UNIT 4	Creating Human Figure In Rhino
UNIT 5	Converting In To Dye Format, Casting Through CAD-CAM Process.

### COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: Understand use of specialist 3D technology and processes in chosen pathway CO2: Be able to apply understanding of specialist processes to produce design work CO3: Be able to produce outcomes using specialist 3D technology and processes CO4: Be able to evaluate own work

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS O3	PS O4	PS O5
CO1	M	H	H							M				M			H
CO2		H	H										M				
CO3		H	H											M			
CO4		H	H	H	H		H	H						M			

H = Highly Related; M = Medium L = Low

**TEXT BOOK**

- Rhino for Jewelry Paperback – 2 Jul 2010 by [Dana Buscaglia](#) (Author)

GDD041A	DESIGN PROJECT II – DIAMOND JEWELLERY	0-0-4 [2]
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### AIM

After Understanding the About Enamels and Enameling, Different Jewelry Markets of India and World, Characteristics of Light Metals Their Visual, Tactile and Functional Characteristics. Student Will Be Able To Develop Designs And Communicate Ideas Using Drawing, Rendering Finishing Techniques Application Of Inspiration Into A Jewelry Product. Make Product Range of All the Design like Pendant, Earring, Flexible Bracelet, Fixed Bracelet, Bangle, Ring and Necklace. Make Product Detail For All Designs. Choose any one Design and Make Prototype of kundan meena Jewelry In Jewelry Manufacturing Module.

### OBJECTIVE

- This unit will enable learners to understand the factors relevant to product design, and to develop skills in planning and producing prototypes.
- To make understand the contrasting difference between casted jewelry and traditional Kundan- Meena jewelry.
- Understanding of traditional and contemporary Kundan Meena. Understanding the technique through practical demonstration.
- Understanding the process of traditional jewelry class in India. A comparative analysis of the past Kundan Jadau work as compared to the present.
- Range development using Kundan Meena technique according to jewelry trends and forecast

### PREREQUISITE

- Visual Imagination.
- Eye on detail
- Intrapersonal Skills.
- Skills of different type of stone setting.
- Basic Knowledge of drawing and rendering.
- Basic knowledge of PowerPoint presentation.

<b>UNIT 1</b>	History Of Kundan Meena Jewelry In India, Analyzing Contemporary Kundan Meena Jewelry Trends In India, Traditional Kundan Meena Jewelry Manufacturing Process, Market Identification, Culture Board, Jewelry Board, Client Board, Mood Board, Inspiration Board, Conceptualization And Form Generation, Final Design Development, Cost Assessment Techniques
<b>UNIT 2</b>	Analyzing Global Jewelry Brands, Analyzing Indian Jewelry Brands,
<b>UNIT 3</b>	Kundan Meena Jewelry Manufacturing Process, Jewelry Trend & Forecast,
<b>UNIT 4</b>	Market Identification, Culture Board, Jewelry Board, Client Board, Mood Board, Inspiration Board
<b>UNIT 5</b>	Conceptualization & Form Generation.
<b>UNIT 6</b>	Final Design Development, Prototype Development, Packaging, Portfolio.

## COURSE OUTCOME (CO)

At the end of this course students will:

CO1: Understand the principles and characteristics of Kundan Meena.

CO2: Be able to create a Kundan Meena collection and developing the portfolio in digital software. CO3: Be able to respond to design requirements and get knowledge of History of Kundan Meena. CO4: Understand professional practice in Kundan Meena jewelry making.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	M	H		H		M			M	M			H
CO2	H	H		H		H	M	H					M		M		
CO3	H	M	H	H	H	M		H					M		M	L	
CO4	H	H		M	M			M					H	H	H		

H = Highly Related; M = Medium L = Low

## WEBSITES

- [Www.Renelalique.Com](http://Www.Renelalique.Com)
- [Www.Birdhichandghanshyamdasjewelry.Com](http://Www.Birdhichandghanshyamdasjewelry.Com)
- [Www.Sunitashekhawat.Com](http://Www.Sunitashekhawat.Com)
- When Jewelry Speaks
- [KhannaJewellers.com](http://KhannaJewellers.com)
- [KalajeeJewellers.com](http://KalajeeJewellers.com)
- [HazoorlilalJewellers.com](http://HazoorlilalJewellers.com)
- When jewelry speaks by

GDD042A	PORTFOLIO	0-0-4 [2]
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### AIM

Design portfolio is the expression of student to translate themes into design. Here one gets inspired by different themes which could be art movements, sport, historic eras, music, dance culture, nature, traditions etc. And picks out tangible and intangible elements which are to be used as design elements in the collection. The ability of a designer to exhibit and use design elements is highlighted which is further on translated into projects. A portfolio is an exhibit of the overall knowledge of the student work which he/she has gained through the course of three years. The purpose lies in promoting the skills of students in a single format this course will help students enter the “real world”. It’s structured around equipping students on skills of “self selling and presenting their portfolios”. The course is aimed at equipping them select “perfect fit” careers, find better jobs and become professional and street smart. It will give students a realistic picture of their future professional lives and provides tools on coping with it.

### OBJECTIVE

- Have the necessary professional communication skills. These include a wide array of tools like making CV’s and presentations, preparing for job tests and interviews and the necessary computer skills to produce these.
- Knowledge about the local and international markets and their operations.
- Career planning, channels for job search, basics of entrepreneurship.
- The course will also assist students to be able to present their portfolios in various modern formats like USB’s, digital photography, websites, CD’s etc.
- Work ethics will also be touched upon to enable them to have long term and fruitful relations with employers.


### PREREQUISITE

- Visual Imagination.
- Basics of colour balance, rhythm, contrast etc.
- Eye on detail.
- Skill of 2D Software.
- Basic knowledge of PowerPoint presentation.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOME

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5
CO1	M		M	H	M	M	H						H	M			
CO2				H		H	H						H		H		
CO3	M	M			H	H	H						H		H		
CO4													H		H		

H = Highly Related; M = Medium L = Low

  
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## **COURSE OUTCOME (CO)**

**At the end of this course students will:**

CO1: Be able to place themselves and their work in the context of their selected discipline. CO2:  
Understand their specialist area and the career opportunities available

CO3: Be able to develop and present a professional portfolio in an appropriate format  
Understand how to promote themselves and their work professionally.

CO4: A copy of portfolio has to be submitted with the department at the time of final Assessment.

  
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GDD043A	OFFICE TRAINING (INTERNSHIP)	0-0-16 [8]
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## AIM

The Aim Of This Unit Is To Extend Learners' Knowledge Of Professional Practices Within Their Specialist Area And To Relate These To Personal Goals And Career Opportunities.

## OBJECTIVE

- To encourage students to work in with relevant industries.
- An avenue to enhance academics learning through hands on work experience.
- Get advice on career from knowledgeable and experienced professionals.
- Gain exposure to a professional work atmosphere.
- Be able to place themselves and their work in the context of their selected discipline
- Understand their specialist area and the career opportunities available
- Understand how to promote themselves and their work professionally.

## INTERNSHIP TRAINING

- In the IV semester , student will undergo a 12 weeks training in a jewelry designing industry /manufacturing unit/ jewelry export unit so that they can understand the existing working practices , conditions and acquire an in depth technical knowhow.
- The student shall prepare a report on the training given by the organization he/she will submit the report. The student has to submit the certificate regarding successful training with the organization.
- A copy of report has to be submitted with the department along with the performance certificate issued by the firm manager/ owner and one with the firm (where internship is pursued).
- After the internship, student has to appear in front of jury members for a presentation seminar, who will judge the performance based on their presentation, report & viva- voce and award marks to student

<b>UNIT 1</b>	<b>Weekly Teaching Plan</b> Week 1-2 How to assess your internship Week 3 writing an introduction Week 4 doing your research Week 5-6 locating the required area of research and analyzing it Week 7-8 writing down about the context of your report Week 9 linking the research to the context of your report Week 10 writing up the conclusion of the report and editing it Week 11 making a short, 'to the point' presentation Week 12- 14 working on the presentation Teaching & Learning Methods: Assessment and Evaluation: A Proposal
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<b>UNIT 2</b>	<b>A Paper (minimum 2000 words)</b> Reason for particular Placement. Brief description of the context. Description of your duties. Findings. Diary of activities. Professional's report
<b>UNIT 3</b>	<b>A Presentation</b> (approx. 30 minutes) Over view of your paper. Visual support materials.
<b>UNIT 4</b>	<b>PROJECT REPORT</b> To Be Submitted ,Background of Industry, Number Of Employees Project Detail On Which Assisted, Manufacturing Process, Hand & Computer, Sketches, Experience ,Any Other Details

## COURSE OUTCOME (CO)

**At the end of this course students will:**

CO1: To identify business strategies for buying and selecting product of the company. CO2: To identify process and procedures for company purchases.

CO3: To explore the buying process, Increase skills in buying and merchandising. CO4: To identify business strategies for buying and selecting products.

CO5: To understand that how they write a report of their industry experience & develop written communication skills

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M		M	H	M	M	H						H	M			
CO2				H		H							H	M			
CO3	M	M			H	H	H						M	M			
CO4						M	M						H	M			
CO5	M				H				M	M	M		M	M	M		

H = Highly Related; M = Medium L = Low

<b>GDD001A</b>	<b>DESIGN FOUNDATION</b>	<b>0-0-8[4]</b>
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### AIM

To make students see, make and appreciate the basic design concepts. The first level includes the vocabulary of design and principles of composition. This level includes 3D composition and study of Volumes. The aim of this course is to understand the method of visualizing and drawing from nature, cast and product drawing. Learners will be introduced to a brief history and introduction to 3D materials, tools and processes and made aware of the range of possibilities of different materials in their 2D and 3D application to design. This may be done through lectures / ppt presentations / swatches/ samples. The aim of this unit is to enable learners to develop knowledge and understanding of the issues that have informed debate on the purposes and processes of design. This unit aims to give learners opportunities to develop skills and knowledge in the development of new products or services in design pathways.

### OBJECTIVE

- Know the phases of the design development cycle
- Skill in color mixing and fine color-discernment.
- Know in principle the physics of color (light), the chemistry of color (pigment), and the impact of color (psychology).
- Practice and develop rendering and presentation techniques in design presentations.
- Recognize the relationship between lighting, surface and perception.
- Student will be able to understand design & principles of composition & 3D compositions
- Student will be able to understand the methods & techniques of visualization & drawing.
- The student would be exposed to appreciation of drawing different products.
- Student will be able to understand basics of design concepts

<b>UNIT 1</b>	<b>THEORY-</b> Elements of Design- Point, Line, Characteristic of Line, Types of Line, Shapes, Categories of Shape, Space, Categories . <b>PRACTICAL-</b> Elements of design- Types of Lines, Line Compositions, Different types of Shapes- Geometric, Organic, Free-form, Natural, and Shape, composition, Positive & Negative. Textures- Physical & Visual, Texture Composition, Form Space-Positive & Negative.
<b>UNIT 2</b>	<b>THEORY-</b> Principle of Design- Balance, Types of Balance, Emphasis, Unity, Repetition, Rhythm, Pattern, Harmony, Proportion, Contrast, Functionality. Gestalt and his Concepts- Closures, Continuance, Similarity, Proximity, Alignment. <b>PRACTICAL-</b> Principle of design- Balance, types of balance emphasis, unity, repetition (rhythm, pattern), harmony, proportion (scale), variety (alteration), contrast, functionality.
<b>UNIT 3</b>	<b>THEORY-</b> Color- Introduction to Color, Color Theory, Color Harmonies, Color Schemes, Color Wheel, Tint, Tone, Shades. Different Mediums in Art. <b>PRACTICAL-</b> Color- Color Wheel and color chart, Color Exploration, Color Interaction. Primary colors- Color Wheel, Color Composition, Secondary colors- Color Wheel, Color Composition, Tertiary colors- Color Wheel, Color Composition Color schemes- Monochromatic, Achromatic, Complimentary, Split Complimentary, Double-Split Complimentary Polychromatic. Tint, tone & shades- Application of Gray Scale and Black & White. Mediums in art- Pencil, Charcoal, Pastels, Water & Poster.

<b>UNIT 4</b>	<b>THEORY/PRACTICAL-</b> What is Design, Philosophies and Studies of Design, Approaches to Design, Philosophies for Methods of Designing, Philosophies for the Purpose of Design, Design as a Process, Defining a Design Process, Typical Steps or Stages of the Design Process, Design and Art, Design and Engineering, Design and Production, Process Design?
<b>UNIT 5</b>	<b>THEORY/PRACTICAL</b> - Drawing, Nature-drawing Composition, Free-Hand Sketching. Object drawing-2D & 3D, Human drawing- Outline Sketches, Shades & Shadow Composition, Light- Dark Tone Composition, positive and negative spaces, Product drawings; method of representing
<b>UNIT 6</b>	<b>THEORY-</b> Composition, Principle of Organization, View Point Compositional Techniques, Rules of Thirds, Odds, Space, Simplification, Limiting Focus, Geometry and Symmetry <b>PRACTICAL</b> –View- Perspective, Isometric, Geometry- Lines & Angle bisecting, Constructing Regular & Semi Regular Tessellation, Constructing 3D Tessellation

### COURSE OUTCOME (CO)

**At the end of this course students will have:**

CO1: An ability to color mixing and fine color-discernment.

CO2: An ability to know in principle the physics of color (light), the chemistry of color (pigment), and the impact of color (psychology).

CO3: An ability to rendering and presentation techniques in design presentations. CO4: An ability to recognize the relationship between lighting, surface and perception.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1			H		M											M	M
CO2			H		M											M	M
CO3			M		M				L							M	M
CO4			M		M				L							M	M

### TEXT BOOKS

5. Broome, Gerald F., (1974), Elements of Design: Space, Davis Publications Inc. Worcester, Massachusetts.
6. Bruce D. Kurty, (1987), Visual imagination- An introduction of Art, Prentice Hall, New Jers.

  
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<b>GDD002A</b>	<b>BASIC ART &amp; DESIGN</b>	<b>0-0-6(3)</b>
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### AIM

Art and design stimulates creativity and imagination. It provides visual, tactile and sensory experiences and a special way of understanding and responding to the world. It enables students to communicate what they see, feel and think through the use of color, texture, form, pattern and different materials and processes. Students become involved in shaping their environments through art and design activities. They learn to make informed judgments and aesthetic and practical decisions. They explore ideas and meanings through the work of artists and designers. Through learning about the roles and functions of art, they can explore the impact it has had on contemporary life and that of different times and cultures. The appreciation and enjoyment of the visual arts enriches all our lives

### OBJECTIVE

- To understand of the social, psychological, cultural, historical and commercial factors.
- Development of Graphic Skills, Ability and Comprehension. Establishing Significance of Art.
- To understand the influences on art and design activities.

<b>UNIT 1</b>	Introduction to History of Art, Design and Architecture – Pre History To Ancient Civilization, Mesopotamia, Egypt, Indus Valley, China.
<b>UNIT 2</b>	Introduction to Indian folk Art- Worli, Fadd, Madhubani, Modern Art, Blue Pottery, Fresco, Meenakari , glass mosaic, Miniature Art, Kalamkari, Inlay- Work.
<b>UNIT 3</b>	<b>Techniques &amp; Process</b> Material exposure ranging from POP, Fly-ash, Terracotta & Ceramics Clay, Wood, metal, etc.,) Techniques, Processes terminology and tools.
<b>UNIT 4</b>	<b>Techniques &amp; Process</b> Material exposure ranging from Leather, Resin, Paper, Fabric, Tissues, foil etc.) Techniques, Processes terminology and tools.
<b>UNIT 5</b>	Introduction to Photography for documentation

### COURSE OUTCOME (CO)

**At the end of this course students will have:**

CO1: An ability to understand influences on art and design activities.

CO2: To understand outcomes through the interpretation and analysis of information. CO3:

An ability to be able to assess, interpret and evaluate information.

CO4: An ability to be able to evaluate and present conclusions.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	M	M										M				M
CO2	L	M	M										M				M
CO3	L	M	M										M				M
CO4	L	M	M										M				M

**TEXT BOOKS**

9. Broomer F. Gerald, (1974), Elements of Design, Space, Davis Publications Inc., Worcester, Masschusetts.
  10. Dodson B., (1990), Keys to Drawing, North Light Publications, Cincinnati.
  11. Mark W., Mary W. (1999), Drawing for Absolute Beginner, F&W Publications, Cincinnati.
  12. Davis M.L. (1996), Visual Design in Dress, Prentice Hall, Canada.
- Graves M., (1951). The Art of Colour and Design, McGraw-Hill Book Company





DEN001A	Communication Skills	Credits 2-0-2 3
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### Course Objectives

- To enhance English language competence in reading, writing, listening and speaking.
- Switch the approach from teacher-centred to student-centred one.
- Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
- Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
- To link communication skills with the organizational behaviour.
- To inculcate skills that are very much required for employability and adjust in the professional Environment.

### Course Outcomes (CO):

**At the end of this course students will have:**

- CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario
- CO2: Ability to analyze the usage of English words in different contexts. CO3: An understanding of technical and academic articles' comprehension.
- CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

### Syllabus: Theory

UNIT 1	<b>Basics of Organizational Communication:</b> Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
UNIT 2	<b>Basic Writing Skills:</b> Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
UNIT 3	<b>Composition:</b> , Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
UNIT 4	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
UNIT 5	<b>Professional and Technical Communication :</b> Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

### Syllabus: Lab

UNIT 1	<b>Basics of Organizational Communication:</b> Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time-management, Following Deadlines etc
UNIT 2	<b>Write Dialogue from the different contexts of corporate culture:</b> Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc

<b>UNIT 3</b>	<b>Composition:</b> , Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

### Methodology for Evaluation

- |   |   |          |
|---|---|----------|
| 9. Internal Assessment (Theory)         |   |          |
| g) Home Assignments: One from each Unit | : | 15 Marks |
| h) In Semester Tests (Minimum two)      | : | 30 Marks |
| i) Attendance                           | : | 05 Marks |
| 10. Term End (Theory)                   | : | 50 Marks |
| 11. Internal Assessment (Lab)           |   |          |
| (c) Daily Performance in the Lab        | : | 50 Marks |
| 12. Term End (Lab)                      | : | 50 Marks |

### Suggested Reading:

21. Practical English Usage. Michael Swan. OUP. 1995
22. Remedial English Grammar. F.T. Wood. Macmillan. 2007
23. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
24. On Writing Well. William Zinsser. Harper Resource Book. 2001
25. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
26. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
27. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
28. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006
29. More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.
30. The BBC and British Council online resources

<b>GDD071A</b>	<b>Rendering Techniques</b>	<b>0-0-6[3]</b>
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### Objective

- Student will be able to understand the perceptual and cognitive processes associated with the evolution of the human mind and its essential relationship to Rendering as an art form.
- Ability to Compare and contrast different uses of Rendering in art.
- Show a fundamental proficiency in the current technology and understanding of the materials, methods and techniques.
- To develop a portfolio that enables the graduate to showcase his/her abilities while reflecting the individual personality of the designer.

<b>Unit 1</b>	Introduce drawing Shading Techniques - geometric figures Accent Lines. Power lines and adding elements i.e. dramatic sky, flowers, landscaping.
<b>Unit 2</b>	Rendering in pen and ink, or colored pencil, in marker & stipple.
<b>Unit 3</b>	The art of Ink Line Drawings, Sepia Washes using ink, graphite, chalk, charcoal, or crayon.
<b>Unit 4</b>	Patch Pattern Rendering Technique, Blending Rendering Technique and Monochrome Rendering Technique.
<b>Unit 5</b>	Isometric Drawings, Multiple Orthographic Views, Perspective Projections, Depth Cueing, Depth Clipping, Illumination and Transparency and Reflection.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to Gain a broad-based knowledge and understanding of art and its histories.
- CO2: An ability to Develop your understanding of the production, circulation, and interpretation of visual culture in specific historical contexts.
- CO3: An ability to Gain awareness of the role of the visual arts within different cultures and societies, both Western and non-Western.
- CO4: An ability to Gain awareness of the role of museums and galleries in the production and reproduction of cultural values.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

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CO1		M	L		L							M		H	L		
CO2	M	M	H										M	M	L		M
CO3				L		H	H	H	H	L						M	M
CO4	H					M	M	M	M	L					M	L	L

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Principles of Form and Design by Wucius Wong John Wiley & Sons, New York
2. Principles of Color Design by Wucius Wong.
3. Principles of Two-Dimensional Design, Wucius Wong.
4. Action Anatomy by Takashi Iijima.
5. The World of my illustrations by Ravi Paranjpe

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<b>GDD072A</b>	<b>Graphic Print</b>	<b>0-0-4[2]</b>
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### Objective

- Student will be able to Exercise and demonstrate use and mastery of the elements of design
- Use materials, tools and processes from a variety of media (printmaking)
- Handle materials effectively.

<b>Unit 1</b>	Introduction: Relief printmaking is a form of printmaking in which the image to be printed is raised from the surface. This creates a surface similar to a stamp and is sometimes referred to as "block printing".
<b>Unit 2</b>	Linoleum cut and wood cut. Beginning printmakers -.Calligraphy, Linoleum allows the printmaker (student) to easily carve curved lines and is able to accept impressions from sharp objects. Lay outing & drawing.
<b>Unit 3</b>	A pointed tool, such as pen or pencil, is used to trace the lines of the drawing, forcing the soft graphite on the back of the drawing on to the linoleum surface. Material (Calligraphy / linoleum, wood, or rubber).
<b>Unit 4</b>	Creating a relief print. Handling tools a variety of blades called gouges. Each gouge is designed to remove linoleum at different widths. Smaller gouges remove less material, but are more precise. Larger gouges remove more of the material, but are far less precise.
<b>Unit 5</b>	Inking process is demonstrated. Tray, ink, and brayer aroused. Over-inked or under- inked, or uneven inking solutions during the burnishing process.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to create professional Graphics and illustrations, and graphic prints.
- CO2: Ability to Transforming objects, Drawing, Working with Tools and Materials i.e. Lino and Wood.
- CO3: An ability to Recognize and evaluate basic elements of design (color, line, form, texture, rhythm, etc.)
- CO4: An ability to acquire a working vocabulary associated with the analysis and interpretation of works and architecture.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

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CO1	M	M			M		L			L	M	M		M		L	L
CO2	M		M	L	H	L	L	L		L	L	M	M	L		L	
CO3				L	H	L	L	M	L	L			L				M
CO4	M	M			M				L				M	L	M	M	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. The Print Making ideas book Frances Stanfield, LuryMcGeown
2. Print Matters – Modern Print making by Sylvie Coney
3. Perspectives on Contemporary Printmaking: Critical Writing Since 1986 by Ruth Plezer Montada

<b>GDD073A</b>	<b>Computer Graphic I</b>	<b>0-0-6[3]</b>
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### Objective

- Corel draw is a graphic design software coral draw enables users to create professional Illustrations for newsletters, brochures logos and web graphics.
- Provides training about illustration program that can be used for print, multimedia, and online graphics. Whether you plan to design or illustrate multimedia artwork illustrator offers all the tools needed to produce professional and quality results for even a beginner.
- Photoshop provides hands-on with creative image designing techniques. Photoshop is the leading digital image editing application for the internet, print, and other new media disciplines.
- Important tool for graphic artists, print designers, visual communicators, and other regular peoples.

<b>Unit 1</b>	Introduction of Raster and vector Software' show they used in different scenario of digital platform. Introduction of software's and user interface.
<b>Unit 2</b>	Making sketches in Photoshop, customize the workspace, create projects, Basic tools settings and brush options, Color theory and light painting, Selection tools and cropping images, Image manipulation process pipeline. Raster vs. Vector.
<b>Unit 3</b>	Introduction of layer, Use the Layers Panel, Layer Dexterity, Fast Alignments Layer Types Explained, Manipulate Layers in Photoshop, Use Blending Modes, Find out how art boards can help you, Creating and resizing art boards, Introduction Photoshop vs. Illustrator, Tools explained and making digital paintings.
<b>Unit 4</b>	Introduction Of art boards, Difference Raster and vector, Resolutions formats, Creating vector illustrations, Turning photographs into vector artwork, Vector zing and colorizing traced hand drawings, Learn useful keyboard shortcuts and best practices.
<b>Unit 5</b>	Colour correction images, Image Manipulation, Digital painting concepts, Matte painting process, Different Ways to Paint, Background and Final Effects.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to create professional Graphics and illustrations for newsletters, brochures logos and web graphics.
- CO2: An ability to Transforming objects, Drawing, Coloring and Painting, Working with Type, Layers, Brushes, Using Effects, Appearance Attributes and Graphic Styles
- CO3: An ability to Working with Symbols Expected Outcome This being a job-oriented course.
- CO4: An ability to creative image designing techniques. Photoshop is the leading digital image editing application for the internet, print, and other new media disciplines, color manipulations, levels, curves dust and scratches, seeing color accurately

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

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CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M	L	M				M	M	L	H	H	L	M	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Fluid Simulation for Computer Graphics –Robert Bridson
2. Computer Graphics – Nobuhiko Mukai
3. Design, Animate & Create with Computer Graphics –by Max Wainewright



<b>GDD073A</b>	<b>Typography</b>	<b>0-0-4[2]</b>
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### Objective

- Student will be able to Create and evaluate typographical designs for audience, meaning, and effectiveness.
- Explain the importance of appearance in effective layout design. Demonstrate the ability to control the reader's eye in layout design.
- Use typography in layout design. Basic design principles in layout creation.
- Create and modify typefaces. Use color in an effective manner in layout design

<b>Unit 1</b>	Introduce Typography (letterform, layout, grouping and hierarchy).
<b>Unit 2</b>	Conceptual development, verbal articulation of visual solutions, research, production, and visual, verbal and written presentation skills.
<b>Unit 3</b>	Structure of Design: Visual Elements: Line, Shape, Light and dark, Color, Texture, Perspective and depth and Organization of the Elements. Techniques: Contrast, Tone, Shape, Juxtaposition, Harmony, Balance, Opacity, Singularity, Flatness, Repetition and regularity.
<b>Unit 4</b>	Principles of Typography: Origins of the alphabet Pictograms, Ideographs, Phoenician, Greek and Roman alphabets, Sans Serif, Serif, Script, Families of type, Color of type, Personalities of type. Visual change between type over time Garamond, Baskerville and Bodoni, Century Expanded and Helvetica, Display type, Roman and Egyptian, Sans Serif and Script Widows and orphans Designing with type, Function of type: Ornate type Creating moods with type Altering of characteristics of existing fonts. Anatomy of a Page – Terminology, Feelings duotones-quad tones, without black, White space, Bleeds, Drop shadows Methods: Repetition, Grids/Headlines.
<b>Unit 5</b>	Kern Type: The Kerning Game Better Web Typography In a Few Simple Steps. Helvetica - A Documentary About the Most Ubiquitous Typeface in The WorldGame Bonus.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to explain the fundamental role that typography plays in developing legibility for the reading audience.
- CO2: An ability to explain Analyze the cultural significance of typography as a means to convey messages.
- CO3: An ability to explain Compare and contrast different typographic approaches and how they influence and change meaning.
- CO4: An ability to explain Apply a range of typographic approaches in response to specific design problems. Different typographical approaches for a range of media and audiences.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M	L	M				M	M	L	H	H	L	M	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Rookledge's Handbook of Type Designers: A Biographical Directory from the 15th Century by Ron Easton, Sarah Rookledge, Phil Baines
2. Type & Typography 2<sup>nd</sup> Edition, by Phil Baines
3. Thinking with Type by Ellen Lupton
13. The visual History of Type – Paul McNeil
14. Typography, by G.M. Rege, Mumbai

<b>GDD076A</b>	<b>Photography I</b>	<b>0-0-4[2]</b>
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### Objective

- Develop knowledge of principles of aesthetics and visual communication and integrate these principles creatively in still and motion based images and in new media storytelling.
- Demonstrate thorough knowledge and application of DSLR camera techniques for capture of both still, time and video based imagery.
- Develop a thorough and adaptable knowledge of software used in digital imaging and new media storytelling.
- Develop complete digital imaging workflow that includes capture, post processing, ethical considerations of digital techniques based on genre and asset management techniques from image capture to image archive.

<b>Unit 1</b>	Introduction to Photography. History of Photography - the evolution, journey and advancement of photographic techniques and usage in context to development.
<b>Unit 2</b>	The Camera prototype. Introduction and handling of camera. Basics of DSLR Camera. Understanding of Optics & Lenses, and their usage.
<b>Unit 3</b>	Principles of Photography - Understanding of rhythm, balance, pattern, emphasis, contrast, unity and movement. The knowledge about balance and colour patterns.
<b>Unit 4</b>	Study of lights– Taking control over lights, capturing Dramatics from day to night. Natural & Studio light study. Shoot in One light source, Multi-light sources, understanding of Shadow, Silhouette and Exposure.
<b>Unit 5</b>	Composition basics – elements and ideations. Framing, crop factor and introduction to editing.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to understanding of professional practices, communications, organizations and career opportunities in the field of professional photography.
- CO2: An ability to identify the primary working methods (conceptual and illustrative vs. journalistic and found moment) within different genres of photography in order to understand ethically acceptable images.
- CO3: An ability to apply effective lighting techniques in natural, artificial and mixed lighting in a variety of photographic areas including product, still life and portraiture.
- CO4: An ability to Develop a professional body of work and appropriate support material such as website and marketing materials, to showcase personal vision and technical skills.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M	L	M				M	M	L	H	H	L	M	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

- Understanding Exposure: by [Bryan Peterson](#).
- The Beginner's Photography Guide by Chris Gatcum
- The History of Photography by Beaumont Newhall
- A History of Photography: From 1839 to the Present, edited by Therese Mulligan and David Wooters

<b>GDD077A</b>	<b>Production Design</b>	<b>0-0-4[2]</b>
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### Objectives

- 1- Student will be able to understand basics of production design, and film language.
- 2- Develop a skill for visualization and conceptualization.
- 3- To make miniature with diagram, and basic mold making.
- 4- Pre production skill development.
- 5- Understand design principals of moving images.

<b>Unit 1</b>	Introduction to Production Design, basic understanding of Film Language.
<b>Unit 2</b>	Visualization & Foundation. Developing empathetic approach for working. Set Illustration, Narrative and Décor in context to it.
<b>Unit 3</b>	Set completion – complete visualization, miniature set design, (diagram based model) Basic molding workshop.
<b>Unit 4</b>	Light design in context to Production. Location Scouting trip. Design principles of moving images.
<b>Unit 5</b>	Submission on basis of Virtual Set Design. The informative interaction for the same.

### Course Outcome

At the end of this course students will have

CO1- An ability to understand basics of production design, and film language. CO2-

An ability to develop skill for visualization and conceptualization.

CO3- An ability to develop skill to make miniature sets with diagram, and basic mould making. CO4- An ability to develop plan and execution pre-production.

CO5- An ability to develop understand design principals of moving images.

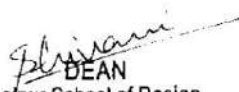
### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M	L	M				M	M	L	H	H	L	M	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

### Reference Books

1. The Art of Illusion, by Tery Auckland Snow & Wendy Laybourn
2. Manufacturing – Design, Production, Automation & Integration, by BenoBenhabibs
3. Dream Worlds -by Hans Bacher
4. Production Design for Screen: Visual Storytelling in Film and Television, by Jane Barnwell
5. Vision – Colour& Composition for films by Hans Bacher

  
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<b>GDD078A</b>	<b>Workshop I – Material Exploration</b>	<b>0-0-4[2]</b>
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### Objective

- 1 Basic study of forms, shapes,
- 2 Deformation, and model making
- 3 To enhance the brief knowledge of design methodology and steps of the design process.
- 4 Learn and apply the basic knowledge of tools and techniques according to the material to be used.
- 5 Interpreting the natural environment and creating a design with realistic approach.

<b>Unit 1</b>	Basic study of design & shapes in Model making & understanding of new dimensions.
<b>Unit 2</b>	Brief on Design Methodology – the process of development. Design conceptualization in perspective of executional details.
<b>Unit 3</b>	Creating the Miniature forms. The study of objects and subject shaping. Understanding of tools and usage in different variants accordingly.
<b>Unit 4</b>	Creating Natural Environmental Scenario. Application, molding & execution of different segments for creating it on realistic manner.
<b>Unit 5</b>	The finalized submission with proper models and usage of different techniques. Play with variety of materials like Textile, Leather, Clay, Thermacol, Fiber, Paper and Hardboard.

### Course Outcome

At the end of this course students will have:

- CO1 An ability to understand Basic knowledge about forms, shapes,  
CO2 An ability to develop skill for deformation, and model making with concepts.  
CO3 An ability to apply Knowledge of design methodology and steps of the design process. CO4 An ability to apply Basic knowledge of tools and techniques according to the material.  
CO5 An ability to apply advance knowledge of creating design and concepts to more approachable to the real time.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H		L	H	L			L	L	M				M	L		
CO2	H		L	H	L			L	L	M				M	L		
CO3	H		L	H	L			L	L	M				M	L		
CO4	H		L	H	L			L	L	M				M	L		

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Material Culture & Texts, The Art of Ambiguity by Christopher Tilley
2. Why Material Matter, by SeetalSolanki

**Journals**

1. Materials & Design, Editor-in-Chief: Alexander M. Korsunsky,

GDD079A	Computer Graphic –II	0-0-4[2]
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### Objective

- Student will be able to Navigate premiere pro, create and open projects, work with files
- Import media into premiere pro, organize your media once it's imported, use the timeline for video and audio tracks
- Create and work with key frames, add animation and other effects, add transitions, use the colour- correction tools, sync clips from multiple cameras, add text, shapes, and logos to your project, work with audio in the audio workspace, export media from premiere pro, create and edit closed captions
- Produce professional quality print material, Manage documents effectively Indesign is Pro Software in Industry.

<b>Unit 1</b>	Getting Started with lightroom, Lightroom classic library module, Image Manipulation, Organization, Develop Module.
<b>Unit 2</b>	Colorize images manipulation with advanced technique in Photoshop tools, color grading, Advanced tricks for Healing Brush for retouching in Photoshop, clone Tool Stamp in Photoshop, vanishing point to mocking up designs, How to edit video in Adobe Photoshop, Parallax effect.
<b>Unit 3</b>	How to setup a file ready for web UI designing, How to export your web design UI project for Dreamweaver.
<b>Unit 4</b>	Make 3D text & 3D logos, Adding lights & casting shadows using Photoshop 3D, How make a reusable mock-up in Photoshop using smart objects, How to make a simple UI app web design mock-up using Photoshop.
<b>Unit 5</b>	<u>An Overview of Adobe Premiere Pro</u> , An Overview Of The Entire Workflow. Optimizing Your Hardware, Navigating Within The Workspace Customizing Your Workspace, Trimming Clips In Advance - Project Panel And Source Monitor, Animatic Workflow.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to describe what adobe premiere pro is and how it can help you with your video making needs.
- CO2: An ability to Demonstrate installing, setting up, and working with media in adobe premiere.
- CO3: An ability to apply this In-Design training will make familiar with easily manipulating text by setting different font styles, weights and other properties and then saving the style you created to apply to other desired text within the document.
- CO4: An ability to acquire Better job opportunities, quick career growth.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M	L	M				M	M	L	H	H	L	M	L		
CO3	H	M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Fluid Simulation for Computer Graphics –Robert Bridson
2. Computer Graphics – Nobuhiko Mukai
3. Design, Animate & Create with Computer Graphics –by Max Wainewright

<b>GDD080A</b>	<b>Design Project I - Storyboard Design</b>	<b>0-0-4[2]</b>
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### Objective

- Student will be able to serves as an outline of the design approach.
- It defines the elements that need to go on each page or movie frame.
- Students will be able to critical study of cinema inform their filmmaking and that the study and practice of film production enhance their work as film scholars and analysts.
- Students will be able to understand the pre-production, production, and postproduction filmmaking process.

<b>Unit 1</b>	Introduction to Story board design, brief on manual process of development. Difference of the Basic Templates and understanding the utility in animation video.
<b>Unit 2</b>	Manual Designing and composition. Importance of Color/BW. The usage of Light & Shadow. Illustrating the actions in accordance to storyboard design.
<b>Unit 3</b>	Conventions of the Camera movements. Shot Selections and understanding. Methods of Montage, Edit and Dynamic Design.
<b>Unit 4</b>	The Sequencing of frame wise design & time management.Introduction and merger of Special Effects. Dialogue based content development.
<b>Unit 5</b>	UX based design thinking & execution. Story Board for interaction design.

### Course Outcome (CO):

At the end of this course students will have:

CO1: An ability to present a clear picture of what will be happening throughout the entire site, what each page will look like, and what each team member/developer will do.

CO2: An ability to draw detailed information on graphics, text, video, sound, audience interaction, colour, type fonts, type size, etc.

CO3: An ability to conduct film research and compose cogent, persuasive, and valid essays about film. CO4: An ability to demonstrate the relationship between film form and aesthetic effect through both film analysis and the creation of motion pictures.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H		L	H	L			L	L	M				M	L		
CO2	H		L	H	L			L	L	M				M	L		
CO3	H		L	H	L			L	L	M				M	L		
CO4	H		L	H	L			L	L	M				M	L		

H = Highly Related; M = Medium L = Low

**Recommended Text:**

1. Story: Substance, Structure, Style and the Principles of Screenwriting by Robert McKee 2. The Way of the Storyteller by Ruth Sawyer

**Reference Books:**

1. Comic Book Design: The Essential Guide to Creating Great Comics and Graphic Novels
2. Gary Spencer Millidge
3. Storyboard Design Course: Principles, Practice, and Techniques; book by Giuseppe Cristiano

<b>GDD081A</b>	<b>Strategic Communication &amp; Consumer Behavior</b>	<b>2-0-2[2]</b>
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### Objective

- 1- Student will develop Market understanding and understand consumer behavior.
- 2- Understanding the deference between needs, wants and demands.
- 3- How to plan strategically according to the consumer behavior.
- 4- Learn how to create a design in way it triggers impulsive buying.
- 5- Study top business models and their insides which triggers the consumer behavior.

<b>Unit 1</b>	Introduction to the types of market, knowing the Consumer & Target Audience. Understanding the demand and supply chain for expected buyers.
<b>Unit 2</b>	The Strategic planning, Variations according to the business module. The mode of communication for influencing consumer decisions. Research and Development for expected buyers knowing the inflow and limitations. Key factors of Consumer Behavior impacted by communication strategy; Awareness, Choice, Preference, Accountability and Personalization.
<b>Unit 3</b>	Approaches of Consumer Behavior .Models of Consumer Behavior. Study of the Buying Behavior of consumer– Routine response, Limited Decision Making, Extreme Decision Making and Impulsive Buying.
<b>Unit 4</b>	Relationship between customers and business by communication skills. Defining communication as a core driving force for emerging business modules. Persuasive Communication and its types – Ethos, Logos & Pathos.
<b>Unit 5</b>	The channels of communication in an organization, Personal, Broadcast Media, Mobile, Electronic and written. Building strategic communication for “Business to Business” model & “Business to Customer” model.

### Course Outcome

At the end of this course students will have:

- 1 An ability to understand markets and consumers.
- 2 An ability to develop an understanding between needs, wants and demands.
- 3 An ability to plan strategically according to the consumer behavior.
- 4 An ability to create a design in a way it triggers impulsive buying.
- 5 An ability to understand top business models and their insides which triggers the consumer behavior.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	M	M										M				M
CO2	L	M	M										M				M
CO3	L	M	M										M				M
CO4	L	M	M										M				M

H = Highly Related; M = Medium L = Low

**Reference Books**

1. Strategic Communications for PR, Social Media and Marketing, by Laurie J. Wilson, Joseph Ogden
2. Strategic Integrated Marketing Communications, 2<sup>nd</sup> Edition, by Lary Percy
3. Strategic Integrated Marketing Communications, 3<sup>rd</sup> Edition, by Lary Percy
4. Integrated Marketing Communication: Creative Strategy from Idea to Implementation, by Robyn Blakeman

GDD082A	Motion Graphics- I	0-0-6[3]
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### Objectives

- Student will be able to learn and use adobe illustrator tools and techniques.
- Student will be able to Learn to create charts, icons and 3D typography.
- To learn to create animated stories with a basic knowledge of after effects, Layers, exporting, animation techniques.
- Understand how to create graphics for Information of the Brands
- Deliver process of Product with minimalist information
- Create and work with key frames, add animation and other effects

<b>Unit 1</b>	Advanced Pen Tool Tricks, create icons and typography with Advanced Pen Tool Tricks and Live Shape Effects, multiple strokes to a path, 3D in Adobe Illustrator CC, Semi flat 3D icons & UI design using Adobe Illustrator.
<b>Unit 2</b>	How to make a pie chart line graph & bar graph, Linocut effect, 3D gradient lettering, 3D Ribbon, Puppet Warp Tool settings.
<b>Unit 3</b>	Animated GIF using Adobe Illustrator, Character designing, Mascots, Scenes developing export techniques.
<b>Unit 4</b>	Introduction to after effects, Layer management, exporting, Basic animation techniques.
<b>Unit 5</b>	Create animated story, animation with puppet tool, exporting animation and editing with adobe premiere, sound recording and cleaning process with adobe audition.

### Course Outcome (CO)

At the end of this course students will have:

- CO1:** An ability to communicate with the viewer, and add depth to the story by linking text with graphics for better visualization
- CO2:** An ability to demonstrate installing, setting up, and working with media in adobe after effects
- CO3:** An ability to bring brand to life by using your colors, visuals, & Brand Policies.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2	H	M		M				M	M	L	H	H	L	M	L		
CO3	H	M		M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

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### **Reference Books**

1. The Theory and Practice of Motion Design: Critical Perspectives and Professional Practice, by R. Brian Stone & Leah Wahlin
2. Motion Graphics, Principles & Practices from Ground up, by Ian crook & Peter Beare
3. The History of Motion Graphics; from Avant-Garde to Industry in United States, by Michael Betancourt

<b>GDD083A</b>	<b>Advertising Film Making</b>	<b>0-0-6[3]</b>
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### Objectives

- 1 Student will be able to learn the tools and techniques of adobe Premier.
- 2 Student will be able to learn importing and after effects.
- 3 Student will be able to learn editing
- 4 Student will be able to learn sound compilation
- 5 Student will be able Basic understanding of color grading and lumetric color and LUT's

<b>Unit 1</b>	Introduction to Adobe Premier
<b>Unit 2</b>	Importing footage to Premier, understanding the use of after effects with Premier for Video Compositing
<b>Unit 3</b>	Video Editing for Documentary
<b>Unit 4</b>	Taking footage to the sequence for Ad making with sound compilation
<b>Unit 5</b>	Giving final touch by Color Grading and understanding of Lumetric Color and LUT's

### Course Outcome (CO)

At the end of this course students will have:

- CO 1 An ability to, understand the use of after effects with Premier for Video Compositing. CO 2 An ability to demonstrate their knowledge on video editing in their projects.  
CO 3 An ability to develop taking footage to the sequence for Ad making. CO 4 An ability to develop final touch by Color Grading.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1		L	L			H	H			L	M	H		L	L		L
CO2	H		L	M				M	M	L	H	H	L	M	L		
CO3		M	L	M				M	M	L	H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

### Reference Books

1. Hope for Film, by Ted Hope with Anthony Kaufman
2. David Mamet on Directing Film
3. The Filmmaker's Handbook: A Comprehensive Guide for the Digital Age, by Ascher, Steven, Pincus, Edward



<b>GDD084A</b>	<b>3D (Modeling &amp; illustration)</b>	<b>0-0-6[3]</b>
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**Objective –**

- Student will be able to develop the skill & knowledge in 3D Modeling & illustration.
- Students will understand the knowhow and can function either as an entrepreneur or can take up jobs in the multimedia and animation industry, video studios, edit set-up and other special effects sectors.

<b>Unit 1</b>	3DS MAX UI, Viewport navigation, Create versus modify objects, Selections, Transformations, Pivot Point, Transformation settings, Object duplication, Basic scene management.
<b>Unit 2</b>	Modifiers for modify objects, Layer management, Snapping, Align objects, Arrays,
<b>Unit 3</b>	Introduction to splines, Spline vertex types, Spline modification, Spline Boolean operation, Cross-insert and weld, product modeling with spline
<b>Unit 4</b>	Primitive versus editable objects, Introduction to editable poly, Sub-object selection, Edge modeling techniques, Cut and slice techniques, Polygon modeling techniques.
<b>Unit 5</b>	Modeling product, packaging, branding and Basics of Character design with poly modeling.

**Course Outcome (CO)**

Student will be able to

CO 1 -

CO 2-

CO 3-

CO 4-

H = Highly Related; M = Medium L = Low

**Textbooks:**

1. 3D Animation Essentials by Andy Beane
2. 3D Art Essentials by Ami Chopine

**Reference Books:**

1. Understanding 3D Animation Using Maya by John Edgar Park
2. Basics Animation: Digital Animation by Andrew Chong

GDD085A	Design Project- II Branding & Corporate Identity	0-0-6 [3]
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### Objective

- The course will help the students to explore how communication strategies and branding programs are developed and executed in contemporary design practice, which include their extension across a range of applications.
- In this subject, students learn to assess the goals, initiatives, missions and values of a client and communicate the essence of their business visually through signs, symbols, typography, colour and design.
- In addition to creating a corporate identity, they learn to create a brand identity system
- Students learn about the functions of branding through the study of companies' visual identity system that communicates the characteristics of the organisation.

<b>Unit 1</b>	Indicative content. Foundations of branding and evolution of branding concept.
<b>Unit 2</b>	Brand development process; role of insight; understanding values, positioning and essence; brand equity communicating the brand; emotional approaches; communication tools.
<b>Unit 3</b>	Managing the brand portfolio; brand architecture and hierarchy. Brand identity design process; corporate brand identity; role of design; communicating differences. Developing brand touch points; names; packaging; logos.
<b>Unit 4</b>	Brand identity analysis; interpreting the visual manifestation of brand identity. Brand extension; rationale, benefits and risks; distancing techniques; co-branding.
<b>Unit 5</b>	Luxury branding; Veblen effects; communicating values. Services and retail branding; managing the environment. Why branding is important in marketing.

### Course Outcome (CO):

At the end of this course students will have:

- CO1: An ability to identify the value of brand strategies.
- CO2: An ability to differentiate branding projects with different forms of identity applications.
- CO3: An ability to generate a branding strategy for a branding program, apply creativity and critical thinking ability on input of new ideas to create a corporate identity system.
- CO4: An ability to demonstrate the ability to handle a range of extended branding applications.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L	L			L	M	H		L	L		L
CO2		M	L	M					M		H	H	L	M	L		
CO3		M	L	M					M		H	H	L	M	L		
CO4	L	M	M	L	M			L		L	M	L			M	H	H

H = Highly Related; M = Medium L = Low

**Reference Books**

1. [Brand Bible: The Complete Guide to Building, Designing and Sustaining Brands](#) by Debbie Millman Editor
2. [Designing Brand Identity, 4th Edition](#), by Alina Wheeler
3. [How Brands Become Icons](#), by Douglas B. Holt

GDD086A	Portfolio Submission	0-0-4[2]
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**Objective:**

- To assess the performance of student in the practical training, a final jury will be conducted in the month of January, after commencement of the new session.
- The student have to be present in the jury along with their training reports (properly binded), on the basis of which marks for VI sem. will be awarded.
- The jury will be taken on the Training Report & not on the sheets.

**Note:** Students has to follow the instructions as guided in the training manual.

GDD087A	OFFICE TRAINING (INTERNSHIP)	0-0-16[8]
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#### OBJECTIVE

- To encourage students to work in with relevant industries.
- An avenue to enhance academics learning through hands on work experience.
- Get advice on career from knowledgeable and experienced professionals.
- Gain exposure to a professional work atmosphere.

<b>UNIT 1</b>	<p>In the VI semester, student will undergo a 12 weeks training in a Graphics designing industry /manufacturing unit/ Graphics export unit so that they can understand the existing working practices, conditions and acquire an in depth technical knowhow.</p> <p>The student shall prepare a report on the training given by the organization He/she will submit the report. The student has to submit the certificate regarding successful training with the organization.</p> <p>A Copy of Report has to be submitted with the department along with the performance certificate issued by the firm Manager/ Owner and one with the Firm (where internship is pursued).</p> <p>After the Internship, student has to appear in front of jury members for a presentation seminar, who will judge the performance based on their presentation, report &amp; Viva-voce and award marks to student.</p> <p>Project Report to be submitted</p> <p>Background of industry Number of employees</p> <p>Project detail on which assisted Task and deadlines Manufacturing process</p> <p>Hand &amp; Computer sketches</p> <p>Experience</p> <p>Any other details</p>
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#### Course Outcome (CO):

At the end of this course students will have:

An able to place themselves and their work in the context of their selected discipline

An understand their specialist area and the career opportunities available An

understand how to promote themselves and their work professionally.

The aim of this unit is to extend learners' knowledge of professional practices within their specialist area and to relate these to personal goals and career opportunities.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M		H	M		L	H	M			L	H		M	L		M
CO2	H	M				L		M	H			H	L	M	L		
CO3	H	M		M				M		L	H		L	M	L		
CO4	L	M		L	M			L		L	M				M	H	H

H = Highly Related; M = Medium L = Low

MDE001A	Professional Communication Skills	2-0-0[2]
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**PREREQUISITE OF THE COURSE**---Communication skills, Knowledge of different department in the industry

#### AIM

The aim of this module is to enhance Professional competence in reading, writing, listening and speaking and Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication

#### OBJECTIVE

- Introduce the importance of communication skills through listening, writing and presenting in the professional context.
- Provide an in depth understanding of effective communication techniques and tools.
- Emphasize on the knowledge of communication strategies to apply appropriately in different situations in the professional context.

<b>UNIT 1</b>	<b>Elements of Communication:</b> Process of Communication; What makes a competent communicator? Characteristics of effective communicator types of communication- intrapersonal, interpersonal, small group communication, public communication, mass communication; Barriers of communication and overcoming the barriers.
<b>UNIT 2</b>	<b>Listening:</b> Types of Listening – Content listening, Empathetic listening, Critical/Evaluative listening; Barriers of Listening; Active Listening to overcome the barriers of listening
<b>UNIT 3</b>	<b>Non-verbal Communication:</b> Characteristics of non-verbal communication; Classification of non-verbal communication – posture & gesture, face and eyes, voice, touch, clothing, distance, time, territoriality; Effective use of non-verbal communication
<b>UNIT 4</b>	<b>Oral Communication:</b> Principles of Oral communication – accuracy, preciseness clarity, courtesy; Identifying behavioral patterns such as dominant, passive, pessimists, optimists, advisors, diplomats and managing these effectively; Etiquette for phone calls and voicemails
<b>UNIT 5</b>	<b>Team Communication:</b> Definition of team and importance of culture of team; Individual's role in the team; Managing – peer to peer, peer to superior relationship, managing peer-subordinate relationship; Managing interactions such as extempore speech, debate, negotiations
<b>UNIT 6</b>	<b>Public Communication: Theme/ Situation based Communication:</b> Choosing theme; defining purpose – general, specific, thesis statement; Analyzing the situation – audience analysis, occasion; Gathering information – internet, library, interviews, personal observation, survey; <b>Organization &amp; Support:</b> Structuring the speech; Principles of Outlining; Logical structuring – using transitions; Beginning & ending speech; Supporting material; Visual aids; <b>Presenting the Message:</b> Dealing with stage fright; Practicing the Speech
<b>UNIT 7</b>	<b>Written Communication:</b> Planning & Execution of Written Content – Planning, Drafting, Completing, Proofreading, distributing; Electronic Messages – Managing the semantics of Emails, Text messaging, Blogs, Podcasts and Vodcasts; Writing Reports, Proposals & Business Plans: Characteristics of Reports, Types of Reports, writing good report; Characteristics of Proposals, Types of Proposals, Making a Proposal and a Business Plan
<b>UNIT 8</b>	<b>Event Management and Media Communication</b> Types of events; Organizing an event; Writing press releases

**COURSE OUTCOME (CO)****At the end of this course students will have:**

CO1: To know the importance of communication. Skill.

CO2: To understand about effective communication techniques and tools. CO3: To understand about the different situations in the professional context. CO4: To know about the communication strategies.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1			H		M											M	M
CO2			H		M											M	M
CO3			M		M				L							M	M
CO4			M		M				L							M	M

**TEXT BOOKS**

1. Green, David. (2004). *Contemporary English Grammar, Structures and Composition*. Macmillan Publications, Chennai.
2. Adler, R. B., & Rodman, G. R. (2006). *Understanding human communication*. New York NY: Oxford University Press.
3. Raman, M., & Singh, P. (2012). *Business communication*. New Delhi: Oxford University Press
4. Foster, J. (2012 – 5th Edition). *Writing skills for public relations*. UK: Kogan Page Limited.
5. Lesikar, R. V., Flatley, M. E., & Rentz, K. (2008). *Business communication: Making connections in a digital world*. McGraw-Hill/Irwin.



<b>MDE003A</b>	<b>Entrepreneurship</b>	<b>2-0-0[2]</b>
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### AIM

This course aims to impart basic skills and understandings to run a business efficiently and effectively. The course also provides insights to students on entrepreneurship opportunities

### OBJECTIVE

- Types of businesses, design thinking and LMC.
- Analysis of the data and know the target customers, market size, competition and create MVP.
- Various branding and marketing tools such as SEO, digital marketing, PR and websites.
- Understanding costing, revenue, investments and unit economics.
- Components of pitch deck, how to pitch to investors.

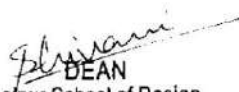
<b>UNIT 1</b>	<b>Introduction to Entrepreneurship and Business Essentials</b> Who is an Entrepreneurs and Types of Businesses? The Lean Approach. Designing Thinking. Lean Model Canvas / Business Model Canvas
<b>UNIT 2</b>	<b>Forecasting Demands and Acquiring Customers</b> Identifying the Target Audience / Customer. Analyzing the Target Market (TAM, SAM, SOM). Conducting Surveys. Building an MVP based on the Survey. Analyzing Competition.
<b>UNIT 3</b>	<b>Brand Building and Establishing Brand Presence</b> Digital Marketing and Social Media Marketing. SEO. Basics of PR and Importance of Digital Presence. Building a Website – Tools and Techniques.
<b>UNIT 4</b>	<b>Understanding Finance and Planning for Investment</b> Creating a Revenue Model. Developing Sales Projects, Unit Economics, Investment Deck.
<b>UNIT 5</b>	<b>Building a Pitch Deck</b> Analyzing Essential Components of Pitch Deck. Data Collection and Content Generation for Pitch Deck. Designing a Pitch Deck. Art of Pitching to an Investor

### COURSE OUTCOME (CO):

**At the end of this course students will have:**

- CO1: To approach the ideas through design thinking and create its LMC. and identify the demand and its customers. CO2: To analyze the data and obtain info like target market, market size, competition.
- CO3: To create the MVP for the business, and do branding and marketing through SEO, social media, website and various other digital marketing tools.
- CO4: To understand financials of a business such as various costs, unit cost, revenue, unit economics and various investment deck and to collect and put the data in various components of pitch deck and able to pitch in front of the investors.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

  
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Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		H	M						M	
CO2		M		H					H	
CO3	H									M
CO4			H	M				H		

#### TEXT BOOKS

- The Lean startup by Eric Ries, Entrepreneurial Management by Robert J. Calvin
- Entrepreneurship Development-Small Business Enterprise- Poornima Charantimath, Pearson Education, 2007
- Entrepreneurship- Rober D Hisrich, Michael P Peters, Dean A Shepherd, 6/e, The McGraw-Hill companies, 2007
- Entrepreneurship Development , Khanka, S Chand Publications
- Entrepreneurship Development, B Janakiram

<b>MDE005A</b>	<b>Industrial Pattern Making and Grading</b>	<b>0-0-8[4]</b>
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**PREREQUISITE OF THE COURSE** – Basic Pattern making of women’s, men’s and kids.

#### **OBJECTIVE**

- To learn industrial pattern making & Grading
- To understand design, measurement and sizes as per the industry requirements

<b>UNIT 1</b>	Interpret Technical Package and Garment Specification.
<b>UNIT 2</b>	Take Body and Garment Measurements
<b>UNIT 3</b>	Create Basic Bodice Block and Pattern for Garments
<b>UNIT 4</b>	Perform Pattern Grading for Garment Production
<b>UNIT 5</b>	Develop Professionalism

#### **COURSE OUTCOME (CO)**

**At the end of this course students will have:**


- Know job requirements of technical package ,Communicate with others and work in a team
- Apply health and safety requirement.
- Use and maintain drafting and grading tools and create basic block and other patterns
- Take body and garment measurements and perform grading and production
- Demonstrate professionalism and manage time

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>												<b>Program Specific Outcome</b>				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1			H		M											M	M
CO2			H		M											M	M
CO3			M		M				L							M	M
CO4			M		M				L							M	M

#### **TEXT BOOKS**

- Armstrong, H.J. (2009), Pattern Making for Fashion Design, New York, Prentice Hall.
- Aldrich, W. (2008), Metric Pattern Cutting for Women’s Wear, Oxford, Willey Blackwell Publication.
- Di Marco, S.M. (2010). Draping Basics, New York, Fairchild Books.
- Nakamichi, T. (2010). Pattern Magic, London, Lawrence King Publishing.
- Nakamichi, T. (2011). Pattern Magic- II, London, Lawrence King Publishing.
- Nakamichi, T. (2010). Pattern Magic- Stretch Fabrics, London, Lawrence King Publishing.
- Bolsner, Jane. (2010). Sewing machine basics: step by step course for first stitcher London UK. CICO books.
- Phillips, Charlene. (2011). The Sewing machine classroom: Learn the ins and outs of your machine. WI, USA. Krause publication.
- Kunkel, Karen .E. (1998). The Complete Sewing Machine Handbook. NY. USA. Sterling Publishers.
- Giordano, John. (1997). The Sewing Machine Guide. Newtown, CT. USA. Taunton Press.
- Editors of Readers Digest. (1997). Complete guide to Sewing (revised & updated). NY USA. Readers Digest Publication.
- Smith, Alison .(1999).Complete Book of Sewing. Dorling Kindersley.

  
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<b>MDE006A</b>	<b>Design Project &amp; Documentation – 1 (Women Wear)</b>	<b>0-0-8 [4]</b>
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**PREREQUISITE OF THE COURSE** – Design process, fashion illustration, Pattern making and garment construction.

#### **OBJECTIVE**

This module represents culmination of your learning experience and skills development acquired in the previous programme modules. It enables you to realize and confirm your individual practice from your negotiated project proposal.

You will consolidate your knowledge and skills to evidence a sustained, critically informed body of work that is original and creative in its scope and ambition, demonstrating a professional approach, using your technical skills and in-depth knowledge of your subject specialism.

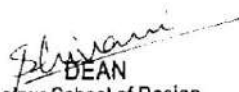
The realization of your project will be supported through a combination of teaching and learning activities that include tutor feedback and peer learning before a final presentation and exhibition.

<b>UNIT 1</b>	<b>Research &amp; Analysis</b> Planning. Forecasting. Research process. Fashion market and marketing environment research
<b>UNIT 2</b>	<b>Concept</b> Illustrate the idea of design through various mediums. Selection and implementation of proper colors and medium in fashion product. Brainstorming and ideation on papers.
<b>UNIT 3</b>	<b>Form Generation</b> Design Illustration and Silhouette. Patterns and Grading. Prototypes.
<b>UNIT 4</b>	<b>Computer Aided Design</b> Fashion Illustration. Documentation Manual & digital Technical Design and Tech Packs. .
<b>UNIT 5</b>	<b>Checks &amp; Tests</b> The quality checks examine the design from various angles like aesthetics, performance, durability, strength, functionality etc. <b>Presentation &amp; Documentation</b> Oral, written, documentation, digital. Sketchbooks; maquettes; plans; photographs; performance; 2D; 3D; time-based

#### **COURSE OUTCOME (CO)**

**At the end of this course students will have:**

- CO1: To investigate trends, through contextual research, to inform the strategy for a fashion collection. CO2: To communicate a fashion collection strategy, based on research and experimentation.
- CO3: To develop a cohesive fashion collection, in response to a brief.
- CO4: To present a fashion collection, identifying areas for further development and best practice, evaluate the project outcomes. And present the project outcomes.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		L				L	
CO2			L		M				H	
CO3		M								M
CO4	L		H			M	M		H	

**TEXT BOOKS**

- Dr. Mahesh Kulkarni, Nirali Prakashan. Foundation of research.
- Bryman A. & Cramer D. (1994) Quantitative data Analysis for social scientists
- Van Maanen (1983) Qualitative Methodology. Sage Publication.
- Sumati Mulay and Sabarathanam V.E. (1980) Research Methods in Extension Education. New Delhi, Sole Selling Agents.
- Kothari C.R. Research Methodology: Methods and techniques. New Age International publishers.

MDE007A	Trends Research, Analysis & Forecasting	1-0-0 [1]
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#### OBJECTIVE

- Critically analyze, synthesize and reflect on complex theories and recent developments, both local and international, at a micro and macro level, to extend and challenge knowledge and practice in fashion entrepreneurship.
- Investigate emergent global entrepreneurial issues and strategically respond to their impact in the fashion and textiles industry.
- Identify, evaluate and communicate the potential impact of cultural, social, economic and technological components in the trend forecasting process.

<b>UNIT 1</b>	Trend Materials & Fashion Development <ul style="list-style-type: none"> <li>• Materials for research</li> <li>• Color practice</li> <li>• Interactions between colors and materials</li> <li>• Briefing and mood board creation</li> <li>• Materials art buying</li> <li>• Product development</li> </ul>
<b>UNIT 2</b>	Trend Design research, Transmission and interpretation <ul style="list-style-type: none"> <li>• Fashion trend terminology</li> <li>• The trend industry</li> <li>• Nature of trends</li> <li>• Trends in urban environment</li> <li>• Information Management</li> <li>• Visualization techniques</li> </ul> Argumentation Strategies
<b>UNIT 3</b>	Fashion market and marketing environment research <ul style="list-style-type: none"> <li>• Market research</li> <li>• Trend research techniques</li> <li>• Research design &amp; data sources</li> <li>• Sampling methods</li> <li>• Evaluating the collections</li> <li>• Forecasting Fashion</li> <li>• Market Segmentation marketing mix</li> <li>• Fashion consumer</li> </ul>
<b>UNIT 4</b>	<b>Trend Analysis</b> <ul style="list-style-type: none"> <li>• Evolution of fashion trend</li> <li>• Fashion trend implications for design/retail decisions</li> <li>• Consumer influence on market</li> </ul>
<b>UNIT 5</b>	<b>Fashion Forecasting</b> <ul style="list-style-type: none"> <li>• Fashion Forecasting Process</li> <li>• Diffusion of Innovation</li> <li>• Fashion Cycles</li> <li>• Cultural Indicators</li> <li>• Color Forecasting</li> <li>• Textile Forecasting</li> <li>• Styling Forecasting</li> <li>• Sales Forecasting Competitive Analysis</li> </ul>

**COURSE OUTCOME (CO)**

**At the end of this course students will have:**

- CO1: To assess and review the requirements and operational methods of the role of a trend forecaster relevant to fashion and textiles entrepreneurship.
- CO2: To substantiate and apply appropriate research methodologies to identify and analyze alternative research sources for identifying global trend directions.
- CO3: To research and critically analyze the challenges and opportunities of translating trend scenarios into the development of textile and fashion products

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		L				L	
CO2			L		M				H	
CO3		M								M
CO4	L		H			M	M		H	

**TEXT BOOKS**

- Elaine Stone, "Fashion Merchandising", Blackwell Science Ltd., 2000.
- Eundeok Kim, Ann Marie Fiore, Hyejeong Kim, "Fashion Trends Analysis and Forecasting", Berg Publishers, 2011.

MDE008A	Operations and Supply Chain Management	2-0-0 [2]
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**PREREQUISITE OF THE COURSE** – Knowledge of apparel manufacturing technology and garment construction

**OBJECTIVE**

- It enables students to understand the need to implement an appropriate operation's strategy for a supply chain and logistics company.
- It offer the students a vast avenue of understanding on the major strategic issues and trade-offs in supply chain management which acquires analytical capability to uncover problems and suggest improvement.

<b>UNIT 1</b>	<b>Introduction to Production/Operations Management:</b> Meaning & Introduction to Production & Operations Management - Scope of Operations Management w.r.t. Design & Selection of Product, Selection & Planning for Process as well Layout, Selection of Location, Aggregate and Capacity Planning, Types of Production systems and Operational/Short Term Decisions - Criteria of Performance
<b>UNIT 2</b>	<b>Services:</b> Meaning of Service & Intangibility of Service - Customer's view w.r.t. Service - Comparison between Services & Goods - Non-inventor ability of services & Customer Involvement - Service Matrix & Implications for Operations Policy - Determinants of Service Quality
<b>UNIT 3</b>	<b>Outsourcing:</b> Business Process Outsourcing (BPO) - Make or Buy - Quality considerations - Quantity considerations - Cost considerations - Service considerations - Other considerations - Sub-contracting
<b>UNIT 4</b>	<b>Introduction to supply chains:</b> Importance of supply chains, decision phases, process view, drivers of supply chain – facilities, inventory, transportation, information, sourcing, pricing. Demand forecasting: characteristics of forecasts, bull whip effect, forecasting methods – basic approaches, role of IT in forecasting. Aggregate Sales & Operations planning: Role of aggregate planning in supply chain, aggregate planning strategies, role of IT in aggregate planning
<b>UNIT 5</b>	<b>Supply Chain:</b> Role of sourcing in a supply chain, in house or outsource, third party and fourth party logistics providers, supplier scoring and assessment, supplier selection – auctions and negotiations, contracts and supply chain performance, design collaboration, procurement process, sourcing planning and analysis.
<b>UNIT 6</b>	<b>Coordination in a supply chain:</b> Bullwhip effect impact on performance, obstacles to coordination in a supply chain, managerial levers to achieve coordination, vertical integration, partnerships, continuous replenishment and vendor managed inventories, collaborative planning, forecasting and replenishment.



**COURSE OUTCOME (CO)****At the end of this course students will have:**

CO1: To understand about the appropriate operation's strategy for a supply chain and logistics company. CO2: To understand the major strategic issues in supply chain management.

CO3: Students will be able to recommend improvement along the dimensions of efficiency, quality and speed, and improved team-work capability to cooperate with others to solve business operations problems in supply chain management.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		L				L	
CO2			L		M				H	
CO3		M								M
CO4	L		H			M	M		H	

**TEXT BOOKS**

- Production and Operations Management by R. Panneerselvam, PHI Learning
- Operations and Supply Management by Ravi Shankar, F. Robert Jacobs, Richard B. Chase, Nicholas J. Aquilano, TMH Education
- Supply chain management by Sunil Chopra & Peter Meindl, Pearson Education India.
- Supply Chain Management: Text And Cases 1st Edition (Paperback) by Janat Shah

MDE009A	Brand Management	2-0-0 [2]
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#### OBJECTIVE

To discuss components and elements to help build, measure and manage brands with efforts directed to Digital channels

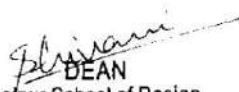
<b>UNIT 1</b>	<b>Introduction to Brands and Brand Management:</b> Define Brand, Brand elements, Branding for products and services, High-tech Branding, Branding challenges and opportunities, Strategic Brand Management Process
<b>UNIT 2</b>	<b>Developing a Brand Strategy:</b> Steps in Brand building, Customer based Brand Equity, Branding building, Sources of Brand Equity - Brand awareness, Brand Image, Product Development and Brand Analysis, Establishing Product Market fit - Segmentation and Brand Positioning, Approaches for Brand Positioning, Segmentation Basis
<b>UNIT 3</b>	<b>Design and Implementing Brand Marketing Programs:</b> Criteria for choosing Brand elements, Options and tactics for Brand elements, Programmes to build Brand Equity – Product Strategy, Pricing Strategy, Channel Strategy, Understand the launch process for a new brand, Product Design and Delivery, Pricing Strategy, Legal Branding consideration.
<b>UNIT 4</b>	<b>Brand Equity Measurement and Management:</b> Conducting Brand Audits, Developing a Brand Equity Measurement: Qualitative Research Techniques – Zaltman Metaphor Elicitation Technique, Neural Research Methods and Quantitative Research Techniques – Brand awareness, Image and Responses, Relationships, Measuring outcomes of Brand Equity: Comparative methods: brand and marketing based methods, Conjoint analysis Holistic methods: Residual, general and valuation approaches, Brand management: ten criteria for brand report card, seven deadly sins of brand management
<b>UNIT 5</b>	<b>Managing brands over time, geographic boundaries:</b> Reinforcing Brands, Revitalizing Brands, Brand Reinforcement Strategies, Brand Revitalization Strategies, Positioning over time, Main growth strategies, How loyalty programmes help, maintain and grow brand allegiance, Importance of keeping brand relevant, The Brand Value Chain; Challenges and steps needed to become a global brand
<b>UNIT 6</b>	<b>Managing a brand in the digital age:</b> New age influencers and brand ambassadors, the Buzz Marketing Process, Online and Virtual Brands • Multisensory Branding Online, Online Image and Identity, Digital Co- creation of Brands, Neuro-branding, Key Brand Performance Indicators available through social media, Evolving challenges in managing a brand in the age of social media..

#### COURSE OUTCOME (CO)

**At the end of this course students will have:**

CO1: To understand about the Brands, Brand Management and Brand Strategy CO2: To understand the Brand Equity Measurement and Management.

CO3: Students will be able to understand about Managing brands over time, geographic boundaries. CO4: Students will be able to understand about Managing a brand in the digital age

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		L				L	
CO2			L		M				H	
CO3		M								M
CO4	L		H			M	M		H	

**TEXT BOOKS**

- Kevin Lane Keller, Parameshwaran and Issac Jacob (2015), "*Strategic Brand Management*", 4th Edition, Pearson Education
- Jean Noel Kapferer (2003) *Strategic brand management*, 2/e, Kogan Page
- Pran K Choudhury (2001) *Successful branding*, 1/e, University Press Ltd.
- Barbara Kahn (2013) *Global Brand Power: Leveraging Branding for Long-Term Growth*, Wharton School Press
- YLR Moorthi (2002) *Brand management*, 2/e, Vikas Publishing.-

MDE011A	Design Project & Documentation –2 (Industry Based Class Room Project)	0-0-8 [4]
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**PREREQUISITE OF THE COURSE** – Knowledge of apparel manufacturing technology, Different department, Pattern Making and garment construction

#### OBJECTIVE

This module represents culmination of your learning experience and skills development acquired in the previous programme modules. It enables you to realize and confirm your individual practice from your negotiated project proposal.

You will consolidate your knowledge and skills to evidence a sustained, critically informed body of work that is original and creative in its scope and ambition, demonstrating a professional approach, using your technical skills and in-depth knowledge of your subject specialism.

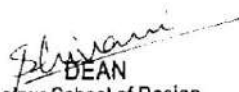
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<b>UNIT 2</b>	<b>Concept</b> Illustrate the idea of design through various mediums. Selection and implementation of proper colors and medium in fashion product. Brainstorming and ideation on papers.
<b>UNIT 3</b>	<b>Form Generation</b>
	Design Illustration and Silhouette. Patterns and Grading. Prototypes.
<b>UNIT 4</b>	<b>Computer Aided Design</b> Fashion Illustration. Documentation Manual & digital Technical Design and Tech Packs. .
<b>UNIT 5</b>	<b>Checks &amp; Tests</b> The quality checks examine the design from various angles like aesthetics, performance, durability, strength, functionality etc. <b>Presentation &amp; Documentation</b> Oral, written, documentation, digital. Sketchbooks; maquettes; plans; photographs; performance; 2D; 3D; time-based

#### COURSE OUTCOME (CO)

**At the end of this course students will have:**

- CO1: To investigate trends, through contextual research, to inform the strategy for a fashion collection. CO2: To communicate a fashion collection strategy, based on research and experimentation.  
CO3: To develop a cohesive fashion collection, in response to a brief.  
CO4: To present a fashion collection, identifying areas for further development and best practice, evaluate the project outcomes. And present the project outcomes.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		L				L	
CO2			L		M				H	
CO3		M								M
CO4	L		H			M	M		H	

**TEXT BOOKS**

- Dr. Mahesh Kulkarni, Nirali Prakashan. Foundation of research.
- Bryman A. & Cramer D. (1994) Quantitative data Analysis for social scientists
- Van Maanen (1983) Qualitative Methodology. Sage Publication.
- Sumati Mulay and Sabarathanam V.E. (1980) Research Methods in Extension Education. New Delhi, Sole Selling Agents.
- Kothari C.R. Research Methodology: Methods and techniques. New Age International publishers.

MDE012A	Digital Fashion Design and Illustrations	0-0-6 [3]
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**PREREQUISITE OF THE COURSE** – Knowledge of basic Computer, Basics of Multimedia.

#### OBJECTIVE

This course presents the introductory concepts that are needed in order to use the digital medium Photoshop, Illustrator and In Design to develop creative and innovative visual representation, to be able to communicate ideas and concept through effective presentation in regards to Fashion industry.

<b>UNIT 1</b>	<b>Digital Design Principles:</b> What is Design and Graphics: Types and Roles of Graphics In Fashion Illustrations. How to Enhance Photos & Manual Illustrations. Process of Digital Illustrations.
<b>UNIT 2</b>	<b>Introduction to Digital design Mediums &amp; Methods</b> Introduction of Digital Painting and Vector Graphics in Photoshop & Illustrator. Photoshop and Illustrator Tools for Fashion Designing. Introduction of Corel Draw. Fashion Illustrations Method.
<b>UNIT 3</b>	<b>2d Styling Fabric and Textures:</b> Fabric and Texture Designing Pipeline in Corel Draw. Fashion Illustration with Photoshop. Types of Dresses and Fabric into digital design process. Mockups of Stick Figure overlays and Dress Wrapping process.

#### COURSE OUTCOME (CO)

**At the end of this course students will have:**

- CO1: To understand about the introductory concepts that is needed in order to use the digital medium CO2: To understand how to develop creative and innovative visual representation.,  
CO3: Students will be able to understand that how to communicate ideas and concept through effective presentation in regards to Fashion industry

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		L				L	
CO2			L		M				H	
CO3		M								M
CO4	L		H			M	M		H	

  
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## TEXT BOOKS

- Design for Motion: Fundamentals and Techniques of Motion Design – 15 October 2019 by Austin Shaw (Author)
- Design Elements, Color Fundamentals: A Graphic Style Manual for Understanding How Color Affects Design by Aaris Sherin (Author)
- Typographic Systems of Design: Frameworks for Type Beyond the Grid (Graphic Design Book on Typography Layouts and Fundamentals) by Kimberly Elam (Author)
- Graphic Design: The New Basics: The New Basics (Bestselling Introduction to Graphic Design Book) by Ellen Lupton (Author), Jennifer Cole Phillips (Author)
- Xtine burrough, Michael Mandiberg. Digital Foundations: Intro to Media Design with the Adobe Creative Suite. Peachpit Press.
- Kevin Tallon. (1985). Creative Fashion Design with Illustrator. Batsford Publications.
- Centner M. (2007). Fashion Designers Handbook for Adobe Illustrator. Willey Blackwell Publication.
- Susan Lazer. (2008). Adobe Illustrator for Fashion Design. Prentice Hall Publications.
- Susan Lazer. (2007). Adobe Photoshop for Fashion Design. Prentice Hall Publications.

MDE014A	Elective 2-Fashion Styling and Photography	0-2 [1]
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**PREREQUISITE OF THE COURSE** – Knowledge of Fashion Collection, Fashion drawing, Sewing techniques, Fashion draping.

#### OBJECTIVE

The course aims at various areas of Fashion, Beauty and Clothing where students would be exposed to Movie styling, Character styling, Lifestyle styling and Prop Styling. This course would include concepts of equipment used and the lightning concepts that need to be taken into consideration for fashion photographs. This course would enable the students to take photographs for their portfolios and fashion shows.

<b>UNIT 1</b>	Introduction to Fashion Styling and Photography: Meaning, Types- editorial styling, Fashion styling, Wardrobe styling, catalogue styling, prop styling, set styling, personal styling, celebrity styling. Introduction to fashion photography: magazine photography, advertising photography icons and trendsetter, taking inspiration, choosing a style, tools and equipment required – camera, lens, tripods and monopods, camera controls and operations.
<b>UNIT 2</b>	Make-Up, Hairstyle and Basic Studio Photography: Introduction to make up artistry, history of makeup, special effect makeup, fantasy makeup, character make up, different hairstyles. Select any two artists and their styles and techniques. Photography in studio: Basic studio requirements, basic lighting, studio flash, setting the backdrop
<b>UNIT 3</b>	Final Project and Portfolio: Thematic fashion styling, Portfolio, Fashion make up Team building: Fashion protocols, assistants, styling, sourcing models, testing for models. Creating pictures: Composition, content, attitude, movement versus static, the frame, sourcing clothes, props and set design, managing a shoot. The Portfolio: Editing process, putting stories together, printing photos, styles of presentation. Portfolio should include – Developmental sketches and stage wise photographs of the forms develop under the above modules.

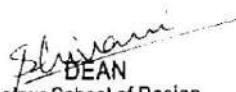
#### COURSE OUTCOME (CO)

**At the end of this course students will have:**

- CO1: Students would be able to understand about the Movie styling, Character styling, Lifestyle styling and Prop Styling.  
CO2: Students would be able to understand about the concepts of equipment used and the lightning concepts that need to be taken into consideration for fashion photographs.  
CO3: Students will be able to understand how students to take photographs for their portfolios and fashion shows.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		L				L	
CO2			L		M				H	
CO3		M								M
CO4	L		H			M	M		H	

  
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#### **TEXT BOOKS**

- Stylewise by Shannon Burns- Tran.
- Fashion Stylist by ARMOR.
- Bruce Smith. (2008). Fashion photography: A complete Guide to the Tools and Techniques of the Trade. Amphoto Books.
- Perkins M. (2011). 500 Poses for Photographing Women: A Visual Sourcebook for Digital Portrait Photographs. Amherst Media Inc.

MDE015A	Visual Merchandising & Packaging	2-0-0[2]
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#### OBJECTIVE

- To introduce the students to the concept of visual Merchandising.
- To enable the students to plan a visual display and packaging after attaining the understanding the concept and elements of Visual Display.

<b>UNIT 1</b>	<b>Visual merchandising and display basics</b> Why do we display; colour and texture; light and composition; light and lighting; types of display and display settings; signing; lighting
<b>UNIT 2</b>	<b>Where to display</b> The exterior of the store; display window construction; store interiors
<b>UNIT 3</b>	<b>What to use for successful display.</b> Mannequins; alternatives to mannequins; dressing the three-dimensional form; fixtures; visual merchandising and dressing fixtures-feature fixture and capacity fixture; furniture as props.
<b>UNIT 4</b>	<b>Visual merchandising and display techniques</b> Attention getting devices; familiar symbols; masking and proscenia; sale ideas, fashion accessories
<b>UNIT 5</b>	<b>Related areas of visual merchandising</b> Point-of-purchase display; exhibit and trade show designs; fashion shows. Packaging, Importance of packaging, types of packaging, materials used for packaging, packaging for different brands, packaging for different merchandise.

#### COURSE OUTCOME (CO)

**At the end of this course students will have:**

- CO1: Students would be able to understand about the concept of visual Merchandising
- CO2: Students would be able to understand about the visual display and packaging after attaining the understanding the concept and elements of Visual Display.
- CO3: Students will be able to understand about the related areas of visual merchandising

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		L				L	
CO2			L		M				H	
CO3		M								M
CO4	L		H			M	M		H	

#### TEXT BOOKS

- Martin M Pegler. Visual Merchandising and Display. Fairchild Books, New York
- Judy Bell., Kate Ternus. Silent Selling – Best Practices and Effective Strategies in Visual Merchandising. Fairchild Books, New York.

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<b>MDE016A</b>	<b>Fashion &amp; Lifestyle</b>	<b>1-0-0[1]</b>
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#### OBJECTIVE

- To understand what Fashion and the co-relation between Fashion and Lifestyle is. How lifestyle affects your fashion and the impacts of fashion on lifestyle.
- To learn about the Fashion and Lifestyle products and the brands.

<b>UNIT 1</b>	<b>What is Fashion</b> Impact of Fashion and how it rules the world, Co-existence of Lifestyle and Fashion
<b>UNIT 2</b>	<b>Introduction to Fashion and Lifestyle</b> Fundamentals of Fashion and Lifestyle, Influential Lifestyle and its impact on Fashion
<b>UNIT 3</b>	<b>Fashion Products</b> Understanding of Fashion products: Apparels, Footwear, Accessories, Jewelry, Textiles, Formal wear, Cosmetics etc., Study of brands: Retail, Non-Retail, E-commerce, online
<b>UNIT 4</b>	<b>Demonstration of Lifestyle</b> Different types of Lifestyles, Elements that influence quality of Lifestyle, Curating fashion product to demonstrate a community of lifestyle.
<b>UNIT 5</b>	<b>Visual representation</b> Visual communication and documentation, Representation of Fashion and lifestyle: Class projects, Study of Fashion Bloggers.

#### COURSE OUTCOME (CO)

**At the end of this course students will have:**

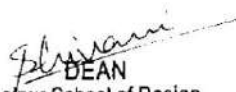
- CO1: Students would be able to understand about what Fashion and the co-relation between Fashion and Lifestyle CO2: Students would be able to understand that how lifestyle effects your fashion and the impacts of fashion on lifestyle
- CO3: Students will be able to learn about the Fashion and Lifestyle products and the brands

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		L				L	
CO2			L		M				H	
CO3		M								M
CO4	L		H			M	M		H	

#### TEXT BOOKS

- Fashion: The Ultimate Book of Costume and Style (Dk) by Judith Watt (Author).
- London Society Fashion 1905–1925: The Wardrobe of Heather Firbank by by Cassie Davies-Strodder (Author) and Jenny Lister (Author).
- The Accessory Handbook: A Costume Designer's Secrets for Buying, Wearing, and Caring – Illustrated, 1 August 2018 by Alison Freer (Author)
- The New Fashion Rules – 1 November 2018 by Victoria Magrath (Author)
- BOOK ON HABIT AND LIFESTYLE by Valerie Craft (Author)

  
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<b>MDE019A</b>	<b>Fashion Illustrations 3D &amp; Advertising Media</b>	<b>0-0-8 [4]</b>
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**PREREQUISITE OF THE COURSE** – Knowledge of Graphic Design Basics, Basic of Shading and Rendering, Cloth Pattern.

#### OBJECTIVE

This course is about being able to turn a flat drawing or sketch into real looking clothing using 3D software. You will get lectures that cover tool and concepts along with Marvelous designer files of the final output and textures used. You will be learning a skill where you can either save money for your fashion company or provide 3D clothing Presentation.

<b>UNIT 1</b>	<b>Design Cloth 3d:</b> Introduction of Marvelous Designer. Tools and Workspace 3D.
<b>UNIT 2</b>	<b>Cloth Designing Construction Method</b> Design Cloth and Styling Fabric Texture 3d Constructing Cloths in 3D Presenting 3D Garments
<b>UNIT 3</b>	<b>Print Advertising Design:</b> Book Design, Flyers and Catalogues for Fashion. Photography Fashion Shoots
<b>UNIT 4</b>	<b>Develop and Demonstration:</b> Virtual presentation method and Types. Photo Manipulation with Light room Classic.
<b>UNIT 5</b>	<b>Presentation Fashion Artwork:</b> Digital presentation work video and still. Printing Pipeline and methods. Video Advertising Making process.

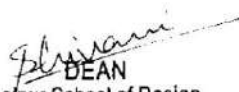
#### COURSE OUTCOME (CO)

**At the end of this course students will have:**

- CO1: To understand about the Concept of Design 3d Clothing and textures.  
CO2: To understand how to develop creative and innovative visual representation.  
CO3: Students will be able to understand that how to communicate ideas and concept through effective presentation in regards to Fashion industry

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		L				L	
CO2			L		M				H	
CO3		M								M
CO4	L		H			M	M		H	

  
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## TEXT BOOKS

- Design for Motion: Fundamentals and Techniques of Motion Design – 15 October 2019 by Austin Shaw (Author)
- Design Elements, Color Fundamentals: A Graphic Style Manual for Understanding How Color Affects Design by Aaris Sherin (Author)
- Typographic Systems of Design: Frameworks for Type Beyond the Grid (Graphic Design Book on Typography Layouts and Fundamentals) by Kimberly Elam (Author)
- Graphic Design: The New Basics: The New Basics (Bestselling Introduction to Graphic Design Book) by Ellen Lupton (Author), Jennifer Cole Phillips (Author)
- Xtine burrough, Michael Mandiberg. Digital Foundations: Intro to Media Design with the Adobe Creative Suite. Peachpit Press.
- Kevin Tallon. (1985). Creative Fashion Design with Illustrator. Batsford Publications.
- Centner M. (2007). Fashion Designers Handbook for Adobe Illustrator. Willey Blackwell Publication.
- Susan Lazer. (2008). Adobe Illustrator for Fashion Design. Prentice Hall Publications.
- Susan Lazer. (2007). Adobe Photoshop for Fashion Design. Prentice Hall Publications.

MDE020A	Portfolio	0-0-4 [2]
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**PREREQUISITE OF THE COURSE** – Knowledge of all the software that we used in the fashion industry.

**AIM:**

Design portfolio is the expression of student to translate themes into design collections. Here one gets inspired by different themes which could be art movements, sport, historic eras, music, dance, culture, nature, traditions etc. and picks out tangible and intangible elements which are to be used as design elements in the collection. The ability of a designer to exhibit and use design elements is highlighted which is further translated into garments. A portfolio is an exhibit of the overall knowledge of the student work which he/she has gained through the course of four years. The purpose lies in promoting the skills of students in a single format.

**OBJECTIVE**

Students will present a portfolio of all the files/ folders/ projects created during the course of study in I to III year. The portfolio should include projects, industrial visit reports, any other projects made during the academic session. The external examiner will evaluate the portfolio and take a viva of the student.

  
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<b>MDE025A</b>	<b>Office Training (Internship)</b>	<b>0-0-48 [24]</b>
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**Learning Objective:**

This course will prepare students to enter into full-time employment in their area of specialization upon Post graduation. It will provide students with the opportunity to test their career aptitude and aid them adjusting from college to full-time employment. It will present students with the opportunity to develop attitudes conducive to effective interpersonal relationships, increase their sense of responsibility, and help them acquire good work habits. It will offer the opportunity for students to understand informal organizational interrelationships and provide in-depth knowledge of the formal functional activities of a participating organization.

<b>UNIT 1</b>	First hand exposure to an apparel organization, designer or Export House and their working structures and systems.
<b>UNIT 2</b>	Specific project on the job to sharpen skills required for chosen area of specialism. Further development of generic/cognitive skills.
<b>UNIT 3</b>	Identification of industry for internship with student's career path in mind.
<b>UNIT 4</b>	Internship log book: is a tool to help you record your daily activities along with a reflection on the same. Reflective writing enables the documentation experiences, thoughts questions, ideas and conclusions that signpost the learning journey.
<b>UNIT 5</b>	Internship report: will focus on study of the organizational structure & development objective of the internship. Personal design philosophy & career path linked to learning in the internship. Learning process and its analysis as internship progresses through detailed processes and projects undertaken. Report should be a reflection of the internship experience of the personal & professional development.

**COURSE OUTCOME (CO):**

At the end of this course students will have:

CO1: To identify business strategies for buying and selecting product. CO2:

To identify process and procedures for company purchases.

CO3: To explore the buying process, increase skills in buying and merchandising.

CO4: To understand that how they write a report of their industry experience and develop written communication skills

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1		M			M	M						M					
CO2		M			M	M						M					
CO3		M			M	M						M					
CO4		M			M	M						M					

<b>MDE026A</b>	<b>DESIGN &amp; DRAFTING</b>	<b>0-4-0[2]</b>
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## OBJECTIVE

- Design Learners Need To Learn To Visualize And Communicate Their Concepts/Ideas Through Various Representation Techniques Like Freehand Drawing And Sketches Through Manual And Digital Methods.

<b>UNIT 1</b>	Introduction To Drafting, Drafting Tools, Surface And Fundamentals Pencils, Parallel Bar, Set-Square, Variety In Sheets(Sizes), Scales Etc.
<b>UNIT 2</b>	Fundamentals Of Drafting Vocabulary Of Architecture, Scaling, Lines, Symbols, Lettering, Etc.
<b>UNIT 3</b>	Orthographic Drawings, Section Drawings.
<b>UNIT 4</b>	Isometric Drawings-Grid, Projection Of 3D Geometry, Analytical Drawings.
<b>UNIT 5</b>	Digital Drafting -Autocad

## COURSE OUTCOME (CO)

### At The End Of This Course Students Will Have:

CO1: Develop An Understanding Of Various Marking Devices And Surfaces And Learn To Draw Through Observation And Using Motor Skills.

CO2: Develop Skills To Understand The Size, Scale, And Proportion, Surface Textures Through Drawing Techniques Of Line, Shapes And Volume.

CO3: Develop Techniques Of Various Methods Of Visual Representation Such As Longhand Drawing, Isometric Drawings, Perspective Drawing.

CO4: Illustrate The Ability Of Design Idea Through 2d And 3d Visuals.

CO5: To Observe The Environment And Draw Exterior And Interior Spaces.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Outcome Specific				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1																	
CO2		M															
CO3					M												H
CO4																	
CO5							H										



**TEXT BOOKS:**

- I.H. Morris, Orient Longman, Chennai -Geometrical Drawing For Art Students.
- M.S. Kumar, D.D. Publications, Chennai Engineering Drawing.
- Architectural Drafting And Design By Alan Jefferis, David. A. Madsen.
- Hand Drafting For Interior Design By Diana Bennett Writz.

**Reference Books:**

- Allen Tate- Harper & Row Publishers, New York, 1987. The Making Of Interiors- An Introduction.
- Sherrill Whiton- Prentice Hall, Fourth Edition- 1974-Interior Design & Decoration.

<b>MDE030A</b>	<b>DESIGN PROJECT - I</b>	<b>0-10-0[5]</b>
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### OBJECTIVE

The Emphasis Of The Project Is On Individually Planned Design Projects That Involve Considerations Of Interactions With Product / Communication System, Wide Range Of Requirements Of Different Users And Scope For Visual, Formal, And Structural Innovations.

Pre-Requisite: Design Project

Selection of Project. Literature Review, Investigation and Exploratory Studies of Problem Area Including User Studies to Define the Design Brief. Ideation and Visualization Applying Concept Generation Techniques. Evaluation Techniques for Concept Selection. Documentation Of The Design Process And Conclusion Of Phase I With A Submission Of A Report And Presentation Of Design Concepts.

The Project Is Supported By Theoretical Information And Assignments In The Complementary Nature Of Systematic And Creative Thinking In The Various Stages Of The Design Process And Visual, Structural, And Functional Analysis Of Design System.

These Will Be Developed And Presented In The Form Of Appropriate And Tangible Design Solutions Including Models, Graphic Solutions Etc.

### COURSE OUTCOME (CO):

At The End Of This Course Student Will Have:

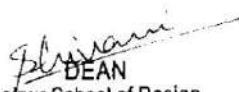
CO1: Understand the Project Studies, Case Studies of Various Related Topics For Interiors Will Be Used. Presentation Of Data Collected Will Be Done By Means Of Seminars / Visits / Books /Visuals.

CO2: Understand About The Anthropometric & Ergonomics.CO3: Understand How To Work In A Professional Context.

CO4: The Outcome Of The Project Will Be In The Form Of Innovative And Conceptual DesignProposal That Reflect The Students Understanding Of The Design Process.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L						L		
CO2					H					
CO3						M				H
CO4										
CO5										

  
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### **Reference Books:**

1. Time Savers Standards for Interior Design & Space Planning By Joseph Dechiara, JuliusPanero & Martin Zelink.
2. Time Savers Standards For Architectural Design By Michael J. Crosbie & Donald Watson
3. Human Dimension and Interior Space: A Source Book of Design Reference.

<b>MDE031A</b>	<b>MODEL MAKING WORKSHOP</b>	<b>0-4-0[2]</b>
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### Course Objectives

To Introduce The Students To Basics Of Model Making With Various Materials.

<b>UNIT 1</b>	<b>INTRODUCTION TO MODEL MAKING</b> Introduction To Concepts Of Model Making And Various Materials Used For ModelMaking.
<b>UNIT 2</b>	<b>BLOCK MODELLING</b> Preparation Of Base For Models Using Wood Or Boards • Introduction To Block Models Of Buildings (Or 3D Compositions) Involving The Usage Of Various Materials Like Thermocol, Soap/Wax, Boards, Clay Etc.
<b>UNIT 3</b>	<b>DETAILED MODELLING</b> Making Detailed Models Which Include The Representation Of Various Building Elements Like Walls, Columns, Steps, Windows/Glazing, Sunshades, Handrails Using Materials Like Mount Board, Snow-White Board, Acrylic Sheets. • Representing Various Surface Finishes Like Brick/Stone Representation, Stucco Finish Etc. Various Site Elements – Contour Representation, Roads/Pavements, Trees/Shrubs, Lawn, Water Bodies, Street Furniture, Fencing Etc.
<b>UNIT 4</b>	<b>INTERIOR MODELS OF INTERIOR SPACES</b> Making Models Of The Various Interior Spaces Such As • Residences • Offices • Retail Spaces • Recreational Spaces Scaled Models Of Furniture.
<b>UNIT 5</b>	Introducing The Techniques Of Planning, Chiselling & Jointing In Timber To Learn The Use Of Hand Tools. Exercise Involving The Design Of Simple Furniture And Making A Model Of The Same.

### Course Outcomes (CO):

At The End Of This Course Student Will Have:

CO1: Develop An Understanding Of Various Marking Devices And Surfaces And Learn To DrawThrough Observation And Using Motor Skills.

CO2: Develop Skills To Understand The Size, Scale, And Proportion, Surface Textures ThroughDrawing Techniques Of Line, Shapes And Volume.

CO3: Develop Techniques of Various Methods of Visual Representation Such As Longhand Drawing, Isometric Drawings, and Perspective Drawing.

CO4: Illustrate The Ability Of Design Idea Through 2d And 3d Visuals.

CO5: To Observe The Environment And Draw Exterior And Interior Spaces.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1													L				
CO2		M															
CO3					M												H
CO4																	
CO5							H										

**TEXT BOOKS**

- Jannsen, Constructional Drawings & Architectural Models, Karl Kramer Verlag Stuttgart, 1973.
- 3. Harry W.Smith, The Art Of Making Furniture In Miniature, E.P.Dutton Inc., New York, 1982.

**Reference Books:**

- BENN, The Book Of The House, Ernest Benn Limited, London.

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<b>MDE032A</b>	<b>ESTIMATING &amp; COSTING</b>	<b>0-4-0[2]</b>
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### Objective

- Implement An Interior Design Project & Also To Monitor / Control Project Cost.

<b>UNIT 1</b>	<b>INTRODUCTION TO ESTIMATION:</b> Estimation – Definition, Purpose, Types Of Estimate, And Procedure For Estimating The Cost Of Work In Order To Implement An Interior Design Project Or To Make Products Related To Interior Design Like Furniture, Artifacts Etc.
<b>UNIT 2</b>	<b>RATE ANALYSIS &amp; ESTIMATION FORMAT :</b> Rate Analysis – Definition, Method Of Preparation, Quantity & Labour Estimate For Woodwork, Steelwork, Aluminium Work, Glass & Its Rate For Different, Thickness & Sections, Finishing (Enamel Paint, Duco Paints, Melamine, DU Coats, Hand Polishing, Veneering And Laminating) For Walls & Ceilings. Electrical & Plumbing Products, Wiring, Ducting Etc., And Laying Of Tiles & Wall Panelling In The Estimate Format Of The Project.
<b>UNIT 3</b>	<b>DETAILED ESTIMATE:</b> Detailed Estimate – Data Required, Factors To Be Considered, Methodology Of Preparation, Abstract Of Estimate, Contingencies, Labor Charges, Bill Of Quantities, Different Methods Of Estimate For Interior Design Works, Methods Of Measurement Of Works.
<b>UNIT 4</b>	<b>COSTING OF FIXTURES &amp; FITTINGS:</b> Cost Of The Following Items: Electrical Fitting Like, Luminaries, Fan, Cables, Switches Etc., Tiles In Skirting & Dado, Cement Plaster, Joinery In Wood, Steel & Aluminium, Painting To Walls – Cement Paint, Oil Paints , Distemper Acrylic Emulsion, Enamel Paint Painting To Joinery, Varnishing, French Polishing Plumbing Equipment Like Piping, Shower Panels ,Cubicles, Tubs, Jacuzzis , Taps, Motors, Fountains, False Ceiling Of Aluminium Panels, Steel & Wooden Frame Work, Thermocol Etc. Wall Panelling Of Ceramic Tiles & Other Tiles Of Materials Suitable For The Same, Partitions Made Of Materials Like Aluminium Wood, Steel Etc.
<b>UNIT 5</b>	<b>INTRODUCTION TO SPECIFICATION :</b> Specification – Definition, Purpose, Procedure For Writing Specification For The Purpose Of Calling Tenders, Types Of Specification. Specification For Different Item Related To Interior Design Project – Woodwork For Furniture Window Frames & Pelmet, Partitions Etc. Also Of Materials Like Steel Aluminium Glass Of Various Kind. Wall Panelling & False Ceiling Of Materials Like Aluminium, Steel, Wood, Electrical, Plumbing, Air-Conditioning & Fire Fighting Equipment.

### **Course Outcome (CO):**

At The End Of This Course Student Will Have:

CO1: Develop An Understanding Of Various Marking Devices And Surfaces And Learn To Draw Through Observation And Using Motor Skills.

CO2: Develop Skills To Understand The Size, Scale, And Proportion, Surface Textures Through Drawing Techniques Of Line, Shapes And Volume.

CO3: Develop Techniques Of Various Methods Of Visual Representation Such As Longhand Drawing, Isometric Drawings, And Perspective Drawing.

CO4: Illustrate The Ability Of Design Idea Through 2d And 3d Visuals.

CO5: To Observe The Environment And Draw Exterior And Interior Spaces.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

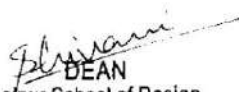
Course Outcome	Program Outcome												Program Outcome Specific				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1													L				
CO2		M															
CO3					M												H
CO4																	
CO5							H										

### **TEXT BOOKS**

- M. Chakraborti,. Estimation, Costing, Specification and Valuation In Civil Engineering.
- Dutta, Estimating and Costing, S. Dutta And Co., Lucknow 1983.

### **Reference Books:**

- S. C. Rangwala, Elements of Estimating And Costing, Charoter Publishing House, Anand,India, 1984.
- The Interior Designers Guide: To Pricing, Estimating Budgeting. By Theo Susan

  
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<b>MDE033A</b>	<b>INTERIOR MATERIALS &amp; SPECIFICATION</b>	<b>3-0-0[3]</b>
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### Objective

- Design Learners Need To Learn To Visualize And Communicate Their Concepts/Ideas Through Various Representation Techniques Like Freehand Drawing And Sketches Through Manual And Digital Methods.

<b>UNIT 1</b>	Floor Coverings & Wall Coverings Rugs, Carpets, PVC Coverings, Vinyl Floors, Linoleum Floors, Wallpapers, Paints & Finishes, Cladding; Market Survey.
<b>UNIT 2</b>	Interior Furnishings Curtains, Blinds, Upholstery, Tapestry, Covers, Cushions, Bathroom & Table Linen-Styles, Material Classification, Functions, Fittings; Market Survey.
<b>UNIT 3</b>	Kitchen & Toilets Fixtures & Fittings; Finishing Material; Market Survey
<b>UNIT 4</b>	Door & Window Hardware Hinges, Handles, Locks, Door Stoppers, Etc.- Types, Material Classification, Function; Market Survey.
<b>UNIT 5</b>	Lighting Natural & Artificial- Fixtures, Fittings, Light Controls- Switches, Dimmers, Contractors, Photocells, Timers, Occupancy Sensors, Light Sensitive Controls, Decorative Lighting Style, Special Effect Lighting, Selection Of Amount Of Lighting For An Area, Market Survey.

Course Outcome (CO):

At The End Of These Course Students Will Have:

CO1: An Ability To Understand The Construction Detail That Use A Variety Of Techniques, Including Manual Drafting, To Convey The Design Solution Clearly.

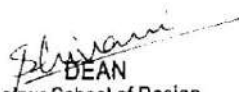
CO2: An Ability to Understand the Interior Design on Material and Construction Methodology. CO3: An Ability to Understand the Hardware Detail of Elements Such As Doors & Windows.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1					M										
CO2	L		L					L						M	
CO3			L					L						M	

### Reference Books :

- Interior Design Materials & Specifications By Lisa Godsey.
- Interior Design By Ahmed A. Kasu.

  
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MDE035A	DESIGN PROJECT - 2	0-10-0[5]
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## OBJECTIVE

Identify And Conserve The Untapped Values And Principles Of Vernacular Design Theories For Architectural Creations, Highlight Needs And Various Ways Of Vernacular Building Research, Analysis, Presentation Of, Finding And Its Application To Contemporary Buildings.

<b>UNIT 1</b>	<b>Case Studies Of Works Of Designers And Architects In Contemporary World Architecture</b> Case Studies Of Works Of Designers And Architects In Contemporary World Architecture (Outside Indian Subcontinent) whose Works Are Influenced By The Vernacular Design Of The Region.
<b>UNIT 2</b>	<b>Case Studies Of Works Of Designers And Architects In Contemporary Indian Styles</b> Case Studies Of Works Of Designers In Contemporary Indian Style; whose Works Are Influenced By The Vernacular Architecture Of The Region.
<b>UNIT 3</b>	<b>Design Project</b>

## COURSE OUTCOME (CO):

At The End Of This Course Students Will Have:

CO1: Be Able To Manipulate Interior Environments to Meet Design Requirements.

CO2: Be Able To Respond To the Aesthetic and Functional Requirements of an Interior Design Brief.

CO3: Be Able To Employ Technical Processes to Respond To an Interior Design Brief. CO4: Be Able To Understand the Role of Vernacular in Design.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Outcome Specific				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1						L									M		
CO2								M						L			
CO3					H												H
CO4			L														

*[Signature]*  
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### **Reference Books:**

1. Time Savers Standards for Interior Design & Space Planning By Joseph Dechiara, JuliusPanero & Martin Zelink.
2. Time Savers Standards for Architectural Design by Michael J. Crosbie & Donald Watson
3. Human Dimension and Interior Space: A Source Book of Design Reference.

<b>MDE036A</b>	<b>Digital Software-I (Furniture Design And Detailing)</b>	<b>0-4-0[2]</b>
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### Objective

- The Course Shares Fundamental Knowledge On Digital Software To Enable The Student To Make Effective Audio Visual Presentations, Create Two Dimensional Drawings And Three Dimensional Visualization Of Interiors.
- This Unit Intends To Equip The Students With Concepts And Principle Of CAD Pertaining To Interior Design Using Software Like AUTOCAD And Similar Ones.

<b>UNIT 1</b>	Fundamentals Of Photo Editing And Presentation Skills With Adobe Photoshop /Coreldraw.
<b>UNIT 2</b>	2D Drawings With Autocad
<b>UNIT 3</b>	3D Modelling Through Sketch Up
<b>UNIT 4</b>	Rendering With V-Ray
<b>UNIT 5</b>	3D Drawings- Introduction To 3D3D Forms Material Application Rendering Tools & Techniques Project Setting Up Plotters And Print

Course Outcome (CO):

At The End Of This Course Student Will Have:

CO1: Knowledge On Basic Software Required For Design Presentations.

CO2: An Ability to Understand The Total Use Of All Commands Relate To Windows And AutoCAD For Making Designs.

CO3: An Ability to Understand the 2D Drawings Line Compositions to Be Taken Color Compositions, Painting In Windows,

CO4: An Ability To Understand The Drawing Simple Geometry Objects And Drafting Of Room Give Building /Apartment / Flat And Bungalows.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Outcome Specific				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L				M										L		M
CO2					M												
CO3								L							L		
CO4								M							L		

  
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### **Reference Books:**

1. Beginning Autocad 2016 By Cheryl R. Shrock
2. Autocaddhelp/Guide/Tutorial
3. Adobe Creative Team, Adobe Photoshop CS (Class Workbook)
4. Droblas, Adele Greenberg, Fundamental Photoshop: A Complete Introduction.
5. Adele Croblasgreenberg, Fundamental Photoshop: A Complete Introduction .
6. Teyapoovan. T., Engineering Drawing With Auto CAD 2000. Vikas Pub House Pvt Ltd, NewDelhi, 2000.
7. Parker, Daniel And Rice, Habert. Inside Auto CAD Daniel, 1987. Geomura, Auto CAD, Release 2000.
8. Oscar Rieraajed ,Lucast Guerre, Hyper Realistic Computer Generated Architectural Renderings.
9. Giuliano Zampi Conway Lloyd Morgan, Virtual Architecture.
10. Aidan Chopra, Rebecca Huehls, Sketchup For Dummies Bonnie Roskes, Modeling With Sketchup For Interior Design Daniel Tal, Rendering In Sketchup

<b>MDE037A</b>	<b>Design Project-II (FURNITURE DESIGN AND DETAILING)</b>	<b>0-0-4[2]</b>
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### Objective

- To Familiarize Students With Understanding Furniture Categories: Exploration Of The Idea Of Furniture, Role Of Furniture In Interior Design, Design Approaches In Furniture Design.

<b>UNIT 1</b>	Styles Of Furniture: Traditional, Contemporary, And Modern Design. Furniture For Different Purpose.
<b>UNIT 2</b>	Seating Design: Different Types Of Seating With A Focus On The Following – Functionality, Aesthetics, Style, Human Factors, And Ergonomics.
<b>UNIT 3</b>	Modular Approach To Furniture Design: Soft Furnishings. Meaning, Importance – Relationship Of Furnishings With Space, Selection And Use Of Furnishings. Visiting To Different Manufacturers To Understand Material And Its Processes.
<b>UNIT 4</b>	Batch Production And Mass Production Of Furniture. Technical Considerations Of Internal Subsystems Of Furniture And Their Influence On Detailing. Selection Of Natural, Synthetic, And Manmade Materials And Their Processes For Detailing Furniture For Manufacture. Detailing Mechanisms For Foldable, Stackable, And Collapsible Considerations Of The Furniture. Design Detailing Of Components Vis-À-Vis Considerations Of Manufacture, Maintenance, And Assembly.
<b>UNIT 5</b>	Design Problem: Exercise Oriented For Designing Some Furniture By Creative Explorations, Observation, And Constraints Along With Measured Drawing – Plan, Elevation And Drawings On Full Scale Supported By Prototype Making.

### Course Outcome (CO):

At The End Of This Course Student Will Have:

CO1: Be Able To Research and Studying Furniture Pieces.

CO2: Be Able to Becoming Familiar with Basic Traditional and Modern Joinery of Furniture's. CO3:

Be Able To Sketching Basic Joints Used In Furniture and Cabinet Making. CO4: Be Able To Develop

Knowledge and Critical Comprehension of Key Concepts,

Methodologies, Current Trends, and Theoretical Approaches in All Studio Concentrations In Order To Understand the Relationship among Them.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1		M													H		
CO2	L																
CO3	L																
CO4					M			L								M	

**References:**

1. Indian Anthropometric Dimensions For Ergonomic Design Practice (1997), By Debkumar Chakrabarti
2. Joseph Aronson, (1961) The Encyclopedia Of Furniture: Third Edition.
3. Bradley Quinn, (2006) Mid-Century Modern: Interiors, Furniture, Design Details, Conran Octopus Interiors. Edward Lucie-Smith (1985) Furniture: A Concise History (World Of Art), Thames And Hudson.
4. Jim Postell, (2007) Furniture Design, Wiley Publishers.
5. John.F. Pile (2005) Interior Design, 2nd Edition, Illustrated, H.N.Abrams.
6. Robbie. G. Blakemore, (2005) History Of Interior Design And Furniture: FromAncient Egypt To Nineteenth-Century Europe, Wiley Publishers
7. J. Lesko, Materials And Manufacturing Guide: Industrial Design, John Wiley And Sons Inc.,2003
8. G. Boothroyd, Product Design For Manufacture And Assembly, 2nd Edition, MarcelDekker Inc., 2002.
9. J.W. Priest, S. M. Jose, Product Development For Manufacturing, Marcel Dekker Inc.,200

MDE039A	Interior Landscape	0-4-0[2]
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### Objective

- To Develop An Understanding About The Design Of Interior Landscape With Special Emphasis On The Choice And Care Of Plant Materials Used In The Interior Spaces.
- To Study about the Various Landscaping Elements and Their Application in Interior Spaces.
- To Study The Concepts Of Interior Landscaping And Their Application In The Design Of Interior Spaces.

UNIT 1	<b>INTERIOR LANDSCAPING</b> Definition, Classification Of Plants, Indoor Plants And Their Functions, Layout & Components, Floriculture – Commercial, Ornamental, Selection Of Plants & Pest Control.
UNIT 2	<b>PHYSICAL REQUIREMENTS OF PLANTS</b> Physical Requirements Of Plants – Light, Temperature, Water, Planting Medium, Soil Separator, Weight Of Plants, Acclimatization & Maintenance. Techniques To Meet Physical Requirements.
UNIT 3	<b>INTERIOR LANDSCAPING ELEMENTS &amp; PRINCIPLES</b> Various Interior Landscaping Elements – Water Bodies - Pools, Fountains, Cascades Plants, Rocks, Artifacts, Paving & Lighting, Design Guidelines- Plant Texture & Colour, Plant Height, Plant Spacing.
UNIT 4	<b>ROOF AND DECK LANDSCAPE</b> Protection Of The Integrity Of The Roof And Structure, Provisions For Drainage, Light Weight Planting Medium, Irrigation, Selection Of Materials, Water Proofing, Provision For Utilities And Maintenance.
UNIT 5	<b>EXERCISE ON INTERIOR LANDSCAPE</b> Courtyard Design An Outdoor Room Design Terrace Garden

### Course Outcome (CO):

At The End Of This Course Student Will Have:

CO1: An Ability to Understand the Theory and Design of Landscape and Site Plan.

CO2: An Ability to Develop the Design of Interior Landscape with Special Emphasis on the Choice And Care Of Plant Materials Used In the Interior Spaces.

CO3: An Ability To Develop And Understanding About The Design Of Interior Landscape With Special Emphasis On The Choice And Care Of Plant Materials Used In The Interior Spaces.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L													L			
CO2			L														
CO3					M										M		

**Suggested Readings:**

1. Residential Landscape Design by Dean Herald.
2. Residential Landscape Architects by Norman K Booth & James E. Hiss.



MDE040A	Digital Software-II	0-4-0[2]
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### Objective

- This Unit Intends To Equip The Students With Concepts And Principle Of CAD PertainingTo Interior Design Using Software Like AUTOCAD And Similar Ones.
- This Unit Intends To Equip The Students With Throughout Knowledge Of Application Of Computer In Interiors And Efficient Working In 3D & 3D Animation And Walk Through.

<b>UNIT 1</b>	<b>Module 1:</b> Introduction - About Max System Configuration Max Interface Customize Viewports Standard Primitives Creating Objects Using Keyboard Entry Setting Projec Creating Extended Primitives Defining Object Name & ColorUsing Manipulator Using Navigation Tools Transforms [Move, Rotate, And Scale With Short-Cut Keys]Using Absolute / Relative Transform Type-In Dialog Box Restrict To X, Y, Z, XY, YZ, ZX With Short-Cut Keys Using Clone (Copy Option Only)
<b>UNIT 2</b>	<b>Module 2:</b> PHOTOSHOP
<b>UNIT 3</b>	<b>Module 3:</b> Applying Basic 3D Modifiers – Bend, Taper, Twist, Noise ,Relax, Skew. Applying Basic 3D Modifiers-Affect Region, Displace, Lattice, Mirror, Push,Ripple, Stretch, Squeeze, And Spherify, Shell, Slice And Wave. 2D-Shapes, About Start New Shape. Editing Line Object 2D Modifiers - Edit Spline Modifier, Lathe, Extrude, Bevel, BevelProfile,Sweep, Fillet/Chamfer Compound Objects – Boolean AEC Extended Objects – Foliage, Railing, And Wall, Stair, Doors, Windows.

<b>UNIT 4</b>	<p><b>Module 4:</b></p> <p>Introduction To Lights - Standard Lights – Omni Target Spot, And Free Spot</p> <p>Target Direct, Free Direct, Sky Light, ,</p> <p>Photometric Lights –Target Point, Free Point, Target Linear, Free Linear,Target Area, Free Area.</p> <p>Copying Objects – Clone, Instance, Reference, Array, Spacing Tool, NormalAlign, And Align View, Align Camera.</p> <p>Working With Shape BooleanEdit-Spline</p> <p>Compound Object- Loft</p> <p>Deforming Loft Objects – Scale, Twist, Teeter, Bevel, Fit – Modifying Objects</p>
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<b>UNIT 5</b>	<b>Module 5:</b> Fill, Stroke. Changing The Background Color, Foreground Color. Pen Tool, Free Form, Add Anchor, Delete Anchor, Convert Point Tool.Path And Direct Selection Tool. Applying Brush Tool On The Stroke. Working With Text, Applying Layer Style. Creating Reflections. Working With Vector Shapes. Creating Layers, Arranging Layers, Merging Layers, Flattening Layers. Changing The Background. Applying Blending Modes. Group Layers, Ungroup Layers Using Modes – RGB, CMYK. Applying Adjustments - Color Balance, Brightness & Contrast.  How To Create Own Designs. Page Setup, Print, Printer Settings How To Create Own Designs. Page Setup, Print, Printer Settings. Project Poster Making
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### **Course Outcome (CO):**

At The End Of This Course Student Will Have:

CO1: An Ability To Understand The Total Use Of All Commands Relate To Windows And AutoCAD For Making Designs.

CO2: An Ability to Understand the 3D Drawings Line Compositions to Be Taken Color Compositions, Painting In Windows.

CO3: An Ability To Understand The Implementation Strategies Will Include Use And Regular Practice Of All Related Commands Of AUTOCAD 3D, 3D Studio, Photoshop, Walk Through Animations. The Generation of Drawings and Animation Should Satisfy the Client's Requirements and It Should Ease the Planning, Design and Execution of the Interior Work.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					H								L				
CO2					H												
CO3	M							L							H	L	

**Reference Books:**

1. Creating And Rendering Exterior Visualizations In 3ds Max Video Tutori
2. Kelly L. Murdock's Autodesk 3ds Max 2015 Complete Reference Guide Inside 3D StudioMAX 2, Volume 1by Stylin Elliott & Philip Miller
3. <http://Shadowmysticstudios.Daportfolio.Com>

MDE042A	DESIGN PROJECT – III	0-10-0[5]
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### Objective

- Explore To A Preliminary Level Basic Spatial And Material Design Concepts.
- This Unit Intends To Equip The Students With Concept And Principles Of Design.
- Pre-Requisite: Design Project  
Selection of Project. Literature Review, Investigation and Exploratory Studies of Problem Area Including User Studies to Define the Design Brief. Ideation and Visualization Applying Concept Generation Techniques. Evaluation Techniques for Concept Selection. Documentation Of The Design Process And Conclusion Of Phase I With A Submission Of A Report And Presentation Of Design Concepts.

Course Outcome (CO):

At The End Of This Course Student Will Have:

CO1: Understand The Project Studies, Case Studies Of Various Related Topics For Interiors Will Be Used. Presentation Of Data Collected Will Be Done By Means Of Seminars / Visits / Books / Visuals.

CO2: Understand About the Anthropometric & Ergonomics

CO3: Understand The Specific Requirements Of The Project Given. CO4:

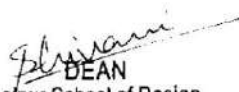
Understand How To Work In A Professional Context.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1					L				M							L	
CO2																	
CO3											L				L		
CO4		M															H

### Reference Books :

1. Time Savers Standards for Interior Design & Space Planning By Joseph Dechiara, Julius Panero & Martin Zelink.
2. Time Savers Standards for Architectural Design by Michael J. Crosbie & Donald Watson
3. Human Dimension and Interior Space: A Source Book of Design Reference

  
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MDE046A	Industrial Training	0-10-0[5]
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### **Aim**

In This Semester The Learner Will Be Equipped With Knowledge And Skills Needed Such As Management Of Office Along With Current Practices, Codes Of Conduct Required To Enhance Skills And Techniques Of Managing Small And Large Scale Residential And Commercial Interior Projects.

### **OBJECTIVE**

- To Encourage Students To Work In With Relevant Industries.
  - An Avenue to Enhance Academics Learning Through Hands on Work Experience.
  - Get Advice On Career From Knowledgeable And Experienced Professionals.
  - Gain Exposure to a Professional Work Atmosphere.
- Be Able To Place Themselves And Their Work In The Context Of Their Selected Discipline  
Understand Their Specialist Area And The Career Opportunities Available  
Understand How To Promote Themselves And Their Work Professionally.

The Aim Of This Unit Is To Extend Learners' Knowledge Of Professional Practices Within Their Specialist Area And To Relate These To Personal Goals And Career Opportunities.

### **INTERNSHIP TRAINING**

- In The IV Semester, Student Will Undergo An Internship Of 10 Weeks Duration In An Interior Designing Or Architectural Firm And Form A Project Report About His/Her Practical Experience Gained By Working On Various Projects Worked Under The Supervision Of A Professional Designer, So That They Can Understand The Existing Working Practices, Conditions And Acquire An In Depth Technical Knowhow.
- The Student Has To Submit A Certificate Regarding Their Successful Training With The Firm.
- A Copy Of Report Needs To Be Submitted With The Department Along With The Performance Certificate Issued By The Firm Manager/ Owner And One With The Firm (Where Internship Is Pursued).
- After The Internship, Student Needs To Appear In Front Of Jury Members For A Presentation Seminar, Who Will Judge The Performance Based On Their Presentation, Report, And Viva-Voce And Award Marks To Student.
- PROJECT REPORT To Be Submitted
  - Background Of Industry
  - Number Of Employees
  - Project Detail On Which Assisted
  - Manufacturing Process
  - Hand & Computer Sketches
  - Experience
  - Any Other Details

**Course Outcome (CO):**

CO1: Student Will Be Able To Understand About Entrepreneurship And Evolution Of Entrepreneurship.

CO2: Student Will Be Able To Understand Creating And Starting The Venture.

CO3: Student Will Be Able To Understand Managing, Growing And Ending The New Venture. CO4: Student Will Be Able To Understand Entrepreneurship Development And Government.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	H				L		M		M			H	M		H
CO2	H		M	L					M			H			H
CO3		M				M				M	L		M		
CO4	M							L							

MDE047A	Office Portfolio Submission	0-10-0[5]
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**Objective:**

- To Assess The Performance Of Student In The Practical Training, A Final Jury Will Be Conducted In The Month Of June, After Commencement Of The Session.
- The Student Have To Be Present In The Jury Along With Their Training Reports (Properly Binded), On The Basis Of Which Marks For IV Sem. Will Be Awarded.
- The Jury Will Be Taken On The Training Report & Not On The Sheets.

Course Outcome (CO):


CO1: Understand The Different Attributes Of Portfolio Design.

CO2: Illustrate Reflecting Their Accomplishments, Skills, Designs, Values, And Attributes. CO3: Develop A Portfolio Showcasing Various Aspects Of Projects.

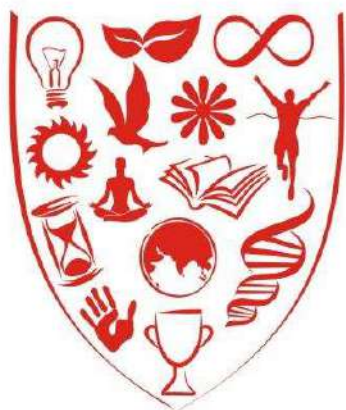
**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	H				L		M		M			H	M		H
CO2	M		M	L							M	H			H
CO3		M				M				M			M		

**Note:** Students Has To Follow The Instructions As Guided In The Training Manual.

  
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**SCHOOL OF ENGINEERING**

**SYLLABUS AND COURSE STRUCTURE**

**B. TECH (CIVIL ENGINEERING)**  
**ACADEMIC YEAR 2022-23**

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JECRC University, Jaipur-303005

**B. Tech. (CE) Program Educational Objective (PEO's):**

A graduate of the Civil Engineering Program should:

**PEO-I**

Graduates of the Programme will contribute to the development of infrastructure that is sustainable.

**PEO-II**

Graduates of the Programme, as part of an organization or as Entrepreneurs, will continue to learn to harness evolving technologies.

**PEO-III**

Graduates of the Programme will be professional Civil Engineers with ethical and societal responsibility.

**Program Outcome (PO's)**

A graduate of the Civil Engineering Program will demonstrate:

**PO1: Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and Civil Engineering principles to the solution of complex problems in Civil Engineering.

**PO2: Problem Analysis:** Identify, formulate, research literature, and analyse complex Civil Engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.

**PO3: Design/development of solutions:** Design solutions for complex Civil Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4: Conduct investigation of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions related to Civil Engineering problems.

**PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex Civil Engineering activities with an understanding of the limitations.

  
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**PO6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional Civil Engineering practice.

**PO7: Environment and sustainability:** Understand the impact of the professional Civil Engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8: Culture, Values and Ethics:** Understand the importance of culture and values along with the implication it has on learning, teaching, engineering practice, identify and enculturation as an engineer. Apply ethical principles and commit to professional ethics and responsibilities and norms of the Civil Engineering practice.

**PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication:** Communicate effectively on complex Civil Engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage Civil Engineering projects and in multidisciplinary environments.

**PO12: Life-long learning:** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **Program Specific Outcome:**

The B. Tech. Degree Programme in Civil Engineering is offered in the department with the following programme specific objectives:

**PSO1:** Able to apply the knowledge gained during the course of the program from one or more streams of civil engineering such as construction management, structural engineering, environmental engineering, transportation engineering, water resource engineering, Geotech engineering, software development etc particularly to identify, formulate and solve real life problems faced by industries.

**PSO2:** Able to provide economically viable and socially acceptable technical solutions to complex civil engineering problems with the application of modern and appropriate techniques for sustainable development.

  
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**PSO3:** Able to grasp emerging and futuristic technologies as and when introduced in the specified streams of civil engineering and even beyond through self-learning and make them to face competitive exams like GATE, IES etc ready.

## CODE AND SUBJECT SCHEME FOR B.TECH. CIVIL

### Semester I

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
DME011A	Engineering Graphics and Design	3	0	0	3	F

### Semester II

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
DLW005A	A Professional's Approach to Law and Ethics	3	0	0	3	F

### Semester III

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
DEN003A	Life Skills - 1 (Personality Development)	1	0	0	1	F
DEN003B	Life Skills - 1 (Personality Development)	0	0	2	1	F
DIN003A	Value Education & Ethics -1	1	0	0	1	F
DMA010A	Engineering Mathematics - III	3	1	0	4	F
BCI081A	Strength of Material	3	1	0	4	C
BCI082A	Building Materials and Construction Technology	3	0	0	3	C
BCI083A	Engineering Surveying	3	0	0	3	C
BCI002B	Fluid Mechanics	3	0	0	3	C
BCI084A	Engineering Surveying Lab	0	0	2	1	C
BCI063C	Fluid Mechanics and Hydraulics Lab	0	0	2	1	C
BCI006C	Building Materials & Concrete Technology Lab	0	0	2	1	C

  
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### Semester IV

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
DMA003A/ DMA011A/ DMA011B	Life Skills - 2 (Aptitude)/Life Skills-II	1	0	2	2	F
DIN004A	Value Education & Ethics - 2	1	0	0	1	F
BCI085A	Geotechnical Engineering	3	1	0	4	C
BCI086A	Structure Analysis	3	0	0	3	C
BCI014A	Hydraulics and Hydraulic Machines	3	0	0	3	S
BCI022B	Geotechnical Engineering Lab	0	0	2	1	C
BCI024C	Material Testing Lab	0	0	2	1	C
BCI087A	Strength of Material Lab	0	0	2	1	C

### Semester V

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
BCI020A	Reinforced Cement Concrete I	3	1	0	4	C
BCI030B	Environmental Engineering I	3	0	0	3	C
BCI037C	Foundation Engineering	3	0	0	3	S
BCI011C	Design of Steel Structures	3	0	0	3	S
BCI044C	Environmental Engineering Lab	0	0	2	1	C
BCI094A	Structure Analysis Lab	0	0	2	1	C

### Semester VI

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
BCI029C	Transportation Engineering I	3	1	0	4	C
BCI036B	Advanced Reinforced Cement Concrete	3	0	0	3	S
BCI077A	Quantity Surveying and Valuation	3	0	0	3	S
BCI073A	Project Work	0	0	8	4	C
BCI043C	Transportation Engineering Lab	0	0	2	1	C
BCI065B	CAD Building Drawing Lab	0	0	2	1	C

### Semester VII

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
BCI039B	Water Resource Engineering	3	1	0	4	C
BCI040B	Transportation Engineering II	3	0	0	3	S
BCI055A	Solid Waste Management	3	0	0	3	S
BCI077A	Quantity Surveying and Valuation	3	0	0	3	C
BCI080A	Earthquake Resistant Design	3	0	0	3	S

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BCI073A	Project Work	0	0	4	4	C
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### Semester VIII

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
BCI050A	Industrial Project and Dissertation	0	0	28	28	C

### Semester I

<b>DME011A</b>	<b>Engineering Graphics and Design</b>	<b>3: 0: 0</b>	<b>3</b>
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#### ❖ Course Overview:

The course provides the fundamental knowledge on engineering graphics and design, which is used for technical communication in the industry. The practical expertise of L&T has been leveraged for the course development to help the learners understand and apply the knowledge as it is being done in the field. This course covers the fundamentals of engineering graphics involving geometrical 1D, 2D, and 3D objects. The knowledge of engineering graphics gained through this course can be applied to design and draw simple machine parts, small office and residential buildings. Computer Aided Design is introduced and discussed in a practical way with an exposure to Building Information Modelling. This course facilitates the learners to have a clear understanding on how to apply the knowledge of graphics in their respective disciplines for engineering design.

#### ❖ Course Objective:

To help learners draw engineering drawings of objects in manual and computer aided drafting methods, read and interpret the drawing of simple machine components, buildings, etc., and apply the knowledge for creative engineering design

#### ❖ Key Topics:

Drawing Codes | Manual Drafting | Traditional Engineering Graphics | Computer Graphics and Computer Aided Design | Solid Modelling | Building Information Modelling | Design Project

#### ❖ Syllabus:

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### **Basics of Engineering Graphics, Projection of Points**

Introduction to Engineering Drawing, Manual & Computer Aided Design and Drafting, Lettering, Dimensioning, Geometrical Constructions, Plane Curves, Conic Sections, Cycloidal Curves, Involute – Projection of point placed in a quadrant – Projection of a line using first angle projection method, rotating line method, trapezoidal plane method – Solve & draw projections of a line kept inclined to two planes – Determination of true length, true inclinations & traces of a straight line

### **Projection of Planes & Solids**

Description of plane shapes & solids - Drawing plane projections & solids using change of position and auxiliary plane method – Projection of solids with inclined axis – Drawing projection of solids using change of position and auxiliary plane method.

### **Orthographic Projections & Sections of Solids**

Visualization & drawing orthographic projections – Description & drawing of Plan, elevation, side elevation of objects, simple machine parts using first angle projection method – Description of section plane & portion of solid – Drawing sectional top view, front view, true shape of section on an auxiliary plane

### **Isometric & Perspective Projection, Development of Surfaces**

Drawing isometric view of solids (Box method) – Drawing isometric scale & construction of isometric projection from orthographic projection – Drawing perspective projection of small, large objects and building components using suitable methods – Drawing section plane & determining lateral surface – Determination of shortest distance between points – Drawing & determining shape of metal sheet to cut objects.

### **Building Drawing, Solid Modeling, Building Information Modeling**

Drawing plan, elevation and sectional elevation of a small residential & office building – Description & creation of Solid models in general and with respect to engineering – Designing and creating a new product & generating various views – Basics of Building Information Modeling (BIM)

#### **❖ Case Studies**

1. Building drawing of a small office building
2. Building drawing of a small office building

#### **❖ Software used: AUTOCAD**

## Semester II

<b>L-T-P</b>	<b>DLW005A – A Professional's Approach to Law and Ethics</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### ❖ Course overview:

This course is structured keeping in mind the need to familiarize the learners with various laws they would be required to apply in their professional life on a day-to-day basis. The contents of the course are divided into lessons that deal with various areas of law, such as:

- Study of professional ethics
- Insights into law of contract
- Study on dispute resolution
- Study on labour laws
- Study on Intellectual Property Rights and Taxation.
- Insights into basic laws governing companies.

### ❖ Course Objectives:

The Course aims addressing the following aspects:

- to enable learners to make informed ethical and legal choices in their professional capacity.
- to sensitize the learners to the legal and ethical issues that may arise during the course of their employment.

  
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- To provide adequate exposure to the various laws that are relevant in their day-to-day professional life.

#### ❖ Syllabus:

##### **General Principles of Contracts Management:**

Performance, Joint Liabilities, Impossibility, Excusable Non-performance and Doctrine of Frustration. Breach of Contract, Consequences, Remedies and different forums for Enforcement of Contract. Performance, Joint Liabilities, Impossibility, Excusable Non-performance and Doctrine of Frustration.

##### **Professional Ethics, Arbitration and Mediation:**

Evolution and Salient Provisions of the Arbitration Act. Salient Features of Arbitration: Notice invoking arbitration, Eligibility of an arbitrator, Seat vs Venue, Challenging the Arbitral Award. Alternate Dispute Resolution methods and Confidentiality. Resource Allocation and Resource Levelling, Case Study on Schedule Compression, PERT to Predict the Probability of Project Completion.

##### **Corporate and Commercial Laws:**

Definitions and Terms under Company Law, and authentication of contracts. Company Act and the Landmarks under this act. Basic Definitions and Terms under Insolvency Code and Corporate Insolvency Resolution Process (CIRP). Competition Law, Anti-Competitive agreements and abuse of dominant position

##### **Taxation, Labour Laws:**

Basic terms under Income Tax Act and Sources of Income. Overview of (Foreign Exchange Management Act) FEMA, Foreign Trade Policy and other Special Scenarios. Industrial Disputes Act, Building and Other Construction Workers Act. Social Security Laws and Health and Safety Laws.

##### **Environmental Protection laws, IPR:**

Overview of Environmental Laws in India, Environment Impact Assessment and understanding Sustainable Development, Overview of International Conventions on Environment Protection.

An Introduction to Intellectual Property Law, Copyrights and Trademarks, General legal recourse for Copyright infringement, Trademark infringement, Design infringement and IP Issues, Software and Business Method Patenting in India & in other Jurisdictions.

### Semester III

<b>L-T-P</b>	<b>DEN003A(L)/3B(P) – Life Skills - 1 (Personality Development)</b>	<b>Credits:2</b>
<b>1-0-2</b>		

#### Objectives

1. To prepare the students as per the industry demands.
2. Switching to Activity and Task based Teaching modules.
3. To focus on the linguistic aspects in relation to life situations.
4. Facilitating the aspects of behavioral skills in language.
5. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
6. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

  
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### Course Outcomes (CO):

**At the end of this course students will have:**

CO1: Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields.

CO2: Ability to learn by doing it practically in the classroom.

CO3: Ability to learn by creating an environment and adapting to the environment.

CO4: The ability to prepare the students as per the need of the Multi-cultural scenario around.

### Syllabus: Theory

<b>UNIT 1</b>	<ul style="list-style-type: none"><li>Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion</li><li>Basics of Narrating and describing things</li></ul>
<b>UNIT 2</b>	<ul style="list-style-type: none"><li>Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview</li><li>CV/Resume Drafting and HR Interview advance theory</li><li>Basics of Video Interviews and Video Profiles for Job</li></ul>
<b>UNIT 3</b>	<ul style="list-style-type: none"><li>Types of listening, advantages and disadvantages</li></ul>
<b>UNIT 4</b>	<ul style="list-style-type: none"><li>Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report</li></ul>
<b>UNIT 5</b>	Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc

### Syllabus: Lab

<b>UNIT 1</b>	<ul style="list-style-type: none"><li>Debates / Speeches / Addressing the public / Extempore/Group Discussion</li><li>Describing a hypothetical situation / theme / surroundings / appearance/personality traits/company/ a professional Concept/New Idea, / New Project through PPT and video aids</li></ul>
<b>UNIT 2</b>	<ul style="list-style-type: none"><li>Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview</li></ul>

  
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	<ul style="list-style-type: none"> <li>CV/Resume Drafting and HR Interview practice sessions elaborating the points as per the CV and industry demand</li> <li>Video Interviews and Video Profiles for Job-Practice session for Online Interviews</li> </ul>
<b>UNIT 3</b>	<ul style="list-style-type: none"> <li>Listening to variety of audio/video conversations including interviews, news, reports, reports, GDs, dialogues from body language, logic, wit and vocabulary perspectives</li> </ul>
<b>UNIT 4</b>	<ul style="list-style-type: none"> <li>Group Discussion-Practice sessions, Presenting New Idea/Concept/Proposal/ Project/ Report</li> </ul>
<b>UNIT 5</b>	Activities on how to be a strong Personality, Motivation, Case studies for Resourcefulness and out of the box thinking, Role plays and Case studies on Risk taking, Self confidence and Self-esteem, Decision Making, Emotion Management, Cultural Adaptability, Multicultural Perspective towards things, ideas, views, codes etc

### Methodology for Evaluation

1. Internal Assessment (Theory)
  - a) Home Assignments: One from each Unit : 15 Marks
  - b) In Semester Tests (Minimum two) : 30 Marks
  - c) Attendance : 05 Marks
2. Term End (Theory) : 50 Marks
3. Internal Assessment (Lab)
  - (a) Daily Performance in the Lab : 50 Marks
4. Term End (Lab) : 50 Marks

### Suggested Readings:

1. A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.
2. Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
3. Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.
4. The Hard Truth about Soft Skills, by Amazone Publication.
5. 101 Great Answers to the Toughest Interview Questions. Ron Fry. High Bridge Company. 1996.
6. Michael Swan. Practical English Usage, Oxford University Press.

<b>L-T-P</b>	<b>BCI081A – Strength of Material</b>	<b>Credits: 4</b>
<b>3-1-0</b>		

### Objective:

  
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- To provide basic knowledge in mechanics of materials so that the students can solve real engineering problems and design engineering systems.
- Ability to analyze the various types of structures.
- To understand the deformations of structures under loading.
- To understand about the theory of vibration and torsion effects on the structures.

### Unit 1

**Simple Stresses and Strains:** Concept of stress and strain in three dimensions and generalized Hooke's law; Young's modulus; Tension test of mild steel and other materials: true and apparent stress, ultimate strength, Yield stress and permissible stress; Stresses in prismatic & non-prismatic members and in composite members; Thermal stresses; Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress; Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants; Stresses in composite members, Compatibility condition

**Compound Stress:** Two dimensional stress system: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle & its application.

### Unit 2

**Columns:** Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler's theory and its limitation, concept of effective length of columns; Rankine & Secant formula.

**Membrane Analysis:** Stress and strain in thin cylindrical & spherical shells under internal pressures.

**Moment of Inertia:** Polar and product moment of inertia, Principal axes and principal moment of inertia

### Unit 3

**Bending of Beams:** Types of supports, support reactions, determinate and indeterminate structures, static stability of plane structures.

Bending moment, Shear force and Axial thrust diagrams for statically determinate beams subjected to various types of loads and moments, Point of Contra- flexure, relation between load, SF and BM

**Theory of simple bending:** Distribution of bending and shear stresses for simple and composite sections.

### Unit 4

**Deflection of Beams:** Differential relation between load, shear force, bending moment, slope deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method.

**Analysis of prop cantilever structures:** Analysis of Indeterminate Structure using Area moment method, Conjugate beam method Combined direct and bending stress, middle third rule, core of a section, gravity retaining wall

**Fixed Beams and Continuous Beams:** Analysis of fixed beams & continuous beams by three moments Theorem and Area moment method.

### Unit 5

**Torsion:** Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion;

**Springs:** Stiffness of springs, springs in series and parallel, laminated plate springs, leaf spring, close coiled helical springs, open coiled springs.

**Vibrations:** Elementary concepts of structural vibration, Mathematical models, basic elements of vibratory system. Degree of freedom. Equivalent Spring stiffness of springs in parallel and in series. Basics of simple harmonic motion and undamped free vibration of SDOF system.

**Course Outcome:**

*At the end of this course, students will be able to:*

CO1: Understand the fundamental concepts of stress and strain and the relationship between both through the strain-stress equations in order to solve problems for simple tri dimensional elastic solids. Determine the principal stresses and strains in structural members.

CO2: To obtain solutions to column buckling and plate problems

CO3: Describe the concepts and principles, and perform calculations, relative to the strength and stability of structures and mechanical components and to solve problems relating to pure and non-uniform bending of beams and other simple structures

CO4: Evaluate the slope and deflection of cantilever, simply supported, overhanging, propped cantilever, fixed and continuous beams subjected to loads.

CO5: Solve problems relating to torsional deformation of bars; Analyze and design springs and understand the fundamental concept of vibration.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	H	L	H	H	L	L	M		H	H	M	M	L	
CO2	H	H	L	H	H	M				H	H	M	H	L	
CO3	H	H	L	H	H	M			M	H	H	M	H	M	M
CO4	H	H	L	H	H	M			L	H	H	H	H	M	
CO5	H	H	L	H	H	M			M	H	H	M	H	M	M

H = Highly Related

M = Medium

L=Low

**Text Book:**

1. Bansal, R.K. *Strength of Materials*, Laxmi Publications, 2010
2. Punmia, B.C. *Strength of Materials & Mechanics of Structures*: Vol. I, II - Laxmi Publication, 2002

**Reference Book:**

1. Popov, E.P. *Engineering Mechanics of Solids*, Pearson Education, 201
2. Ryder G.H. *Strength of Materials*, Macmillan and Co. Ltd, 2002
3. Norries & Wilbur. *Elementary Structural Analysis*. McGraw Hill
4. Laursen, H. I. *Structural Analysis*. McGraw Hill.

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<b>L-T-P</b>	<b>BCI082A - Building Materials &amp; Construction Technology</b>	<b>Credits:3</b>
<b>3-0-0</b>		

#### Objectives:

- Building materials are to be studied from a different view point, that is, Right from manufacture.
- The objective of the course is to provide basic knowledge of Construction Technology and its application.
- To understand the safety aspects during construction of various structures.
- Properties of building materials which are used for construction behavior

#### Unit 1

**Stones & Bricks :** Source and types of stones, various standard test on building stones, Selection criteria and uses of common building stones. Manufacturing of Bricks. Types and properties of bricks and their determination as per IS code such as water absorption, compressive strength, effloresces, dimension and tolerance test. Types of Tiles, Standard tests for tiles as per IS code such as water absorption, tolerance, impact value, glazing.

Fly Ash: Properties, classification, use of fly-ash in manufacturing of bricks & cement.

#### Unit 2

**Cement & Lime:** Raw materials, chemical composition and manufacturing process of cement. Basic compounds (Bouge's compounds) of cement and their role, types of cement. Setting and hardening of cement, physical properties of cement, various standard tests on Portland cements, as per IS code including consistency, setting time, fineness, soundness and strength. **Mortar and Plaster:** types of sand, bulking of sand, tests for sand, classification, mortar preparation methods: Functions and tests & their uses in various types pointing & plastering.

**Lime:** Classification as per IS, Manufacturing process, properties, standard tests of lime. Use of lime in construction. Gypsum, properties and use, Plaster of Paris.

#### Unit 3

**Brick and Stone Masonry:** Basic principle of sound masonry work, different types of bonds, relative merits and demerits of English, single Flemish and double Flemish bond. Comparison between stone and brick masonry. General principles, classification of stone masonry.

**Timber & Steel:** Definitions of related terms, classifications and properties, defects in wood, conversion of wood, seasoning, preservation, fire proofing, Plywood, fiber boards, Steel: properties, type's mild steel and HYSD steel and their use, common tests on steel

Various types of paints and Varnishes; white wash and distempers and their application.

#### Unit 4

**Ground & Upper floors:** Floor components and their junctions, selection of flooring and floor types, construction details of ground and upper floors, merits and demerits.

Roof and Roof Covering: Purposes, classification of roofs, terms used, types of pitched roofs, method of construction, roof covering materials for pitched roofs. **Stairs:** Terms used requirements of good staircase, classification, construction details and suitability of different types of stairs.

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**Building Requirements & Construction System:** Building components, their functions and requirements, types of construction, load bearing construction and framed structure construction. Temporary structures: Types & methods of shoring, underpinning and scaffolding. Foundation & Site Preparation: Purpose, types of foundation, depth of foundation.

**Damp Proofing:** Causes of dampness, effects of dampness methods and material for damp proofing DPC treatment in buildings, methods and materials for anti-termite treatment.

#### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: understand the properties of stones and bricks suitable for construction and testing procedure

CO2: understand the manufacturing, properties and the type of cement and Lime

CO3: understand about the techniques of brick and stone masonry.

CO4: Identify effective measures for floor and roof components.

CO5: Classification of different structural components and their applications

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	H	H	H	H	L	H	M			H	H	H	H	H
CO2	H	H	H	H	H	L	H	M		H	H	H	H	H	H
CO3	H	H	M	M	H	L	H	M	H	H	H	H	H	H	M
CO4	H	M	H	L	H	L	H	M	L	H	H	M	H	H	
CO5	H	H	M	H	H	L	H	M		M	H	H	H	H	

H = Highly Related

M = Medium

L=Low

#### Text Book:

1. Illston, J.M. Spon E. *Construction Materials: Their nature & Behaviour* Avenue, New York, USA. 2010
2. Ghambir, *Building Materials: Products, Properties and Systems*. Tata McGraw Hill, Delhi, 2005.

#### Reference Book:

1. Singh Prabin, *Building Materials*, S.K. Kataria & Sons. 2009.
2. Duggal S. K. *Building Materials* New Age International Publishers. 2009
3. CBRI and BMTPC Publications. 2003

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<b>L-T-P</b>	<b>BCI083A – Engineering Surveying</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:**

- At the end of the course the student will possess knowledge about Chain surveying, Compass surveying, Contouring, Plane table surveying, Levelling, trigonometric levelling, Theodolite surveying modern field survey systems and Engineering surveys.

**Unit 1**

Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well - conditioned triangles.

**Unit 2**

Prismatic compass - Surveyor's compass - Bearing - Systems and conversions – Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors. Level line - Horizontal line - Levels- Spirit level- Bench marks - Temporary and permanent adjustments - Fly and check leveling- Reduction -Curvature and refraction - Reciprocal leveling - Longitudinal and cross sections.

**Unit 3**

Theodolite - Vernier and microptic - Description and uses - Temporary and permanent adjustments of Vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error. Methods of trigonometric leveling.

**Unit 4**

Curve Surveying: Elements of circular (Simple, compound and reverse) curves, transition curves, degrees of curves, Methods of setting out circular and transition curves.

**Unit 5**

Contouring - Methods - Characteristics and uses of contours. Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection – Traversing. Principle of E.D.M. (Electronic Distance Measurements), Modulation, Types of E.D.M., Distomat, Total station, parts of total station, advantages and application.

**Course outcomes:**

*At the end of this course, students will be able to:*

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- CO1: Understand the working principles of survey instruments  
 CO2: Calculate angles and distances  
 CO3: Able to measure and layout elevations and relative heights between points  
 CO4: Able to measure horizontal and vertical angles.  
 CO5: Able to carry out profiling and grid leveling, for generation of profiles, contour maps.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M		H		M			M	H		M	L	M	M	
CO2	H	H		M	H			M	H		H				M
CO3	H	H		M	H			M	H		H	L	L	H	
CO4	H	H		M	H			M	H		H		H		L
CO5	M	H		M	H			M	H		H	L	H	L	

H = Highly Related

M = Medium

L=Low

**Text book:**

1. Punmia B.C. *Surveying* Vol. I & II. Laxmi publication.

**References book:**

1. Arora K.R. *Surveying Vol. I & II*. Standard Book House.
2. Cledenning & Oliver. *Surveying Instruments*.

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<b>L-T-P</b>	<b>BCI002B – Fluid Mechanics</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objectives:**

- To understand behavior of fluids under different conditions of flow and static properties.
- Several engineering operations and designs of equipment are based on fluid mechanics.

**Unit 1**

Introduction of fluid, Properties of fluids: Density, Specific volume, Specific gravity Viscosity, Compressibility, Surface Tension, Capillarity, Vapour Pressure; Cavitation, Classification of fluids: Newtonian and non-Newtonian fluids.

**Unit 2**

Principles of fluid statics: Pascal's law, Hydrostatic law, Measurement of pressure by Manometers and mechanical gauges; Pressure on plane and curved surfaces.

Buoyancy: Total Pressure and Centre of pressure, Stability of immersed and floating bodies, Meta-centre, Meta-centric height.

**Unit 3**

Kinematics of flow and Equations of motion Continuity equation and Continuity equation in 3-D, Lagrangian and Euler equation of motion, Types of fluid Flows: Steady and Un-steady, Uniform and non-uniform, Laminar and turbulent flows, 1, 2 and 3-D flows; Stream lines, Path lines and Streak lines, Elementary explanation of Stream function and Velocity potential.

**Unit 4**

Bernoulli's equation and its applications in flow measurement in pipes and open channels: Concept of control volume and control surface, Introduction to Navier-Stokes Equations, Pitot tube, Flow through orifices, Mouthpieces, Nozzles, Notches, Weirs, Free and Forced vortex motion. Introduction of boundary layer theory and Hydro-dynamically smooth and rough boundaries.

**Unit 5**

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Introduction of Laminar and turbulent flow through pipes: Nature of turbulent flow in pipes, Equation for velocity distribution over smooth and rough surfaces, Major and Minor energy losses, Resistance coefficient and its variation, Hydraulic gradient and total energy lines, Flow in sudden expansion, contraction, bends, valves and siphons, Concept of equivalent length Branched pipes, Pipes in series and parallel.

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Categorize solutions to fluids problems by their fundamental assumptions

CO2: Compute hydrostatic and hydrodynamic forces

CO3: List and explain the assumptions behind the classical equations of fluid dynamics

CO4: Identify and formulate the physical interpretation of the mathematical terms used in Solutions to fluid dynamics problems

CO5: Analyze and design simple pipe systems

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	L	M	L	H	M		H	H	M	M	M	H	L	H
CO2	H	M	H	L	H	M		H	H	M	M	M	H	L	L
CO3	H	H	H	L	H	M		H	H	L	H	M	H	L	M
CO4	H	H	H	L	H	M		H	H	L	H	M	H	L	M
CO5	H	H	H	L	H	H		H	H	M	H	M	H	M	H

H = Highly Related

M = Medium

L=Low

### Text Book:

1. Bansal, R.K. *Fluid mechanics and hydraulic machines*. Laxmi publications. New Delhi 2009
2. Modi & Seth. *Hydraulics and Fluid Mechanics Including Hydraulics Machines* Standard Book House, 2002
3. Arora, K.R. *Fluid Mechanics, Hydraulics and Hydraulic Machines* Standard Publishers Distributors, 01-Jan-2005

### Reference Book:

1. Streeter, Wylie & Bedford: *Fluid Mechanics*, WCB/McGraw Hill, 1998
2. Natarajan, M.K. *Principles of Fluid Mechanics*, Oxford & Ibh Publishing Company Pvt Limited, 1994
3. Garde, R.J. *Fluid Mechanics Thorough Problems*, New age international (P)Limited publications 1997.

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<b>L-T-P</b>	<b>BCI084A – Engineering Surveying Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

#### Experiments

1. Ranging and fixing of survey station by chain and tap.
2. Determination of area of polygon by chain and cross staff.
3. To determine the magnetic bearing of a line by using surveyor's compass.
4. To determine the magnetic bearing of a line by using prismatic compass.
5. Determination of elevation of various points with tilting/dumpy level by collimation plane method.
6. Determination of elevation of various points with tilting/dumpy level by rise and fall method.
7. To measure the horizontal angles by theodolite.
8. To measure the vertical angles by theodolite.
9. Determination of elevation of point by trigonometric levelling (Same and different vertical plane).
10. To prepare a contour map by indirect contouring.
11. Locating given building by plane table surveying.
12. Demonstration of Total Station.

#### Course Outcomes:

*At the end of this course, students will be able to:*

- CO1: use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling
- CO2: apply the procedures involved in field work and to work as a surveying team
- CO3: plan a survey appropriately with the skill to understand the surroundings
- CO4: take accurate measurements, field booking, plotting and adjustment of errors can be understood

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CO5: plot traverses / sides of building and determine the location of points present on field on a piece of paper

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H		H		H			M	H		M		H	H	
CO2	H	H		M	H	L			H			M	H	H	L
CO3	H	H		M				M	H		H		H	H	
CO4	H	H		M	H		M	M		L	H		H	L	
CO5	M	H	M		H			M	H		H	L	H	H	

H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>BCI063C – Fluid Mechanics and Hydraulics Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

**Experiments**

1. Determination of friction
2. Hydraulic coefficient of an orifice/mouthpiece.
3. Impact of jet on vanes.
4. Performance test on centrifugal and reciprocating pump.
5. Performance test on Pelton wheel turbine, Francis turbine and Kaplan turbine.
6. To verify Bernoulli's theorem.
7. To calibrate a Venturimeter and Orificemeter.
8. To determine Metacentric Height.
9. To determine velocity by Pitot tube.
10. To determine  $C_d$  of a V-notch.
11. Determination of losses in pipe fitting.
12. Determination of Reynolds no. for flowing water.

**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: understand Hydraulic coefficient

CO2: understand turbines.

CO3: understand Venturimeter and Orificemeter.

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CO4: understand Pitot tube.

CO5: understand losses in pipe fitting.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	H	M		H	L		M			H	M	H	M	
CO2	H	H	M		H	L		M			H	M	H	M	
CO3	H	H	M		H	L		M			H	M	H	M	
CO4	H	H	M		H	L		M			H	M	H	M	
CO5	H	H	M		H	L		M			H	M	H	M	

H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>BCI006C – Building Materials and Concrete Technology Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

**Experiments**

**Cement**

1. Normal Consistency of cement.
2. Initial & final setting time of cement
3. Compressive strength of cement
4. Fineness of cement.
5. Soundness & specific gravity of cement by Le-Chatelier's apparatus.

**Aggregate**

6. Sieve analysis of sand
7. To determine the specific gravity of fine aggregate.
8. Bulking of sand

**Bricks:**

9. Water absorption & Compressive strength

**Concrete**

10. Slump test & Compaction factor test
11. Flow table test

  
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## 12. Compressive strength test

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: understand the basic test for materials and cement.

CO2: determination of various test of sand and concrete.

CO3: understand the basic test workability of the concrete.

CO4: understand of the basic test for fine and coarse aggregates.

CO5: understand of the basic test of compressive strength test of concrete.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H		M		H	L		M			H	M	H	H	
CO2	H		M		H	L		M			H	M	H	H	
CO3	H		M		H	L		M			H	M	H	H	
CO4	H		M		H	L		M			H	L	H	H	
CO5	H		M		H	L		M			H	M	H	H	

H = Highly Related

M = Medium

L=Low

## Semester IV

L-T-P	DMA003A – Life Skills -2 (Aptitude)	Credits:2
1-0-2		

### Course Objectives

1. Students will be able to interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience.
2. Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
3. Students will be able to reason, model, and draw conclusions or make decisions with mathematical, statistical, and quantitative information.
4. Students will be able to critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
5. Students will be able to use appropriate technology in a given context.

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## Course Outcomes (CO):

At the end of this course students will have:

CO1: Demonstrate procedural fluency with real number arithmetic operations and use those operations to represent real-world scenarios and to solve stated problems. Demonstrate number sense, including dimensional analysis and conversions between fractions, decimals, and percentages. Determine when approximations are appropriate and when exact calculations are necessary.

CO2: Solve linear equations, graph and interpret linear models, and read and apply formulas. Demonstrate a basic understanding of displays of univariate data such as bar graphs, histograms, dotplots, and circle graphs, including appropriate labeling.

CO3: Take charge of their own learning through good classroom habits, time management, and persistence. Participate in the classroom community through written and oral communication.

## Syllabus: Theory

<b>UNIT 1</b>	<b>Number System:</b> a. Number system b. Power cycle c. Remainder cycle d. Factors, Multiples e. HCF and LCM
<b>UNIT 2</b>	<b>Data Arrangements and Blood Relations:</b> a. Linear Arrangement b. Circular Arrangement c. Multi-dimensional Arrangement d. Blood Relations
<b>UNIT 3</b>	<b>Time and Work:</b> a. Work with different efficiencies b. Pipes and cisterns c. Work equivalence d. Division of wages
<b>UNIT 4</b>	<b>Coding &amp; Decoding, Series, Analogy, Odd Man Out and Visual Reasoning:</b> a. Coding and Decoding b. Series c. Analogy d. Odd Man Out e. Visual Reasoning
<b>UNIT 5</b>	<b>Percentages, Simple Interest and Compound Interest:</b> a. Percentages as Fractions and Decimals b. Percentage Increase / Decrease c. Simple Interest d. Compound Interest e. Relation Between Simple and Compound Interest

<b>UNIT 6</b>	<b>Permutation, Combination and Probability:</b> a. Fundamental Counting Principle b. Permutation and Combination c. Computation of Permutation d. Circular Permutations e. Computation of Combination f. Probability
<b>UNIT 7</b>	<b>Data Interpretation and Data Sufficiency:</b> a. Data Interpretation – Tables b. Data Interpretation - Pie Chart c. Data Interpretation - Bar Graph d. Data Sufficiency
<b>UNIT 8</b>	<b>Profit and Loss, Partnerships and Averages:</b> a. Basic terminologies in profit and loss b. Partnership c. Averages d. Weighted average e. Mixtures and allegations

## Methodology for Evaluation

1. Internal Assessment
    - a) Class/ Home Assignments (Minimum One from each Unit) : 30 Marks
    - b) In Semester Tests (Minimum two) : 30 Marks
  2. Term End : 40 Marks
- \*Note: Minimum one class assignment shall be given in each turn in the Lab which will be attempted by the students in the class itself and evaluated by the end of the day. Balance work shall be completed at home and submitted at the beginning of the next turn in Lab.

## Suggested Reading:

1. Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;
2. The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;
3. How to Ace the Brainteaser Interview, by John Kador, McGraw Hill Publishers.
4. Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
5. Quicker Maths, by M tyra& K Kundan, BSC Publishing Co. Pvt. Ltd., Delhi;
6. Owl Purdue University online teaching resources

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<b>L-T-P</b>	<b>BCI085A - Geotechnical Engineering</b>	<b>Credits: 4</b>
<b>3-1-0</b>		

**Objective:**

- To get the knowledge about different types of soil and their origin.
- Study of different soil improvement techniques.
- Study of natural occurring phenomena in soil and variation of the properties of soil.
- To provide the knowledge of different soil structures and their properties.

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- To get the experimental knowledge of soil parameters.

### Unit 1

**Introduction:** Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc. Inter relationships of the above.

Index properties of soil and tests: Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits, void ratio and density index.

### Unit 2

**Plasticity Characteristics of Soil-Introduction to definitions of:** plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency limits.

**Soil Classification:** Classification of soil for general engineering purposes: particle size, textural, H.R.B. Unified and I.S. Classification systems

### Unit 3

**Clay mineralogy:** Soil structure; single grained, honeycombed, flocculent, and dispersed, structure of composite soils, clay structure; basic structure, mineral structures, structures of Illite, Montmorillonite and kaolinite and their characteristics.

**Permeability of soil:** Soil water absorbed, capillary and free water, Darcy's law of permeability of soil and its determination in laboratory. Field pumping out tests, factors affecting permeability, permeability of stratified soil masses.

### Unit 4

**Stresses in soil mass:** Total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quicksand phenomenon.

**Seepage Analysis:** Seepage and Seepage Pressure, Laplace's equation for seepage. Flow net and its construction. Uplift pressure, piping, phreatic line, Flow net through earth dam.

### Unit 5

Compaction of Soil-Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Compaction in field, compaction specifications and field control. Consolidation of Soil-Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, consolidation test results, basic definitions, Terzaghi's theory of consolidation, final settlement of soil deposits, consolidation settlement: one-dimensional method, secondary consolidation.

### Course Outcomes:

*At the end of this course, students will be able to:*

- CO1: Develop a basic understanding of the engineering properties of soil, and the use of such properties in the analysis of selected geotechnical engineering problems.
- CO2: Understanding of the fundamental behavior of soil and its relevance to civil engineering operations and applications. Develop a understanding the behavior of soil in field conditions
- CO3: Understanding of mineralogy of soil mass and its impacts on soil behavior. Ability to determine and understand of permeability of soil in context of stability.
- CO4: Estimation and analysis of developed stress in soil mass. Analysis of impacts and determination of seepage pressure.
- CO5: Develop a concept to adopt the best suitable technique for soil strength improvement techniques (Compaction Techniques).

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	H	H	L	H		H		H	M	H	M	M	H	
CO2			H	L	H		H	H	H	M		M			
CO3		H			H		H	H			H		H	H	M
CO4	H	H	H	L		H	H	H		H		H	H		H
CO5	H			L	H		H		H	M	H	M	M	H	

**Text Books:**

1. Punamia, B.C. *Soil Mechanics and Foundation Engineering*. Laxmi publication, 2005.
2. Ranjan G. & Rao A.S.R. *Basic and Applied Soil Mechanics*, New age international publishers

**Reference Book:**

1. Murthy V.N.S. *Soil Mechanics and Foundation Engineering*. CBS publishers, 2011.
2. Singh A. *Modern Geotechnical Engineering*. IBI publs.
3. Venkataramaiah C. *Geotechnical Engineering*. New age international publishers.
4. Ranjan G. & Rao A.S.R. *Basic and Applied Soil Mechanics*, New age international publishers.

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<b>L-T-P</b>	<b>BCI086A – Structure Analysis</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### Objectives:

- Ability to analyze the various types of structures.
- To study the different methods to analyze the structures.
- To introduce portal method, cantilever method & factor method for analysis of Analysis of multistory frames.
- To understand the deformations of structures under loading.
- To determine forces and deflections in arches and cable.

### Unit 1

**Introduction to indeterminate structures:** Degrees of freedom per node, Static and Kinematic Indeterminacy Releases in structures, Maxwell's reciprocal theorem and Betti's theorem.

**Analysis of indeterminate structures:** Methods of analysis, analysis of indeterminate structures by displacement method (Slope Deflection Method, Moment Distribution Method, Kani's Method and Stiffness Matrix Method).

### Unit 2

**Analysis of indeterminate structures by force methods:** Method of Consistent Deformation, Column Analogy Method, Strain Energy Method, Unit Load Method and Flexibility Matrix Method.

### Unit 3

**Approximate methods for lateral loads:** Analysis of multi-storey frames by portal method, cantilever method & factor method. Analysis of determinate space trusses by tension coefficient method.

### Unit 4

**Influence line diagram and rolling load:** ILD for beams & frames, Muller-Breslau principle and its application for drawing ILD, Rolling load, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure.

### Unit 5

**Arches:** analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels.

**Cable and Suspension bridges:** Analysis of cables with concentrated and continuous loading, analysis of two and three hinged stiffening girder.

**Unsymmetrical bending:** Definition, location of NA, computation of stresses and deflection, shear center and its location, Theories of Failures.

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Ability to identify determinate, indeterminate, stable and unstable structures.

CO2: Able to understand the concept of different exact methods to analyze the structures.

CO3: Able to understand the concept of approximate methods to analyze the structures.

CO4: Ability to understand the concept of ILD for various loading and structures.

CO5: Ability to determine forces and deflections in determinate arches and cable.

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	H	L	H	H	L	L	M		H	H	M	M	L	H
CO2	H	H	L	H	H	M				H	H	M	H	L	H
CO3	H	H	L	H	H	M			M	H	H	M	H	M	H
CO4	H	H	L	H	H	M			L	H	H	H	H	M	H
CO5	H	H	L	H	H	M			M	H	H	M	H	M	H

H = Highly Related

M = Medium

L=Low

**Text Book:**

1. Punmia, B.C. - *Theory of Structures*. New Delhi India: Laxmi Publication 2017
2. Bhavikatti, S.S. - *Structural Analysis Volume – I*, 3<sup>rd</sup> edition. Uttar Pradesh India: Vikas Publishers, 2013
3. R.S. Khurmi - *Theory of Structures*. New Delhi India: S Chand Publication, 2000
4. S. Ramamrutham, R Narayan. *Theory of Structures*. New Delhi India: Dhanpat Rai Publication, 2014

**Reference Book:**

1. Reddy, C.S. *Basic Structural Analysis*. Uttar Pradesh India: Tata McGraw Hill, 2017
2. Timoshenko & Young. *Theory of Structures*. Uttar Pradesh India: Tata McGraw Hill, 1965
3. Wang, C.K. *Intermediate Structural Analysis*. Uttar Pradesh India: McGraw Hill, 1982
4. Norries & Wilbur. *Elementary Structural Analysis*. Uttar Pradesh India: McGraw Hill, 2012
5. Laursen, H.I. *Structural Analysis*. Uttar Pradesh India: McGraw Hill, 1988
6. Menon, D.-*Structural Analysis* Narosa Publishing House, Reprint 2016
7. Hibbeler R.C, *Structural Analysis*, Prentice Hall; 7<sup>th</sup> edition, 2009.
8. Pandit & Gupta- *Structural Analysis A Matrix Approach*, Tata McGraw Hill Publication, 2008

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<b>L-T-P</b>	<b>BCI022B – Geotechnical Engineering Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

## Experiments

1. To determine the particle size distribution of a soil by sieve analysis/ hydrometer analysis.
2. To determine the water content of a soil sample by Oven drying/pycnometer method.
3. To determine the specific gravity of a soil sample by pycnometer method.
4. To determine the liquid limit, plastic limit and shrinkage limit of a soil specimen.
5. To determine the field/dry density of the soil by core-cutter/Sand replacement method.
6. To determine the compaction characteristics of a soil specimen by Standard proctor's test/Modified Proctor's test.
7. To determine the shear parameters of a sandy soil specimen by direct shear test.
8. To determine the CBR of soil.
9. To determine the compressibility parameters of soil by consolidation test.
10. To determine the permeability of a soil sample using Constant/ Variable Head permeability test method.
11. To determine the shear strength of soil sample by tri-axial test apparatus.
12. To determine the Unconfined Compression Strength of a soil sample.

## Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Develop a basic understanding of the engineering properties of soil, and the use of such properties in the analysis of selected geotechnical engineering problems.

CO2: Experimentally determination of fundamental properties of soil to suit industrial need.

CO3: Experimentally able to understand and estimate plastic properties of soil using Casagrande's apparatus.

CO4: Estimation and analysis of various limits defined under plastic characteristics of soil.

CO5: Determine the compaction characteristics of a soil specimen by Standard proctor's test/Modified Proctor's test.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H			L	H	L	H	H	H	M	M		H	H	L
CO2		H	H	L	H	L		H		M		H			
CO3	H	H			H		H		H	M			H		L
CO4		H	H	L	H	L	H			M	M		H	H	L
CO5	H	H		L	H	L	H	H	H	H		M	H	H	L

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H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>BCI024C – Material Testing Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

**Experiments**

1. Tensile strength of material with the help of Universal Testing Machine.
2. Compressive strength of material with the help of Universal Testing Machine.
3. Flexural strength of material with the help of Universal Testing Machine.
4. Shear strength of material with the help of Universal Testing Machine.
5. Bending tests on simply supported beam and Cantilever beam.
6. Torsion test
7. Hardness tests with Rockwell's method
8. Hardness tests with Brinell's method
9. Tests on closely coiled and open coiled springs
10. Compression test on wood or concrete
11. Charpy and Izod Impact test
12. Fatigue Test

**Course Outcome:***At the end of this course, students will be able to:*

CO1: Conduct tension test on steel, aluminum, copper and brass

CO2: Conduct compression tests on spring, wood and concrete

CO3: Conduct flexural and torsion test to determine elastic constants

CO4: Determine hardness of metals

CO5: Use of Universal Testing Machine

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1		H	M												
CO2		H	M						L			H			
CO3		H	M												
CO4	M	H	M												
CO5		L									H	M			

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<b>L-T-P</b>	<b>BCI087A – Strength of Material Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

### Experiments

1. To study the stress-strain diagram for various materials.
2. To study the strain measurement using Rosette strain gauge
3. To study behavior of different types of columns and find Euler's buckling load for each case.
4. To study the slope & deflection of cantilever beam subjected to various loads.
5. To study the slope & deflection of simply supported beam subjected to various loads.
6. To study the slope & deflection of simply supported beam with overhangs subjected to various loads.
7. To study the slope & deflection of propped cantilever beam subjected to various loads.
8. To study the slope & deflection of fixed beam subjected to various loads.
9. To study the slope & deflection of continuous beam subjected to various loads.
10. To study the stiffness of springs in series and parallel arrangement.

### Course Outcome:

*At the end of this course, students will be able to:*

CO1: Understand the stress-strain property for various materials.

CO2: Understand the use of Rosette strain gauge for strain measurement.

CO3: Understand the behavior of different types of columns subjected to buckling load.

CO4: Analyse the slope & deflection of different beams subjected to various loads.

CO5: Understand the spring behaviour in different arrangements.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	H		H	H	L			M	H	H	M	M	L	

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CO2	H	H		H	H	M			M	H	H	M	H	L	
CO3	H	H	M	H	H	M			M	H	H	M	H	M	
CO4	H	H	M	H	H	M			L	H	H	H	H	M	
CO5	H	H	M	H	H	M			M	H	H	M	H	M	

H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>BCI014A – Hydraulics and Hydraulic Machine</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

#### Objectives:

- The knowledge of this subject is necessary to study further hydraulics and hydraulic machinery.
- To understand the behavior for designing different hydraulic structures.

#### Unit 1

Introduction: Dimensional analysis, Rayleigh method, Buckingham theorem, applications of dimensional analysis to pipe Friction problems, Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Dimensionless numbers: Reynolds's, Froude's, Weber's, Euler and Mach numbers. Distorted and undistorted river models, proper choice of scale ratios. Scale effect.

#### Unit 2

Laminar Flow: Relation between shear & pressure gradient, Flow between plates & pipes, Equation of velocity distribution and Pressure difference.

Turbulent Flow in pipes: Theories of Turbulence, Nikuradse's Experiments, and Hydro-dynamically smooth and rough boundaries, Laminar, Sub-layer, Equations of velocity distribution and friction coefficient, Stanton Diagram, Moody's diagram.

#### Unit 3

Flow through channels: Uniform, Non-Uniform and variable flow. Resistance equations of Chezy, Manning and Bazin, Section factor for uniform flow, Most Efficient rectangular, triangular and trapezoidal sections, Equations of gradually varied flow in Prismatic channels, Limitation of its applicability and assumption made in its derivation, Specific energy of flow, Critical depth in prismatic channels, Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes.

#### Unit 4

Rapidly varied flow: Hydraulic jump or standing wave in rectangular channels, Conjugate or sequent depths Losses in jump, location of jump, Broad crested weirs for channel flow: Measurement, velocity distribution in open channels, parshall flume. Impact of free Jets: Impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes.

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## Unit 5

Pumps and turbines: Volute and whirlpool chambers, Losses of head due to variation of discharge, Monomeric and Hydraulic efficiencies, Description of single and multistage pumps. Specific speed, characteristic curves. Model Test. Reaction and Impulse turbines, specific speed, mixed flow turbines, Pelton wheel turbine, Francis turbine, propeller turbine and Kaplan turbine Efficiency, Characteristics of turbines. Basic principles of governing of turbines, Draft-tube, Selection of turbines, model tests.

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Able to use of dimensions & model numbers

CO2: To understand the functioning of different types of laminar & turbulent flow.

CO3: Able to understand Flow through channels

CO4: Able to understand the impact of jet on vanes.

CO5: To understand the functioning of different types of pumps and turbines.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	M	M		H	L		M			H	M	H	M	
CO2	H	M	M		H	L		M			H	M	H	M	
CO3	H	M	M		H	L		M			H	M	H	M	
CO4	H	M	M		H	L		M			H	M	H	M	
CO5	H	M	M		H	L		M			H	M	H	M	

H = Highly Related

M = Medium

L=Low

### Text book:

1. Bansal N.A *Text Book of Fluid Mechanics and Hydraulic Machines*. Laxmi publication, 2010.

2. Modi P.N. & Seth S.M. *Hydraulics and Fluid Mechanics*. Hydraulics Machines, Standard book house, 2014.

3. Arora K.R. *Fluid Mechanics, Hydraulics And Hydraulic Machines*. Standard Publishers Distributors.

### Reference book:

1. Ramamrutham, S. & Narayan, R. *Hydraulics, Fluid Mechanics and Fluid Machines*. Dhanpat Rai Pub Company, 2006.

## Semester V

<b>L-T-P</b>	<b>BCI020A – Reinforced Cement Concrete I</b>	<b>Credits: 4</b>
<b>3-1-0</b>		

### Objectives:

- Study of design Philosophies.
- Analysis and design of structural members such as beam, slab, column, footing etc.

### Unit 1

Objective and fundamental concepts of design of RC members, Types and function of reinforcement. Introduction to various related IS codes. Design Philosophies: Working stress, ultimate strength and limit states of design. Analysis and Design of singly reinforced rectangular beam section for flexure using Working Stress Method and Limit State Method

### Unit 2

Analysis and design of singly reinforced, flanged beams and doubly reinforced rectangular beams for flexure using Limit State Method. Limit state of serviceability for deflection, control of deflection as per codal provisions of empirical coefficients

### Unit 3

Limit state of collapse in shear: analysis and design of prismatic sections for shear using LSM. Limit state of collapse in bond: concept of bond stress, anchorage length and development length, curtailment of reinforcement as per codal provisions.

### Unit 4

  
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Analysis and design of one way and two way slabs using LSM and Flat slab using direct design method as per code, Detailing of reinforcement.

### Unit 5

Columns: Short and long columns, their structural behavior. Analysis and design of axially loaded short columns, using LSM. Analysis of uniaxial eccentrically loaded short columns. Introduction to Pu-Mu interaction curves and their use for eccentrically loaded columns.

Design of Column Footings: Analysis and design of isolated column footing and combined footing for two columns (without central beam) for axial loads using LSM

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Understand the concept of shear and shear reinforcement

CO2: Ability to analyze and design of beams.

CO3: Ability to analyze and design of columns.

CO4: Ability to analyze and design of slab.

CO5: Ability to analyze and design of footings.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	M	M	L								M	M	L	M
CO2	H	H	M	M	M	L						M	H	L	H
CO3	H	H	M	L	L	L						M	H	H	M
CO4	H	H	M	L	L	L						M	H	H	M
CO5	H	H	M	L	L	L						M	H	H	M

H = Highly Related

M = Medium

L=Low

### Text book:

1. Varghese, P.C. *Limit State Design of Reinforced Concrete*. New Delhi India: Prentice Hall of India Pvt. Ltd.,2008
2. *IS:456-2000*
3. Dr.B C Punmia, *B C Punmia Design of Reinforced Concrete*. New Delhi India: Laxmi Publication Ltd,2008
4. Neelam Sharma. New Delhi India: S.K. Kataria & Sons

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**Reference Book:**

1. Nilson, A.H. *Design of Concrete Structures*, McGraw Hill Companies Inc. New York, NY Columbus, McGraw Hill Companies Inc, 2009
2. Pilla, S.U. & Menon, D. *Reinforced Concrete Design 3<sup>rd</sup> edition*. Noida, Uttar Pradesh India: Tata McGraw Hill Publishing, 2017
3. Syal & Goel *Reinforced concrete structures Reprint Edition*. New Delhi India: S Chand, 2007

<b>L-T-P</b>	<b>BCI030B – Environmental Engineering I</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objectives:**

- Demonstrate the importance of interdisciplinary nature of environmental and health risk assessment.
- To study the Aesthetics of metropolitans.
- Facilitates to plan urban area's removing the environmental issues.

**Unit 1**

Water supply and quantity: Introduction, Water demands and domestic use, variation in demands; population forecasting by various methods using logistic curve method; per capita supply, basic needs and factors affecting consumption; design period. Sources of water: Kinds of water sources and their characteristics, collection of surface and ground water; quality of surface and ground waters; factors governing the selection of a source of water supply.

Quality of water: Introduction, Common impurities in water and their effect, quality of source, water analysis, physical examination, chemical examination, micro-organism in water, microbiological examination of water, bacterial effect on quality of water, common water borne diseases, standards of purified water

  
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## Unit 2

Transmission of water: Various types of conduits, capacity and sizes including economical sizes of rising main, structural requirements; laying and testing of water supply pipelines; pipe materials, joints, appurtenances and valves; leakages and control; water hammer and its control measures.

## Unit 3

Storage and distribution of water: Methods of distribution, pressure and gravity distribution systems, concept of service and balancing reservoirs, capacity of distribution reservoirs; general design guidelines for distribution system, Hardy - Cross method, Newton - Raphson method and equivalent pipe method of pipe network analysis; rural water supply distribution system.

## Unit 4

Purification of water supplies: Introduction, coarse and fine screens, theory of sedimentation, sedimentation tanks, tube settlers, analysis of flocculent settling, coagulation, constituents of coagulation plant, determination of optimum coagulant quantity, coagulation sediment process, theory of filtration, filter materials, types of filters and their classification, slow sand filters, rapid gravity filters, design of filtering media, hydraulics of sand gravity filters, pressure filters, other filters

## Unit 5

Disinfection, softening and miscellaneous treatments: Minor methods of disinfection, chlorination, methods of removing temporary hardness and permanent hardness, removal of colors, odors and tastes from water, Desalination, arsenic contamination and its removal, removal of iron and manganese, packaged natural mineral water, BIS standards for packaged drinking water.

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Able to design a water supply scheme for a particular section of community.

CO2: To know the different water treatment technologies.

CO3: Basic knowledge of storage and transmission.

CO4: Basic knowledge of distribution system.

CO5: Able to understand Purification of water supplies

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H		M		L	M		H		L	M		H	L	
CO2	M	L	M		M	H		M		M	M	H	H		M
CO3	M		M		H	L					M	M	H	M	H
CO4		M	M		H	L		L		H	M		H		
CO5	L	H	M		L	L		H			M	L	H	L	

H = Highly Related

M = Medium

L=Low

### Text Book:

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1. Garg, S.K. *Water Supply Engineering (Environmental Engineering Vol. – I)*. New Delhi India: Khanna Publisher, 2017

**References Books:**

1. Peavy, Rowe & Tchobanoglous. *Environmental Engineering First edition*. Noida Uttar Pradesh India: McGraw Hill Education, 2017
2. Metcalf & Eddy. *Wastewater Engineering*. Noida Uttar Pradesh India: McGraw Hill Education, 2002
3. Garg, S.K. *Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol. – II)*. Jaipur Rajasthan India: Schand, 1979
4. Manual on Water Supply and Treatment. *C. P. H. E. E. O. Government of India*, New Delhi India: Ministry of Urban Development, 2009
5. Manual on Sewerage and Sewage Treatment. *C. P. H. E. E. O., Government of India*, New Delhi India: Ministry of Urban Development, 2009

<b>L-T-P</b>	<b>BCI044C – Environmental Engineering Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

**Experiments**

1. To determine the pH of the given sample of water & sewage.
2. To determine the turbidity of the given sample of water & wastewater.
3. To determine the Total Solids of the given sample of water & sewage.
4. To determine the Total Dissolved Solids of the given sample of water & sewage.
5. To find out conductivity of the given water sample.

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6. Determination of the iron and fluoride content in drinking water.
7. Determination of BOD & COD of waste water.
8. To find out chloride of the given water sample.
9. To determine alkalinity of the given water sample.
10. To determine hardness of the given water sample.
11. To determine the optimum dose of alum by Jar test.
12. Determine the dissolved oxygen in water by winkler method.
13. Determine the color and odor of a given sample of water
14. To find out Total Settle able Solids of the given sewage sample.
15. To determine Total Suspended Solids of the given sewage sample.

#### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Understanding different theory of filtration.

CO2: Understanding anaerobic digestion of sludge of wastewater

CO3: Understanding anaerobic digestion of disposal of waste water.

CO4: Would be able to explain the different aspects of quality of water.

CO5: Able to understand Wastewater Treatment

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H		M		L	L		H	H		L	L	H	M	
CO2	H		M		L	L		H	M	L			H	M	L
CO3	H		M		L	L		H			M	H	H	M	H
CO4	H		M		L	L		H	L	M	H		H	M	
CO5	H		M		L	L		H		H			H	M	

H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>BCI094A – Structure Analysis Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

#### Experiments

1. To verify strain in an externally loaded beam with the help of a strain gauge indicator and to verify theoretically.

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2. To study behavior of different types of columns and find Euler's buckling load for each case.
3. To study two hinged arch for the horizontal displacement of the roller end for a given system of loading and to compare the same with those obtained analytically.
4. To determine the deflection of a pin connected truss analytically & graphically and verify the same experimentally.
5. To verify the Maxwell's reciprocal theorem and Muller Breslau theorem.
6. To verify the moment area theorem regarding the slopes and deflections of the beam.
7. To study ILD for various types of structure.
8. To study the unsymmetrical bending, computation of stresses and deflection, shear center and its location.
9. To study the flexibility matrix and stiffness matrix method.

**Course Outcome:**

*At the end of this course, students will be able to:*

CO1: Measurement of strain using strain gauge indicator.

CO2: Understand the behavior of different types of columns subjected to buckling load.

CO3: Analyse the various types of arches and ILD for various structures.

CO4: Analyse the slope & deflection of different beams subjected to various loads.

CO5: Understand the spring behaviour in different arrangements.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	H		H	H	L			M	H	H	M	M	L	
CO2	H	H		H	H	M			M	H	H	M	H	L	
CO3	H	H	M	H	H	M			M	H	H	M	H	M	
CO4	H	H	M	H	H	M			L	H	H	H	H	M	
CO5	H	H	M	H	H	M			M	H	H	M	H	M	

H = Highly Related

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<b>L-T-P</b>	<b>BCI037C – Foundation Engineering</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

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**Objective:**

- To understand the suitability of different type of foundation on the basis of soil type.
- Methods to determine the load carrying capacity of soil.
- To understand the design of shallow, pile and well foundations.
- Study of different types loading on soil and calculation of stresses due to such loadings.

**Unit 1**

Bearing Capacity of Shallow Foundation: Definitions of ultimate bearing capacity, gross, net and safe pressures, allowable bearing pressure, types of shallow foundations modes of failures. Bearing capacity theories: Rankine's approach, Prandtl's approach and Terzaghi's approach, concept behind derivation of equation, general bearing capacity equation, bearing capacity equations for square and circular footings, factors influencing bearing capacity, performance of footings in different soils, Vesic's chart, ultimate bearing capacity in case of local shear failure. Plate load test and its applications and estimation of settlements, bearing capacity based on Standard Penetration Test

**Unit 2**

Design of Shallow foundation: Types of shallow foundation, Footing size and loading parameters, principle of design of footing, different types of method of design of strip, spread, combined footing and raft footing.

**Unit 3**

Lateral Earth Pressures Theories- Introduction: applications of earth pressure theories, different types of earth pressure at rest, active and passive pressure. Rankine's Earth Pressure Theory, active earth pressure and passive earth pressure for horizontal and inclined backfill including the direction of failure Planes for cohesion-less and cohesive soils. Coulomb's Wedge Theory: Coulomb's active pressure in cohesion-less soils, expression for active pressure, Coulomb's passive earth pressure. Rebhann's Construction for Active Pressure, Culmann's graphical solutions for active soils, Wedge Method, passive pressure by friction circle method for cohesion-less and cohesive soils.

**Unit 4**

Soil Stabilization: Introduction, Mechanical Stabilization, Cement Stabilization, Lime Stabilization, Bituminous Stabilization, Chemical Stabilization, Chemical Stabilization, Thermal Stabilization, Electrical Stabilization, Stabilization by Grouting, Stabilization by Geotextile and fabric, Reinforced earth.

**Unit 5**

Foundation on Difficult Soils: Collapsible soil; identification, Collapse settlement: foundation design. Sanitary land fills settlement of sanitary land fill.

Expansive soils: Behaviour of expansive soil, foundation practices, underreamed piles. Methods of finding out load carrying capacity of under reamed piles in clayey and sandy soil. Provision of IS 2911 Part III-1980 for design of under-reamed pile foundations.

**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Develop a basic understanding of bearing capacity of soil foundation, and the use of such properties in the analysis of selected geotechnical engineering problems.

CO2: Understanding of the fundamental Shallow foundations.

CO3: Understanding of Lateral earth pressure theories of soil for cohesion less or cohesive soil.

CO4 analysis of techniques for improvement of soil quality by using the different types of stabilization methods.

CO5: Understanding the behavior of foundation design and expansive soil.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

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Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	H	H	L	H		H		H	M	H	M	M	H	
CO2			H	L	H		H	H	H	M		H			
CO3		H			H		H	H			H		H	H	M
CO4	H	H	H	L		H	H	H		H		H	H		H
CO5	H			L	H		H		H	M	H	M	M	H	

H = Highly Related

M = Medium

L=Low

**Text Books:**

1. Punamia, B.C. *Soil Mechanics and Foundation Engineering*. Laxmi publication, 2005.
2. Ranjan G. & Rao A.S.R. *Basic and Applied Soil Mechanics*, New age international publishers

**Reference Book:**

1. Murthy V.N.S. *Soil Mechanics and Foundation Engineering*. CBS publishers, 2011.
2. Singh A. *Modern Geotechnical Engineering*. IBI publs.
3. Venkataramaiah C. *Geotechnical Engineering*. New age international publishers.
4. Ranjan G. & Rao A.S.R. *Basic and Applied Soil Mechanics*, New age international publishers.

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<b>L-T-P</b>	<b>BCI011C – Design of Steel Structures</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objectives:**

- To know how to design and use the different types of steel structural elements.
- To know about different design concepts for different types of steel structures.

**Unit 1**

**Connections:** Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings.

**Unit 2**

**Tension Members:** Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded tension members.

**Unit 3**

Design of laterally supported and unsupported beam.

**Unit 4**

Columns and Bases- Design of columns under axial loads using single or multiple rolled steel sections, design of lacing and battens, columns subjected to axial load and bending, design of slab and Gusseted base.

**Unit 5**

Plastic analysis of steel structures, fundamentals, and static and mechanism method of analysis, bending of beams of rectangular and I sections beams, shape factor. Classification of Cross Sections: As per IS 800-2007 Plastic, compact, semi compact, slender sections, their characteristics including moment rotation.

**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: An understanding of the basic principles and design of bolt and weld connections

CO2: Able to design of tension members

CO3: Able to design of beams and beam columns

CO4: Able to design of column bases and compression members

CO5: To understand plastic design method in steel structures and classification of section.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>	<b>Program Specific Outcome</b>
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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	L				H			M	H		H		L	L	
CO2	H		M		H	L		M			H	L	H	M	
CO3	H		M		H	L		M			M	L	H	H	
CO4	H		M		H	L		M			H	L	H	H	
CO5	H		M		H	L		M			H		H	H	
CO6	H		L		H	L		M	H		M		H	M	

H = Highly Related

M = Medium

L=Low

**Text Book:**

1. Negi, L. *Design of Steel Structures 2 edition*. New Delhi India: Tata McGraw Hill, 2017
2. Duggal, SK. *Limit State Design of Steel Structures 2 edition*. New York: Tata McGraw-Hill Education, 2017

**Reference Books:**

1. Shah, V.L.& Gore, V. *Limit State Design of Steel Structures IS: 800-2007*, Pune, Maharashtra India: Structures Publications, 2010.
2. Bhavikatti, S.S. *Design of Steel Structures*. New Delhi India: I.K. International Publishing House Limited, 2010
3. Subramanian, N. *Design of Steel Structures*. United Kingdom: Oxford University Press, 2010
4. Relevant Codes IS: 800-2007

## Semester VI

<b>L-T-P</b>	<b>BCI029C – Transportation Engineering I</b>	<b>Credits: 4</b>
<b>3-1-0</b>		

### Objectives:

- Ability to mathematically develop and interpret design standards for horizontal and vertical geometry and super elevation.
- Ability to apply standards to design of alignments when considering topography and environmental concerns.
- Providing faster system of transport to avoid traffic jams in urban areas.

### Unit 1

Introduction: Importance and Role of Transportation Systems, Technological and Operating Characteristics of Transportation Systems, Components of transportation Systems, Transportation Coordination, Transportation Modes and their comparison. Highway Planning: Highway Planning Process, specifically in India, Transport or Highway related Agencies in India. Classification of Roads and Road Development Plans, Road Patterns, Controlling Factors and Surveys for Highway Alignment.

### Unit 2

Highway Materials: Desirable Properties, Testing Procedures, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly-ash/pond-ash.

### Unit 3

Highway Geometric Design: Cross Sectional Elements, camber, Sight Distances - definition and analysis of SSD and OSD, Design of Horizontal Alignment – Super elevation, extra widening, transition curves. Design of Vertical Alignment – Gradients, Vertical curves.

### Unit 4

Highway Construction: Methods of constructing different types of roads viz. Earth roads, Stabilized roads, WBM roads, fly ash embankments, bituminous roads and Concrete roads.

### Unit 5

Structural design of Highway Pavements: Design of Flexible Pavements by G. I. and CBR methods. Design of Rigid Pavements by Westergaard and modified methods.

  
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**Course Outcomes:***At the end of this course, students will be able to:*

CO1: Plan highway networks

CO2: Understand the principles of construction and maintenance of highways

CO3: Design highway geometrics.

CO4: Design Intersections and prepare traffic management plans

CO5: Design flexible and rigid pavements.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	M								L		L	M	M	
CO2	H	L					H			L			L	M	L
CO3	L	M	H		L		M				M		H	H	
CO4		H				H	M			L	M	L	H	H	M
CO5	L		H				L			L		L	H	M	

H = Highly Related

M = Medium

L=Low

**Text Book:**

1. Kadiyali, L.R. & Lal, N.B. - *Principles and practice of highway engineering*, Khanna Publications, 2005
2. Mannering, F.L., S.K. Khanna & C.E.G. Justo – *Highway Engineering*, Nem Chand & Bros; 10th Edition 2015
3. Rao, G.V. – *Principal of Transportation & Highway Engineering*.

**Reference Books:**

1. Morlok, E.R. - *An Introduction to Transportation Engineering and Planning*, McGraw Hill, NY, 1978
2. Hay, W.W. - *Introduction to transportation Engineering*, John Wiley & Sons, NY, 1988.
3. Papacostas, C.S. - *Fundamentals of transportation Engineering*, Prentice Hall of India, 1987.
4. Chakroborty, P. - *Principles Of Transportation Engineering*, PHI Learning, 1<sup>st</sup> edition, 2009
5. Washburn, S.S. & Kilareski, W.P. - *Principles of Highway Engineering and Traffic Analysis*, John Wiley 4th Edition,

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<b>L-T-P</b>	<b>BCI043C – Transportation Engineering Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

### Experiments

1. Aggregate impact test
2. To determine fineness modulus of a given sample of coarse aggregate.
3. Los angles abrasion test
4. Aggregate crushing value test
5. Standard tar viscometer test
6. Specific gravity and water absorption test
7. To determine the elongation index for given sample of aggregate.
8. To determine the flakiness index & angularity number of given sample of aggregate.
9. Ductility test
10. To determine the softening point for give sample of bitumen.
11. To determine penetration value of bitumen.
12. Marshal stability test
13. Float test

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Characterize the pavement materials

CO2: Perform quality control tests on pavements and pavement materials

CO3: Develop Job mix for various types of bituminous constructions such as WMM, SDBC, BC, DBM and BM etc.

CO4: Prepare the testing reports related to highway engineering works.

CO5: Monitor and maintain road pavements.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

<b>Course Outcome</b>	<b>Program Outcome</b>	<b>Program Specific Outcome</b>
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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	L	L	L	M	L			L	H		M		L	L	
CO2	M	H	L	L	M			L	H	L	H	M	M	M	
CO3	H	M	M	M	H			H	M	L	H		H	H	
CO4	M	H	H	H	M			H	H	L	H	M	M	M	
CO5	M	H	H	H	M			H	M	L	H		M	L	

H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>BCI065B - CAD Building Drawing Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

#### **Auto CAD 2D –**

1. Introduction to AutoCAD
2. Draw Commands
3. Drawing Aids
4. Edit Drawings
5. Text
6. Layers, Line Types, Colors
7. Polylines and Polygon
8. Crosshatching
9. Dimensioning
10. Draw Building Plan
11. Draw Building Section and Elevation
12. Plot and Print

#### **AutoCAD 3D –**

1. 3D Modeling Concepts in AutoCAD
2. 3D Co-ordinates Systems Viewpoint & UCS
3. Wireframe Modeling & Editing Solid, Mesh, Surface (Modeling& Editing ) Materials, Lights and Rendering Working with Images Import & Export

#### **Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Introduction to AutoCAD

CO2: Draw Commands, Drawing Aids, Edit Drawings.

CO3: Draw the plan, section and elevation of a building

CO4: Create, analyze and produce 2-D drawings of buildings in AUTO CAD environment.

CO5: Detailing building plans in CAD environment.

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1						M					H				
CO2		M												H	
CO3		M										M		H	
CO4			L										L	H	
CO5			L									M	M	H	

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<b>L-T-P</b>	<b>BCI036B – Advanced Reinforced Cement Concrete</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:**

- Design of various structural members.

**Unit 1**

**Elements of Prestressed Concrete:** Principles and systems, material properties, losses of prestress, I.S. specifications, analysis and design of rectangular and T sections for flexure and shear.

**Unit 2**

Torsion: Analysis and Design of beams for torsion as per code method.

Continuous and Curved Beams: Analysis and Design of continuous beams using coefficients (IS Code), concept of moment redistribution. Analysis and design of beams curved in plan.

**Unit 3**

Circular Domes: Analysis and design of Circular domes with u.d.l. and concentrated load at crown.

Water Tanks and Towers: Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging

**Unit 4**

Yield Line Theory: Introduction to Yield line concept, Application of Y.L.T. to slabs with simple support conditions.

Retaining walls: Analysis and design of Cantilever Retaining Walls: Introduction to counterfort and buttress type retaining walls, their structural behavior and stability analysis.

**Unit 5**

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Culverts and Bridges: Analysis and Design of superstructure of slab culverts and T-bridge for I.R.C. loading.

**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Understand the concept of Prestressed concrete

CO2: Ability to analyze and design of torsion reinforcement.

CO3: Ability to analyze and design of Circular domes & Water Tank.

CO4: Ability to analyze and design of Retaining wall.

CO5: Ability to analyze and design of Culverts & Bridges.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	M	H	L	L	L						L	H	L	M
CO2	M	M											L		
CO3	H	M	H	L		L						L	H	H	M
CO4	H	M	M	L	L								H	M	M
CO5	H	M	H	L	M	L						L	H	M	H

H = Highly Related

M = Medium

L=Low

**Text Book:**

1. Punmia, B.C., Jain, A.K.& Jain, A.K. - *RCC Designs (Reinforced Concrete Design)*, , Lakshmi Publishers, 10<sup>th</sup> Edition 2006
2. *IS:456-2000*

**Reference Book:**

1. Victor, J *Essentials Of Bridge Engineering*, Oxford & Ibh, 6<sup>th</sup> edition, 2016
2. Krishna Raju N, *Design of Bridges*, South Asia Books; 2<sup>nd</sup> edition, 1988.
3. Varghese P.C. *Advanced reinforced structure design* Prentice Hall India Learning Private Limited; 2<sup>nd</sup> edition (2005)
4. Krishna Raju N, *Advanced reinforced Concrete design* CBS; 3<sup>rd</sup> edition ,2005.

<b>L-T-P</b>	<b>BCI077A – Quantity Surveying and Valuation</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objectives:**

- To produce civil engineering students who have strong foundation in estimation of quantities required for roads and buildings
- To familiarize with the knowledge of preparing bar bending schedules and valuation of buildings.

**Unit 1**

**Introduction:** Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

**Unit 2**

**Rate Analysis:** Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

**Unit 3**

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**Estimates:** Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts, Services for building such as water supply, drainage and electrification.

#### Unit 4

**Cost of Works:** Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.

#### Unit 5

**Valuation:** Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

#### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: To identify and differentiate the types of estimates

CO2: To prepare rate analysis and identify the main sources of current and forecast labour rates and

CO3: To prepare detailed estimates of roads and buildings

CO4: To quantify the various items of constructions and estimation of overhead costs

CO5: Ability to prepare valuation of the buildings

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H	L	H	L	M	H	H			M	L		M	H	
CO2	H	M	H	L	H	H	H			M	H	L	M	H	
CO3	H	M	H	M	H	H	H			H	M	M	H	H	
CO4	L	L	H	L	H	L	H			H	L		H	M	
CO5	H	L	H	H	H	H	H			M	M	L	M	L	

H = Highly Related

M = Medium

L=Low

#### Text Book:

1. Dutta B.N. *Estimating & costing*, UBS Publishers' Distributors Pvt Ltd; 28<sup>th</sup> Revised Edition edition (2016)

#### Reference Book:

1. Chakroborty M., *Estimating Costing Specification & Valuation in Civil Engg.* Bhakti Vedanta, Book Trust, Delhi, 2016
2. Rangwala S.C. *Quantity Surveying and Valuation*, Charotar Publishing House.

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<b>L-T-P</b>	<b>BCI073A – Project Work</b>	<b>Credits: 4</b>
<b>0-0-4</b>		

### **Semester VII**

<b>L-T-P</b>	<b>BCI039A – Water Resource Engineering</b>	<b>Credits: 4</b>
<b>3-1-0</b>		

#### **Objectives:**

- To understand the design of different types of regulatory works and diversion headwork.
- To incorporate analytical abilities into the planning and design of water resource systems.
- To understand the design of different types of dams.

#### **Unit 1**

Regulation of works: Falls, Classification of falls, Design of falls, Distributary head regulator and cross-head regulator, Escape, bed bars.

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Cross-Drainage Structure: Necessity of Cross-drainage structures, their types and selection, comparative merits and demerits, design of various types of cross-drainage structure-aqueducts, siphon aqueduct, super passage siphon, level crossing and other types.

## Unit 2

Diversion Head works: Design for surface and subsurface flows, Bligh's and Khosla's methods. Selection of site and layout, different parts of diversion head works, types of weirs and barrages, design of weirs on permeable foundation, silt excluders and different types of silt ejectors. Energy dissipation.

## Unit 3

Embankment Dams: Suitable sites, causes of failures, stability and seepage analysis, flownet, slope stability analysis, precautions of piping, principles of design of earth dams.

Gravity Dams: Force acting on a gravity dam, stability requirements, Instrumentation.

## Unit 4

Spillways: Spillway capacity, flood routing through spillways, different types of spillways and gates, energy dissipation below spillways.

Hydro Power Plant: General features of hydroelectric schemes, elements of power house structure, selection of turbines, draft tube and setting of turbine, cavitation.

## Unit 5

Reservoirs: Evaluation of impact of water projects on river regimes and environment. Reservoir sedimentation and watershed management.

Optimization: Introduction to optimization techniques and system approach. Introduction to G.I.S. and Computer aided irrigation design.

## Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Design and analysis of flow regulation work, and cross drainage work and classification.

CO2: Design and analysis of diversion head work and its classification.

CO3: Design and analysis of embankment and gravity dam in context of site selection, stability and instrumentation.

CO4: Design and assessment of water power projects, various structural components.

CO5: Analysis and understanding of reservoirs impacts, relevance in context of environment using optimization techniques.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome											Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	H	M	H	L	H	H	L	H	H	M	M	H	H	H
CO2	H	M	H	L	H	H	L	H	H	M	M	H	H	H
CO3	H	M	H	L	H		L	H	H	M	M	H	H	H
CO4	H	M	H	L	H	H	L	H	H	M	M	H	H	H

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CO5	M	L	H	H	L	H	L	H	H	M	M	M	M	H
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H = Highly Related

M = Medium

L=Low

**Text Book:**

1. Basak, N.N. *Irrigation engineering (water resources engineering)*. New York USA: McGraw Hill Education Publication, 2017.
2. Arora, K.R. *Irrigation Water Power and Water Resource Engineering*; NaiSarak, Delhi, India: Standard Publisher, 2010.

**Reference Book:**

1. Asawa, G.L. *Irrigation Engineering*. DariyaGanj New Delhi, India: Wiley Eastern publication, 2011.
2. Garg, S.K. *Irrigation Engineering & Hydraulic Structures*, NaiSarak Delhi, India: Khanna Publishers, 2017.

<b>L-T-P</b>	<b>BCI040B– Transportation Engineering II</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objectives:**

- Students should be able to relate their understanding of the railroad industry, history, and principal components.
- Finding out the traffic load analyzing them and designing transportation systems.

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- To overcome the traffic problems in peak hours.

### **Unit 1**

Introduction and Permanent Way Components: Types and Selection of Gauges, Selection of Alignment, Ideal Permanent Ways and Cross-sections in different conditions, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast, Rail Fastenings. Study of Specific Aspects: Coning of Wheels, Creep, Wear, failures in Rails, Rail Joints, Length of Rail, Sleeper Density and Spacing, Stations, Yards and Sidings, Turntable, Signalling.

### **Unit 2**

Points and Crossings: Types of Turnouts, Points or Switches, layout Plans of different types of Crossings, Design calculations of turnouts. Railway Systems Specific to Urban Movements: Surface railways (suburban railway system of Mumbai, Chennai and Delhi), Underground system (Metro of Kolkata/ Delhi), Elevated Systems (as Proposed for Jaipur, Delhi, Mumbai), Light Rail System (MRTS, Thane). Recent developments in Railway Networking.

### **Unit 3**

Geometric Design: Gradient and Grade Compensation, Superelevation and cant, cant deficiency, Types of Curves, Transition curves, their designs, Widening of Gauges.

### **Unit 4**

Airport Engineering: Introduction: Requirements to Airport Planning, Airport Classifications, Factors in Airport Site Selection, Airport Size, Obstructions, Zoning. Planning and Design of Airport: Requirements of Airport, Planning of Terminal Area, and different Layouts, Location of Gates, Types of Runway patterns, Runway Layout, Runway Length, Geometric Design of Runways, Layout of Taxiways, Geometric Standards, Exit or Turnaround Taxiways, Apron and Hangers.

### **Unit 5**

Airport Pavement Design: Factors Affecting Pavement Design, Design methods of Flexible Pavements, Design methods of Rigid Pavements.

### **Course Outcomes:**

*At the end of this course, students will be able to:*

- CO1: Understand the importance of railway infrastructure planning and Design fundamental.
- CO2: Identify the factors governing design of railway infrastructures
- CO3: Design and analyze the railway track system
- CO4: Describe the different components of airport and aircrafts
- CO5: Design flexible and rigid pavements

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

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Course Outcome	Program Outcome											Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	L	L	L	M	L			L	H		M	L	L	
CO2	M	H	L	M	M			L	H	L	M	M	M	
CO3	H	M	L	M	H			H	H	L	H	H	H	
CO4	H	H	H	H	M			H	H	L	H	M	M	
CO5	H	H	H	H	M			H	M	L	H	H	L	

H = Highly Related

M = Medium

L=Low

**Text Book:**

1. Saxena, S.C. & Arora, S.P. *A Course of Railway Engineering*. Daryaganj New Delhi, India: Dhanpat Rai publication, 2010.
2. Khanna, Arora. *Airport Planning & Design*. Civil Lines Roorkee, India: Nemchand Bros, 2015.

**Reference Book:**

1. Agarwal, M. M. *Indian Railway Track*, Shahdara, Delhi, India: Sachdeva Press, 2018.
2. Bindra, S.P. *Docks and Harbour Engineering*, Daryaganj New Delhi, India: Dhanpat Rai, 2012.

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<b>L-T-P</b>	<b>BCI055A – Solid Waste Management</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### Objectives:

- To provide the student with a working knowledge of all unit operations involved in solid waste management.
- To identify the hazardous wastes, their transportation and disposal.
- To predict the sources and types of solid wastes.

### Unit 1

Solid Wastes: sources, types, composition, physical, chemical, and biological properties of solid wastes/ sources and types of hazardous and infectious wastes in municipal solid wastes.

### Unit 2

Solid waste generation and collection, Handling, Storage, Processing, Transportation.

### Unit 3

Disposal of Solid waste, materials separation and processing, thermal conversion, biological and chemical conversion, recycling of material in municipal solid wastes, Land-filling, Composting, gas generation, closure of land-fills.

### Unit 4

Hazardous Wastes–Fundamentals, fate, and Transport of contaminants, Toxicology origin, quantity and quality parameters. Biomedical / infectious Waste: Composition, Collection, Handling and Disposal. Legal aspects of Hazardous Waste Management: Collection, Conveyance, Treatment and Disposal

### Unit 5

Hazardous Waste Management Practices: Environmental Audits, Pollution Prevention Treatment and Disposal Methods; Physicochemical processes, Biological Methods, Stabilization & Solidification, Thermal Methods, Land Disposal. Site Remediation- Site and Subsurface Characterization, Remedial Technologies.

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Study of physical, chemical, and biological properties of solid wastes

CO2: Analysis of solid waste generation and collection

CO3: Disposal of Solid waste, materials

CO4: Study of hazardous Wastes

CO5: Ability to explain the various aspects of solid waste management

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome											Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	L	M	H	L		L		H	L		H	H	H	H
CO2	L	M	H	L		L		H	L		H	H	H	H

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CO3	L	M	H	L		L		H	L		H	H	H	H
CO4	L	L	H	L		L		H	L		H	H	H	H
CO5	L	L	H	L		L		H	L		H	H	H	H

H = Highly Related

M = Medium

L=Low

**Text Book:**

1. Singh J., Ramanathan A. L. *Solid Waste Management: Present and Future Challenges*. Dariyaganj New Delhi India: I. K. International Pvt Ltd, 2010.

**Reference Books:**

1. Tchobanoglous T. *Integrated Solid Waste Management*, New York U.S.A: McGraw Hill Education, 2017.

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<b>L-T-P</b>	<b>BCI077A – Quantity Surveying and Valuation</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objectives:**

- To produce civil engineering students who have strong foundation in estimation of quantities required for roads and buildings
- To familiarize with the knowledge of preparing bar bending schedules and valuation of buildings.

**Unit 1**

**Introduction:** Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

**Unit 2**

**Rate Analysis:** Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

**Unit 3**

**Estimates:** Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts, Services for building such as water supply, drainage and electrification.

**Unit 4**

**Cost of Works:** Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.

**Unit 5**

**Valuation:** Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: To identify and differentiate the types of estimates

CO2: To prepare rate analysis and identify the main sources of current and forecast labour rates and

CO3: To prepare detailed estimates of roads and buildings

CO4: To quantify the various items of constructions and estimation of overhead costs

CO5: Ability to prepare valuation of the buildings

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

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Course Outcome	Program Outcome											Program Specific Outcome		
	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	H	L	H	L	M	H	H			M	L	M	H	
CO2	H	M	H	L	H	H	H			M	H	M	H	
CO3	H	M	H	M	H	H	H			H	M	H	H	
CO4	L	L	H	L	H	L	H			H	L	H	M	
CO5	H	L	H	H	H	H	H			M	M	M	L	

H = Highly Related

M = Medium

L=Low

**Text Book:**

1. Dutta B.N. *Estimating & costing*, UBS Publishers' Distributors Pvt Ltd; 28<sup>th</sup> Revised Edition edition (2016)

**Reference Book:**

1. ChakrobortyM., *Estimating Costing Specification & Valuation in Civil Engg.* Bhakti Vedanta, Book Trust, Delhi,2016
2. Rangwala S.C. *Quantity Surveying and Valuation*, Charotar Publishing House.

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<b>L-T-P</b>	<b>BCI080A – Earthquake Resistant Design</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objectives:**

- *Understand phenomenon, causes and effects of earthquake.*
- *Apply concepts of dynamics to earthquake problems.*
- *Design earthquake resistant RCC structures using Codal provisions.*
- *Design earthquake resistant masonry structures.*

**Unit 1**

**Seismology:** Causes of earthquakes and seismic waves, magnitude, intensity and energy release, plate tectonics, types of earthquakes, related IS codes.

**Unit 2**

**Characterization of Ground Motion:** Measurement of earthquake ground motion, seismic instruments, strong ground motion parameters.

**Unit 3**

**Effect of Damping:** Types of damping and their form, Logarithmic Decrement.

**Unit 4**

**Forced vibration of Single Degree of Freedom System:** Equation of motion, harmonic force excitation, Dynamic Magnification Factor, Resonance, system excited at base, Transmissibility of force/motion. Free vibration of Multi-Degree of Freedom System.

**Unit 5**

**Earthquake resistant design of buildings, Ductile Detailing.**

**Earthquake resistant design for masonry structures.**

**Course Outcomes:**

***At the end of this course, students will be able to:***

CO1: Able to understand the basic of seismology.

CO2: To know the measurements, equipment and parameters related to seismology.

CO3: Able to understand the effect of damping.

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CO4: Basic knowledge of dynamics of seismic.  
CO5: Able to design earthquake resistant buildings.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	M	L	L	M	M			L	H		M	M	M	
CO2	L	H	L	L	L			L	H	L	H	L	M	
CO3	H	M	H	M	H			H	H	L	H	H	H	
CO4	H	H	H	H	H			H	H	L	H	H	H	
CO5	H	H	H	H	H			H	M	L	H	H	M	

H = Highly Related

M = Medium

L=Low

**Text & References Books:**

1. Chopra A. K. *Dynamics of Structures*, Pearson Education Asia Pte.
2. Kramer S. L. *Geotechnical Earthquake Engineering*, Pearson Education Asia Pte..
3. Duggal S. K. *Earthquake Resistant Design of Structures*, OXFORD University Press.
4. IS CODES: IS:456, IS:1893, IS:4326, IS:18935, IS:13920

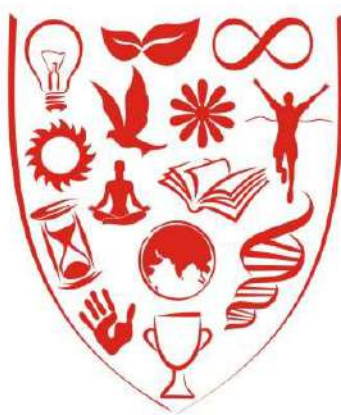
<b>L-T-P</b>	<b>BCI073A – Project Work</b>	<b>Credits: 4</b>
<b>0-0-4</b>		

**Semester VIII**

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<b>L-T-P</b>	<b>BCI050A – Industrial Project and Dissertation</b>	<b>Credits: 28</b>
<b>0-0-28</b>		

  
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**M. TECH (CIVIL ENGINEERING)**  
**ACADEMIC YEAR 2022-23**

**M. Tech. (CE) Program Educational Objective (PEO's):**

A postgraduate of the Civil Engineering with specialization Program should:

**PEO-I**

Postgraduates of the Programme will adopt to the technological advancements for professional development to cater for the changing needs of the society through critical thinking

**PEO-II**

Postgraduates of the Programme, will become as Professional Engineers, teaching experts and engage in Research and Development works both with ethically and societal responsibility

**PEO-III**

Postgraduates of the Programme will impart practical perspectives of civil engineering in order to propose techno-economically and practical solutions to complex problems for collaborative and multidisciplinary projects.

**Program Outcomes (PO)**

A postgraduate of the Civil Engineering with specialization Program will demonstrate:

**PO1:** To acquire in-depth knowledge of civil engineering, with an ability to understand, evaluate and analyse existing techniques and establish new techniques and integrate them for the betterment of the field.

**PO2:** To analyse complex civil engineering problems critically, apply independent judgment for synthesizing information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.

**PO3:** To think laterally and originally, conceptualize and solve engineering problems, evaluate a wide range of potential solutions for those problems and arrive at technically feasible and economically viable solutions after considering health and safety, cultural, societal and environmental factors in the core areas of expertise.

**PO4:** To extract information pertinent to engineering problems through literature survey and experiments, apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyze and interpret data, demonstrate higher order skill and view things in a broader perspective, contribute individually / in group(s) to the development of scientific / technological knowledge in one or more domains of civil engineering.

**PO5:** To create, select, learn and apply appropriate techniques, resources, and modern engineering modelling tools, including modelling and prediction, to complex civil engineering activities with an understanding of the limitations.

**PO6:** To possess knowledge and understanding of group dynamics, recognize opportunities and contribute positively to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision making based on open-mindedness, objectivity and rational analysis in order to achieve common goals and further the learning of themselves as well as others.

**PO7:** To demonstrate knowledge and understanding of engineering and management principles and apply the same to one's own work, as a member and leader in a team, manage projects efficiently after consideration of economic and financial factors.

**PO8:** To communicate with the engineering community, and with society at large, regarding complex civil engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.

**PO9:** To recognize the need for, and have the preparation and ability to engage in lifelong learning, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.

**PO10:** To acquire professional and intellectual integrity, professional ethics and code of conduct, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the society for sustainable development.

**PO11:** To observe and examine critically the outcomes of one's actions in addressing Civil Engineering problems and make corrective measures subsequently, and learn from mistakes without depending on external feedback.

### **Program Specific Outcomes:**

The M. Tech. Degree Programme in Civil Engineering with specialization is offered in the department with the following programme specific objectives:

**PSO1:** Graduates of the programme will possess the ability to provide solutions to Engineering problems with the highest standards economically, socially and ethically.

**PSO2:** Graduates of the Programme, as part of an organization or as Entrepreneurs, will continue to learn to harness evolving technologies and work for the betterment of the global community.

**PSO3:** Graduates of the programme will continue their lifelong learning to remain effective professionals to maintain and enhance technical and professional growth.

## M. Tech. (Civil Engineering) Code & Subject Scheme

### Semester-I

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
MCI116A	Urban Project Management	3	0	0	3	C
MCI117B	Technologies for Sustainability and Sustainable Development	3	0	0	3	C
MCI118B	Advance Concrete and Concrete Mechanics	3	0	0	3	C
MCI148A	MicroStation Lab	0	0	4	2	C
MCI121A	Advance Excel Lab	0	0	2	1	C
DMA017A	Research Methodology	2	0	0	2	C
DMA018A	Research Methodology Lab	0	0	2	1	C

### Semester-II

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
	Program Elective – I	3	0	0	3	S
	Program Elective – II	3	0	0	3	S
	Program Elective – III	3	0	0	3	S
	Core Lab – I	0	0	4	2	C
MCI124A	Project	0	0	8	4	C

### Semester-III

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
	Program Elective – IV	3	0	0	3	S
	Program Elective – V	3	0	0	3	S
	Program Elective – VI	3	0	0	3	S
MCI125A	Seminar on Proposed Dissertation	0	0	2	1	C

### Semester-IV

Code	Subject	Contact Hours/week			Total Credits	Type
		L	T	P		
MCI023B	Dissertation Part – II	0	0	40	20	C

### Specialization in Structural Engineering

Core Lab – I			
MCI122B	Advanced Concrete Technology Lab		

Program Elective – I, II, III, IV, V & VI			
Elective Subjects (Choose any six)			
MCI024B	Structural Dynamics	MCI030B	Advanced Design of Steel Structures
MCI027B	Bridge Engineering	MCI129A	Design of Advanced Concrete Structures
MCI031B	Prestressed Concrete Design	MCI032B	Theory of Elasticity and Plasticity

### Specialization in Transportation Engineering

Core Lab – I			
MCI132B	Transportation Planning Lab		

Program Elective – I, II, III, IV, V & VI			
Elective Subjects (Choose any six)			
MCI133A	Pavement Materials	MCI136A	Pavement Design and Analysis
MCI134A	Traffic Engineering and Management	MCI138A	Pavement Construction and Maintenance
MCI135A	Transportation Systems Planning	MCI142A	Geo-informatics in Transportation Engineering

### Specialization in Environment Engineering

Program Elective – I, II, III, IV, V & VI			
Elective Subjects (Choose any six)			
MCI068B	Ecology and Environmental Impact Assessment	MCI069B	Wastewater Treatment Engineering
		MCI078B	Global Warming and Climate Change

### Specialization in Construction Engineering and Management

Core Lab – I			
MCI100C	Construction Management Lab		

Program Elective – I, II, III, IV, V & VI			
Elective Subjects (Choose any six)			
MCI096B	Construction Project Management	MCI099B	Construction Quality and Safety Management
MCI103B	Construction Contracts and Specifications	MCI104B	Durability and Repair of Concrete Structures
MCI102B	Construction Practices and Equipment	MCI145A	Composite Materials



## Semester-I

<b>L-T-P</b>	<b>MCI116A – Urban Project Management</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### Objective:

- Learn how to Understand the concepts, principles, theories, tools and techniques of project management
- Apply the methods learned to a prepare project implementation plan

### UNIT 1

**Overview of Project Management** - Concepts of a Project and Project Management, Public Sector Vs Private Sector Projects, The Challenges of Public-Sector Project Management, Why Do Public-Sector Projects Fail? The Link between Plans, Programs and Projects, Classification of Projects, Overview of Project Life Cycle

### UNIT 2

**Project Identification:** Sources of project ideas, Participatory analysis, Problem analysis, Objective analysis, Alternative Tree Analysis or Project Selection, Logical Framework Approach

**Project preparation:** Pre-feasibility study, Support study, Feasibility study, Proposal writing

### UNIT 3:

**Financial analysis of a project-** The Costs of a Project, Means of finance, Accounting Income Vs Cash Flows, Project Appraisal - Accounting Rate of Return (ARR), Payback Period, Net Present Value (NPV) method, Benefit Cost Ratio (BCR), Internal Rate of Return (IRR), Discounted payback period

**Economic Analysis of a project** -The Rational for Economic Analysis, How to do Economic Analysis, Economic Prices, Economic transfer, Tradable and non-tradable Goods, Factors of production, Application of financial appraisal methods

### Risk and uncertainty in project Appraisal

### UNIT 4:

**Project Team Building and Conflict Management** - Team building and conflict management, Establishing a Team Identity, Traits of effective project manager,

**Project Monitoring, Evaluation and closing** - Introduction, What is project monitoring, What is project evaluation?, Process and impact evaluation, Usefulness of project Evaluation, Problems with project Evaluation, Project Closing

### UNIT 5

**Project implementation** - Project Organization, Project Contract Administration, Project Implementation tools, Work breakdown structure, Gantt Chart, Network Techniques, The Critical path method (CPM), Program Evaluation and Review Technique (PERT), Project cost analysis, Project Resource Scheduling, Earning Value Methods, Successful Project Implementation

**Outcome:**

CO1:Identify potential development projects

CO2: Prepare project proposals for appropriate development projects

CO3:Appraise public projects using financial and economic cost benefit analysis techniques.

CO4:Create project risk management tools and techniques and evaluate the effectiveness of public projects

CO5:Design tools and methods for successful implementation of public projects

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H													M
CO2			M	H									M	L
CO3			H		L							H		
CO4				M			H	M				M		
CO5			L		H		L						M	H

H = Highly Related

M = Medium

L=Low

**Text/Reference Books:**

1. Wirick, D. (2009) Public-sector project management : meeting the challenges and achieving results, John Wiley & Sons, Inc. USA
2. Chandra, P. (2006) Projects: Planning, Analysis, Selection, Financing, Implementation and Review (8th edn), Tata McGraw-Hill, New Delhi
3. Larson and Gary (2011) Project Management: The Managerial Process, 5th Edition. McGraw-Hill/Irwin, New York.
4. Lock, D (2007), Project Management, 9th edition
5. MOFED (2006) Guidelines for the preparation of Public Sector Projects in Ethiopia
6. PMI (2008) A Guide to the Project Management Body of Knowledge, (PMBOK Guide), 4th Edition

<b>L-T-P</b>	<b>MCI117B – Technologies for Sustainability and Sustainable Development</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:**

- Learn about sustainability and technical performance of sustainable technologies.
- Apply the methods learned to a realistic engineering problem by using sustainable energy technologies.

**Unit 1**

Introduction to Sustainability and Sustainable development; Need, role and significance of sustainability

**Unit 2**

Sustainable Development dimensions and intersections; Measurement of Sustainability; Sustainable Impact Assessment

**Unit 3**

Economic Development and sustainability; Social dimensions of Sustainability; Environment Modeling for Sustainable Development

**Unit 4**

Sustainable Infrastructure; Industrial Practices in Sustainability; Climate Change Adaptation for Sustainable Management of Water in India

**Unit 5**

Sustainability of Carbon Storage and Sequestration; Energy Needs for Sustainable Buildings and Transportation; Remote Sensing and GIS Applications in Sustainability

**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Understand the base concepts and terminologies of Sustainability and Sustainable development

CO2: Analyse and measure sustainability

CO3: Prepare and understand economic, social and environmental models of sustainable development.

CO4: Apply sustainability to infrastructure, industries, water management

CO5: Apply sustainability and RS to energy needs of buildings and transportation

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	M		L					M		M	L		M
CO2	H	L		L					L		L		M	M
CO3	H	L	M						L		M	M		
CO4	M	H							L		M	M		
CO5	M	H			L				M		M			M

H = Highly Related

M = Medium

L=Low

**Text/Reference Books:**

1. R. Y. Surampalli, T. C. Zhang, M. K. Goyal, S. K. Brar, R. D. Tyagi *Sustainability Fundamentals and Applications*, Wiley, 2020
2. Sachs, Jeffrey D. *The age of sustainable development*. Columbia University Press, 2015
3. Gagnon, B., Leduc, R., and Savard, L., *Sustainable development in engineering: a review of principles and definition of a conceptual framework*. Cahier de recherche / Working Paper 08-18, 2008.
4. Dalby, Simon, et al. *Achieving the Sustainable Development Goals: Global Governance Challenges*. Routledge, 2019.
5. Elliott, Jennifer. *An introduction to sustainable development*. Routledge, 2012.
6. Day, G.S., and P.J.H. Schoemaker (2011), Innovating in uncertain markets: 10 lessons for green technologies, *MIT Sloan Management Review*, 52.4: 37-45.

<b>L-T-P</b>	<b>MCI118B – Advance Concrete and Concrete Mechanics</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### Objectives

- To familiarize with the fundamentals of advance concrete
- To study the different cementitious materials
- To understand the basic concepts of deterioration of concrete
- To study the application of different mineral admixtures

### Unit -1

Introduction to cement and concrete, composition of cement and hydration of cement phases, mechanics of hydrating concrete, flowing concrete.

### Unit -2

Supplementary cementitious materials and chemical admixtures, Rheology of concrete, Rheological modelling of fresh concrete, Creep, Drying shrinkage, relaxation and volume stability of concrete.

### Unit-3

Deterioration processes, Special concretes, Microstructural development and internal microstresses, Micromechanics.

### Unit -4

**Durability of concrete:** Carbonation, chloride ingress, corrosion, sulphate attack, freezing and thawing: Factors affecting, effects, mechanisms, Corrosion mapping, prevention and control.

### Unit-5

**Concrete containing supplementary cementitious materials:** Specifications of fly ash, silica fume and GGBFS for use in concrete, reaction mechanism, properties of fresh and hardened concrete.

### Course Outcomes:

*At the end of this course, students will be able to:*

- CO1: Ability to understand about advance concrete practices.  
CO2: Knowledge about properties of concrete chemical admixtures.  
CO3: Knowledge about various concrete attacks.  
CO4: Knowledge about durability of concrete.  
CO5: Knowledge about supplementary cementitious materials

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	M		L			M		M	M	M	L		M
CO2	H	L		L			L		L	L	L		M	M
CO3	H	L	M				L		L	M	M	M		
CO4	M	H					H		L	M	M	M		
CO5	M	H			L		H		M	M	M			M

H = Highly Related

M = Medium

L=Low

**Text Book:**

1. A.M. Neville, "Properties of Concrete", Pearson Education, 1995

**Reference Book:**

1. Metha P.K. and Monterio P.J.M. "Concrete-Structures", Properties and Materials, 3rd Edition, McGraw Hill Professional, 2006.
2. M.S. Shetty, "Concrete Technology" S.Chand and Company Ltd, Delhi, 2000.
3. Neville.A.M. "Properties of Concrete", Pitman Publishing Limited, London, 1990

<b>L-T-P</b>	<b>MCI148A – MicroStation Lab</b>	<b>Credits: 2</b>
<b>0-0-4</b>		

### Experiments

MicroStation is used by engineers, architects, GIS professionals, constructors, and owner-operators to design, model, visualize, document, map, and sustain infrastructure projects because it delivers an integrated and proven suite of intuitive, interactive, and highly interoperable design capabilities.

### **Course Outcomes:**

**At the end of this course, students will be able to:**

CO1: Use MicroStation for designing

CO2: Prepare Maps and model

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PS O1	PS O2	PS O3
CO1	H	M	M	M							M	H	M	
CO2	H	M		M							M	H	M	
CO3	H	M		M							M	H	M	
CO4		M		M							M	H	M	
CO5	M	M	M	M							M	H	M	

H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>MCI121A – Advanced Excel Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

**Various Methods and Uses of Advance Excel Formulas:** Vlookup, Hlookup, Sumif, Sumifs, Sumproduct, Dsum, Countif, Countifs, If, Iferror, Iserror, Isna, Isnumber, Isnontext, Isblank, Istext, Getpivotdata, Dcount, Dcounta, Or, And, Search, Index, Match Etc

**Various Methods and Uses of IF Conditions:** When should use the "IF" Conditions?, Creation of Multiple IF Conditions in One Cell, Use the IF Conditions with the Other Advance Functions, How to use nested IF statements in Excel with AND, OR Functions

**ADVANCED EXCEL OPTIONS :** Various Methods of Filter and Advance Filter options, Creating and Updating Subtotals, Various Methods of Text to Column options, Uses of Data Grouping and Consolidation options, Uses of Goal Seek and Scenarios Manager, Various Method of Sorting Data, Creating, Formatting and Modifying Chart, Data Validation, Creating drop down lists using different data sources, Linking Workbooks and Uses of Edit Link options, Excel Options, Customizing the Quick Access Tool Bar, Formula Auditing features and Trace formula error

**Pivot Tables & Charts :** Various Methods and Options of Pivot Table, Using the Pivot Table Wizard, Changing the Pivot Table Layout, Subtotal and Grand total Options, Formatting, Grouping Items, Inserting Calculated Fields, Pivot Table Options, Calculation in Pivot Table, Display and Hide Data in Field, Select, Move & Clear Pivot Data, Creating and Modifying Pivot Chart

**Advance Use of Function:** Mixing Function to get Various MIS Outputs, Creating Data Table, Advance Data Validation, Using conditional formatting with Formulas and Function, Using Name Manager, Array Formulas

**Importing Data from External Sources: Macros,** What is a Macro?, Creating Excel Macro, Running Macros and Editing, Automating Tasks with Macro



<b>L-T-P</b>	<b>DMA017A – Research Methodology</b>	<b>Credits: 2</b>
<b>2-0-0</b>		

### Objectives:

- To understand basic concepts of research and its methodologies
- To Identify appropriate research topics
- To Select and define appropriate research problem and parameters
- To understand hypothesis formulation and testing
- To learn fundamentals of thesis writing

### Unit 1

**Research Fundamentals and Terminology:** Importance of Research in Management Decisions. Defining Research Problems and Formulation of Hypothesis

### Unit 2

**Research Design:** Type of Research Design, Natural Experiments, Formal Type of Experiments, Evaluation of Experiments, Selecting Relevant Variables, Validity of Experiments. Sample design, Steps in sample design, Criteria for selection of sample, Different types of sample design, The Sampling Process

### Unit 3

**Data Analysis:** Methods and Techniques of Data Collection, Type of Data, Distinction between primary Data and Secondary, Data Collection Procedure for primary Data, Data preparation and Preliminary Analysis, Presentation of Data, Oral Presentation Statistical Analysis and Interpretation of Data.

### Unit 4

**Hypothesis Testing:** Null and alternative hypothesis, Level of significance, Type I and type II error, Two-tailed and one-tailed tests, Procedure of hypothesis testing, Power of hypothesis test, difference Hypothesis Testing, Multivariate Analysis of Data, Multiple Linear Regression.

### Unit 5

**Report writing and Presentation:** Fundamental of Report Writing and Formatting of Reports, Additional Statistics in Research

### Course Outcomes:

At the end of this course, students will be able to

1. Understand basic concepts of various research areas
2. identify appropriate research topics concerned to Engineering field
3. select and define appropriate research problem and its related parameters
4. prepare the hypothesis and testing of hypothesis.
5. develop skill of thesis /Dissertation writing.

### Text Book:

1. Bhattacharya K. Dipak, Research Methodolgy , , Excel Books , New Delhi
2. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan, 2006
3. Ranjit Kumar, Research Methodology- A Step-By-Step Guide for Beginners,(Pearson Education, Delhi)
4. Bendat and Piersol, Random data: Analysis and Measurement Procedures, Wiley Interscience, 2001

**Reference Book:**

1. Montgomery, Douglas C. & Runger, George C. (2007) – Applied Statistics & Probability
2. Trochim, William M.K., (2003), 2/e, Research Methods, (Biztantra, Dreamtech Press, New Delhi)
3. Richard I Levin amp; David S. Rubin, Statistics for Management, 7/e. Pearson Education, 2005
4. Krishnaswamy, K. N., Sivakumar, Appa Iyer and Mathirajan, M. (2006), Management Research Methodology: Integration of Principles, Methods and Techniques (Pearson Education, New Delhi) Montgomery, Douglas C. (2007) – Design & Analysis of Experiments, 5/e. (New Delhi)
5. Donald R. Cooper, Pamela S. Schindler, Business Research Methods, 8/e, Tata McGraw-Hill Co. Ltd., 2006

<b>L-T-P</b>	<b>DMA017B – Research Methodology Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

### **SPSS Package -**

**An Overview of SPSS :** Mouse and keyboard processing, frequently –used dialog boxes, Editing output, Printing results, Creating and editing a data file

**Managing Data:** Listing cases, replacing missing values, computing new variables, recording variables, exploring data ,selecting cases, sorting cases, merging files

**Graphs:** Creating and editing graphs and charts

**Frequencies:** Frequencies, bar charts, histograms, percentiles

**Descriptive Statistics:** measures of central tendency, variability, deviation from normality, size and stability, Cross Tabulation and chi-square analyses, The means Procedure

**Bivariate Correlation:** Bivariate Correlation, Partial, Correlations and the correlation matrix

**The T-test procedure:** Independent –samples, paired samples, and one sample tests

**The one way ANOVA procedure:** One way analysis of variance

**General Linear model:** Two –way analysis of variance and the influence of covariates, Simple Linear Regression, Multiple regression analysis, Multidimensional scaling, Factor analysis, Cluster analysis.

## Semester-II

### Specialization in Structural Engineering

<b>L-T-P</b>	<b>MCI122B – Advanced Concrete Technology Lab</b>	<b>Credits: 2</b>
<b>0-0-4</b>		

#### List of Experiments:

1. Determination of bond strength of specimens with M25 Grade and M50 Grade concrete.
2. Preparation of M40 Grade pumpable concrete with superplasticizer and supplementary cementitious materials
3. Preparation of M60 Grade self- compacting concrete and testing it for properties in fresh and hardened states.
4. Determine stress-strain curve of high strength concrete specimens (M60 or higher grade).
5. Determine correlation between cube strength, cylinder strength, split tensile strength and modulus of rupture with normal strength concrete and high strength concrete mixes
6. Non-Destructive testing of existing concrete members through rebound hammer, Ultrasonic pulse velocity meter, resistivity meter, carbonation test and core test.
7. Behavior of Reinforced Concrete Beam specimen- measurement of strains at various levels through LVDTs, strain Gages- determination of moment curvature relationship

#### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Determination of bond strength of Different specimens grade of concrete

CO2: apply the procedures involved Preparation of M40 Grade pumpable concrete with superplasticize and different cementitious material

CO3: apply the procedures Preparation of M60 Grade self- compacting concrete.

CO4: take measurements of stress-strain curve of high strength concrete specimens, Non-Destructive testing

CO5: Behavior of Reinforced Concrete Beam specimen- measurement of strains at various levels.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H		H		H		H	M	H	H	M		H	H	H
CO2	H	H		M	H	L			H	H		M	H	H	L
CO3	H	H		M		H		M	H		H		H	H	
CO4		H		M	H	H	H	M		L	H	H	H	L	H
CO5	M	H	M		H			M	H		H	L	H	H	

H = Highly Related

M = Medium

L=Low

## Specialization in Transportation Engineering

<b>L-T-P</b>	<b>MCI132B-Transportation Planning Lab</b>	<b>Credits: 2</b>
<b>0-0-4</b>		

### List of Experiments:

1. Traffic volume data collection at midblock section in urban area and its analysis
2. Traffic volume data collection at rural highway section and its analysis
3. Categorized vehicle speed data collection at urban and rural sections and its analysis
4. Deriving flow relationships between flow characteristics based on volume and speed data collected
5. Speed and delay study using Moving observed method
6. Volume study at a roundabout to examine its capacity
7. Volume and speed study at a four legged intersection
8. Parking study in a market or commercial area (accumulation and duration analysis)
9. Analysis of accident data procured from police stations
10. Demonstration and hands-on training with transportation software for design of flexible as well as rigid pavements.
11. Road Safety Audit of a rural section of a highway

### Course Outcomes:

*At the end of this course, students will be able to:*

- CO1: Understand the base concepts and terminologies of Transportation Planning  
CO2: Conduct surveys to collect traffic data  
CO3: Interpret different traffic studies and data sampling processes.  
CO4: Analyse all survey data.  
CO5: Design and analyse pavements

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	M		L					M			L		M
CO2	H	M							M					M
CO3	H	M	L						L		L	M	L	
CO4	M	L	L		L				L		L	M		
CO5	L	M	L		M			M	M		L		L	M

H = Highly Related

M = Medium

L=Low

## Specialization in Environment Engineering

### Specialization in Construction Engineering and Management

<b>L-T-P</b>	<b>MCI100C-Construction Management Lab</b>	<b>Credits: 2</b>
<b>0-0-4</b>		

#### List of Experiments:

1. Analytical solution of construction project models.
2. Numerical solution of construction project models.
3. Application software for project planning, scheduling & control.
4. Programming exercises for estimation, network planning and control, LP in construction.
5. MATLAB Programming in linear and non-linear programming.

#### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Understand the basic concept of analytical solution of construction project models.

CO2: Conduct Numerical solution of construction project models.

CO3: Application and uses of software for project planning & scheduling

CO4: Understand the basic concept of estimation & network planning

CO5: Understand the basic concept of MATLAB Programming

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	M		L		M			M			L		M
CO2	H	M				M			M					M
CO3	H					L			L		L	M	L	
CO4	M	L	L		L	L			L		L	M		
CO5	L	M	L		M	M		M	M		L		L	M

H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>MCI124A – Project</b>	<b>Credits: 4</b>
<b>0-0-8</b>		

### **Semester III**

<b>L-T-P</b>	<b>MCI125A – Seminar on Proposed Dissertation</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

### **Semester IV**

<b>L-T-P</b>	<b>MCI023B – Dissertation Part - II</b>	<b>Credits: 20</b>
<b>0-0-40</b>		



## Specialization in Structural Engineering

L-T-P	MCI024B - Structural Dynamics	Credits: 3
3-0-0		

**Objective:** To understand the response of structures to earthquakes requires study of structural dynamics. Therefore, Single Dynamic Degree of Freedom Systems are first introduced, then two and three DOF systems are covered. Finally the earthquake effects on structures are covered.

### UNIT-1

**Dynamics of Structures:** Objectives and importance. Types of dynamic loads, Dynamic degree of freedom, Mathematical modelling, Damping and stiffness, Torsional stiffness, Equivalent stiffness, Free and forced vibrations

### UNIT-2

**Single Degree of Freedom (SDOF) Systems:** Undamped free vibrations, formulation of differential equation of motion: Newton's law of motion, D'Alembert's principle and energy approach. Natural frequency. Vibration response.

### UNIT-3

**Single Degree of Freedom (SDOF) Systems:** damped free vibrations, critically damped, under damped & over damped systems, formulation of differential equation of motion: Natural frequency. Vibration response.

### UNIT-4

**Forced vibration (under Harmonic Excitation):** Undamped and Underdamped SDOF System: Formulation and Solution of Differential Equation of Motion; Dynamic Magnification Factor, Frequency Ratios and Damping Factors, and Phase angles.

### UNIT-5

**Two Degree of Freedom Systems:** Formulation of equations of motion. Undamped free vibrations and Principle Mode of Vibration and mode shapes: Analysis of Dynamic response, Normal co-ordinates, Uncoupled equations of motion, Orthogonal, properties of normal modes; Coordinate Coupling: Static and Dynamic Coupling.

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: understand the properties of objectives and importance Types of dynamic loads.

CO2: Able to solve the Sdof system Undamped free vibrations

CO3: Able to solve the Sdof system damped free vibrations.

CO4: Identify effective measures for Forced vibration (under Harmonic Excitation).

CO5: Classification of different structural Two Degree of Freedom Systems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1	M J	H	M	H	H		H				H		M	H	H
CO2	H		H	H		L		H		H	H		H		H
CO3		H	M		H	L	H		H	H				H	M
CO4	H	M	H	L	H		H	M	L	H	H		H	H	
CO5	H	H		H	H	L		M		M	H			L	

H = Highly Related

M = Medium

L=Low

**Text Book/Reference Book:**

1. Dynamics of Structures by Clough and Penzien, McGraw Hill, New York 1971
2. Anil Chopra, "Dynamics of Structures ", Mc Graw Hill 2001
3. Structural Dynamics by Mario Paz, C.B.S Publishers, New Delhi.

<b>L-T-P</b>	<b>MCI027B - Bridge Engineering</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### **Objective:**

- To study the loads, forces on bridges and design of several types of bridges .
- Analysis and design of RC and PSC box girder bridge deck

### **UNIT-1**

**Introduction** - Classification and components of bridges, historical perspective, layout and planning, investigations for Bridges, choice of type of the bridges, conceptual bridge design, bridge aesthetics. Bridge appurtenances

### **UNIT-2**

**Loads on bridges** - loading standards for highway and railway bridges (IRC, IRS) Analysis and design of RC and PSC bridge decks: slab culvert bridges, slab and beam bridges, load distribution in slabs and beams, bowstring girder bridges, behaviour of skew bridge decks

### **UNIT-3**

Behaviour, analysis and design of RC and PSC box girder bridge decks. Behaviour, analysis and design of steel bridge decks: girder bridges, truss bridges, arch bridges, composite construction.

### **UNIT-4**

Modern methods of construction of concrete, steel and composite bridges, their impact on analysis and design. Introduction to analysis and design of long span bridges: suspension.

### **UNIT-5**

Design of bearings, substructure and foundations - piers and abutments of different types, shallow and deep foundations-design and constructional aspects.

### **Course Outcomes:**

*At the end of this course, students will be able to:*

- CO1: Able to understand types and Classification and components of bridges.
- CO2: Able to Analysis and design of RC and PSC bridge decks: slab culvert bridges
- CO3:Able to understand Behaviour, analysis and design of steel bridge decks.
- CO4: Classification of different Modern methods of construction of concrete.
- CO5: Classification of different Design of bearings, substructure and foundations .

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1	H	H	H	H	H		H				H		H	H	H
CO2	H		H	H		L		M		H	H		H		H
CO3		H	M		H	L	H		H	H				H	M
CO4	M N	M		L	H		H	M	L	H	H		H	H	
CO5	H	H		H	H	L		M		M	H			H	

H = Highly Related

M = Medium

L=Low

**Text Book/Reference Book:**

1. J.E. Long, "Bearings in Structural Engineering", Newnes Butterworth & Co., 1974.
2. Swami Saran, "Analysis and Design of Substructures", Oxford & IBH Publishing Co., 1996.

<b>L-T-P</b>	<b>MCI031B - Prestressed Concrete Design</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### Objective

- This subject is thought to give the concepts of pre stress
- To impart the knowledge about analysis and design of pre stressed concrete members

### UNIT-1

**Introduction to prestressed concrete:** types of prestressing, systems and devices, materials, losses in prestress.

### UNIT-2

Analysis of PSC flexural members: basic concepts, stresses at transfer and service loads, ultimate strength in flexure, code provisions in IS 1343. Statically determinate PSC beams: design for ultimate and serviceability limit states for flexure, and flexure combined with axial compression or tension

### UNIT-3

Analysis and design for shear and torsion, code provisions. Transmission of prestress in pretensioned concepts, crack-width members. Anchorage zone stresses for posttensioned members.

### UNIT-4

Statically indeterminate structures Analysis and design continuous beams and frames, choice of cable profile, linear transformation and concordancy. Composite construction with precast PSC beams and cast insitu RC slab Analysis and design, creep and shrinkage effects. Partial prestressing principles, analysis and design calculations

### UNIT-5

Analysis and design of prestressed concrete pipes, tanks and spatial structures slabs.

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Able to understand types of prestressing, systems and devices.

CO2: Able to Analysis of PSC flexural members.

CO3: Able to understand Analysis and design for shear and torsion.

CO4: Classification of different Statically indeterminate structures Analysis and design continuous beams and frames.

CO5: Analysis and design of prestressed concrete pipes.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1	H	H	H	H	H		H				H		H	H	H
CO2	H		H	H		L		M		H	H		H		H
CO3		H	M		H	L	H		H	H				H	M
CO4	M N	M		L	H		H	M	L	H	H		H	H	
CO5	H	H		H	H	L		M		M	H			H	

H = Highly Related

M = Medium

L=Low

***Text Book/Reference Book:***

- 1.Krishna Raju.N, (2004), Pre-stressed Concrete, Third Edition, Tata McGraw Hill Co,2004.
2. Rajagopal.N, (2005), Prestressed Concrete, Second Edition, Narosa Publishing House,2005.
- 3.Sinha.N.C and Roy.S.K, (2000), Fundamentals of Pre- stressed Concrete, S.Chand& Company limited.2000

<b>L-T-P</b>	<b>MCI030B - Advanced Design of Steel Structures</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### Objective-

- To introduce basic concepts of stability of structures and illustrate it's application.
- Perform Limit state design of trusses and frames.
- Perform Minimum weight design of steel structures.

### UNIT-1

Limit States Load and Resistance Factor Design methods. Behaviour and design of members under tension, compression, bending, and combined forces (shear bending, axial force bending).

### UNIT-2

Fasteners: Methods of installation and behaviour of rivets, bolts and welds. Screws and rivets in cold formed steel construction Connections, Types of fasteners, Behaviour of local elements, Analysis, Design and Detailing of Connections. Design for Earthquake Forces.

### UNIT-3

Cold formed Steel Sections - Types of cross sections - Local buckling and post buckling - Design of compression and Tension members - Beams - Deflection of beams - Combined stresses and connections

### UNIT-4

Design for ductility, R factor, concentrically and eccentrically braced frames, non-buckling bracings.

### UNIT-5

Estimation of wind load - Design of industrial stacks - Self-supporting and guyed stacks lined and unlined – along wind and across wind vibration.

### Course Outcomes:

*At the end of this course, students will be able to:*

- CO1: Able to understand Limit States Load and Resistance Factor Design methods.  
CO2: Able to Analysis Methods of installation and behaviour of rivets, bolts and welds.  
CO3: Able to understand Types of cross sections.  
CO4: Able to understand non-buckling bracings.  
CO5: Analysis and design of Estimation of wind load.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1	H								H					M	H
CO2	H	H	M		M		L		H		H		H	M	H
CO3	M	L	M						H				M	M	H
CO4	H	M	H	M	M		M		H		H		H	M	H
CO5	H	H	M	M			M		H		H		H	M	H

H = Highly Related

M = Medium

L=Low

**Text Book/Reference Book:**

1. N. Subramanian, "Design of Steel Structures", Oxford University Press,2008.
2. M.L. Gambhir, "Stability Analysis and Design of Structures", Springer,2005.
3. A.S. Arya and J.L. Ajmani, "Design of Steel Structures" Nem Chand & Bros,2000.



<b>L-T-P</b>	<b>MCI129A - Design of Advanced Concrete Structures</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective-**

- Perform Limit state design of trusses and frames.
- Perform Minimum weight design of steel structures.

**Course details:**

<b>S. No.</b>	<b>Contents</b>	<b>Contact hours</b>
1	<b>Limit State Design:</b> Objective, scope and outcome of the course Revision of Basic Concepts of Limit State Design of Prismatic Members in Flexure, Shear & Bond. Limit State Analysis and Design of Continuous Beams using Coefficient, Reinforcement Detailing & Curtailment provisions as per Code.	7
2	<b>Serviceability Requirements:</b> Limit State of Serviceability of Beams and Slabs in Deflection. Calculation of Deflection due to Loads, Shrinkage & Creep; Calculation of Crack Width as per IS Code.	8
3	<b>Flat Slabs:</b> Direct design method: Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns. Shear in Flat Slabs-Check for one way and two-way shears. Introduction to Equivalent frame method. Limitations of Direct design method, Distribution of moments in column strips and middle strip sketch showing reinforcement details.	10
4	<b>Columns and Footing:</b> Design of Slender Columns. Analysis and Design of (i) Isolated Footing subjected to Axial Load and Moment (ii) Combined Rectangular Footing for Two Columns subjected to Axial Loads and moments. Reinforcement Detailing	8
5	<b>Ribbed Floor and Shell Roofs:</b> Introduction to Structural Behavior and Construction & Design Features of Ribbed floor, Shell Roofs and Stresses in Simple Semicircular Shell. <b>Stair Case:</b> Types and Planning of Staircases, Analysis and Design of Staircase spanning longitudinally on Waist slab. Reinforcement detailing.	10
	<b>Total</b>	<b>45</b>

**Course Outcomes:**

***At the end of this course, students will be able to:***

CO1: Understand the concept of shear and shear reinforcement

CO2: Ability to understand the Limit State of Serviceability of Beams and Slabs.

CO3: Ability to analyze and design of columns & footings.

CO4: Ability to analyze and design of slab.

CO5: Ability to analyze and design of Ribbed Floor and Shell Roofs

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	M	M		M					M	M	M	M	L
CO2	H	M	L		L						L	M	M	L
CO3	H	M	M	M						M	H	M	M	M
CO4	H	H	H	M		L				L	H	H	M	M
CO5	H	H	H	M		L				L	H	H	H	H

H = Highly Related

M = Medium

L=Low

**Suggested Books:**

S. No.	Name of Authors/Books/Publishers	Publishing year
1	“Reinforced Concrete Design” S. Unnikrishna Pillai & Devdas Menon; Tata Mc. Graw-Hill Publishing Company Ltd. New Delhi 2010.	2010
2	“Advanced Reinforced Concrete” P.C. Varghese Prentice Hall of INDIA Private Ltd. 2008	2008
3	“Limit State Theory and Design of Reinforced Concrete” Dr. S. R. Karve and V.L Shah. Standard Publishers, PUNE 2004	2004

<b>L-T-P</b>	<b>MCI032B - Theory of Elasticity and Plasticity</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### **Objective-**

This subject is taught to impart knowledge on theory of elasticity and plasticity .

### **UNIT-1**

Introduction: Elasticity - notation for forces and stresses - components of stresses - components of strain - Hooks law. Plane stress and plane strain analysis - plane stress - plane strain – differential equations of equilibrium - boundary conditions - compatibility equations - stress function – boundary condition..

### **UNIT-2**

Two dimensional problems in rectangular coordinates - solution by polynomials - Saint- Venant's principle - determination of displacements - bending of simple beams. Two dimensional problems in polar coordinates – strain components in polar coordinates - displacements for symmetrical stress distributions - simple symmetric and asymmetric problems - general solution of two- dimensional problem in polar coordinates - application of general solution in polar coordinates.

### **UNIT-3**

Analysis of stress and strain in three dimensions - principal stresses - stress ellipsoid - director surface - determination of principal stresses - max shear stresses – homogeneous deformation - principal axes of strain rotation. General Theorems: Differential equations of equilibrium – conditions of compatibility - determination of displacement - equations of equilibrium in terms of displacements - principle of super position - uniqueness of solution - the reciprocal theorem.

### **UNIT-4**

Torsion method - use of soap films in solving torsion problems - hydro dynamical analogies - torsion of shafts, tubes, bars etc. Bending of Prismatic Bars: Stress function - bending of cantilever – circular cross section - elliptical cross section - rectangular cross section - bending problems by soap film method – displacements of Prismatic Bars - torsion of prismatic bars - bars with elliptical cross sections – other elementary solution - membrane analogy - torsion of rectangular bars - solution of torsion problems by energy

### **UNIT-5**

Theory of Plasticity: Introduction - concepts and assumptions - yield criterions

### **Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Able to understand components of stresses - components of strain.

CO2: Able to Analysis of Two dimensional problems in rectangular coordinates.

CO3:Able to understand stress and strain in three dimensions.

CO4: Able to understand Torsion method by using different bars..

CO5: Analysis a concept of Theory of Plasticity.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1	H	H	H	H	H		H				H		H	H	H
CO2	H		H	H		L		M		H	H		H		H
CO3		H	M		H	L	H		H	H				H	M
CO4	M N	M		L	H		H	M	L	H	H		H	H	
CO5	H	H		H	H	L		M		M	H			H	

H = Highly Related

M = Medium

L=Low

***Text Book/Reference Book:***

1. Theory of Elasticity by Timoshenko, McGrawhill Publications,2000.
2. Theory of Elasticity by Gurucharan Singh

## Specialization in Transportation Engineering

<b>L-T-P</b>	<b>MCI133A-Pavement Materials</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To introduce the use of highway materials in construction of different layers of a pavement.

**Pre-requisite:** Nil

**Course details:**

S. No.	Contents	Contact hours
1	<b>Aggregates:</b> Classification, physical and strength characteristics, Proportioning of aggregates, Aggregate texture and skid resistance, polishing of aggregates.	9
2	<b>Soil:</b> Classification, Structural and Constructional problems in soil subgrade, Identification and strength tests, Soil-moisture movement, Sub-soil drainage, Soil stabilization.	8
3	<b>Bitumen:</b> Bitumen sources and manufacturing, Bitumen constituents, structure and rheology, Mechanical and engineering properties of bitumen, Tests on bitumen, Emulsions – Properties, types, modifications, Durability of bitumen, Adhesion of bitumen, Modified bitumen.	10
4	<b>Bituminous Mixes:</b> Desirable properties of mixes, Design of bituminous mixes, Tests on bituminous mixes, Fillers, Theory of fillers and specifications.	9
5	<b>Cement Concrete:</b> Constituents and their requirements, Physical, plastic and structural properties of concrete, Factors influencing mix design, Design of concrete mixes for DLC and PQC.	9
	<b>Total</b>	<b>45</b>

**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Analyse the properties of aggregates

CO2: Analyse the properties of soil materials.

CO3: Analyse the properties of bituminous.

CO4: Design of bituminous mixes.

CO5: Design of cement concrete road.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	L	L	L	M			M		H		M	L	L	
CO2	M	H		L				L	H	L	H		M	
CO3		M	H				L	H	M		H	H	H	M
CO4	M		H	H				H		L		M	M	
CO5	M	H	L	H			L		M	L	H	M	L	

**Suggested Books:**

S. No.	Name of Authors/Books/Publishers	Publishing year
1	Krebs, Robert D., Walker, R. D. <i>Highway Materials</i> . New York: McGraw Hill Book Co.	1971

2	Her Majesty's Stationery Office, "Soil Mechanics for Road Engineers", Ministry of Transport, Road Research Laboratory, UK	1966
3	Her Majesty's Stationery Office, "Bituminous Materials in Road Construction", Ministry of Transport, Road Research Laboratory, UK	1966
4	Her Majesty's Stationery Office, "Concrete Roads Design and Construction", Ministry of Transport, Road Research Laboratory, UK	1966

<b>L-T-P</b>	<b>MCI134A-Traffic Engineering and Management</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To introduce the concepts of characterizing traffic, various modeling approaches, and design of facilities to control and manage traffic.

**Pre-requisite:** Nil

**Course details:**

<b>S. No.</b>	<b>Contents</b>	<b>Contact hours</b>
1	<b>Traffic Characteristics and Measurement:</b> Introduction to Traffic Engineering, Fundamental parameters and relations of traffic flow, Traffic stream models, Traffic measurement procedures.	10
2	<b>Uninterrupted flow:</b> Capacity and LOS, Urban street classification and performance measures, Multilane highways, Freeway operations, Ramp metering and corridor analysis.	9
3	<b>Traffic Intersection control:</b> Principles of control, traffic signs and markings, uncontrolled intersection, Channelisation, Traffic rotary, Grade separated intersection	10
4	<b>Traffic Signal design:</b> Elements of signal, Principles of design, Phase diagram, Cycle time, Green splitting, Evaluation of traffic signal, Webster's delay model, Coordinated signals and area traffic control.	9
5	<b>Specialised traffic studies:</b> Parking studies, Accident Studies, Pedestrian studies, Congestion Studies and Introduction to ITS.	7
	<b>Total</b>	<b>45</b>

**Suggested Books:**

<b>S. No.</b>	<b>Name of Authors/Books/Publishers</b>	<b>Publishing year</b>
1	Kadiyali, LR, Traffic Engineering and Transportation Planning, Khanna.	2007
2	Roess, RP., McShane, WR. and Prassas, ES., Traffic Engineering, Prentice Hall.	1998
3	Highway Capacity Manual, Transportation Research Board, USA.	2000



**Course Outcomes:***At the end of this course, students will be able to:*

CO1: Understand the base concepts and terminologies of Traffic Engineering and analyse stream characteristics

CO2: Analyse uninterrupted traffic flow.

CO3: Evaluate and design control systems for effective management of traffic intersections.

CO4: Evaluate and analyse Traffic Signals

CO5: Interpret different traffic studies and data sampling processes.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	M							M			L		M
CO2	H	M		L					M					M
CO3	M	H	L	L					L		L	M		
CO4	M	H	L	L					L		L	M		
CO5	M	H						M	M		L			M

H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>MCI135A-Transportation Systems Planning</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To introduce the planning process of any transportation system and give exposure to land-use transport models

**Course details:**

<b>S. No.</b>	<b>Contents</b>	<b>Contact hours</b>
1	<b>Introduction to transportation planning:</b> Fields of transportation Engineering; System-Environment Ensemble; Transportation planning process; Transportation problems and problem solving process, Evaluation and choice.	6
2	<b>Urban Transportation System:</b> Transportation in cities, Urban activity systems, Classification of roads, Urban road system types, Urban goods movements.	9
3	<b>Transportation data and survey methods:</b> Data requirements, data sources, Survey design, Study area, Zoning, Types of surveys: Home interview surveys, Post card survey, Commercial Vehicle survey, Stop line survey, Public transit survey, Cordon line survey, Registration number survey, tag on vehicle survey, Group survey, online web survey and others.	10
4	<b>Four-stage Sequential Planning:</b> Urban transportation planning process; trip generation, correlation analysis and regression analysis; trip distribution, Growth factor methods; modal split models, behavioral models; Trip assignments, route assignment, multiple assignment and network assignment. Network Analysis; Minimum Path Algorithms	11
5	<b>Land use–Transportation Planning:</b> Urban Forms, mobility and activity hierarchy; accessibility-based early-era models; Lowery’s model and its derivatives; Modern era models.	9
	<b>Total</b>	<b>45</b>

**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Understand the base concepts and terminologies of transportation planning and analyse transportation problems

CO2: Analyse urban transportation systems.

CO3: Evaluate transportation data and survey methods.

CO4: Evaluate and analyse four-stage Sequential planning

CO5: Analyse of Land use–Transportation Planning

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	M		M					M			L		M
CO2	M	M		L					L					M
CO3	L	L	M					L	L		L	M	M	
CO4	M	H	L	L					L		L	M		
CO5	M			M							L			M

H = Highly Related

M = Medium

L=Low

**Suggested Books:**

S. No.	Name of Authors/Books/Publishers	Publishing year
1	Ortuzar, J.D.D. and Willumsen, L.G. "Modelling Transport", John Wiley & Sons	1990
2.	Hutchinson, B.G., "Principles of Urban Transport Systems Planning", McGraw Hill Book Company	1974
3.	Kadiyali, LR, Traffic Engineering and Transportation Planning, Khanna.	1987

<b>L-T-P</b>	<b>MCI136A-Pavement Design and Analysis</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To discuss and analyse the pavement structure and stresses developed in pavements and learn to design types of pavements using different methods.

**Pre-requisite:** Nil

**Course details:**

<b>S. No.</b>	<b>Contents</b>	<b>Contact hours</b>
1	<b>Introduction:</b> Components of pavement structure, importance of sub-grade soil properties on pavement performance. Functions of sub-grade, sub-base, base course and wearing course.	8
2	<b>Stresses in Flexible Pavements:</b> Stresses in homogeneous masses and layered systems (one, two and three layered systems), deflections, shear failures, equivalent wheel and axle loads.	10
3	<b>Elements in Design of Pavements:</b> Traffic and Loading characteristics-static, impact and repeated loads, effects of dual wheels and tandem axles, area of contact and tyre pressure, modulus or CBR value of different layers, equivalent single wheel load, equivalent stress and equivalent deflection criterion, equivalent wheel load factors, climatic and environmental factors.	9
4	<b>Design of Flexible Pavements:</b> Design as per IRC method, CBR method, US navy method, Triaxial test method	9
5	<b>Design of Rigid Pavements:</b> Design as per IRC method, Design of Tie bars and Dowel bars, Westergaard's and Thomlinson's analysis of warping stresses, Combination of stresses due to different causes, Effect of temperature variation on Rigid Pavements.	9
	<b>Total</b>	<b>45</b>

**Suggested Books:**

<b>S. No.</b>	<b>Name of Authors/Books/Publishers</b>	<b>Publishing year</b>
1	relevant IRC and MORT&H codes	
2	Yoder E.J. <i>Principles of Pavement Design</i> . John Wiley&Sons, Inc.	1975
3	Khanna, S.K., Justo, C.E.G. <i>Highway Engineering</i> . Nem Chand Jain & Bros.	2005

**Course Outcomes:***At the end of this course, students will be able to:*

CO1: Introduction Components of pavement structure

CO2: Analyse the Stresses in Flexible Pavements.

CO3: Design elements of Pavements

CO4: Design of flexible pavements

CO5: Design of rigid pavements.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	M		M					M			L		M
CO2	M	M	L	L					L				L	M
CO3	L		M					L	L		L	M		
CO4	M	H	L	L					L		L	M		
CO5	M	H		M				M			L			M

H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>MCI137A-Travel Demand Modeling</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To introduce the steps used in modeling travel demand for transportation studies.

**Pre-requisite:** Transportation Systems Planning

**Course details:**

<b>S. No.</b>	<b>Contents</b>	<b>Contact hours</b>
1	<b>Introduction:</b> Individual travel behavior and aggregate-level travel demand analysis; Alternative approaches to modeling travel demand (aggregate, trip-based approaches and disaggregate, activity-based approaches)	8
2	<b>Trip Generation and Distribution:</b> Linear regression for activity and trip generation (specification, interpretation, estimation, hypothesis testing, market segmentation, nonlinear specification, tests on assumptions); Growth Factor and Synthetic Trip distribution methods.	10
3	<b>Mode Choice:</b> Mode choice and destination choice using discrete choice methods (introduction to binary logit and multinomial logit models, contrast with gravity methods)	10
4	<b>Traffic Assignment:</b> Traffic assignment/route choice (network equilibrium, system optimum)	9
5	<b>Activity Based modeling:</b> Microsimulation for activity-based models; Recent advances.	8
	<b>Total</b>	<b>45</b>

**Suggested Books:**

<b>S. No.</b>	<b>Name of Authors/Books/Publishers</b>	<b>Publishing year</b>
1	J. de D. Ortuzar and L.G. Willumsen, Modelling Transport (4th edition), John Wiley and Sons, 2011.,F. Koppelman and C.R	2011
2	Bhat. A Self-Instructing Course in Mode Choice Modeling: Multinomial and Nested Logit Models, 2006.,S. Washington, M.	2006
3	Karlaftis, F. Mannering. Statistical and econometric methods for transportation data analysis (2nd edition), CRC Press	2010

**Course Outcomes:***At the end of this course, students will be able to:*

CO1: Understand the base concepts and terminologies of Travel Demand Modelling

CO2: Analyse Trip Generation and distribution data.

CO3: Evaluate Mode choice models

CO4: Evaluate Traffic assignment problems

CO5: Interpret and understand activity based models

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	M							M			L		M
CO2	M	M		L					L					M
CO3	L	H	M		L			L	L		L	M		
CO4	M	H	L	L					L		L	M		
CO5	M	H									L			M

H = Highly Related

M = Medium

L=Low

<b>L-T-P</b>	<b>MCI138A-Pavement Construction and Maintenance</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To introduce the construction methods of highways and maintenance systems.

**Pre-requisite:** Pavement Design and Analysis

**Course details:**

<b>S. No.</b>	<b>Contents</b>	<b>Contact hours</b>
1	<b>Flexible Pavement Construction:</b> Construction methods, Quality control requirements, Tools required, IRC & MORT&H recommendations for construction	9
2	<b>Rigid Pavement Construction:</b> Construction methods, Quality control requirements, Joints in cement concrete pavements, Reinforced cement concrete road construction, IRC & MORT&H recommendations for construction	8
3	<b>Pavement Evaluation and Performance:</b> General concept of pavement evaluation, evaluation of pavement performance, evaluation of pavement structural capacity, evaluation of pavement distress, evaluation of pavement safety.	10
4	<b>Types of Distress:</b> Structural and functional, serviceability, fatigue cracking, pavement deformation and low temperature shrinkage cracking, Factors affecting performance, relation between performance and distress.	9
5	<b>Pavement Management System:</b> Introduction to Pavement Management System (PMS) & Maintenance Management System (MMS), construction, maintenance and rehabilitation. Feedback data system.	9
	<b>Total</b>	<b>45</b>

**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Introduction of flexible pavements Construction methods.

CO2: Introduction of rigid pavements Construction methods.

CO3: Analysis of Pavement Evaluation and Performance.

CO4: Analysis of types of distress.

CO5: Introduction of pavement management system.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H			M			L		M			L		M
CO2	M	M	L	L					L					M
CO3	L	L	M				M	L	L		L		L	
CO4	M	H	L	L					L			M		
CO5	M		L	M			L	M			L			M

H = Highly Related

M = Medium

L=Low

**Suggested Books:**

S. No.	Name of Authors/Books/Publishers	Publishing year
1	Hass, R., Hudson, W.R. and Zaniewski, J. "Modern Pavement Management" Krieger.	1994
2	Yoder E.J. <i>Principles of Pavement Design</i> . John Wiley&Sons, Inc.	1975
3	Khanna, S.K., Justo, C.E.G. <i>Highway Engineering</i> . Nem Chand Jain & Bros.	2005

<b>L-T-P</b>	<b>MCI142A- Geo-informatics in Transportation Engineering</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To familiarize students with the application of geo-informatics in transportation engineering.

**Pre-requisite:** Nil

**Course details:**

<b>S. No.</b>	<b>Contents</b>	<b>Contact hours</b>
1	<b>Concept of GIS and RS:</b> GIS, RS, and GPS, History, GIS for transportation in perspective, Spatial and Non spatial data for land use and transportation, Traffic Analysis Zone (TAZ) and screen lines, Network and Routes.	10
2	<b>Data base Development, Map Generation and Analysis:</b> Database domains and transactions, RDBMS and Entity Relationship (ER) diagram, Data base design, Concept of map layers, Land cover analysis., Network creation and linear route building, Map accuracy and location expression.	8
3	<b>Transportation Network Development and Algorithms:</b> Network development and management. Network properties. Shortest path algorithms. Transit network and paths	10
4	<b>Transportation Models and their Applications in GIS:</b> Transportation and land use Models. Linear and Network Models, Background and trends of GIS-T application. GIS-T application areas.	8
5	<b>Intelligent Transport Systems (ITS):</b> Components of ITS. Architecture and integration with GIS. Analysis and visualizations of traffic data in GIS. Integration of GPS and GIS	9
	<b>Total</b>	<b>45</b>

**Suggested Books:**

<b>S. No.</b>	<b>Name of Authors/Books/Publishers</b>	<b>Publishing year</b>
1	Hensher D. A., Button K. J., Haynes K. E., and Stopher P. R. (Eds.), Handbook of Transport Geography and Spatial Systems, Elsevier.	2004
2	Thill Jean-Claude, Geographical Information Systems in Transportation Research, Pergamon.	2000

3	Longley P. A., Barnsley M. J., Donnay Jean-Paul, Remote Sensing and Urban Analysis, Taylor & Francis.	2001
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**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Understand the base concepts and terminologies of GIS and Remote Sensing

CO2: Manage GIS database, analyse it and map generation

CO3: Analyse and develop transportation networks and algorithms

CO4: Apply transportation models with GIS data.

CO5: Understand the base concepts and terminologies of ITS

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	L							L			M		H
CO2	M	H			L								L	M
CO3	L	M						L			L	H		
CO4		M	L		L						L	M		
CO5	H	L	L		L				L			H	L	L

H = Highly Related

M = Medium

L=Low

## Specialization in Environment Engineering

L-T-P	MCI068B-Ecology and Environmental Impact Assessment	Credits: 3
3-0-0		

**Objective:** The course introduces the process of environmental impact assessment and policy decision making as required under the National Environmental Policy Act (NEPA) and the regulations of the Council of Environmental Quality (CEQ).

### Unit 1

**Ecology:** Classification of Ecosystems, Structure and Function of Ecosystems, Energy flow in Ecosystems, Ecological Niche and succession, Bio-geo-chemical cycles, Ecological Pyramids.

### Unit 2

**Aquatic and Terrestrial Ecosystems:** Diversity and dominance Indices, Ecosystem Models. Climate change and biodiversity

**Lake Ecosystem:** Trophic levels, nutrient loading, nutrient enrichment, Leibig's Law, control of eutrophication.

### Unit 3

**Environmental Impact Assessment:** Definition, Objectives, Types – Rapid and Comprehensive EIA, EIS, FONSI. Step by-step procedure for conducting EIA and Limitations of EIA, Prevention of Significant Deterioration (PSD) Programme. Carrying capacity concept.

### Unit 4

**Framework of Impact assessment:** Scope and contents of EIA, methodologies and techniques of EIA. Attributes, Standards and Value functions: Public participation in EIA. Environmental Management Plan (EMP) and Disaster Management Plan (DMP).

### Unit 5

EIA Case Studies –**Thermal Power Plant, Mining, Fertilizer, Construction Projects, Airport, Water and Wastewater Treatment Plants.**

### Course Outcomes:

*At the end of this course, students will be able to:*

**CO1:** Understand basic ecology and its classification..

**CO2:** Gain knowledge about aquatic and terrestrial ecosystems.

**CO3:** Gain knowledge about basics of EIA Process..

**CO4:** Gain knowledge about the Environmental Impact Assessment framework..

**CO5:** Understand detailed EIA Reports of various projects

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	H		H			M	L	H		L	M	H	L	M
CO2	M	L	L			H	M	M		M	M	H		L
CO3	M		L			L	H				M	H	M	H
CO4		M	M			L	H	L		H	M	H		
CO5	L	H	M			L	L	H			M	H	L	

H = Highly Related

M = Medium

L=Low

**Suggested Books:**

- 1) Krebs J. *Ecology - The Experimental Analysis of Distribution and Abundance*. Harper International
- 2) Hall C.A.S., Day J.W. *Ecosystem Modeling in Theory and Practice: An Introduction with Case Histories*. John Willey
- 3) EIA manual by MOEF.

<b>L-T-P</b>	<b>MCI069B-Wastewater Treatment Engineering</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To provide a basic description and understanding of the principal unit processes used in the treatment of wastewater. This will include coverage of the scientific basis of each unit process, as well as the conventional approach to their engineering design.

### Unit 1

**Introduction:** Biological Wastewater Treatment, Biological Sludge Treatment. Biological Systems: Fundamentals of Microbiology and Biochemistry, Bioenergetics and Metabolism, Kinetics of Biological Growth. Process Analysis: Reaction Rates, Effect of Temperature on Reaction Rate, Enzyme Reaction and Kinetics, Reactor Analysis, Residence Time Distribution.

### Unit 2

**Sewerage System:** Domestic wastewater characteristics, Flow equalization, population equivalent, Treatment flow chart. Primary, secondary and tertiary treatment of domestic wastewater. Downstream Wastewater Treatment for Reuse and Recycle – Need for downstream processing, Guidelines for wastewater recycling, Small and package plants for wastewater treatment.

### Unit 3

Activated sludge process design for nutrient removal, Process operation: (F/M), mean cell residence time, oxygen requirement. Biological and Chemical phosphorus removal, Sedimentation of Activated Sludge. Advanced Activated Sludge Process- Sequencing Batch Reactor, Oxidation Ditch and membrane bioreactors.

### Unit 4

Biofilm Process: Trickling Filter, Bio tower, Rotating Biological Contactor, Integrated Activated Sludge and Biofilm processes. Stabilization Ponds & Aerated Lagoons: Types and their description, Design, Operation and Maintenance.

### Unit 5

Anaerobic Processes: Process Description; Process Design, Operation and Maintenance; Sludge Digestion. Sludge Treatment- Thickening, Dewatering- Mechanical and Sludge drying Beds. Rural wastewater systems: Septic tanks, two-pit latrines, eco-toilet, soak pits

### Course Outcomes:

*At the end of this course, students will be able to:*

**CO1:** Ability to understand industrial waste water effects.

**CO2:** Knowledge about industrial wastewater standards and their monitoring.

**CO3:** Knowledge about various treatment techniques in specific industries.

**CO4:** Knowledge about complete industrial wastewater treatment systems.

**CO5:** Ability to understand anaerobic treatment processes.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	H		M		L	M		H		L	M	H	L	
CO2	M	L	M		M	H		M		M	M	H		M
CO3	M		M		H	L					M	H	M	H
CO4		M	M		H	L		L		H	M	H		
CO5	L	H	M		L	L		H			M	H	L	

H = Highly Related

M = Medium

L=Low

**Suggested Books:**

- 1) Metcalf, Eddy I. *“Wastewater Engineering - Treatment and Reuse*. Tata McGraw Hill Publishing Co. Ltd., New Delhi
- 2) Karia G.L. Christian R.A. *Wastewater Treatment Concepts and Design Approach*. Prentice Hall of India Pvt. Ltd., New Delhi

<b>L-T-P</b>	<b>MCI078B-Global Warming and Climate Change</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To provide an understanding of the factors responsible for climate change, the biological and sociological consequences of such changes; and the possible engineering, economic, and legal solutions to avoid more extreme perturbations

**Prerequisite:** Nil

**Course details:**

### **Unit 1**

Energy Issues and Climate Change, Alternate Energy Sources

### **Unit 2**

Green-House Effect as a Natural Phenomenon, GreenHouse Gases GHGs) and their Emission Sources  
Quantification of CO<sub>2</sub> Emission, Global Warming Potential (GWP) of GHGs.

### **Unit 3**

Modelling Climate change, Ozone layer depletion and its control, Impacts of climate change: Global and India, Temperature Rise, Sea Level rise, Coastal Erosion and landslides, Coastal Flooding, Wetlands, Estuaries Loss Impact of ocean current on global climate, EL-NINO & LA-NINA effects.

### **Unit 4**

Kyoto Protocol: Importance, Significance and its role in Climate Change. Carbon Trading - Mechanisms, Various Models (European, Indian) Global and Indian Scenario.

### **Unit 5**

Cleaner Development Mechanisms: Various Projects related to CO<sub>2</sub> Emission Reduction.  
Alternatives of Carbon Sequestration: Conventional and non-conventional techniques, Role of Countries and Citizens in Containing Global Warming.

### **Course Outcomes:**

*At the end of this course, students will be able to:*

**CO1:** Understand about climate change.

**CO2:** Gain knowledge about greenhouse effect, causes and prevention.

**CO3:** Gain knowledge about various effects of greenhouse.

**CO4:** Gain knowledge about carbon trading.

**CO5:** Understand projects related to carbon dioxide reduction



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	H		M	L		M		H		L	M	H	L	
CO2	M	L	M	M		H		M		M	M	H		M
CO3	M		M	M		L					M	H	L	H
CO4		M	M	M		L		L		H	M	H		
CO5	M	H	M	M		L		H			M	H	L	

H = Highly Related

M = Medium

L=Low

**Suggested Books:**

- 1) B. *Carbon Cycle Modelling*. John Wiley and Sons Publications
- 2) Linden E. *The Winds of Change: Climate, Weather and the Destruction of Civilizations*. Simon and Schuster Publications

## Specialization in Construction Engineering and Management

<b>L-T-P</b>	<b>MCI096B-Construction Project Management</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To understand the concepts of CPM & Measuring project progress & performance and Identification of risks and impact.

### Course details:

S. No.	Contents	Contact hours
1	Introduction to construction project management - CPM, PERT, PDM, LOB. Scope management, WBS, PDRI.	9
2	Time and cost management, material related management - purchase & inventory control, time-cost-resource optimization, quality, safety - planning & control.	9
3	Labor productivity variations, productivity improvement - work study.	9
4	Measuring project progress & performance - EVA & ES	9
5	Identification of risks and impact. Management Information systems	9
	<b>Total</b>	<b>45</b>

### Course Outcomes:

*At the end of this course, students will be able to:*

CO1: Ability to ensure that construction projects are completed on-time and within budget.

CO2: Able to apply different techniques for planning.

CO3: Able to apply PERT for predicting probability and time of completion of project.

CO4: Able to understand about CPM & PERT method.

Co5: Able to understand about MIS.

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PS O1	PS O2	PS O3
CO1	L						H					L	L	
CO2	M		L				M					L	L	
CO3	M	H		L			L					L	L	
CO4	M	M	M				L					L	L	
CO5	M						M					L	L	

**Suggested Books:**

S. No.	Name of Authors/Books/Publishers	Publishing year
1	Prasanna Chandra, Projects Planning, Analysis, Selection, Implementation, and Review. Bangalore: Tata McGraw Hill Publications	2019
2	Sengupta B., Guha H. <i>Construction Management and Planning</i> . New Delhi: Tata McGraw Hill Publication	
3	Alan Twort C., Gordon Rees J. <i>Civil Engineering Project Management</i> . New York: Elsevier Publications.	
4	Pilcher Roy. <i>Principles of Construction Management</i> . McGraw-Hill.	

<b>L-T-P</b>	<b>MCI103B- Construction Contracts and Specifications</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To understand procedures of tendering, contracts & its administration and various acts along with case studies.

#### **UNIT-1**

Professional Ethics, Duties and Responsibilities of Parties. Owner's and contractor's estimate, Bidding Models and Bidding Strategies, Qualification of Bidders.

#### **UNIT-2**

Tendering and Contractual procedures and Indian Contract Act 1872

#### **UNIT-3**

Definition of Contract and its Applicability, Types of Contracts, Clauses in Domestic and International Contracts - CPWD, MES, FIDIC, AIA, NEC, JCT, etc

#### **UNIT-4**

Contract Administration, Delay Protocol, Change Orders Analysis, Claim Management and Compensation, Disputes and Resolution Techniques.

#### **UNIT-5**

Arbitration and Conciliation Act 1996 and Arbitration Case Studies.

#### **Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Ability to understand Professional Ethics .

CO2: Able to understand tendering Indian Contract Act 1872.

CO3: understand Definition of Contract and its Applicability.

CO4: Able to understand Contract Administration.

Co5: Able to understand Arbitration and Conciliation Act 1996.

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PS O1	PS O2	PS O3
CO1	L		H		M		H		H			L		
CO2	M		L		M		M			H			L	
CO3	M	H		L		L	L	H		H		L		H
CO4	M	M	M		H		L		M			H	L	
CO5	M				M		M			H		L	L	

**Text/reference books:-**

1. Brian Greenhalgh. Introduction to Construction Contract Management. Routledge,2016.
2. Jimmie Hinze. Construction Contracts. McGraw Hill Education,2013.

<b>L-T-P</b>	<b>MCI102B-Construction Practices and Equipment</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To understand the characteristics and performances of equipment for major civil engineering activities.

**Pre-requisite:** Nil

**Course details:**

<b>S. No.</b>	<b>Contents</b>	<b>Contact hours</b>
1	Form work design and scaffolding, slip form and other moving forms, Shoring, Reshoring, and Back shoring in multistoried Building construction.	8
2	Prestressing, Steel and composites construction methods: Fabrication and erection of structures including heavy structures, Prefab construction, Industrialized construction, Modular coordination.	10
3	Special construction methods: High rise construction, Bridge construction including segmental construction, incremental construction and push launching techniques.	9
4	Factors affecting selection of equipment - technical and economic, Analysis of production outputs and costs	9
5	Characteristics and performances of equipment for major civil engineering activities such as Earth moving, erection, material transport, pile driving, Dewatering, and Concreting.	9
	<b>Total</b>	<b>45</b>

**Course Outcome:**

1. Able to design the formwork for multistory buildings
2. Learn about the composite construction method like prefabricated buildings and steel industry buildings
3. Learn about the more complex techniques for construction of high rise buildings and bridges.
4. Able to identify the proper equipment and its performance for various constructions.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PS O1	PS O2	PS O3
CO1							M			H		M		
CO2	M							L				L		
CO3					H							M		
CO4		H							L			L		M

H = Highly Related

M = Medium

L=Low

**Suggested Books:**

S. No.	Name of Authors/Books/Publishers	Publishing year
1	Mahlingam, B. Construction Techniques, Equipment and Practices. ARS Publications.	
2	Sharma S.C. "Construction Equipment and Management", Khanna Publishers New Delhi.	1988

<b>L-T-P</b>	<b>MCI099B- Construction Quality and Safety management</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To introduce and to relate the understanding regarding safety, injuries, assessment of quality in construction.

#### **UNIT-1**

Introduction to safety. Types of injuries, Factors affecting safety, Strategic Planning for safety provisions

#### **UNIT-2**

Personal & Structural safety - Safety consideration during construction, demolition and during use of equipment. Recording injuries and accident indices. Method statement, SOPs, PPE, Inspections, Investigations.

#### **UNIT-3**

Site safety programmes - JSA, JHA, Root cause analysis, meetings, safety policy, manuals, training & orientation. Safety legislation regard to violation.

#### **UNIT-4**

Introduction to quality, assurance, control and audit. Regulatory agent - owner, designer, contractor. Strategic Planning and control of quality during design and construction, Quality tools in construction projects, Customer satisfaction and QFD, Quantitative techniques in quality control, Quality assurance during construction, Inspection of materials and machinery

#### **UNIT-5**

Assessing quality. Teachings/findings of Gurus - Concept and philosophy of TQM, 6Sigma, ISO Certification.

IS codes and standards regard to quality & safety

#### **Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Ability to understand Introduction to safety .

CO2: Able to understand Personal & Structural safety.

CO3: understand Definition Site safety programmes.

CO4: Able to understand Introduction to quality, assurance, control and audit. Regulatory agent.

Co5: Able to understand Assessing quality.



Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PS O1	PS O2	PSO3
CO1	L		H		M		H		H			L		
CO2	M		L		M		M			H			L	
CO3	M	H		L		L	L	H		H		L		H
CO4	M	M	M		H		L		M			H	L	
CO5	M				M		M			H		L	L	

**Text/reference books:-**

1. Brian Thorpe, Peter Sumner. Quality Management in Construction. Gower Publishing, Ltd.,2004.
2. Bhattacharjee S. K. Safety Management in Construction. Khanna Publishers.
3. IS codes.

<b>L-T-P</b>	<b>MCI104B-Durability and Repair of Concrete Structures</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:** To understand properties of concrete and non-destructive testing, repairs, protection and retrofitting, durability based design of structures.

#### **UNIT-1**

Chemical composition of concrete, permeability and transport processes.

#### **UNIT-2**

Corrosion of reinforcement and pre-stressing steel in concrete.

#### **UNIT-3**

Carbonation, chloride attack, alkali-silica reaction, freeze-thaw attack, sulphate attack, acid attack.

#### **UNIT-4**

Effect of fire and high temperatures and seawater attack, cracking, weathering, biological processes.

#### **UNIT-5**

Non-destructive testing, repairs, protection and retrofitting, durability based design of structures.

#### **Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: Ability to understand Chemical composition of concrete.

CO2: Able to understand Corrosion of reinforcement and pre-stressing steel in concrete.

CO3: understand Definition of Carbonation, chloride attack.

CO4: Able to understand Effect of fire and high temperatures and seawater attack.

Co5: Able to understand Non-destructive testing, repairs.

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PS O1	PS O2	PS O3
CO1	L		H		M		H		H			L		H
CO2	M		L		M		M			H	H		L	
CO3	M	H		L		L	L	H		H		L		H
CO4	M	M	M		H		L		M		H	H	L	
CO5	M				M		M			H		L	L	H

**Text/reference books:-**

1. Varghese P.C. Maintenance, Repair & Rehabilitation and Minor Works of Buildings. PHI Learning Pvt. Ltd,2014.
2. Mays G.C. Durability of Concrete Structures: Investigation, repair, protection. CRC Press,1991.

<b>L-T-P</b>	<b>MCI145A- Composite Materials</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

**Objective:**

- To familiarize students with the application of composite materials in civil engineering.
- Familiarization with the basic expressions and methods used in the mechanics of composite structures. A complete theoretical and practical knowledge of composite materials.

**Prerequisite:** Nil

**Course details:**

<b>S. No.</b>	<b>Contents</b>	<b>Contact hours</b>
1	Introduction: Historical development, concept of composites, properties, classification, Constituent materials in composites	10
2	Laminae: Behavior of laminae, Stress strain concept, hooke's law, plane stress concept and assumptions, Mechanics of Composites, load transfer, Laminates, composite laminates, properties.	8
3	Laminated composites: Introduction, Introduction to Mechanics of Plates, Mechanical Behavior of Laminates, Laminate Plate Theory, Kirchhoff's Plate Theory, Classical Laminated Plate Theory, Structural Mechanics of Laminates, Special Classification of Laminates	10
4	Strength and Failure Theories, Strength of unidirectional composites and laminates, Failure Mechanics of Composites, Macromechanical Failure Theories/Failure Theories for Fiber Reinforced Materials.	8
5	Design Concepts, Manufacturing Composite laminates, Engineering Applications, Civil Engineering applications.	9
	<b>Total</b>	<b>45</b>

**Course Outcomes:**

*At the end of this course, students will be able to:*

CO1: understand the properties, classification of Constituent materials in composites

CO2: understand the Behavior of laminae

CO3: understand about the Mechanical Behavior of Laminates

CO4: Identify effective measures of Strength and Failure Theories

CO5: Design Concepts, Manufacturing Composite laminates

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome											Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	M		L			M		M	M	M	L		M
CO2	H	L		L			L		L	L	L		M	M
CO3	H	L	M				L		L	M	M	M		
CO4	M	H					H		L	M	M	M		
CO5	M	H			L		H		M	M	M			M

H = Highly Related

M = Medium

L=Low

**Suggested Books:**

S. No.	Name of Authors/Books/Publishers	Publishing year
1	Mathews F. L. and Rawlings R. D., "Composite Materials: Engineering and Science", 1st Edition, Chapman and Hall, London, England.	1994
2	Daniel, I. M. and Ishaai, O., "Engineering Mechanics of Composite Materials", , Oxford University Press.	2000
3	Chawla K. K., "Composite materials", Second Edition, Springer – Verlag.	1998



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# **SCHOOL OF ENGINEERING**

## **Syllabi and Course Structure**

### **B. Tech. - Computer Science & Engineering with Various Specialization (Session: 2022-2023)**

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The curriculum and syllabus for B.Tech. Program conforms to outcome based teaching learning process. In general, several outcomes have been identified and the curriculum and syllabus have been planned in such a way that each of the courses meets one or more of these outcomes. Student outcomes illustrate the students are expected to know and be able to do by the time of graduation. These relate to the skills, understanding, and behaviours that students acquire as they progress through the program. Further each course in the program brings out clear instructional objectives which are mapped to the student outcomes.

**B.Tech. (CSE) Program Educational Objective (PEO's):**

A graduate of the Computer Science and Engineering Program should:

**PEO- I**

Students will develop themselves as effective professionals by solving real problems through the use of computer science knowledge and with attention to team work, effective communication, critical thinking and problem solving skills.

**PEO- II**

Students will develop professional skills that prepare them for immediate employment and for life-long learning in advanced areas of computer science and related fields.

**PEO- III**

Students will demonstrate their ability to adapt to a rapidly changing environment by having learned and applied new skills and new technologies.

**PEO- IV**

Students will be provided with an educational foundation that prepares them for excellence, leadership roles along diverse career paths with encouragement to professional ethics and active participation needed for a successful career.

  
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## **Program Outcome (PO's)**

**A graduate of the Computer Science and Engineering Program will demonstrate:**

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

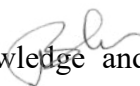
PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

  
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PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**Program Specific Outcome:**

PSO1: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.( Professional Skills)

PSO2: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success. (Problem-Solving Skills)

PSO3: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.( Successful Career and Entrepreneurship)

  
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<b>L-T-P</b>	<b>Communication Skills (DEN001C)</b>	<b>Credits 2-0-1 3</b>
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### **Course Objectives**

1. To enhance English language competence in reading, writing, listening and speaking.
2. Switch the approach from teacher-centred to student-centred one.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. To link communication skills with the organizational behaviour.
6. To inculcate skills which are very much required for employability and adjust in the professional environment.

### **Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in different contexts.

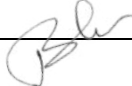
CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

CO5: Ability to showcase employability skills and professional writing skills

### **Syllabus: Theory**

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> <i>Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture</i>
<b>UNIT 2</b>	<b>Basic Writing Skills:</b> <i>Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration</i>
<b>UNIT 3</b>	<b>Composition:</b> <i>Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,</i>
<b>UNIT 4</b>	<b>Vocabulary Building:</b> <i>Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms</i>
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> <i>Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation</i>

  
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### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcome							Program Specific Outcome					
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6
CO1	3	2	3					2	3	3	2	3	3
CO2	2	3	3					1	2	3	3	3	2
CO3	3	2	1				3		1	3	2	2	3
CO4	2	3	3					2	2	3	3	3	3
CO5	3	3	3				3	3	1	1	3	3	3

#### ***Suggested Reading:***

- A. Practical English Usage. Michael Swan. OUP. 1995*
- B. Remedial English Grammar. F.T. Wood. Macmillan. 2007*
- C. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.*
- D. On Writing Well. William Zinsser. Harper Resource Book. 2001*
- E. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.*
- F. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.*
- G. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.*
- H. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006*

  
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<b>DCO001A</b>	<b>Computer Programming in C++</b>	<b>3: 0: 0</b>	<b>3</b>
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### OBJECTIVE:

- To perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members
- To demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance
- To demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems
- To learn syntax and features of exception handling
- To demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using applets

<b>UNIT 1</b>	C++ Overview, C++ Characteristics, Object-Oriented Terminology, Polymorphism, encapsulation ,inheritance, Object-Oriented Paradigm, Abstract Data Types, I/O Services, Standard Template Library, Standards Compliance, Functions and Variables. Declaration and Definition
<b>UNIT 2</b>	Variables: Dynamic Creation and Derived Data, Arrays and Strings in C++,Classes in C++, Defining Classes in C++, Classes and Encapsulation, Member Functions, Friend function ,Inline function
<b>UNIT 3</b>	Using Constructors, Multiple Constructors and Initialization Lists, Using Destructors to Destroy Instances, Using Destructors to Destroy Instances, Operator Overloading: operator overloading of unary and binary operator, Function Overloading, Working with Overloaded Operator Methods
<b>UNIT 4</b>	Constant and Static Class Members, Inheritance, Overview of Inheritance, Defining Base and Derived Classes, Single, Multiple, multilevel, hybrid hierarchical inheritance. Constructor and Destructor Calls in inheritance, virtual function, virtual base class,
<b>UNIT 5</b>	Input and Output in C++ Programs, Standard Streams, Manipulators, Unformatted Input and Output. Working with files.

### Course Outcome (CO):

At the end of this course, students will demonstrate ability to:

CO1: Understand object-oriented programming features in C++,

CO2: Apply these features to program design and implementation,

CO3: Develop applications using Object Oriented Programming Concepts

CO4: Implement features of object oriented programming to solve real world problems.

CO5: CO5: Develop the ability to implement software in high-level programming language like C++

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M												M		
CO2			H		H									H	<u>L</u>
CO3			H		M				M		M		H		
CO4				L								M		L	
CO5	H		H		M			L	M				H	M	

**Text Books**

1. Let Us C: BalaGuruswamy, TATA McGraw Hill.
2. Programming with C, C++: Yashwant Kanetkar


**Reference Books**

1. C++:The Complete Reference.
2. The C++ Programming Language:Bjarne Stroustrup

  
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<b>DCO002A</b>	<b>Computer Programming in C++Lab</b>	<b>0:0:2</b>
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1. Write a program for understanding of C++ program structure without any CLASS declaration. Program may be based on simple input output, understanding of keyword using.
2. Write a Program to Understand Structure & Unions.
3. Write a C++ program to demonstrate concept of declaration of class with public & private member, constructors, object creation using constructors, access restrictions, defining member functions within and outside a class. Scope resolution operators, accessing an object's data members and functions through different type of object handle name of object, reference to object, pointer to object, assigning class objects to each other.
4. Write a Program, involving multiple classes (without inheritance) to accomplish a task & demonstrate composition of class.
5. Write a Program to Demonstrate Friend function, classes and this pointer.
6. Write a Program to Demonstrate Inline functions.
7. Write a Program to Demonstrate pointers to derived classes.
8. Write a Program to demonstrate dynamic memory management using new & delete & static class members.
9. Write a Program to demonstrate an operator overloading, operator functions as member function and/ or friend function, overloading stream insertion and stream extraction, operators, overloading operators etc.
10. Write a Program to demonstrate use of protected members, public & private protected classes, multilevel inheritance etc.
11. Write a Program for multiple inheritance, virtual functions, virtual base classes, abstract classes
12. Write a Program to Demonstrate use of Constructors and Destructors.
13. Write a Program to Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism.

  
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<b>DEN002C</b>	<b>Professional Skills</b>	<b>2-0-1</b>
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### **Course Objectives**

1. To enhance Professional competence in reading, writing, listening and speaking.
2. Switch the approach from providing information about the language to use the language.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
6. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

### **Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in professional scenario.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels as per the demand of the corporate culture

CO5: Ability to enhance professional writing skills in tune with professional scenario.

### **Syllabus: Theory**

<b>UNIT 1</b>	<b>Professional Grooming and Professional Culture:</b> <i>Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management</i>
<b>UNIT 2</b>	<b>Advanced Grammar:</b> <i>Common errors related to prepositions, articles, models , Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents</i>
<b>UNIT 3</b>	<b>Composition:</b> <i>Memo, Notice, Circular, Book Review, Research Article, Reports</i>
<b>UNIT 4</b>	<b>Vocabulary Building:</b> <i>Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms</i>
<b>UNIT 5</b>	<b>Reading Comprehension:</b> <i>Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction,</i>

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcome							Program Specific Outcome					
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3					2	3	3	2	3	3
CO2	2	2	3					1	2	3	3	3	M
CO3	3	2	1				3		1	3	2	2	3
CO4	2	3	3					2	M	3	3	3	3
CO5	3	3	1					2	2	3	3	3	3

#### Suggested Readings:

1. Felix Eskey. Tech Talk, University of Michigan. 2005
2. Michael Swan. Practical English Usage, Oxford University Press. 2005
3. Anderson, Paul. Technical Communication: A Reader Centered Approach, V Edition, Hercourt, 2003.
4. Thampi, G. Balamohan. Meeting the World: Writings on Contemporary Issues. Pearson, 2013.
5. Lynch, Tony. Study Listening. New Delhi: CUP, 2008.
6. Kenneth, Anderson, Tony Lynch, Joan Mac Lean. Study Speaking. New Delhi: CUP, 2008.
7. Marks, Jonathan. English Pronunciation in Use. New Delhi: CUP, 2007.
8. Syamala, V. Effective English Communication For You (Functional Grammar, Oral and Written Communication): Emerald, 2002.

  
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BCO 035B	<b>Programming in Java</b>	<b>3:0:0 [3]</b>
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#### Objective

- Cover issues related to the definition, creation and usage of classes, objects and methods.
- Discuss the principles of inheritance and polymorphism and demonstrate through problem analysis assignments how they relate to the design of methods, abstract classes and interfaces.
- Provide the foundation of good programming skills by discussing key issues to the design of object-oriented software, including programming design patterns, automatic documentation techniques and programming testing.
- Cover the basics of creating APIs as well as allow students to explore the Java Abstract Programming Interface (API) and Java Collection Framework through programming assignments.
- Discuss basic principles and tools of collaborating programming (versioning systems, code review) and study their usage through group programming projects.

<b>UNIT 1</b>	<b>Java Fundamentals:</b> Features of Java ,OOPs concepts , Java virtual machine , Reflection byte codes ,Byte code interpretation , Data types, variable, arrays, expressions, operators, and control structures , Objects and classes
<b>UNIT 2</b>	<b>Java Classes:</b> Abstract classes ,Static classes ,Inner classes ,Packages,Wrapper classes Interfaces ,This ,Super ,Access control
<b>UNIT 3</b>	<b>Exception handling:</b> Exception as objects ,Exception hierarchy ,Try catch finally ,Throw, throws
<b>UNIT 4</b>	<b>IO package:</b> Input streams ,Output streams ,Object serialization ,De serialization ,Sample programs on IO files ,Filter and pipe streams
<b>UNIT 5</b>	<b>Multi threading:</b> Thread Life cycle ,Multi threading advantages and issues ,Simple thread program ,Thread synchronization .GUI: Introduction to AWT programming, Layout and component managers ,Event handling ,Applet class ,Applet life-cycle ,Passing parameters embedding in HTML ,Swing components – JApplet, JButton, JFrame, etc. Sample swing programs

#### Course Outcome:

At the end of this course student will:

CO1:Understand how object-oriented concepts are incorporated into the Java programming language

CO2: Develop problem-solving and programming skills using OOP concept

CO3:Understand the benefits of a well structured program

CO4:Develop the ability to solve real-world problems through software development in high-level programming language like Java

CO5:Develop efficient Java applets,threading and applications using OOP concept

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1		M		M	H				M		H		M	H	
CO2	L		M		H		L	L		M		M		H	M
CO3		M		H	M	L		L		M	H		M	H	
CO4			H	M			L		M		H		M	H	
CO5			H	M		L						M	H	H	

H = Highly Related; M = Medium L = Low

**References:**

1. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. Java Programming John P. Flynt Thomson 2nd
3. Java Programming Language Ken Arnold Pearson
4. The complete reference JAVA2, Herbert schildt. TMH

  
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DCO004A	Programming in Java Lab	0-0-2
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### 1. Operators and Expressions

- a. To write a java program to find the area of rectangle
- b. To write a java program to find the result of the following expressions
  - i)  $(a \ll 2) + (b \gg 2)$
  - ii)  $(b > 0)$
  - iii)  $(a + b * 100) / 10$
  - iv)  $a \& b$
 Assume  $a=10$  and  $b=5$
- c. To write a java program to print the individual digits of a 3 digit number.

### 2. Decision Making Statements

- a. write a java program to read two integers and print the larger number followed by the words "is larger" "If the numbers are equal print the message "These numbers are equal".
- b. To write a java program to read an integer and find whether the number is odd or eve
- c. To write a java program find the biggest of three integers.

### 3. Looping Statements

- a. To write a java program to find the sum of digits of a given number
- b. To write a java program to find the first 15 terms of Fibonacci sequence.
- c. To write a java program to print the Armstrong numbers.

### 4. Array

- a. To write a java program to find the largest and smallest number in an array.

### 5. Strings

- a. To write a java program that creates a string object and initializes it with your name and performs the following operations
  - i) To find the length of the string object using appropriate String method.
  - ii) To find whether the character 'a' is present in the string. If yes find the number of times 'a' appear in the name and the location where it appears

### 6. String Buffer

- a. To write a java program to create a StringBuffer object and illustrate how to append characters and to display the capacity and length of the string buffer
- b. To write a java program to create a StringBuffer object and illustrate how to insert characters at the beginning
- c. To write a java program to Create a StringBuffer object and illustrate the operations of the append () and reverse () methods.

  
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<b>BCO321B</b>	<b>Introduction to AI, Data Science, Ethics and Foundation of Data Analysis</b>	<b>3: 0: 0</b>
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Software Req: MS Office 2013/2016 Version Hours: 4 per Week

*Objectives: The objective of this course is to teach students the concepts of current main conceptual frameworks at use in AI*

## **UNIT – I**

**Introduction to AI:** What is AI, Turing test, cognitive modelling approach, law of thoughts, the relational agent approach, the underlying assumptions about intelligence, techniques required to solve AI problems, level of details required to model human intelligence, successfully building an intelligent problem, history of AI

## **UNIT – II**

**Introduction to Machine Learning:** What is Machine Learning, Learning from Data, History of Machine Learning, Big Data for Machine Learning, Leveraging Machine Learning, Descriptive vs Predictive Analytics, Machine Learning and Statistics, Artificial Intelligence and Machine Learning, Types of Machine Learning – Supervised, Unsupervised, Semi-supervised, Reinforcement Learning, Types of Machine Learning Algorithms, Classification vs Regression Problem, Bayesian, Clustering, Decision Tree, Dimensionality Reduction, Neural Network and Deep Learning, Training machine learning systems

## **UNIT – III**

**AI Research Trends:** Research trends in machine learning, deep learning, reinforcement learning, robotics, computer vision, natural language processing, collaborative systems, algorithmic game theory, internet of things (IoT), neuromorphic computing

**Applications of AI by domain:** Transportation, home/service robots, healthcare, education, low resource communities, public safety and security, employment and workplace, entertainment, finance, banking and insurance

## **UNIT – IV**

**Role of Artificial Intelligence in Society:** Societal challenges AI presents, Ethical and Societal implications, policy and law for AI, fostering dialogue, sharing of best practices

**Malicious Use of AI: Prevention and Mitigation:** Security relevant properties of AI, Security domains and scenarios: digital security, physical security, political security, factors affecting the equilibrium of AI and security

**Explainable AI:** Introduction to explainable AI, why explainable AI, interpretability and explainability, methods of interpretability and explainability

**Introduction to Data Analytics:** Working with Formula and Functions, Introduction to Charts, Logical functions using Excel, Analyzing Data with Excel.

  
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<b>BCO169B</b>	<b>Data Analysis using Python</b>	<b>3:0:0</b>
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**Software:** Python, NumPy, Pandas, Matplotlib, Seaborn, SciPy

*Objectives: The objective of this course is to teach students the concepts of Python Programming Language with Libraries*

#### **UNIT – I**

**Python programming Basic:** Python interpreter, IPython Basics, Tab completion, Introspection, %run command, magic commands, matplotlib integration, python programming, language semantics, scalar types. Control flow

**Data Structure, functions, files:** tuple, list, built-in sequence function, dict, set, functions, namespace, scope, local function, returning multiple values, functions are objects, lambda functions, error and exception handling, file and operation systems

#### **UNIT – II**

**NumPy: Array and vectorized computation:** Multidimensional array object. Creating ndarrays, arithmetic with numpy array, basic indexing and slicing, Boolean indexing, transposing array and swapping axes, universal functions, array-oriented programming with arrays, conditional logic as arrays operations, file input and output with array

**Pandas:** Pandas data structure, series, DataFrame, Index Object, Reindexing, dropping entities from an axis, indexing, selection and filtering, integer indexes, arithmetic and data alignment, function application and mapping, sorting and ranking, correlation and covariance, unique values, values controls and membership, reading and writing data in text format

#### **UNIT -III**

**Visualization with Matplotlib:** Figures and subplots, colors, markers, line style, ticks, labels, legends, annotation and drawing on subplots, matplotlib configuration

**Plotting with pandas and seaborn:** line plots, bar plots, histogram, density plots, scatter and point plots, facet grids and categorical data

<b>BCO370A</b>	<b>Digital Transformation and Agile Development</b>	<b>3-0-0</b>
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### Unit 1: Introduction to Digital Transformation

Introduction, Challenges of Traditional Business Model, Why Digital Transformation, Design Thinking, Different Phases of Design Thinking, Divergence, Emergence and Convergence of Design Thinking, Design Thinking vs. Agile vs. Lean, Agile Practices, Design Sprint and its Phases, Design Thinking Vs Design Spirit

### UNIT 2 Product Management

Introduction to Product Management & Service Mindset, Product Manager, Building Products and services, Product lifecycle and phases, product development & Methodology; systems thinking, value chain, Introduction of Capability Optimization and Capability Maturity Model, Business Integration methods, Agile methodology, Product Marketing; User Experience Design

### Unit 3: Agile Practices

Agile Methodology, Software, History of Software Engineering and Software, Development Methodologies, Traditional Software Development Models, Waterfall Model, Classical Waterfall Model, Traditional IT Organizations, Developers vs IT Operations Conflict, Birth of Agile, Four Values of the Agile Manifesto, Agile and Lean

### Unit 4: Agile & Scrum Methodology

Scrum, Scrum Theory, Scrum Values, Scrum Roles, Scrum Master Scrum Sprints, Benefits of Scrum, Planning and Estimation, Agile Planning, Levels of Agile Planning, Conditions of Satisfaction, Velocity, Estimating Techniques, Soft Skills in Agile, Kanban Model.

### Unit 5: Kanban Principles

Kanban Principle, Kanban Board, Kanban Core Practices, Make work visible, Limit work in progress (WiP), Manage flow, Make progress policies explicit, Implement feedback mechanisms, Improve collaboratively (using methods and models).

  
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<b>BCA371A</b>	<b>Software Craftsmanship</b>	<b>3-0-0</b>
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### Unit 1: Introduction to Software Craftsmanship

Definition, History of the emergence of software craftsmanship, Software craftsmanship, Process versus paradigm, Software development processes, Software development models, Software design paradigms, Software development paradigms, Major programming paradigms Procedural programming paradigm, Object-oriented programming paradigm, Functional programming paradigm, Dimensions of craftsmanship, Craftsmanship - Mastery of the paradigm Describing and defining well-crafted code, Becoming a craftsman, The programming process

### Unit 2: Code Design

Clean code and its fundamental concepts, Code Design, Software design considerations, Kent Beck's principle of simple design, Fundamental characteristics of good design, Design Patterns: Reusing best practices, SOLID design principles, Programming Principles

### Unit 3: Code Structure

Classes, packages and methods: building blocks of code, organizing code: the size of methods and classes, What makes methods and classes "good", Software metaphors, Objects and data structures, data transfer objects, Using libraries, Overview of the best practices in structure: Law of demeter and open close principle,

### Unit 4 Code Formatting & Documentation


Introduction, Variants, Vertical Openness, Vertical Density, Distance and Ordering, Naming Best Practices, Intention-Revealing Names, Avoid Mental Mappings, Naming Classes, Methods and Functions, Comments, Writing Code Documentation

### Unit 5: Testing Debugging & Refactoring

Testing and Debugging, Basic Test-driven Development (TDD), Categories of TDD and Unit tests, Unit Testing Techniques, Automating Testing Using Junit, Refactoring: Improving Structure, Refactoring: Changing Code Structure without Changing Functionality, The need for Refactoring, The Refactoring Process and the Different Levels of Refactoring, Refactoring Strategies, Code Smells: Symptoms of Poorly Designed Code, Categories of Code Smells, Code Base, Using Frameworks & Tools

### Course OUTCOME (CO):

- CO1: Explain the essentials of software craftsmanship.
- CO2: Understand the clean code concepts and code design.
- CO3: Understand the concept of classes and packages.
- CO4: Understand the working with functions.
- CO5: Explore Testing and refactoring concepts.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	L	L	M	L	L	L			L	L	L	L	M	H	M
CO2	L	L	M	L	L				L	L	L	L	M	H	M
CO3	L	M	L	L	L					L		L	M	H	M
CO4	L	M	L	L	L		L			L		L	M	H	M
CO5	L	L	L	L	L	M			L	L		L	M	H	M


H = Highly Related; M = Medium; L = Low

**Text Books:**

1. The Software Craftsman: Professionalism, Pragmatism, Pride, Sandro Mancuso, Pearson Education

**Reference Books:**

2. Fundamentals of Software Architecture:An Engineering Approach, Mark Richards, Neal Ford, O'Reilly
- Clean Code: A Handbook of Agile Software Craftsmanship, Robert C. Martin, Prentice Hall

  
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<b>BCA373A</b>	<b>DevOps Engineering</b>	<b>3-0-0</b>
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## UNIT 1: Introduction to DevOps

Definition of DevOps: Challenges of traditional IT systems & processes, History and emergence of DevOps, DevOps definition and principles governing DevOps, DevOps and Agile, The need for building a business use case for DevOps, Purpose of DevOps, Application Deployment, Automated Application Deployment, Application Release Automation (ARA), Components of Application Release Automation (ARA), Continuous Integration, Best Practices of CI, Benefits of CI, Continuous Delivery, Process

## Unit 2: Typical Toolkit for DevOps

DevOps: An Overview, Achieving DevOps, Continuous Practices, Continuous Integration (CI), How does CI Work?, Continuous Integration Practices, Benefits of Continuous Integration A Quick Recap of Continuous Delivery, Continuous Delivery Process, Benefits of Continuous Delivery, Continuous Deployment, Continuous

## UNIT 3: Source Code Management


History of Version Control Systems (VCS), Basic operations in a VCS, Examples of version control systems, Subversion (SVN), Features and Limitations, Mercurial, Git, Overview, History - Linux and Git by Linus Torvalds, Advantages of Git, Explain how local version control works, Centralized Version Control Systems (CVCS), Distributed Version Control Systems (DVCS), advantages of DVCS, Private Workspace

## Unit 4: Application Containerization

Understanding Containers: Transporting Goods Analogy, Problems in Shipping Industry before Containers, Shipping Industry Challenges, Container: Virtualization Introduction, Hypervisor, Scope of Virtualisation, Containers vs Virtual Machines, Understanding Containers, Containerisation Platform, Runtime and Images, Container Platform, Container Runtime, The Chroot System, FreeBSD Jails, Linux Containers (LXC), Docker

## UNIT 5: Introduction to Containerization

Docker architecture, Docker Daemon (Container Platform), Docker Rest API, CLIDifferent environments: (Dev, QA and Prod), Overcoming issues with different environments, Development Environment Docker Swarm and Kubernetes, Architecture, AWS (ECS,EKS), AWS Elastic Container Services Architecture, Azure Kubernetes Services, Openshift, KUBERNETES ON CLOUD, Monitoring of container

  
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**COURSE OUTCOME (CO):**

CO1: Explore the advent of software engineering.

CO2: Analyse the challenges in traditional IT System

CO3: Learn the purpose and benefits of DevOps.

CO4: Understand the CAMS methods.

CO5: Learn the concepts of Test-Driven Development

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	L	M	M	H	L	L			L	L			L	L	L
CO 2	L	M	M	H	L							L	L	L	L
CO 3	L	M	M	M	L							L	L	L	L
CO 4	L	M	M	M	L							L	L	L	L
CO 5	L	M	M	M	L							L	L	L	L

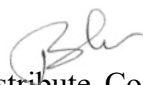
H = Highly Related; M = Medium; L = Low

**Text Books:**

- The DevOps Handbook - Book by Gene Kim, Jez Humble, Patrick Debois, and Willis Willis

**Reference Books:**

1. What is DevOps? - by Mike Loukides
2. Git Essentials: Create, Merge, and Distribute Code with Git, Ferdinando Satacroce, Packt Publishing

  
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<b>BCO353A</b>	<b>Foundation of Artificial Intelligence &amp; Machine Learning</b>	<b>3-0-0</b>
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#### UNIT I Foundations of AIML

Introduction and history of AI, Sources of Data, Introduction to AI, A Brief History of Data Science, Introduction to Machine Learning, History of AI, categories of ML systems, An Introduction to AI, ML and AI Overlap with Each Other? Applications of ML, Types of Data, Organization of Structured Data, Examples of Structured Data, Expansion of Structured Data, What is Semi-structured Data?

#### UNIT II Basic Statistical Concepts

Introduction to Statistics, Classification of Statistical Methods, Descriptive Statistics, Inferential Statistics, Scale of Measurements (Nominal, Ordinal, Ratio and Interval), Nominal Scales, Nominal Scales, Ratio Scales, Mean, Median, Mode, Measures of Variability/Spread, range, Quartiles and Interquartile Range, Standard Deviation (SD), Measures of Shape, Skewness, Kurtosis

#### UNIT III Probability Theory

Principles of Counting, Introduction and Definitions of Probability Theory, Conditional Probability, Bayes Theorem, Discrete Probability Distribution, Covariance and Correlation, Continuous Probability Distribution, Central Limit Theorem, Hypothesis Testing

#### UNIT IV Matrices

Introduction to Matrices, Matrix Notations and Types, Matrix Equality, Operations on Matrices, Determinants, Singularity of a Matrix, Orthogonal Matrix, Elementary Transformations and elementary matrices, Echelon forms and echelon transformations, Matrix Rank and Normal Form of a matrix, Vector Spaces and the axioms, Linear Dependence and Independence of vectors, Consistency of linear system of equations, Eigenvalues and eigenvectors, Cayley Hamilton Theorem, Linear Transformation and Orthogonal transformation, Matrix Factorization and Types

#### UNIT V Linear Algebra

Introduction to Linear Algebra, Notations in Linear Algebra, Important Concepts of Linear Algebra, Definitions of Linear Algebra, Introduction to mathematical modeling, Applications of mathematical modeling, Principles and stages involved in developing a mathematical model, Classification of mathematical modeling, Conceptualizing a mathematical model, Concept of boundary conditions

<b>BCO354A</b>	<b>Python Programming</b>	<b>3-0-0</b>
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## UNIT I Setting up the Python Environment

Compiler vs. Interpreter, Statically vs. Dynamically Typed Languages, Introduction to Python, Installing Python, Anaconda, Jupyter Notebook, Spyder, Components and Versions of Python, Difference between Python 2 and Python 3, Python Distributions

## UNIT II Programming with Python

Python REPL, Variables, control structures, functions and objects, First-class functions, immutable data, strict and non-strict evaluation, Recursion instead of an explicit loop state, Functions, iterators, and generators, Writing pure functions, functions as first-class objects, Using strings, tuples and named tuples, Using lists, dicts, and sets, The itertools module, Best practices and clean coding, Reading data files into Python, writing files, Introduction to Python libraries

## UNIT III Data Preprocessing

Introduction, Introduction to Pandas and Basic Concepts of Pandas, Data Cleaning and Preparation, Handling Missing Data, Filtering out Missing Data, Filling in Missing Data, Data Transformation, Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Renaming Axis Indexes, Discretization and Binning, Detecting and Filtering Outliers, Permutation and Random Sampling, String Manipulation, Feature Engineering

## Unit IV Statistical Modeling

Derived Variables, Basic Exploratory Data Analysis, Methods for EDA and Examples, Statistical Modeling, Curve Fitting: Linear Regression, Nonlinear Regression

  
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<b>BCO427A</b>	<b>Python Programming Lab</b>	<b>3-0-0</b>
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1. Setting up the Python Environment using Anaconda IDE : Know Jupyter & Spyder
2. Write a program to perform Functions in Python
3. Write a program in Python First Class Functions & Immutable Data
4. Write a program in Python exploring Iterators
5. Write a program in Python exploring Generators
6. Work in Python using Collections
7. Write a program in Python to perform Higher Order Function-I
8. Write a program in Python to perform Higher Order Functions-II
9. Write a program in Python to perform File Operation in Python
10. Write a program in Python to perform Data Preprocessing
11. Write a program in Python to perform Exploratory Data Analysis
12. Write a program in Python to actuate Curve Fitting

  
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<b>BCO 173A</b>	<b>Certified Secure Computer User</b>	<b>4-0-0 [4]</b>
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### Course Outcomes:

CO1: Understand the need and importance of data security.

CO2: Ability to implement Operating System security measures.

CO3: Understand the threats associated with email communications and safeguarding against them.

CO4: Ability to make informed decisions for securing cloud, mobile devices and network connections.

CO5: Knowledge of Data Backup and Disaster Recovery.

### Syllabus:

<b>Module</b>	<b>Topics</b>
Module 1. Introduction To Data Security	<ul style="list-style-type: none"> <li>● Data–Digital Building Blocks</li> <li>● Importance of Data in the Information Age</li> <li>● Threats to Data</li> <li>● Data Security</li> <li>● Potential Losses Due to Security Attacks</li> <li>● Implementing Security</li> </ul>
Module 2. Securing Operating Systems	<ul style="list-style-type: none"> <li>● Guidelines to Secure Windows</li> <li>● Guidelines to Secure Mac OS X</li> </ul>
Module 3. Malware and Antiviruses	<ul style="list-style-type: none"> <li>● What is Malware</li> <li>● Types of Malware</li> <li>● Symptoms of Malware Infection</li> <li>● Antivirus</li> <li>● Configuring and Using Antivirus Software</li> <li>● How to Test If an Antivirus is Working</li> </ul>
Module 4. Internet Security	<ul style="list-style-type: none"> <li>● Understanding Web Browser Concepts</li> <li>● Understanding IM Security</li> <li>● Understanding Child Online Safety</li> </ul>
Module 5. Security On Social Networking Sites	<ul style="list-style-type: none"> <li>● Understanding Social Networking Concepts</li> <li>● Understanding Various Social Networking Security Threats</li> <li>● Understanding Facebook Security Settings</li> <li>● Understanding Twitter Security Settings</li> </ul>
Module 6. Securing Email Communications	<ul style="list-style-type: none"> <li>● Understanding Email Security Concepts</li> <li>● Understanding Various Email Security Threats</li> <li>● Understanding Various Email Security Procedures</li> </ul>
Module 7. Securing Mobile Devices	<ul style="list-style-type: none"> <li>● Understanding Mobile Device Security Concepts</li> <li>● Understanding Threats to a Mobile Device</li> <li>● Understanding Various Mobile Security Procedures</li> <li>● Understanding How to Secure iPhone and iPad Devices</li> <li>● Understanding How to Secure Android Devices</li> <li>● Understanding How to Secure Windows Devices</li> </ul>

	<ul style="list-style-type: none"> <li>● Mobile Security Tools</li> </ul>
Module 8. Securing The Cloud	<ul style="list-style-type: none"> <li>● The Concept of Cloud</li> <li>● How Cloud Works</li> <li>● Threats to Cloud Security</li> <li>● Safeguarding Against Cloud Security Threats</li> <li>● Cloud Privacy Issues</li> <li>● Addressing Cloud Privacy Issues</li> <li>● Choosing a Cloud Service Provider</li> </ul>
Module 9. Securing Network Connections	<ul style="list-style-type: none"> <li>● Understanding Various Networking Concepts</li> <li>● Understanding Setting Up a Wireless Network in Windows</li> <li>● Understanding Setting Up a Wireless Network in Mac</li> <li>● Understanding Threats to Wireless Network Security and Countermeasures</li> <li>● Measures to Secure Network Connections</li> </ul>
Module 10. Data Backup and Disaster Recovery	<ul style="list-style-type: none"> <li>● Data Backup Concepts</li> <li>● Types of Data Backups</li> <li>● Windows Backup and Restore Procedures</li> <li>● MAC OS X Backup and Restore Procedures</li> <li>● Understanding Secure Data Destruction</li> </ul>

### CO-PO Mapping:

<i>Cours e Outco mes</i>	<i>Program Outcomes</i>												<i>Program Specific Outcomes</i>		
	<b>P O1</b>	<b>P O2</b>	<b>P O3</b>	<b>P O4</b>	<b>P O5</b>	<b>P O6</b>	<b>P O7</b>	<b>P O8</b>	<b>P O9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PS O1</b>	<b>PS O2</b>	<b>PS O3</b>
CO1	L	M	M	H	H	M		H	M	L		H	H	H	H
CO2	L	M	M	H	H	M		H	M	L		H	H	H	H
CO3	L	M	M	H	H	M		H	M	L		H	H	H	H
CO4	L	M	M	H	H	M		H	M	L		H	H	H	H
CO5	L	M	M	H	H	M		H	M	L		H	H	H	H

  
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BCO 118A	Data Science Methodology, Data Science 101	1: 0:0	1
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### Data Science Methodology

- **Module 1: From Problem to Approach:** Business Understanding, Analytic Approach
- **Module 2: From Requirements to Collection:** Data Requirements, Data Collection
- **Module 3: From Understanding to Preparation :**Data Understanding,Data Preparation
- **Module 4: From Modeling to Evaluation:** Modeling,Evaluation
- **Module 5: From Deployment to Feedback:** Deployment,Feedback

### Data Science

- **Module 1 - Defining Data Science :**What is data science?, There are many paths to data science, Any advice for a new data scientist?, What is the cloud?, Data Science: The Sexiest Job in the 21st Century"
- **Module 2 - What do data science people do?:**A day in the life of a data science person,R versus Python?,Data science tools and technology, "Regression"
- **Module 3 - Data Science in Business:** How should companies get started in data science?,Tips for recruiting data science people,"The Final Deliverable"
- **Module 4 - Use Cases for Data Science:**Applications for data science,"The Report Structure"
- **Module 5 -Data Science People:**Things data science people say., "What Makes Someone a Data Scientist?"



<b>BCO 117A</b>	<b>Data Visualisation</b>	<b>2: 0:0</b>	<b>2</b>
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## Chapter 1: Introduction to Statistics

Introduction to Statistics, Descriptive vs Inferential Statistics,

## Chapter 2 : Inferential Statistics

Drawing Inferences from Data, Random Variables, Normal Distribution, Sampling, Sample Statistics and Sampling Distribution

## Chapter 3 - R overview and Installation

Overview and About R, Installing RStudio

## Chapter 4 - Descriptive Data Analysis using R

Description of Basic Functions used to Describe Data in R

## Chapter 5: Data Manipulation with R

Introduction to dplyr (filter, select, arrange, mutate, summarize), Introduction to data.table

Introduction to reshape2 package, Introduction to tidyr package, Introduction to Lubridate package

## Chapter 6: Data Visualisation with R

Data Visualisation with R, Working with ggplot2,

## Chapter 7: Data Visualisation in Watson Studio

Data Visualisation in Watson Studio, Adding Data to Data Refinery, Visualization of Data on Watson Studio

## Chapter 8: Introduction to Python

Python and Anaconda Installation, Introduction to Jupyter Notebook, Python Scripting Basics

## Chapter 9: Numpy and Pandas

Numpy overview - Creating and Accessing Numpy Arrays, Introduction to Pandas, Pandas read and write csv, Descriptive Statistics using Pandas, Pandas Working with Text Data and DateTime Columns, Pandas Indexing and Selecting Data, Pandas- groupby, Merge/Join Datasets

## Chapter 10: Introduction to Data Visualization Tools in Python

Introduction to Matplotlib, Read a CSV and Generate a Line Plot with Matplotlib

Chapter 11: Basic Plots using Matplotlib

Area Plot, Bar Chart, Histogram

Chapter 12 : Specialized Visualization Tools using Matplotlib

Pie Charts, Box Plot, Scatter Plots, Bubble Plots

Chapter 13: Advanced Visualization Tools using Matplotlib

Waffle Chart, Word Clouds

Chapter 14: Introduction to Seaborn

Introduction to Seaborn, Seaborn Functionalities and Usage

Chapter 15: Spatial Visualizations and Analysis in Python with Folium

Introduction to Folium, Case Study

  
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<b>BCO 119A</b>	<b>Introduction to Python</b>	<b>3:0:0</b>
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## **Introduction to Python**

### Chapter 1: Introduction to Python

What is Python ?, Advantages and disadvantages, Downloading and installing, Python versions, Running Python scripts, Using the interpreter interactively, Using variables, String types: normal, raw, and Unicode, String operators and functions, Math operators and functions, Writing to the screen

### Chapter 2: Deep Dive into Python

Reading from the keyboard, Indenting is significant, Boolean, The if and elif statements, While loops, Using lists, Dictionaries, Using the 'for' statement, Tuples, Opening, reading, and writing a text file

### Chapter 3: Python Libraries

Using Pandas—the Python data analysis library, Series and Data Frames, Grouping, aggregating, and applying, Merging and joining

### Chapter 4: Error Handling

Dealing with syntax errors, Exceptions

### Chapter 5: Other Topics

RE objects, Pattern matching, Parsing data

### Chapter 6: Regression (Use Case Study)

Introduction to regression, Why use regression analysis ?, Types of regression

### Chapter 7: Other Regression Related Topics

Exploratory Data Analysis, Correlation Matrix, Visualizations using matplotlib, Implementing Linear Regression, Use Case: Churn Analysis, Implementing Linear Regression (using Scikit Learn), Results of Linear Regression

### Chapter 8: Advance

Machine Learning Algorithms, Support Vector Machine, Random Forest

<b>BCO 120A</b>	<b>Introduction to Machine Learning with Sound Lab</b>	<b>0: 0:2</b>	<b>2</b>
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IBM Watson Studio

Lab 1: Gather and prepare the data

Lab 2: Build a machine learning model

Lab 3: Create predictions in a Node-RED application

Lab 4: Create multiclass classification models, IBM Watson Visual Recognition

Lab 5: Create UIs and integrate visual recognition

  
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<b>BCO 011A</b>	<b>COMPUTER NETWORKS</b>	<b>3-1-0 [4]</b>
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### OBJECTIVES:

- To build an understanding of the fundamental concepts of computer networking.
- To familiarize the student with the basic taxonomy and terminology of the computer networking area.
- To introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- To allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

<b>UNIT 1</b>	Introduction -Hardware and software, Data communication, Networking, Protocols and standards. Data transmission concepts. Analog and digital transmission. Transmission impairments. Layered Architecture of Computer Networks, OSI and TCP/IP architectures Physical Layer- Guided transmission media and wireless transmission, Data encoding - Digital and analog data. Data communication interface - asynchronous and synchronous transmission, Data link layer - Flow control. Error detection and error control. HDLC and other data link protocols. Multiplexing – Frequency-division, synchronous time-division, and statistical time-division multiplexing
<b>UNIT 2</b>	Link Layer: Medium Access Control: CDMA, ALOHA, and Ethernet; Link Layer Addressing and Forwarding; Spanning Trees; The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANs, Broadband Wireless, Bluetooth, Data Link Layer Switching, Switched networks. Circuit-switched networks, switching concepts, Routing in circuit-switched networks. Control signaling. Packet switching principles. Routing and congestion control
<b>UNIT 3</b>	Network Layer: Network layer design issues. Routing algorithms , Flooding, Shortest path routing, Link State routing, Hierarchical routing, Broadcast and multicast routings, Routing in the Internet, Path Vector routing, OSPF routing. The network layer in the Internet: IP protocol: ARP and RARP, BOOTP, ICMP, DHCP, Network Address Translation(NAT) Internetworking
<b>UNIT 4</b>	Transport Layer:TCP introduction, Reliable/Un- Reliable Transport, TCP, UDP, Congestion Control, Intra-Domain Routing: Distance-Vector, Intra-Domain Routing: Link- State, Wireless Networks: 802.11 MAC, Efficiency considerations
<b>UNIT 5</b>	Application Layer: DNS-The Domain Name System, Electronic Mail, HTTP, FTP, Simple network management protocol (SNMP), The World Wide Web

### Course Outcome (CO) of Computer Network

At the end of this course students will have:

CO1: To provide an in-depth understanding of the terminology of network and concepts of OSI reference model and TCP/IP model.

CO2: To equip our students with technical concept of protocols, network interfaces, and design/performance issues in networks.

CO3: To be familiar with contemporary issues in networking technologies.

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CO4: To be familiar with network tools and to enhance analytical skills to develop innovative solutions.

CO5: To be familiar with message structure used in various type of network applications using the various protocols like SMTP,HTTP,FTP.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H			L									H		
CO2	M		H									L		L	
CO3		M							M				M		L
CO4					H										L
CO5	H	H		M						M	M	L	M	L	

H = Highly Related; M = Medium L = Low

#### Text Books:

1. Computer Networks, by Andrew S Tanenbaum, PHI. (2010)

#### Reference Books:

- Data Communications, Computer networking on OSI , by Fred Halsall, Addison Wesley Publishing Co.1998
- Computer Networking -A Top-Down Approach Featuring the Internet ,James F. Kurose and Keith W. Ross ,Addison Wesley Publishing Co. 2004
- Computer Networks: Protocols standards and interfaces , by Uyles Black, Prentice Hall.2002
- Data communication & Networks , by Behrou A. Forouzan, Tata McGraw Hill. 2002
- Data and Computer Communications, by Walliam Stallings, PHI. (2002)

  
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BCO 002B	DATA STRUCTURES AND ALGORITHMS	3-1-0 [4]
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**OBJECTIVE:**

- To study various data structure concepts like Stacks, Queues, Linked List, Trees and Files
- To overview the applications of data structures.
- To be familiar with utilization of data structure techniques in problem solving.
- To have a comprehensive knowledge of data structures and algorithm.
- To carry out asymptotic analysis of algorithm.

<b>UNIT 1</b>	Introduction: Notions of data type, abstract data type and data structures. Importance of algorithms and data structures in programming. Notion of Complexity covering time complexity, space complexity, Worst case complexity & Average case complexity. BigOh Notation, Omega notation, Theta notation. Examples of simple algorithms and illustration of their complexity. Sorting- Bubble sort, selection sort, insertion sort, Quick sort; Heap sort; Merge sort; Analysis of the sorting methods. Selecting the top k elements. Lower bound on sorting.
<b>UNIT 2</b>	Stack ADT, Infix Notation, Prefix Notation and Postfix Notation. Evaluation of Postfix Expression, conversion of Infix to Prefix and Postfix Iteration and Recursion- Problem solving using iteration and recursion with examples such as binary search, Fibonacci numbers, and Hanoi towers. Tradeoffs between iteration and recursion.
<b>UNIT 3</b>	List ADT. Implementation of lists using arrays and pointers. Stack ADT. Queue ADT. Implementation of stacks and queues. Dictionaries, Hash tables: open tables and closed tables. Searching technique- Binary search and linear search, link list- single link list, double link list, Insertion and deletion in link list.
<b>UNIT 4</b>	Binary Trees- Definition and traversals: preorder, post order, in order. Common types and properties of binary trees. Binary search trees: insertion and deletion in binary search tree worst case analysis and average case analysis. AVL trees. Priority Queues -Binary heaps: insert and delete min operations and analysis.
<b>UNIT 5</b>	Graph: Basic definitions, Directed Graphs- Data structures for graph representation. Shortest path algorithms: Dijkstra (greedy algorithm) and Operations on graph, Worshall's algorithm , Depth first search and Breadth-first search. Directed acyclic graphs. Undirected Graphs, Minimal spanning trees and algorithms (Prims and Kruskal) and implementation. Application to the travelling salesman problem.

**Course OUTCOME (CO):**

CO1: Show the understanding of various data structure concepts like Stacks, Queues, Linked List, Trees and Files

CO2: Understand the applications of data structures.

CO3: Understand with utilization of data structure techniques in problem solving.

CO4: Use comprehensive knowledge of data structures and algorithm.

CO5: Use asymptotic analysis of algorithm.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H												M		
CO2			H		M								M		
CO3		H							M			L		H	
CO4	H	M											L		L
CO5		M		H											L

H = Highly Related; M = Medium; L = Low

**Text Books:**

1. Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft, Addison-Wesley Series (1983)

**Reference Books:**

1. T.H. Cormen, C.E. Leiserson, and R.L. Rivest. Introduction to Algorithms. The MIT Press and
2. McGraw-Hill Book Company, Cambridge, Massachusetts, 1990 (Available in Indian Edition).
3. Steven S. Skiena. The Algorithm Design Manual. Springer, Second Edition, 2008.
4. Data Structures and Algorithm Analysis in Java (3rd Edition) by Mark Allen Weiss, Addison Wesley (2011).

  
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<b>BCO 008B</b>	<b>OPERATING SYSTEMS</b>	<b>3-0-0 [3]</b>
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### **OJECTIVE:**

- To understand the structure and functions of OS
- To learn about Processes, Threads and Scheduling algorithms
- To understand the principles of concurrency and Deadlocks
- To learn various memory management schemes
- To study I/O management and File systems

<b>UNIT 1</b>	Introduction : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Monolithic and Microkernel Systems.
<b>UNIT 2</b>	Process Management-Process & Threads – Process States - Process Control Block – Process Scheduling – Operations on Processes, Threads, CPU Scheduler – Preemptive and Non- Preemptive; Dispatcher, Scheduling Criteria, Scheduling Algorithms – Process Management in UNIX
<b>UNIT 3</b>	Process Synchronization & Inter process Communication-Concurrent Processes, Co-operating Processes, Precedence Graph, Hierarchy of Processes, Critical Section Problem – Two process solution, Synchronization Hardware, Semaphores – Deadlock- detection, handling, prevention, avoidance, recovery, Starvation, Critical Regions, Monitors, Inter process communication
<b>UNIT 4</b>	Memory Management-Objectives and functions, Simple Resident Monitor Program (No design), Overlays – Swapping; Schemes – Paging – Simple, Multi-level Paging; Internal and External Fragmentation; Virtual Memory Concept, Demand Paging – Page Interrupt Fault, Page Replacement Algorithms; Segmentation – Simple, Multi-level, Segmentation with Paging, Memory Management in UNIX.
<b>UNIT 5</b>	I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

### **Course Outcome (CO):**

At the ends of this course students will have:

- CO1: Classify Unix Kernel mode with user mode & contrast between Kernel structures.
- CO2: Identify and estimate process management & thread management strategies along with their different operations
- CO3: Implement different system calls for various file handling operations.
- CO4: Determine paging and Caching techniques related to Virtual Memory.
- CO5: Ability to understand and analyze various disk scheduling and file system techniques

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i><b>Course Outcome</b></i>	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H			M				L			L		H		L
CO2		M	L						M					M	
CO3			M		M									M	M
CO4	M		L									L			
CO5	M	M		H					L				M	M	


H = Highly Related; M = Medium L = Low

***Text Books:***

1. Operating Systems Concepts – Silberschatz, Galvin, Wiley Publications (2008)
2. Modern Operating Systems - Andrew S. Tanenbaum, Pearson Education Asia / PHI(2005)

***Reference Books:***

1. Operating Systems – William Stallings, Pearson Education Asia (2002)
2. UNIX System Programming Using C++, by Terrence Chan: Prentice Hall India, 1999.
3. Advanced Programming in UNIX Environment, by W. Richard Stevens: 2nd Ed, Pearson Education, 2005

  
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<b>BCO 232A</b>	<b>SOFTWARE ENGINEERING AND PROJECT MANAGEMENT</b>	<b>3-0-0 [3]</b>
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### Objective

- To learn about generic models of software development process.
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the different design techniques and their implementation.
- To learn various testing and maintenance measures

<b>UNIT 1</b>	Introduction- Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Engineering aspects of Software production – necessity of automation .Job responsibilities of Programmers and Software Engineers as Software developers. Software Development Life Cycle (SDLC)
<b>UNIT 2</b>	Process Models and Program Design Techniques- Software Development Process Models – Code & Fix model, Waterfall model, Incremental model, Rapid Prototyping model, Spiral (Evolutionary) model. Software Requirement Specifications (SRS), Management of User Needs, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, Design Techniques – Structured Programming, Coupling and Cohesion, Abstraction and Information Hiding, Software Modeling Tools –Data flow Diagrams, UML and XML.
<b>UNIT 3</b>	Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Verification and Validation: Testing of Software Products – Black-Box Testing and White-Box Testing, Static Analysis, Symbolic Execution and Control Flow Graphs –Cyclomatic Complexity. Maintenance and its need and types of maintenance. CASE tools & graphical reporting tools.
<b>UNIT 4</b>	Project Management: project, project specification parameters, principle & life cycle, project management Plan, why the project is delayed? and scheduling activities, critical Path, PERT& CPM. Monitoring & Control: Change Control, Software Configuration Management (SCM).
<b>UNIT 5</b>	Quality Management and People Management- Introduction, Understanding Behavior, Organizational Behavior, Selecting The Right Person For The Job, Motivation, The Old man – Hackman Job Characteristics Model , Working in Groups, Organization and team structures, Decision Making, Leadership, Organizational Structures, Stress, Health And Safety.

  
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## Course Outcome (CO):

At the end of this course students will have:

- CO1. Learn about software and models of software development process and their implementation prospects
- CO2. To understand fundamental concepts of requirements engineering and Analysis Modelling.
- CO3. To understand the importance of software testing and implementation of various testing approaches.
- CO4. To learn about importance of project management and monitoring of software projects
- CO5. To learn about software quality management and people management

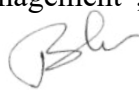
## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L		H		M						L				
CO2		H		H								M	M		
CO3								H	M	L				H	
CO4	L		L			L	M								L
CO5	H				H	M		M			H		M		

H = Highly Related; M = Medium L = Low

## Text Books:


- Fundamentals of Software Engineering – Carlo Ghezzi et al.
- Software Engineering – Design, Reliability Management – Pressman.
- Bob Hughes, Mike Cotterell, “Software Project Management”, Tata McGraw Hill. (2009)

  
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## Reference Books:

- Software Engineering – Ian Sommerville.

- Software Engineering - Shoeman.
- Software Engineering with Abstraction – Berzins and Luqi
- Pankaj Jalote, Software Engineering, Wiley.
- Royce, “Software Project Management”, Pearson Education. (2005).
- Robert K. Wysocki, “Effective Software Project Management”, Wiley.(2006)

  
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BCO 014B	OPERATING SYSTEMS LAB	0-0-2 [2]
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### List of Experiments

Experiment No	Aim
1	Write a C program to implement the various process scheduling mechanisms such as FCFS scheduling.
2	Write a C program to implement the various process scheduling mechanisms such as SJF Scheduling.
3	Write a C program to implement the various process scheduling mechanisms such as Round Robin Scheduling.
4	Write a C program to implement the various process scheduling mechanisms such as Priority Scheduling.
5	To implement deadlock avoidance & Prevention by using Banker's Algorithm.
6	To implement page replacement algorithms FIFO (First In First Out).
7	To implement page replacement algorithm LRU (Least Recently Used).
8	To implement page replacement algorithms Optimal (The page which is not used for longest time)
9	To implement the memory management policy- Paging.
10	To implement the memory management policy-segmentation.
11	Write a C Program to implement Sequential File Allocation method.
12	Write a C Program to implement Indexed File Allocation method.
13	Write a C Program to implement Linked File Allocation method.
14	Write a program to implement multi program variable task (MVT).
15	Write a program to implement multi program fixed task (MFT).

### **Course Outcome (CO):**


At the ends of this course students will have:

- CO1: Classify Unix Kernel mode with user mode & contrast between Kernel structures.
- CO2: Identify and estimate process management & thread management strategies along with their different operations
- CO3: Implement different system calls for various file handling operations.
- CO4: Determine paging and Caching techniques related to Virtual Memory.
- CO5: construct shell scripts.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i><b>Cours e Outco me</b></i>	<b>Program Outcome</b>												<b>Program Specific Outcome</b>		
	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H			M				L			L		H		L
CO2		M	L						M					M	
CO3			M		M									M	M
CO4	M		L									L			
CO5	M	M	L	M								L	H		

H = Highly Related; M = Medium L = Low

  
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BCO 005B	DATA STRUCTURE AND ALGORITHMS LAB	0-0-2 [1]
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### **List of Experiments**

1. Write a program to implement following searching algorithms using array data structure
  - 1.1 Matrix Addition and Subtraction
  - 1.2 Matrix Multiplication and Transpose
2. Write a program to implement following searching algorithms using array data structure
  - 2.1. Linear Search
  - 2.2. Binary Search
3. Write a program to implement following searching algorithms using array data structure
  - 3.1. Insertion Sort
  - 3.2 Bubble Sort
4. Write a program to implement following searching algorithms using array data structure
  - 4.1. Selection Sort
  - 4.2 Quick Sort
5. Write a program to implement following operations on stack using array data structure.
  - 5.1 Traversing
  - 5.2 Push
  - 5.3 POP
6. Write a program to implement following examples of recursion
  - 6.1 Fibonacci Series
  - 6.2 Factorial Function
  - 6.3 Tower of Hanoi
7. Write a program to implement Merge Sort.
8. Write a program to implement following operations on Queue using array data structure.
  - 8.1 Insertion8.2 Deletion8.3 Traversing
9. Write a program to implement Postfix evaluation.
10. Write a program to implement Infix to Postfix Notation.
11. Write a program to implement following operations on Link List data structure.
  - 11.1 Insertion at beginning
  - 11.2 Insertion at last
  - 11.3 Insertion at any location
12. Write a program to implement following operations on Link List data structure.
  - 12.1 Deletion at beginning
  - 12.2 Deletion at last
  - 12.3 Deletion at any location
13. Write a program to implement Doubly Link List
  - 13.1 Insertion13.2 Traversing

  
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14. Write a program to implement Breadth First Search Algorithm.

15. Write a program to implement Depth First Search Algorithm.

**Course Outcomes:**

CO1: Show the understanding of various data structure concepts like Stacks, Queues, Linked List, Trees and Files

CO2: Understand the applications of data structures.

CO3: Understand with utilization of data structure techniques in problem solving.

CO4: Use comprehensive knowledge of data structures and algorithm.

CO5: Use asymptotic analysis of algorithm.

  
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<b>BCO355A</b>	<b>Supervised Learning in Machine Learning</b>	<b>3-0-0</b>
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## UNIT I: Difference Between Supervised and Unsupervised Learning

Machine learning, why we need machine learning, machine learning process State the different types of learning: Supervised, unsupervised and reinforcement learning,, Detailing out on labeled data and its types, classification and regression models, unlabeled data and its types, clustering model; Gradient Descent- Overview, Gradient Descent, Finding a Minimum Using Gradient Descent, Estimating the Gradient, Using the Gradient Descent, Example, Loss Function, Different Loss Functions,

## UNIT II: Regression Techniques

Regression Technique, Origin of Regression, Regression in Real World, regression concepts, Regression Types, Linear Regression Types, Linear Regression Variance, Co-Variance, Linear Regression Correlation Coefficient, OLS, R Squared, Goodness of fit, Linear Regression Using Gradient Descent, Gradient Descent Explained with an Example, Stochastic Gradient Descent, Cost Function –Partial Derivative, Testing Model Using Cross Validation, Cross Validation Types, regularized regression, Ridge Regression, lasso regression, L1 vs L2 Norm – Regression, Generalized Linear Regression, RANDOM COMPONENT OF A GLM

## UNIT III: Classification Techniques- Decision Tress

Classification Technique, Decision Tree, Decision Tree Illustration using Sample Dataset, concept of homogeneity., entropy, Entropy Explained with Rainfall Example, plot of entropy versus the proportionsm, Information Gain, Algorithms to Create a Decision Tree, Gini Index, Truncation and Pruning, Decision Tree Working Methodology, Decision Tree Tuning Parameters

## UNIT IV: Classification Techniques- Naïve Bayes

Naïve Bayes, bayes theorem., Example, Naïve Bayes Algorithm for Categorical Data, Popular Naive Bayes Classifiers, Types of Naive Bayes Classifier, Naïve Bayes for Text Classification, popular naive bayes classifiers, Naïve Bayes Algorithm, K Nearest Neighbour classification , Curse of Dimensionality, K-Factor, Implementation of KNN using Python

## UNIT V Ensemble Methods

Ensemble Methods ,Why Ensemble?, Example, Methods for Constructing Ensemble, advantages and disadvantages of ensembling. Random Forest, Random Forest Example, Random Forest Use Case, Random Forest Algorithm, Comparing other Models Accuracy, Bootstrapping and Bagging, Out of Bag Error, OOB Score Before Tuning, OOB and Hyper Parameter Tuning, Ensemble Model Using Majority Voting, Gradient Boosting, Weak Learner, Gradient Boosting Example, Moving towards XGBoost, Parameters of XGBoost

<b>BCO356A</b>	<b>Supervised Learning in Machine Learning Lab</b>	<b>3-0-0</b>
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### **List of Programs**

1. Understanding the Learning Implementation on Jupyter Notebook
2. Using NumPy functions in Jupyter
3. Using Pandas in Jupyter
4. Using SciPy in Jupyter
5. Using Simple Linear Regression, calculate Gradient and Cost minimum, Along with line of best fit.
6. Understand Linear Regression and other regression techniques using house prices prediction dataset.
7. Understanding Decision tree with sample dataset.
8. KNN algorithm explained with Cancer Data. (Using Python)
9. Identifying optimal K value in K-means Clustering algorithm. (Using Python)
10. Random Forest algorithm explained with classification and Regression (Using Python)
11. Implement Gradient Boosting Machine using Python.
12. Understand Logistic Regression model using Iris dataset (using Python)

  
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<b>BCO 376A</b>	<b>UI Specialist</b>	<b>3-0-0 [3]</b>
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**OBJECTIVE:**

- Introduction to HTML5, CSS3
- Introduction to modern JavaScript

<b>UNIT 1</b>	Intoduction, Need of HTML, HTML Tags, HTML Elements, Formatting Text in HTML, Headings,HTML Paragraphs,Identifying HTML Elements, HTML Basics & Attributes,HTML Links, Lists, Colors, Tables, Symbols, Attributes, Overview of Attributes, Core Attributes, Styles, Class Attribute, Generic Attributes
<b>UNIT 2</b>	HTML5 introduced features, HTML5 form validate/no validate, HTML5 canvas, embedding audio, and video in a webpage, drag and drop,HTML5 Local Storage, HTML5 web workers and server sent events, HTML Attributes, Forms, Form Validation, Validation to HTML Page , CSS Semantics, CSS Selectors CSS Styling, CSS Color, CSS Backgrounds, Borders, Margins, Padding, Box Model, Heightwidth, Tables, Selectors, Display,CSS Buttons, CSS Animation, CSS Display, CSS Float & Clear, CSS Overflow, CSS Align- Horizontal & Center Responsive Web Design, View Port, Grid View, Media Queries, Flex Box
<b>UNIT 3</b>	Javascript, importance, What can JavaScript Do, Need of Javascript, Javascript with HTML Content, HTML Attributes, HTML DOM Elements Java script with CSS, HTML Nodes, Syntax, Rules, Writing Javascript, Tags, Programming Errors, Syntax Error, Runtime Error, Logical Errors, Data Types, Non-primitive, Javascript Data Types, Objects in Javascript, Events in Javascript Objects, Changing HTML Styles, Events, Event Handler Attributes, Adding Event Handlers, Using Element Attribute directly, Using Event Attribute, Using HTML DOM, Reacting to Events
<b>UNIT 4</b>	Introduction, Execution of Functions, Invoking Functions, As methods, As constructor, call(), arguments, apply(), bind(), Nesting Functions & Closure, Objects, Primitive Values, Strings & Objects, Creating JS Object, Literal Syntax, New Keyword,Adding Methods to Objects
<b>UNIT 5</b>	Creating arrays, elements in array access, changing array elements, objectsVs Arrays, recognizing Arrays, Looping Array, Array Methods, Adding Array Elements using Array Methods, Removing Last Array Elements, Converting Array into Strings, Converting and Joining Array into Strings with special separator, Array Methods & Manipulations, Sorting Array Methods , Iteraion Methods, The Map()

**Course OUTCOME (CO):**

CO1: Explain the essentials of HTML.

CO2: Understand the CSS Styling and selectors

CO3: Understand the JavaScript need and implementation.

CO4: Understand the JavaScript Functions, Objects and Events CO5: Explore JavaScript Arrays

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2	PS O3
CO1	L	L	M	L	L	L			L	L	L	L	M	H	M
CO2	L	L	M	L	L				L	L	L	L	M	H	M
CO3	L	M	L	L	L					L		L	M	H	M
CO4	L	M	L	L	L		L			L		L	M	H	M
CO5	L	L	L	L	L	M			L	L		L	M	H	M


H = Highly Related; M = Medium; L = Low

**Text Books:**

- 1) Head First HTML and CSS: A Learner's Guide to Creating Standards-Based Web Pages, Second Edition (Greyscale Indian Edition), Elisabeth Robson, O'Reilly
- 2) JavaScript from Beginner to Professional: Learn JavaScript quickly by building fun, interactive, and dynamic web apps, games, and pages, Laurence Lars Svekis, Rob Percival, Maaiké van Putten, Packt

**Reference Books:**

- 1) HTML & CSS: The Complete Reference, Fifth Edition, Thomas Hill, McGraw-Hill

  
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- 2) Responsive Web Design with HTML5 and CSS - Fourth Edition: Build future-proof responsive websites using the latest HTML5 and CSS techniques, Ben Frain, Packt
- 3) Head First JavaScript Programming: A Brain-Friendly Guide, Elisabeth Robson and Eric Freeman, O'Reilly
- 4) JavaScript Cookbook: Programming the Web, Third Edition, Adam D Scott, Matthew MacDonald and Shelley Powers, O'Reilly

  
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BCO 373A	THINK PYTHON	3-1-0 [4]
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**OBJECTIVE:**

- Explain how to get the Python environment up and running and the basics of Python programming language.
- Describe how to program using Python, by learning concepts like variables, flow controls, data types, type conversion, objects, and classes; functions and how they are considered as objects; basics of iterators and generators; Python as a functional programming language and the concepts that help understand the functional programming aspect.
- Discuss the methods involved in data preprocessing and how outliers can be detected and treated.
- Define the basic concepts of exploratory data analysis and statistical modeling.

<b>UNIT 1</b>	Compiler vs. Interpreter, statically vs. Dynamically Typed Languages, Introduction to Python, Installing Python, Anaconda, Jupyter Notebook, Spyder, Components and Versions of Python, Difference between Python 2 and Python 3, Python Distributions
<b>UNIT 2</b>	Python REPL, Variables, control structures, functions and objects, First-class functions, immutable data, strict and non-strict evaluation, Recursion instead of an explicit loop state, Functions, iterators, and generators, writing pure functions, functions as first-class objects, Using strings, tuples and named tuples,
<b>UNIT 3</b>	Using lists, dicts, and sets, The itertools module, Best practices and clean coding, Reading data files into Python, writing files,, Introduction to Python libraries
<b>UNIT 4</b>	Introduction to Pandas and Basic Concepts of Pandas, Data Cleaning and Preparation, Handling Missing Data, filtering out Missing Data, Filling in Missing Data, Data Transformation, Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Renaming Axis Indexes, Discretization and Binning, Detecting and Filtering Outliers, Permutation and Random Sampling, String Manipulation, Feature Engineering
<b>UNIT 5</b>	Derived Variables, Basic Exploratory Data Analysis, Methods for EDA and Examples, Statistical Modeling, Curve Fitting: Linear Regression, Nonlinear Regression

**Course OUTCOME (CO):**

CO1: Understand working with the IDEs and installation of important libraries.

CO2: Understand Python flow, structure, and functions.

CO3: Explore working with Python Lists

CO4: Explore the key concepts of pandas and data transformation.

CO5: Understand the working of derived variables.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M	M	L	L		L			L	L			M	H	L
CO2	M	H	H	H	L							L	M	H	M
CO3	M	H	H	H				L				L	M	H	M
CO4	M	H	H	H			L				L	L	M	H	M
CO5	M	M	M	M					L			L	M	H	M


H = Highly Related; M = Medium; L = Low

**Text Books:**

1. Head-First Python, 2nd edition: Paul Barry (O'Reilly, 2016)

**Reference Books:**

- a. Dive into Python, Mike
- b. Introduction to Machine Learning with Python by Andreas C. Müller, Sarah Guido

  
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BCO 235A	PROBABILISTIC MODELLING AND REASONING WITH PYTHON	2-0-0 [2]
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**Software:** Python, NumPy, Pandas, Matplotlib, Seaborn, SciPy

**Objectives:** *The objective of this course is to teach students the concepts of Statistics, probability, probability distribution, and other statistical methods to solve various engineering problems*

## UNIT – I

**Introduction to Statistics:** Introduction to Statistics. Role of statistics in scientific methods, current applications of statistics.

**Scientific data gathering:** Sampling techniques, scientific studies, observational studies, data management.

**Data description:** Displaying data on a single variable (graphical methods, measure of central tendency, measure of spread), displaying relationship between two or more variables, measure of association between two or more variables.

## UNIT – II

**Probability Theory:** Sample space and events, probability, axioms of probability, independent events, conditional probability, Bayes' theorem.

**Random Variables:** Discrete and continuous random variables. Probability distribution of discrete random variables, binomial distribution, poisson distribution. Probability distribution of continuous random variables, The uniform distribution, normal (gaussian) distribution, exponential distribution, gamma distribution, beta distribution, t-distribution,  $\chi^2$  distribution. Expectations, variance and covariance. Probability Inequalities. Bivariate distributions

## UNIT -III

**Point Estimations:** Methods of finding estimators, method of moments, maximum likelihood estimators, bayes estimators. Methods of evaluating estimators, mean squared error, best unbiased estimator, sufficiency and unbiasedness

**Interval Estimations:** Confidence interval of means and proportions, Distribution free confidence interval of percentiles

## UNIT - IV

**Test of Statistical Hypothesis and p-values:** Tests about one mean, tests of equality of two means, test about proportions, p-values, likelihood ratio test, Bayesian tests

**Bayesian Statistics:** Bayesian inference of discrete random variable, Bayesian inference of binomial proportion, comparing Bayesian and frequentist inferences of proportion, comparing Bayesian and frequentist inferences of mean

**Univariate Statistics using Python:** Mean, Mode, Median, Variance, Standard Deviation, Normal Distribution, t-distribution, interval estimation, Hypothesis Testing, Pearson correlation test, ANOVA F-test

  
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<b>BCO280B</b>	<b>R Programming for Data Science and Data Analysis</b>	<b>3-0-0</b>
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Objectives: The objective of this course is to teach students R Programming Language, basic functions in R programming language and critical techniques

Reference Books:

- Achim Klenke, (2014), Probability Theory A Comprehensive Course Second Edition, Springer, ISBN 978-1-4471-5360-3
- Christian Heumann, Michael Schomaker Shalabh (2016), Introduction to Statistics and Data Analysis With Exercises, Solutions and Applications in R, Springer International Publishing, ISBN 978-3-319-46160-1

Course Rationale: The course begins with the study of R Programming

Course Objectives:

R is a programming language for statistical computing and graphics that you can use to clean, analyze, and graph your data. It is widely used by researchers from diverse disciplines to estimate and display results and by teachers of statistics and research methods

Learning & Course Outcomes:

On completion of this course, the students are expected to learn

1. Open Source. ...
- 2) Platform Independent. ...
- 3) Machine Learning Operations. ...
- 4) Exemplary support for data wrangling. ...
- 5) Quality plotting and graphing. ...
- 6) The array of packages. ...
- 7) Statistics. ...

## UNIT – I

Getting Started with R and R Workspace: Introducing R, R as a programming Language, the need of R, Installing R, RStudio, RStudio's user interface, console, editor, environment pane, history pane, file pane, plots pane, package pane, help and viewer pane

R Workspace, R's working directory, R Project in R Studio, absolute and relative path, Inspecting an Environment, Inspect existing Symbols, View the structure of object, Removing symbols, Modifying Global Options, Modifying warning level, Library of Packages, Getting to know a package, Installing a Package from CRAN, Updating Package from CRAN, Installing package from online repository, Package Function, Masking and name conflicts

## UNIT – II

Basic Objects and Basic Expressions: Vectors, Numeric Vectors, Logical Vectors, Character Vectors, subset vectors, Named Vectors, extracting element, converting vector, Arithmetic operators, create Matrix, Naming row and columns, subsetting matrix, matrix operators,

creating and subsetting an Array, Creating a List, extracting element from list, subsetting a list, setting value, creating a value of data frame, subsetting a data frame, setting values, factors, useful functions of a data frame, loading and writing data on disk, creating a function, calling a function, dynamic typing, generalizing a function. Assignment Operators, Conditional Expression, using if as expression and statement, using if with vectors, vectorized if: ifelse, using switch, using for loop, nested for loop, while loop

### UNIT – III

Working with Basic Objects and Strings: Working with object function, getting data dimensions, reshaping data structures, iterating over one dimension, logical operators, logical functions, dealing with missing values, logical coercion, math function, number rounding functions, trigonometric functions, hyperbolic functions, extreme functions, finding roots, derivatives and integration, Statistical function, sampling from a vector, Working with random distributions, computing summary statistics, covariance and correlation matrix, printing string, concatenating string, transforming text, Formatting text, formatting date and time, formatting date and time to string, finding string pattern, using group to extract data, reading data

### UNIT – IV

Working with Data – Visualize and Analyze Data: Reading and Writing Data, importing data using built-in-function, READR package, export a data frame to file, reading and writing Excel worksheets, reading and writing native data files, loading built-in data sets, create scatter plot, bar chart, pie chart, histogram and density plots, box plot, fitting linear model and regression tree

#### Reference Books:

- Hands-On Programming with R by Garrett Golemund
- R for Data Science by Hadley Wickham & Garrett Golemund

<b>BCO 339A</b>	<b>EC-Council Certified Security Specialist</b>	<b>4-0-0 [4]</b>
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### Course Outcomes:

CO1: Identify information security threats which reflect on the security posture of the organization

CO2: Knowledge of networks and various components of the OSI and TCP/IP model

CO3: Identify different types of cryptographic principles, cryptography attacks, and cryptanalysis tools.

CO4: Fundamentals of ethical hacking and pen testing

CO5: Understanding E-mail crime, computer forensics and writing investigative reports

### Syllabus:

<b>Module 1</b>	Information Security Fundamentals
<b>Module 2</b>	Networking Fundamentals
<b>Module 3</b>	Secure Network Protocols
<b>Module 4</b>	Information Security Threats and Attacks
<b>Module 5</b>	Social Engineering
<b>Module 6</b>	Hacking Cycle
<b>Module 7</b>	Identification, Authentication, and Authorization
<b>Module 8</b>	Cryptography
<b>Module 9</b>	Firewalls
<b>Module 10</b>	Intrusion Detection System
<b>Module 11</b>	Data Backup
<b>Module 12</b>	Virtual Private Network
<b>Module 13</b>	Wireless Network Security
<b>Module 14</b>	Web Security
<b>Module 15</b>	Ethical Hacking and Pen Testing
<b>Module 16</b>	Incident Response
<b>Module 17</b>	Computer Forensics Fundamentals
<b>Module 18</b>	Digital Evidence
<b>Module 19</b>	Understanding File Systems
<b>Module 20</b>	Windows Forensics
<b>Module 21</b>	Network Forensics and Investigating Network Traffic
<b>Module 22</b>	Steganography
<b>Module 23</b>	Analyzing Logs

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<b>Module 24</b>	E-mail Crime and Computer Forensics
<b>Module 25</b>	Writing Investigative Report

**CO-PO Mapping:**

<i><b>Cours e Outco mes</b></i>	<i><b>Program Outcomes</b></i>												<i><b>Program Specific Outcomes</b></i>		
	<b>P O 1</b>	<b>P O 2</b>	<b>P O 3</b>	<b>P O 4</b>	<b>P O 5</b>	<b>P O 6</b>	<b>P O 7</b>	<b>P O 8</b>	<b>P O 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PS O1</b>	<b>PS O2</b>	<b>PS O3</b>
CO1	L	M	M	H	H	M		H	M	L		H	H	H	H
CO2	L	M	M	H	H	M		H	M	L		H	H	H	H
CO3	L	M	M	H	H	M		H	M	L		H	H	H	H
CO4	L	M	M	H	H	M		H	M	L		H	H	H	H
CO5	L	M	M	H	H	M		H	M	L		H	H	H	H

  
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<b>BCO 121A</b>	<b>Rapid Development for AI (AI Services)</b>	<b>3-0-0 [3]</b>
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#### Module 1: Introduction to Watson

Introduction to Watson, AI Lifecycle Management Tools, Pre-built Watson Applications, Watson API's, Watson Solutions,

#### Module 2: Natural Language Understanding

Overview, Case Study, Curl Setup, Node JS Setup, API Documentation, Resources, Introduction to IBM Watson Knowledge Studio,

#### Module 3: Conversational AI

The Principles of Conversational AI, What is Chatbot?, Introduction to Watson Assistant, Understanding User Intent from a message, Build and train the NLU classifier, Building the Chatbot,

#### Module 4: Build Your Own AI using Watson Tools

Watson Knowledge Catalog, Watson Studio-To Build and Test Custom AI models, Watson Machine Learning- To deploy and monitor AI models,

  
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<b>BCO 122A</b>	<b>Text Analytics 101</b>	<b>3-0-0 [3]</b>
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## COURSE SYLLABUS


Module 1 - Getting to know Information Extraction (IE)

Module 2 - Getting to know SystemT

Module 3 - IE with AQL

Module 4 - AQL Basics

Module 5 - Advanced AQL

  
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<b>BCO 123A</b>	<b>IBM Watson Studio</b>	<b>2-0-0 [2]</b>
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## Module 1: Overview

IBM Watson Studio, About Assets, Asset Types, Lineage, Profiles, Previews, IBM Watson APIs

## Module 2: Projects

Projects, Exporting Projects, Environment, Stopping Active Runtimes, Jobs

## Module 3: Preparing Data

Getting and Preparing Data in a Project, Refining Data, Data Annotation, Python Model Operator, Buckets, File paths, and Partitions in Cloud Object Storage, Cloud Function Operator, Event Streams (Source) Operator, Installing Python Libraries, MQTT (Source and Target) operators, Buckets, file paths, and partitions in Cloud Object Storage, Cloud Function operator, SPSS model operator, Event Streams (Source) operator, Congestion, Clickstream Example Streams Flow, Tutorials for streams flows, Tutorial: Design and create a streams flow in the canvas, Tutorial for using a predictive model with streaming data, Tutorial for metrics, Troubleshooting a streams flow

## Module 4: Data Science

Data Science, The cells in a Jupyter notebook, Deep learning libraries for notebooks, Using project-lib for Python, Using Python functions to work with Cloud Object Storage, Scheduling a notebook, Classification and Regression, Clustering, Survival Analysis, SPSS model visualizations, Random trees, RStudio

## Module 5: Machine Learning & AI Models

Machine Learning & AI Models, Training, Developing Apps, Machine Learning, Watson machine learning plans and compute usage, Watson Machine Learning authentication, AutoAI tutorial: Build a binary classification model, Machine Learning tutorials, Deep Learning sample apps, Python Flask tutorial: Build a web app that recognizes hand-drawn digits, Deploying an AutoAI model, Synthesized Neural Networks, Downloading and using NeuNetS models locally, Modeling, SQL optimization, End-to-end example for running a deep learning training run, Deep Learning Experiment Builder, Importing models into Watson Machine Learning, Deploying a model, Overview: Deploying Python functions in Watson Machine Learning, Managing models

## Module 6: Catalogs

Catalogs with IBM Watson Knowledge Catalog, Integrating with Information Governance Catalog

## Module 7: Governance

Data governance with Watson Knowledge Catalog, Data protection



BCO412A	Formal Language and Automata Theory (TCS)	3-0-0
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**Introduction:** Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.

**Regular languages and finite automata:** Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, *Kleene's theorem*, pumping lemma for regular languages, *MyhillNerode theorem and its uses*, minimization of finite automata.

**Context-free languages and pushdown automata:** Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.

**Context-sensitive languages:** Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG.

**Turing machines:** The basic model for Turing machines (TM), Turing recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators.

**Undecidability:** Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice's theorem, undecidable problems about languages.

**Basic Introduction to Complexity:** Introductory ideas on Time complexity of deterministic and nondeterministic Turing machines, P and NP, NP-completeness, Cook's Theorem, other NP-Complete problems.

#### Text Books:

1. *Introduction to Automata Theory, Languages, and Computation* John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman.

#### Reference Books:

1. *Elements of the Theory of Computation*, Harry R. Lewis and Christos H. Papadimitriou.
2. *Automata and Computability*, Dexter C. Kozen.
3. *Introduction to the Theory of Computation*, Michael Sipser.
4. *Introduction to Languages and the Theory of Computation*, John Martin.

  
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BCO413A	Computer Organization & Architecture (TCS)	3-0-0
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**Revision of basics in Boolean logic and Combinational/Sequential Circuits.**

**Functional blocks of a computer:** CPU, memory, input-output subsystems, control unit.

**Instruction set architecture of a CPU:** Registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Outlining instruction sets of some common CPUs.

**Data representation:** Signed number representation, fixed and floating point representations, character representation.

**Computer arithmetic:** Integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and-add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic, IEEE 754 format.

**Introduction to x86 architecture.**

**CPU control unit design:** Hardwired and micro-programmed design approaches, design of a simple hypothetical CPU.

**Memory system design:** Semiconductor memory technologies, memory organization.

**Peripheral devices and their characteristics:** Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB

**Pipelining:** Basic concepts of pipelining, throughput and speedup, pipeline hazards.

**Parallel Processors:** Introduction to parallel processors, Concurrent access to memory and cache coherency.


**Memory organization:** Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

#### Text Books:

1. *Computer System Architecture* M. M. Mano:, 3rd ed., Prentice Hall of India, New Delhi, 1993.
2. *Computer Organization and Design: The Hardware/Software Interface*, David A. Patterson and John L. Hennessy.
3. *Computer Organization and Embedded Systems*, Carl Hamacher.

#### Reference Books:

1. *Computer Architecture and Organization*, John P. Hayes.
2. *Computer Organization and Architecture: Designing for Performance*, William Stallings.

  
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BCO415A	Object Oriented Programming (TCS)	3-0-0
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**Procedural programming, An Overview of C:** Types Operator and Expressions, Scope and Lifetime, Constants, Pointers, Arrays, and References, Control Flow, Functions and Program Structure, Namespaces, error handling, Input and Output (C-way), Library Functions (*string*, *math*, *stdlib*), Command line arguments, Pre-processor directive

**Some difference between C and C++:** Single line comments, Local variable declaration within function scope, function declaration, function overloading, stronger type checking, Reference variable, parameter passing – value vs reference, passing pointer by value or reference, #define constant vs const, Operator new and delete, the typecasting operator, Inline Functions in contrast to macro, default arguments

**The Fundamentals of Object Oriented Programming:** Necessity for OOP, Data Hiding, Data Abstraction, Encapsulation, Procedural Abstraction, Class and Object.

**More extensions to C in C++ to provide OOP Facilities:** Scope of Class and Scope Resolution Operator, Member Function of a Class, private, protected and public Access Specifier, thisKeyword, Constructors and Destructors, friend class, error handling (exception)

**Essentials of Object Oriented Programming:** Operator overloading, Inheritance – Single and Multiple, Class Hierarchy, Pointers to Objects, Assignment of an Object to another Object, Polymorphism through dynamic binding, Virtual Functions, Overloading, overriding and hiding, Error Handling

**Generic Programming:** Template concept, class template, function template, template specialization

**Input and Output:** Streams, Files, Library functions, formatted output

**Object Oriented Design and Modelling:** UML concept, Use case for requirement capturing,

**Class diagram, Activity diagram and Sequence Diagram for design, Corresponding C++ code from design**

#### Text Books:

1. *The C++ Programming Language*, Bjarne Stroustrup, Addison Wesley.
2. *C++ and Object-Oriented Programming Paradigm*, Debasish Jana, PHI Learning Pvt. Ltd.

#### Reference Books:

1. *Programming – Principles and Practice Using C++*, Bjarne Stroustrup, Addison Wesley.
2. *The Design and Evolution of C++*, Bjarne Stroustrup, Addison Wesley.

  
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BCO416A	Computational Statistics (TCS)	3-0-0
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**Multivariate Normal Distribution:** Multivariate Normal Distribution Functions, Conditional

Distribution and its relation to regression model, Estimation of parameters.

**Multiple Linear Regression Model:** Standard multiple regression models with emphasis on detection of collinearity, outliers, non-normality and autocorrelation, Validation of model assumptions.

**Multivariate Regression:** Assumptions of Multivariate Regression Models, Parameter estimation, Multivariate Analysis of variance and covariance

**Discriminant Analysis:** Statistical background, linear discriminant function analysis, Estimating linear discriminant functions and their properties.

**Principal Component Analysis:** Principal components, Algorithm for conducting principal component analysis, deciding on how many principal components to retain, H-plot.

**Factor Analysis:** Factor analysis model, Extracting common factors, determining number of factors, Transformation of factor analysis solutions, Factor scores.

**Cluster Analysis:** Introduction, Types of clustering, Correlations and distances, clustering by partitioning methods, hierarchical clustering, overlapping clustering, K-Means Clustering Profiling and Interpreting Clusters.


#### Text Books:

1. *An Introduction to Multivariate Statistical Analysis*, T.W. Anderson.
2. *Applied Multivariate Data Analysis, Vol I & II*, J.D. Jobson.
3. *Statistical Tests for Multivariate Analysis*, H. Kris.
4. *Programming Python*,

#### Reference Books:

1. *Regression Diagnostics , Identifying Influential Data and Sources of Collinearity*, D.A. Belsey, E. Kuh and R.E. Welsch
2. *Applied Linear Regression Models*, J. Neter, W. Wasserman and M.H. Kutner.
3. *The Foundations of Factor Analysis*, A.S. Mulaik.
4. *Introduction to Linear Regression Analysis*, D.C. Montgomery and E.A. Peck.

5. *Cluster Analysis for Applications*, M.R. Anderberg.
6. *Multivariate Statistical Analysis*, D.F. Morrison.
7. *Python for Data Analysis*, Wes Mc Kinney.



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BCO418A	Database Management System (TCS)	3-0-0
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**Introduction:** Introduction to Database. Hierarchical, Network and Relational Models.

**Database system architecture:** Data Abstraction, Data Independence, Data Definition Language

(DDL), Data Manipulation Language (DML).

**Data models:** Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

**Relational query languages:** Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQLserver.

**Relational database design:** Domain and data dependency, Armstrong's axioms, Functional Dependencies, Normal forms, Dependency preservation, Lossless design.

**Query processing and optimization:** Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

**Storage strategies:** Indices, B-trees, Hashing.

**Transaction processing:** Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

**Database Security:** Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

**Advanced topics:** Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

#### Text Books:

1. Database System Concepts. Abraham Silberschatz, Henry F. Korth and S. Sudarshan.

#### Reference Books:

1. *Principles of Database and Knowledge – Base Systems*, Vol 1 by J. D. Ullman.
2. *Fundamentals of Database Systems*. R. Elmasri and S. Navathe.
3. *Foundations of Databases*. Serge Abiteboul, Richard Hull, Victor Vianu.

  
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BCO 081B	PROGRAMMING WITH PYTHON	3-0-1 [3]
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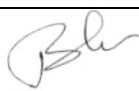
### OBJECTIVE:

- To study various core programming basics—including data types, control structures, algorithm development,
- To overview the applications of Python.
- To be familiar with program design with functions—via the Python programming language.
- Students will solve problems, explore real-world software development challenges, and create practical and contemporary applications

<b>UNIT 1</b>	<b>Introduction:</b> Features of Python, History of Python, installing Python; basic syntax, interactive shell, editing, saving, and running a script. Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types (Numbers, Booleans, Strings, None), Indentation and comments, Type Conversions, type() Function, membership operator
<b>UNIT 2</b>	<b>Control Flow Statements:</b> if, if-else, if-elif-else, while loop, range() Function, for loop, continue and break statements.  <b>Strings:</b> Creating and Storing Strings, Basic String Operations, String Slicing and Joining, String Methods, Formatting Strings
<b>UNIT 3</b>	<b>Lists, Tuples, Dictionaries, Sets:</b> Basic Operations, Indexing and Slicing, Built-In Functions, Using zip() Function  <b>Functions:</b> Function Definition and Calling the Function, The return Statement and void Function, Parameters and Arguments in a Function: Positional, Keyword, Default, Scope and Lifetime of Variables, the return Statement, returning multiple values, recursive functions, Lambda functions
<b>UNIT 4</b>	<b>Object-Oriented Programming:</b> classes, objects, the self-parameter and adding methods to a class, display class attributes and methods, __init__ method (constructor), __del__ method (destructor), using private instance variables and methods, inheritance, types of inheritance  <b>Regular Expression Operations:</b> using r prefix for regular expressions, using parentheses in regular expressions, compiling regular expressions using compile() method of re module, named groups
<b>UNIT 5</b>	<b>Graphics Programming: The Turtle Module:</b> moving the turtle in any direction, draw different shapes, the color, bgcolor, circle and speed method of turtle, drawing basic shapes using iterations  <b>The Tkinter Module:</b> Tk-the GUI Window, displaying images, tkinter Widgets: button, entry, text, canvas, frame, etc.

### Course Outcome:

- CO1. Understand the fundamental Python syntax and semantics
- CO2. Express proficiency in handling of strings and control flow statements
- CO3. Determine the methods to create and manipulate Python programs by utilizing various data structures.

  
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- CO4. Articulate the object-oriented programming concepts used in Python.  
 CO5. Understanding the application of GUI tools in python

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
 PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	<b>Program Outcome</b>												<b>Program Specific Outcome</b>		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H											M	H		
CO2	H	H	M	L								M		L	<u>L</u>
CO3	H	H	H	H								M	M		L
CO4	H	H	H	H								M		M	
CO5	H											M			

H = Highly Related; M = Medium L = Low


**Text Book:**

**Text Book:**

Introduction to Python Programming, Gowrishankar S., Veena A., CRC Press, Taylor & Francis Group, ISBN: 978-0-8153-9437-2

**Reference Books:**

1. Python: Real World Machine Learning, Prateek Joshi et al., Packt Publishing, ISBN 13: 9781787123212
2. Programming and Problem Solving with Python, Ashok Namdev Kamthane et. al., McGraw Hill Education (India) Private Limited, ISBN: 978-93-87067-57-8
3. Fundamentals of Python: First Programs, Kenneth Lambert, Course Technology, Cengage Learning, 2012 ISBN-13: 978-1-111-82270-5

  
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<b>.BCO 010C</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	<b>4-0-0 [4]</b>
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**OJECTIVE:**

- To provide knowledge of relational model
- To learn about ER diagrams.
- To learn about Query Processing and Transaction Processing

<b>UNIT 1</b>	Introduction - Database Systems versus File Systems, View of Data, Data Models, database languages, Database Users and Administrators. Transaction Management, Components of a Database management System. Entity-Relationship Model – Basic Concepts, Constraints, Keys, Design Issues, E-R Diagrams.
<b>UNIT 2</b>	Relational Model- Structures of relational databases, Integrity Constraints, Logical database Design, Tables, Views, Data Dictionary. Relational Algebra, Relational Calculus. SQL – Basic Structures, Query Handling, Triggers, Nested SQL Query, Embedded SQL,
<b>UNIT 3</b>	Relational Database Design- Functional Dependencies, Multi-valued Dependencies, Normal Forms, Decomposition into Normalized Relations.
<b>UNIT 4</b>	Fundamental Concepts of Transaction Management, ACID property. Serializability and testing for serializability, concurrency control schemes, lock-based protocols, two-phase locking protocols, graph-based protocols, time stamp-based protocols, deadlocks.
<b>UNIT 5</b>	File System: File organization- Heap File, Sequential File, Hash File, Clustered file, file operations, indexing, B-tree, B+ tree, Introduction to Data Mining, Data Farming, Data Warehousing

**Course Outcome (CO):**

At the ends of this course students will have:

CO1: Awareness of database management basics and different models that we use for database.

CO2: Design and architecture of relational model, relational algebra and SQL queries.

CO3: Implement different form of normalization.

CO4: Logical representation of internet database.

CO5: Analysis and concepts of transaction, concurrency and recovery systems.

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H												H	M	
CO2			H		M				M						<u>L</u>
CO3				H		M							M		
CO4				M								M		L	L
CO5	M	L		H					L				M		

H = Highly Related; M = Medium L = Low

**Text Books:**

1. Database Systems Concepts – Korth, TMH
2. An Introduction to Database Design – Date

**Reference Books:**

1. Fundamentals of Database Systems – Elmasri and Navathe
2. Database Management and Design – Hansen and Hansen .
3. Object-Oriented Database Design – Harrington

  
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BCO 009A	COMPUTER ORGANIZATION AND DESIGN	3-1-0 [4]
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### OBJECTIVE:

- To understand the basic structure and operation of digital computer
- To study the design of arithmetic and logic unit and implementation of fixed-point and floating-point arithmetic operations
- To study the two types of control unit techniques and the concept of pipelining
- To study the hierarchical memory system including cache memories and virtual memory
- To study the different ways of communicating with I/O devices and standard I/O interfaces

<b>UNIT 1</b>	Basic organization of computers, Register transfer language (RTL), Bus and memory transfer, Arithmetic, logic, shift -micro operations, Types of registers and machine instructions, Fetch, decode and execute cycle.
<b>UNIT 2</b>	Assembly language programming, Instruction format, addressing modes, RISC vs CISC architectures.
<b>UNIT 3</b>	Information representation, Floating point representation (IEEE 754), computer arithmetic and their implementation; Fixed-Point, Signed and 2's complement Arithmetic: Addition, Subtraction, Multiplication and Division, Hardwired and Micro programmed Control.
<b>UNIT 4</b>	Memory Technology, static and dynamic memory, Memory address mapping and cache memory mapping techniques, Memory Hierarchy, Virtual memory and memory management unit
<b>UNIT 5</b>	I/O subsystems: Input-Output devices such as Disk, CD-ROM, Printer etc. Interfacing with IO devices, keyboard and display interfaces; Basic concepts Bus Control, Read Write operations, Programmed IO, Concept of handshaking, Polled and Interrupt-driven I/O, DMA data transfer.

### Course Outcome (CO):

At the ends of this course students will have:

CO1: Awareness of computer organization.

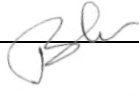
CO2: Design and architecture of machine.

CO3: Implement different system calls for various units.

CO4: Logical representation of storage, representation and management.

CO5: Analysis of I/O subsystem.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome	Program Specific Outcome
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	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H											M	H		
CO2			H		M									M	
CO3				M					M				L		
CO4				H						M			M		L
CO5				H						M					L

H = Highly Related; M = Medium L = Low

**Text Book:**

1. Computer Organization by V. Carl Hamacher, Safwat G. Zaky and Zvonko G. Vranesic , McGraw-Hill series(2002)

**Reference Books:**

1. Computer Organization and Design, by David Patterson and John Hennessey,” Elsevier. 2008.
2. Computer System Architecture by Mano, M.M., Prentice Hall of India, New Delhi, 1992
3. Computer Systems Design and Architecture (2nd Edition) by Vincent P. Heuring and Harry F. Jordan (Dec 6, 2003)
4. Computer Architecture and Organization, by Hayes, J.P.1998, McGraw-Hill

  
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<b>BCO013B</b>	<b>Database Management System Lab</b>	<b>0-0-2</b>
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- 1 Installation of MySQL
- 2 Analyze the problem and come with the entities in it. Identify what Data has to be persisted in the databases.
- 3 Represent all entities in a tabular fashion. Represent all relationships in a tabular fashion.
- 4 Creating of Tables on given problem
- 5 Applying Not Null, Check, Unique Constraints on database Tables.
- 6 Applying Primary Key, References, Foreign Key Constraints on database Tables.
- 7 Applying Insert, Select, Distinct Clause, Where Clause on database Tables.
- 8 Applying Update, Delete, Drop, on database Tables.
- 9 Applying table creation with select, Insert data using select, Renaming on database Tables.
- 10 Practice Queries using MINUS, UNION, INTERSECT, % operator.
- 11 Practice Queries using Group Functions.
- 12 Practice Queries using Group By, Having, Order By Functions.
- 13 Practice Queries using Arithmetic Operators, Comparison Operator.
- 14 Practice Queries using Logical Operator.
- 15 Practice Queries using any four String Functions.
- 16 Practice Queries using any four String Functions.
- 17 Practice Queries using Numeric Functions.
- 18 Practice Queries using Date Functions.

  
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### List of Experiments

1. Write a Python program to print the documents (syntax, description etc.) of Python built-in function(s).
2. Write a Python program which accepts the radius of a circle from the user and compute the area.
3. Write a Python program to accept a filename from the user print the extension of that.
4. Write a Python program to print the calendar of a given month and year.
5. Write a Python program to calculate number of days between two dates.
6. Write a Python program to calculate the length of a string.
7. Write a Python program to multiplies all the items in a list.
8. Write a Python script to sort (ascending and descending) a dictionary by value.
9. Write a Python program to create a tuple with different data types.
10. Write a Python program to find those numbers which are divisible by 7 and multiple of 5, between 1500 and 2700 (both included).
11. Write a Python program to guess a number between 1 to 9.( User is prompted to enter a guess. If the user guesses wrong then the prompt appears again until the guess is correct, on successful guess, user will get a "Well guessed!" message, and the program will exit.)
12. Write a Python program to count the number of even and odd numbers from a series of numbers.
13. Write a Python function to find the Max of three numbers.
14. Write a Python function to sum all the numbers in a list.
15. Write a Python function that takes a list and returns a new list with unique elements of the first list.
16. Write a Python class to find validity of a string of parentheses, '(', ')', '{', '}', '[' and ']' . These brackets must be close in the correct order, for example "()" and "()[{}]" are valid but "[)", "({[})" and "{{{" are invalid.
17. Write a Python class to find a pair of elements (indices of the two numbers) from a given array whose sum equals a specific target number.
18. Write a Python class to implement pow(x, n).

  
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BCO 223A	Open-Source Program with IOT	3-0-0 [3]
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### COURSE OBJECTIVE:

This course gives a foundation in the Internet of Things, including the components, tools, and analysis by teaching the concepts behind the IoT. It will describe the market around the Internet of Things (IoT), the technology used to build these kinds of devices, how they communicate and how they store data. This course will expose students to free open source software environment and introduce them to use open source packages.

### SYLLABUS:

<b>UNIT-I</b>	<b>The Foundations and Philosophies of Free and Open Source:</b> The Origins of Free Software, The Origins of Open Source, Difference Between Free Software and Open Source, Copyright and Licensing, Types of Free and Open Source Software Licenses
<b>UNIT-II</b>	<b>The IoT Open Source Ecosystem:</b> Introduction, Policy Context, IoT OSS Scope and Taxonomy, IoT OSS Ecosystem, Communities and Initiatives, IOT Open Source Project Analysis: Methodology and IoT project Taxonomy
<b>UNIT-III</b>	<b>IoT OSS and H2020 Projects:</b> ASSIST-IoT, VEDLIOT, IoT-NGIN, INGENIOUS, Intell-IoT, TERMINET
<b>UNIT-IV</b>	<b>IoT Analytics:</b> IoT Data and Big Data, Challenges of IoT Analytics Applications, IoT Analytics Lifecycle and Techniques, Requirements of IoT Big Data Analytics Platform, Data Analytic Techniques and Technologies, <b>IoT Network Connectivity Protocols:</b> Bluetooth Low Energy, 6LoWPAN, ZigBee, NFC, Wi-Fi, Cellular (4G/LTE)
<b>UNIT-V</b>	<b>The Rust Programming Language:</b> Writing and Running a Rust Program, Cargo, Variables and Mutability, Shadowing, Data Types, Functions, Control Flow, Ownership, Using Structs to Structure Related Data. <b>Project:</b> Number Guessing Game

### COURSE OUTCOME (CO)

At the end of this course students will have:

CO1: Understanding the need and importance of Free and Open Source

CO2: Understanding of various components of the IOT Open Source Ecosystem

CO3: Awareness of different IOT Open Source Projects

CO4: Ability to analyze IOT Open Source projects and differentiate between various network connectivity protocols

CO5: Ability to create IOT open source programs using the Rust programming language

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome												Program Specific Outcome		
	P01	P0	P0	P0	P0	P0	P0	P0	P0	P010	P01	P012	PS	PSO	PSO
<b>CO1</b>					M	L						M			H
<b>CO2</b>					M	L						M			H
<b>CO3</b>					M	L						M			H
<b>CO4</b>				L	M							M			H
<b>CO5</b>		H	H	L	M				L		H	M	M	M	H

**TEXTBOOKS:**

1. **Forge Your Future with Open Source**, *VM (Vicky) Brasseur*, The Pragmatic Programmers, LLC.
2. **Building Blocks for IoT Analytics, Internet-of-Things Analytics**, *John Soldatos*, River Publishers.
3. **Analytics for the Internet of Things (IoT)**, *Andrew Minter*, Packt Publishing.
4. **The Internet-of-Things Open Source Ecosystem**, Technical Report, December 2021, *John K. Soldatos, Rute C. Sofia*, DOI: 10.13140/RG.2.2.15421.38886

  
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<b>BCO357A</b>	<b>Unsupervised Learning and Neural Networks</b>	<b>3-0-0</b>
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## UNIT I Dimensionality Reduction

Introduction, Singular Value Decomposition, SVD code:, Principal Component Analysis (PCA), Isometric Maps (Isomaps), Multidimensional Scaling (MDS), ISOMAPS with MDS, ISOMAPS (Code), Visualizing the ISOMAPS Data, Applying PCA on the Same Data, Visualization of PCA, Feature Selection Techniques, Wrapper Method

## UNIT II Clustering

What is Clustering and Why is it Important?, Techniques in Clustering, K-Means Clustering, Steps for K-Means Algorithms, Density Based Spatial Clustering (DBSCAN), Types of Points in DBSCAN, DBSCAN Example, DBSCAN: Advantages, DBSCAN: Disadvantages, Hierarchical Clustering, Dendrograms, Hierarchical Clustering Code, DBSCAN Dendrogram Visualization

## UNIT III Neural Networks

Introduction to Neural Networks, Types of Neural Networks, Perceptron, Limitations of Perceptron, Activation Functions, Types of Activation Functions, Linear Activation Function, Non- Linear Data, Non-Linear Activation Function (Sigmoid ), Non- Linear Activation Function (TanH), Non-Linear Activation Function (ReLu), Non-Linear Activation Function (Leaky ReLu), Derivative of Activation Functions Neural Networks, Feed Forward Network, ANN Forward Propagation, Flow of Data in ANN, Backpropagation, Cost Function in Backpropagation, ANN Evaluation, Complete Flow of Data in Neural Network, ANN Training ANN Design, Dropout in Neural Networks

## UNIT IV Understanding Images:

Understanding Images, Need of Convolution Neural Network Convolution, Neural Network Working, Working of CNN with Kernel, Understanding Convolution Mathematically, An Example of CNN, Convolution of Images, Convolution Neurons Visualization, Parameters for Feature Maps, Activation Function in Convolution Neural Network, Pooling Step, Advantages of Pooling, Batch Normalization, Typical Convolution Neural Network, Training CNN using Backpropagation, Steps for CNN Backpropagation, Example of Convolution Neural Network Architecture, Visualization of Convolutional Neural Networks,

## UNIT V RNN Overview

Using MLP instead of RNN, Recurrent Neural Network (RNN), Steps in Recurrent Neuron, RNN Mathematically, Example of Forward Propagation for RNN, Back Propagation in Recurrent Neural Network, Steps for Back Propagation, Applications of RNN, Limitations of RNN, LSTM Conveyor Belt Analogy, Architecture of LSTM, Gates in LSTM, Forget Gate, Input Gate, Output Gate

  
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<b>BCO358A</b>	<b>Unsupervised Learning and Neural Networks Lab</b>	<b>3-0-0</b>
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1. Write a program for using PCA on MNIST Dataset.
2. Write a program for using PCA on Cat and Dog Dataset.
3. Write a program for using LDA on Cat and Dog Dataset.
4. Write a program for using DBSCAN on IRIS Dataset.
5. Write a program for using SVD on MNIST Digits Dataset.
6. Write a program for Feature Selection Techniques (Forward/ Backward).
7. Write a program for K-Means Clustering on IRIS Dataset.
8. Write a program for Hierarchical Clustering on Customers Dataset.
9. Write a program for Neural Networks on Mobile Price Classification.
10. Write a program for Convolution Neural Network on MNIST Dataset.
11. Write a program for Convolution Neural Network on Malaria Dataset.
12. Write a program for Convolution Neural Network on Aerial Cactus Dataset

  
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<b>BCO 378A</b>	<b>UX Expert with React Redux</b>	<b>3-1-0 [4]</b>
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**OBJECTIVE:**

- Understand Refreshing ES6 Specifications and Features
- Knowing React.js
- Know How does React Works?
- Learn Setting up React.
- Understand JSX
- Explain State in React.js
- Describe Props in React.js
- Discuss State Vs. Props

<b>UNIT 1</b>	Specifications and Features, Introduction, The let and const, The arrow functions, New Literal Syntax, Classes, Inheritance using extends, Default Parameter Values, Spread Operator (...), Iterators and Generators, Introduction to React, Features of React, Why we Need React
<b>UNIT 2</b>	ECMA Script, ES6 let and const, the arrow functions, New Literal Syntax, Classes, Inheritance using extends, Default Parameter Values, Spread Operator (...), Iterators and Generators, Features of React, Practical Application, Why need React, How React Works, Leveraging Virtual DOM, Setting up React
<b>UNIT 3</b>	Why JSX, Embedding JavaScript, Expression in JSX, JSX as an Expression, Nested elements in JSX, JSX Attributes, JSX Comments, JSX Styling and representation as object, The State of the Component, Defining State, Changing the State, Props, Validation, Validators
<b>UNIT 4</b>	Rendering Element, About render (), Creating React Element, Updating Element, components, Introducing Components, Types of Components, Functional Component, Functional Components as Stateless, Using Functional Component
<b>UNIT 5</b>	Redux Concepts, Redux Principles, Data Flow, Actions, Functions, Reduces, Testing, DevTools, React & Redux Integrate

**Course OUTCOME (CO):**

- CO1: Understand specifications and features ES6  
CO2: Learn about ECMA Script  
CO3: Analyse expression in JSX  
CO4: Learn rendering elements

  
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CO5: Understand Redux Concepts

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2	PS O3
CO1	M	M	L	H	L	L			L	L	L	L	L	M	M
CO2	M	M	M	H	L				L			L	M	M	M
CO3	M	M	M	H	M							L	M	M	M
CO4	M	M	M	H	M		L					L	M	M	M
CO5	M	L	M	H	M	M			L			L	M	M	M

H = Highly Related; M = Medium; L = Low

**Text Books:**

1. Full Stack React, Anthony Accomazzo, Nate Murray, Ari Lerner, Clay Allsopp, David Guttman, and Tyler McGinnis, Fullstack.io

**Reference Books:**

1. Learning React: Functional Web Development with React and Redux, Alex Banks and Eve Porcello)Reilly
2. React in Action, Mark Tielens Thomas, Manning Publishing
3. Learn React Hooks, Daniel Bugl, Packt

  
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<b>BCO 380A</b>	<b>Backend Development</b>	<b>3-1-0 [4]</b>
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**OBJECTIVE:**

- Understand the Nodejs framework
- Learn asynchronous programming
- Learn about non-blocking, event-driven servers
- Understand reusable modules and distributable packages
- Understand the techniques and working of express

<b>UNIT 1</b>	What is Node.js, History of Node.js, Why Node.js, Node.js Architecture, Working and Features, Installation and Setup, Installing Node.js, Launching REPL, Environment, Installing Visual Studio, Code Editor, Components of Node.js
<b>UNIT 2</b>	Module Exports, Export Object, Export Functions, Export Functions as Class, Loading module from, Separate Folder, Modules, File System Module, Reading and Writing into, Files, Appending and Opening Files, Events and Event Emitters, Handling Events, Customized Class for Handling Events, In-built Modules File Systems, Operating System
<b>UNIT 3</b>	Writing to Buffers, Reading from Buffers, Concatenating Buffers, Copying Buffers, Slicing Buffers, The Stream Module, Reading From Stream, Writing to Stream, Pipes, Pipe Chaining
<b>UNIT 4</b>	Explain REST API, Describe Node.js express, Discuss the importance of express, Explain the installing process of express, Learn express request and response, Describe routing, REST API : Intro to API, History of API Development, Development of AJAX, CRUD

**Course OUTCOME (CO):**

- CO1: Explain the Node.js architecture  
CO2: Understand the concept of Modules, file system and events  
CO3: Explain the operations and buffers  
CO4: Explain REST API and Express  
CO5: Explain AJAX

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

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Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M	M	L	H	L	L			L	L	L	L	L	M	M
CO2	M	M	M	H	L				L			L	M	M	M
CO3	M	M	M	H	M							L	M	M	M
CO4	M	M	M	H	M		L					L	M	M	M
CO5	M	L	M	H	M	M			L			L	M	M	M

H = Highly Related; M = Medium; L = Low

### **Text Books:**

1. Manuel Kiessling, 'The Node Beginner Book', Leanpub
2. Griggs Bethany, 'Node Codebook', Packt **Reference Books:**

1. Ethan Brown, 'Web Development with Node and Express', O Reilly
2. David Herron, 'Node.JS Web Development', Packt
3. Express in Action: Writing, Building, and Testing NodeJS Applications, Evan Hahn, Manning
4. Node.js Design Patterns: Design and implement production-grade Node.js applications using proven patterns and techniques, 3rd Edition, Mario Cascairo and Luciano Mammino, Packt
5. Node.js Web Development, David Herron, Packt

  
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BCO 239A	MACHINE LEARNING AND PATTERN RECOGNITION	3-0-0 [3]
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**Software:** Python, NumPy, Pandas, Matplotlib, Seaborn, SciPy, Scikit-Learn

**Objectives:** *The objective of this course is to teach students the basic concepts of machine learning, supervised learning, unsupervised learning, and reinforcement learning*

## UNIT – I

**Introduction:** Learning systems, real world applications of machine learning, why machine learning, variable types and terminology, function approximation

**Types of machine learning:** Supervised learning, unsupervised learning, reinforcement learning  
**Important concepts of machine learning:** Parametric vs non-parametric models, the trade-off

between prediction accuracy and model interpretability, the curse of dimensionality, measuring the quality of fit, bias-variance trade off, overfitting, model selection, no free lunch theorem

## UNIT – II

**Linear Regression:** Linear regression, estimating the coefficients, assessing the accuracy of coefficient estimates, assessing the accuracy of the model, multiple linear regression, qualitative

**Predictors Classification:** Logistic regression, estimating regression coefficients, making predictions, multiple logistic regressions, linear discriminant analysis, Bayes' theorem of classification, LDA for  $p=1$ , LDA for  $p>1$ , quadratic discriminant analysis

## UNIT – III


**Resampling Methods, Model Selection and Regularization:** Cross-validation, leave-one-out cross-validation, k-fold cross-validation, the bootstrap, subset selection, shrinkage methods, ridge and lasso regression, dimension reduction methods, principal components regression, partial least square

**Tree Based Methods:** Advantages and disadvantages of trees, regression Trees, classification trees, bagging, random forest, boosting

## UNIT – IV

**Support Vector Machine:** Maximum margin classifier, classification using a separating hyperplane, the maximal margin classifier, support vector classifier, support vector machines, classification with non-linear decision boundaries, support vector machine, one-versus-one classification, one-versus-many classification

**Unsupervised Learning:** Principle component analysis, what are principal components, clustering methods, k-means clustering, hierarchical clustering, Independent component analysis, latent semantic indexing, Markov Models, Hidden Markov Models

  
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<b>BCO 317A</b>	<b>Certified Network Defender</b>	<b>4-0-0 [4]</b>
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### Course Outcomes:

CO1: Ability to understand network security management

CO2: Ability to deploy Security Devices

CO3: Ability to implement Host Security

CO4: Ability to secure the Network Perimeter

CO5: Ability to respond to Incidents in network

### Syllabus:

<b>Module 01: Network Attacks and Defense Strategies</b>	This module introduces you to different network-based attacks faced by the organization to understand their working and develop defense strategies.
<b>Module 02: Administrative Network Security</b>	It involves developing or updating security infrastructure and continuously monitoring networks for any suspicious actions or unauthorized access
<b>Module 03: Technical Network Security</b>	Implementing authentication and protection controls for user verification to avoid theft of sensitive information or data. Introducing the concept of zero trust and its effectiveness in maintaining a better security posture
<b>Module 04: Network Perimeter Security</b>	Implementation and management of perimeter devices like firewalls, Intrusion Detection Systems, Intrusion Prevention Systems
<b>Module 05: Endpoint Security- Windows Systems</b>	Security of end-user devices and entry points by implying endpoint security on Windows devices.
<b>Module 06: Endpoint Security- Linux Systems</b>	Securing entry points or end-user devices by ensuring endpoint security on Linux devices
<b>Module 07: Endpoint Security- Mobile Devices</b>	Securing entry points or end-user devices by ensuring endpoint security on mobile devices
<b>Module 08: Endpoint Security-IoT Devices</b>	Fundamentals of IoT, IoT threats and security using endpoint security implementation


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<b>Module 09: Administrative Application Security</b>	Understanding the methodologies of administrative application security and its importance to minimize the security-related vulnerabilities in the application
<b>Module 10: Data Security</b>	Implementing policies to safeguard data from unauthorized access using various techniques like encryption, hashing, tokenization, and other key management practices. Concept of data storage, data classification, data masking, retention and destruction
<b>Module 11: Enterprise Virtual Network Security</b>	In-depth understanding of virtualization, related threats, and security. Essentials of software-defined network (SDN) security, network function virtualization (NFV) security
<b>Module 12: Enterprise Cloud Network Security</b>	Introduction to cloud computing, threats, challenges and security across cloud platforms, concepts of container security, docker security, and Kubernetes security
<b>Module 13: Enterprise Wireless Network Security</b>	Understanding of wireless network security essentials, threats, attacks, and countermeasures.
<b>Module 14: Network Traffic Monitoring and Analysis</b>	Analysis and monitoring of logs from various perimeter network devices to identify any anomalies in the traffic.
<b>Module 15: Network Logs Monitoring and Analysis</b>	Analyzing the events generated by various devices in the network to identify signs of any suspicious activity or a potential incident
<b>Module 16: Incident Response and Forensic Investigations</b>	Understanding of incident management response process and methodologies to be followed in case of security incidents. Understanding of forensics investigation techniques and tools used for analysis.
<b>Module 17: Business Continuity and Disaster Recovery</b>	Understanding the importance of BCP and DR, related concepts and procedures required to allow smooth functioning of operations in case of a disaster
<b>Module 18: Risk Anticipation with Risk Management</b>	Risk management process, analyzing various risks that the organization is susceptible to and developing policies to manage them.
<b>Module 19: Threat Assessment with Attack Surface Analysis</b>	Analyzing the threats and attack vectors to develop solutions for their countermeasures
<b>Module 20: Threat Prediction with Cyber Threat Intelligence</b>	Developing a proactive approach by understanding various frameworks aiding in threat intelligence to anticipate the kinds of attacks hackers could use to gain access to the network.

# CO-PO Mapping:

<i>Course Outcomes</i>	<i>Program Outcomes</i>												<i>Program Specific Outcomes</i>		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	L	M	M	H	H	M		H	M	L		H	H	H	H
CO2	L	M	M	H	H	M		H	M	L		H	H	H	H
CO3	L	M	M	H	H	M		H	M	L		H	H	H	H
CO4	L	M	M	H	H	M		H	M	L		H	H	H	H
CO5	L	M	M	H	H	M		H	M	L		H	H	H	H

  
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<b>BCO 126A</b>	<b>STATISTICS 101, SPARK MLlib, MACHINE LEARNING- DIMENSIONALITY REDUCTION</b>	<b>1-0-0 [1]</b>
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## **Statistics 101**

### Module-1 Welcome to Statistics

Welcome to Statistics, data visualization, All about data, Statistics made easy with SPSS statistics, SPSS in 5 minutes, Lab

### Module -2 Descriptive Statistics

Types of data, mean medium mode, measure of dispersion, Statistics by data types, probability, lab

### Module-3 Advanced descriptive statistics

Statistics by group, visualization of group statistics, pivoting, crosstabs, correlation, lab- Advanced descriptive statistics

### Module-4 visualization

Visualization fundamentals, Descriptive and Statistical charts, scatterplots, Statistical charts, time series chart, lab- data visualization

### Module-5 from start to finish-“Beauty pays data”

Does beauty pays, weighted means standard deviation, data wrangling, descriptive statistics, reproducibility with syntax, lab- Does beauty pays

## **Spark MLlib**

### Module-1 SparkMlib Datatypes


Spark Mlib data types, Spark Mlib data types-local matrices, Spark Mlib data types-Block matrix, Spark Mlib data types-Row IndexedRow and coordinate distributed matrices

### Module-2 Review of Algorithm

Introduction to SparkMlib- Algorithm review, lab

### Module-3 Spark Mlib decision tree and random forest

Decision tree and random forest splitting features, Decision tree and random forest decision tree parameters specifiable and tunable, Decision tree and random forest decision tree stopping parameter, Decision tree and random forest random forest parameters, lab

  
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Module-4 Spark Mlib clustering

K-means clustering, Gaussian mixture clustering, lab

### **Machine Learning - Dimensionality Reduction**

Module 1: Data Series


Learning Objectives, Introduction to Dimension Reduction , Dimension Reduction Goals

Module 2: Data Refinement

Learning Objectives, Principal Component Analysis

Module 3: Exploring Data

Learning Objectives, Exploratory Factor Analysis , Exploratory Factor Analysis 2

  
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BCO 125A	DEEP LEARNING WITH TENSORFLOW	1-0-0 [1]
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### **Module 1 – Introduction to TensorFlow**

- HelloWorld with TensorFlow
- Linear Regression
- Nonlinear Regression
- Logistic Regression
- Activation Functions

### **Module 2 – Convolutional Neural Networks (CNN)**

- CNN History
- Understanding CNNs
- CNN Application

### **Module 3 – Recurrent Neural Networks (RNN)**


- Intro to RNN Model
- Long Short-Term memory (LSTM)
- Recursive Neural Tensor Network Theory
- Recurrent Neural Network Model

### **Module 4 - Unsupervised Learning**

- Applications of Unsupervised Learning
- Restricted Boltzmann Machine
- Collaborative Filtering with RBM

### **Module 5 - Autoencoders**

- Introduction to Autoencoders and Applications
- Autoencoders
- Deep Belief Network

  
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<b>BCO 124A</b>	<b>COGNITIVE DECISION SYSTEM FOR MANAGERS</b>	<b>3-0-0 [3]</b>
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## Module 1: Introduction

Track Agenda, Team Introduction,

Session 1: Cognitive Enterprise of Tomorrow

Session 2: Demonstration - Cognitive Systems

## Module 2: Analytics

Track Agenda,

Session 3: Predictive Analytics and Forecasting

Session 4: Classification and Segmentation

Session 5: Prescriptive Analytics and Optimization

Session 6: Analytics Lab 1 - Time Series

Session 6: Analytics Lab 2 - Logistic Regression

Session 6: Analytics Lab 3 - Clustering

Session 6: Analytics Lab 4 - Prescriptive Analytics and Optimization

## Module 3: Artificial Intelligence

Track Agenda

Session 7: Natural Language Processing

Session 8: Speech Recognition

Session 9: Computer Vision

Session 10: AI Lab - I

Session 10: AI Lab - II

Session 10: AI Lab - III

## Module 4: Data Platforms

Track Agenda

Session 11: Data Engineering – Art of the Possible

Session 12: Data Engineering – Science Underlying

  
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Session 13: Art and Science Together

Session 14: Data Lab

Module 5: Systems and Solutions

Track Agenda

Session 15: Architecting a Cognitive System

Session 16: Policy, Ethics and Explain-ability

Session 17: Selling a Cognitive Solution

Session 18: An end-to-end journey of Industry Application

Conclusion

Track Agenda

Session 19: Hackathon

Session 20: Evaluation

  
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<b>BCO424A</b>	<b>Software Engineering</b>	<b>3-0-0</b>
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Introduction: Programming in the small vs. programming in the large; software project failures

and importance of software quality and timely availability; engineering approach to software development; role of software engineering towards successful execution of large software projects;

emergence of software engineering as a discipline.

Software Project Management: Basic concepts of life cycle models – different models and milestones; software project planning – identification of activities and resources; concepts of feasibility study; techniques for estimation of schedule and effort; software cost estimation models

and concepts of software engineering economics; techniques of software project control and reporting; introduction to measurement of software size; introduction to the concepts of risk and

its mitigation; configuration management.

Software Quality and Reliability: Internal and external qualities; process and product quality; principles to achieve software quality; introduction to different software quality models like McCall, Boehm, FURPS / FURPS+, Dromey, ISO – 9126; introduction to Capability Maturity

Models (CMM and CMMI); introduction to software reliability, reliability models and estimation.

Software Requirements Analysis, Design and Construction: Introduction to Software Requirements Specifications (SRS) and requirement elicitation techniques; techniques for requirement modeling – decision tables, event tables, state transition tables, Petri nets; requirements documentation through use cases; introduction to UML, introduction to software

metrics and metrics based control methods; measures of code and design quality.

Object Oriented Analysis, Design and Construction: Concepts -- the principles of abstraction, modularity, specification, encapsulation and information hiding; concepts of abstract data type;

Class Responsibility Collaborator (CRC) model; quality of design; design measurements; concepts



of design patterns; Refactoring; object oriented construction principles; object oriented metrics.

Software Testing: Introduction to faults and failures; basic testing concepts; concepts of verification and validation; black box and white box tests; white box test coverage – code coverage,

condition coverage, branch coverage; basic concepts of black-box tests – equivalence classes, boundary value tests, usage of state tables; testing use cases; transaction based testing; testing for

non-functional requirements – volume, performance and efficiency; concepts of inspection.

**Text Books:**

1. *Software Engineering*, Ian Sommerville

**Reference Books:**

1. *Fundamentals of Software Engineering*, Carlo Ghezzi, Jazayeri Mehdi, Mandrioli Dino
2. *Software Requirements and Specification: A Lexicon of Practice, Principles and Prejudices*,  
Michael Jackson
3. *The Unified Development Process*, Ivar Jacobson, Grady Booch, James Rumbaugh
4. *Design Patterns: Elements of Object-Oriented Reusable Software*, Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides
5. *Software Metrics: A Rigorous and Practical Approach*, Norman E Fenton, Shari Lawrence Pfleeger
6. *Software Engineering: Theory and Practice*, Shari Lawrence Pfleeger and Joanne M. Atlee
7. *Object-Oriented Software Construction*, Bertrand Meyer
8. *Object Oriented Software Engineering: A Use Case Driven Approach* --Ivar Jacobson
9. *Touch of Class: Learning to Program Well with Objects and Contracts* --Bertrand Meyer
10. *UML Distilled: A Brief Guide to the Standard Object Modeling Language* --Martin Fowler

<b>BCO420A</b>	<b>Operating System</b>	<b>3-0-0</b>
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Introduction: Concept of Operating Systems (OS), Generations of OS, Types of OS, OS Services,

Interrupt handling and System Calls, Basic architectural concepts of an OS, Concept of Virtual

Machine, Resource Manager view, process view and hierarchical view of an OS.

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching.

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.

Scheduling algorithms: Pre-emptive and non-pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Inter-process Communication: Concurrent processes, precedence graphs, Critical Section, Race

Conditions, Mutual Exclusion, Hardware Solution, Semaphores, Strict Alternation, Peterson's

Solution, The Producer / Consumer Problem, Event Counters, Monitors, Message Passing,

Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem, Barber's shop

problem.

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention,


Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Concurrent Programming: Critical region, conditional critical region, monitors, concurrent languages, communicating sequential process (CSP); Deadlocks - prevention, avoidance, detection

and recovery.

Memory Management: Basic concept, Logical and Physical address maps, Memory allocation:

Contiguous Memory allocation – Fixed and variable partition– Internal and External fragmentation

  
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and Compaction.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page allocation, Partitioning, Paging, Page fault, Working Set, Segmentation, Demand

paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC),

Not recently used (NRU) and Least Recently used (LRU).

I/O Hardware: I/O devices, Device controllers, Direct Memory Access, Principles of I/O.

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space

management (bit vector, linked list, grouping), directory implementation (linear list, hash table),

efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

Case study: UNIX OS file system, shell, filters, shell programming, programming with the standard I/O, UNIX system calls.

Text Books:

1. Operating System Concepts Essentials. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne.

Reference Books:


1. Operating Systems: Internals and Design Principles. William Stallings.

2. Operating System: A Design-oriented Approach. Charles Patrick Crowley.

3. Operating Systems: A Modern Perspective. Gary J. Nutt.

4. Design of the Unix Operating Systems. Maurice J. Bach.

5. Understanding the Linux Kernel, Daniel Pierre Bovet, Marco Cesati.

  
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<b>DME027C</b>	<b>Operation Research</b>	<b>3-0-0</b>
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Introduction to OR:

Origin of OR and its definition. Concept of optimizing performance measure, Types of OR problems, Deterministic vs. Stochastic optimization, Phases of OR problem approach – problem

formulation, building mathematical model, deriving solutions, validating model, controlling and

implementing solution.

Linear Programming:

Linear programming – Examples from industrial cases, formulation & definitions, Matrix form.

Implicit assumptions of LPP.

Some basic concepts and results of linear algebra – Vectors, Matrices, Linear Independence / Dependence of vectors, Rank, Basis, System of linear eqns., Hyperplane, Convex set, Convex polyhedron, Extreme points, Basic feasible solutions.

Geometric method: 2-variable case, Special cases – infeasibility, unboundedness, redundancy &

degeneracy, Sensitivity analysis.

Simplex Algorithm – slack, surplus & artificial variables, computational details, big-M method,

identification and resolution of special cases through simplex iterations.

Duality – formulation, results, fundamental theorem of duality, dual-simplex and primal-dual algorithms.

Transportation and Assignment problems:

TP - Examples, Definitions – decision variables, supply & demand constraints, formulation,

Balanced & unbalanced situations, Solution methods – NWCR, minimum cost and VAM, test for

optimality (MODI method), degeneracy and its resolution.

AP - Examples, Definitions – decision variables, constraints, formulation, Balanced & unbalanced

situations, Solution method – Hungarian, test for optimality (MODI method), degeneracy & its

resolution.

PERT – CPM:

Project definition, Project scheduling techniques – Gantt chart, PERT & CPM, Determination of

critical paths, Estimation of Project time and its variance in PERT using statistical principles, Concept of project crashing/time-cost trade-off.

Inventory Control:

Functions of inventory and its disadvantages, ABC analysis, Concept of inventory costs, Basics of

inventory policy (order, lead time, types), Fixed order-quantity models – EOQ, POQ & Quantity

discount models. EOQ models for discrete units, sensitivity analysis and Robustness, Special cases

of EOQ models for safety stock with known / unknown stock out situations, models under prescribed policy, Probabilistic situations.

Queuing Theory:

Definitions – queue (waiting line), waiting costs, characteristics (arrival, queue, service discipline)

of queuing system, queue types (channel vs. phase).

Kendall's notation, Little's law, steady state behaviour, Poisson's Process & queue, Models with

examples - M/M/1 and its performance measures; M/M/m and its performance measures; brief

description about some special models.

Simulation Methodology:

Definition and steps of simulation, random number, random number generator, Discrete Event

System Simulation – clock, event list, Application in Scheduling, Queuing systems and Inventory


systems.

Text Books:

1. Operations Research: An Introduction. H.A. Taha.

Reference Books:

1. Linear Programming. K.G. Murthy.
2. Linear Programming. G. Hadley.
3. Principles of OR with Application to Managerial Decisions. H.M. Wagner.
4. Introduction to Operations Research. F.S. Hiller and G.J. Lieberman.
5. Elements of Queuing Theory. Thomas L. Saaty.
6. Operations Research and Management Science, Hand Book: Edited By A. Ravi Ravindran.
7. Management Guide to PERT/CPM. Wiest & Levy.
8. Modern Inventory Management. J.W. Prichard and R.H. Eagle.

  
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BCO422A	Design and Analysis of Algorithms	3-0-0
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**Introduction:** Characteristics of Algorithm. Analysis of Algorithm: Asymptotic analysis of Complexity Bounds – Best, Average and Worst-Case behavior; Performance Measurements of

Algorithm, Time and Space Trade-Offs, Analysis of Recursive Algorithms through Recurrence

Relations: Substitution Method, Recursion Tree Method and Masters' Theorem.

**Fundamental Algorithmic Strategies:** Brute-Force, Heuristics, Greedy, Dynamic Programming,

Branch and Bound and Backtracking methodologies; Illustrations of these techniques for Problem Solving, Bin Packing, Knapsack, Travelling Salesman Problem.

**Graph and Tree Algorithms:** Traversal algorithms: Depth First Search (DFS) and Breadth First

Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological

sorting, Network Flow Algorithm.

**Tractable and Intractable Problems:** Computability of Algorithms, Computability classes – P,

NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

**Advanced Topics:** Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE, Introduction to Quantum Algorithms.

#### Books:

1. *Fundamental of Computer Algorithms*, E. Horowitz and S. Sahni.
2. *The Design and Analysis of Computer Algorithms*, A. Aho, J. Hopcroft and J. Ullman.

#### Reference Books:

1. *Introduction to Algorithms*, T. H. Cormen, C. E. Leiserson and R. L. Rivest.
  2. *Computer Algorithms: Introduction to Design and Analysis*, S. Baase.
  3. *The Art of Computer Programming, Vol. 1, Vol. 2 and Vol. 3*, D. E. Knuth.
- Quantum Computation and Quantum Information*, Michael A. Nielsen and Isaac L. Chuang.

  
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<b>DBA006A</b>	<b>Introduction to Innovation, IP Management and Entrepreneurship</b>	<b>3-0-0</b>
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## **UNIT – I**

### **Innovation: What and Why?**

Innovation as a core business process, Sources of innovation, Knowledge push vs. need pull innovations.

Class Discussion- Is innovation manageable or just a random gambling activity?

## **UNIT – II**

### **Building an Innovative Organization**

Creating new products and services, Exploiting open innovation and collaboration, Use of innovation

for starting a new venture

Class Discussion- Innovation: Co-operating across networks vs. ‘go-it-alone’ approach

## **UNIT – III**

### **Entrepreneurship:**

- Opportunity recognition and entry strategies
- Entrepreneurship as a Style of Management
- Maintaining Competitive Advantage- Use of IPR to protect Innovation

## **UNIT – IV**

### **Entrepreneurship- Financial Planning:**

- Financial Projections and Valuation
- Stages of financing
- Debt, Venture Capital and other forms of Financing

## **UNIT – V**

### **Intellectual Property Rights (IPR)**

- Introduction and the economics behind development of IPR: Business Perspective
- IPR in India – Genesis and Development
- International Context
- Concept of IP Management, Use in marketing

### **Text Books:**

1. Joe Tidd, John Bessant. Managing Innovation: Integrating Technological, Market and Organizational Change
2. Case Study Materials: To be distributed for class discuss

  
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DBA005A	Marketing Research & Marketing Management	3-0-0
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## UNIT – I

**Marketing Concepts and Applications:** Introduction to Marketing & Core Concepts, Marketing of Services, Importance of marketing in service sector.

**Marketing Planning & Environment:** Elements of Marketing Mix, Analyzing needs & trends in

Environment - Macro, Economic, Political, Technical & Social

**Understanding the consumer:** Determinants of consumer behavior, Factors influencing consumer behavior

**Market Segmentation:** Meaning & Concept, Basis of segmentation, selection of segments, Market

Segmentation strategies, Target Marketing, Product Positioning

## UNIT – II

**Product Management:** Product Life cycle concept, New Product development & strategy, Stages in New

Product development, Product decision and strategies, Branding & packaging

## UNIT – III

**Pricing, Promotion and Distribution Strategy:** Policies & Practices – Pricing Methods & Price

determination Policies. Marketing Communication – The promotion mix, Advertising & Publicity, 5 M's of

Advertising Management. Marketing Channels, Retailing, Marketing Communication, Advertising

## UNIT – IV

**Marketing Research:** Introduction, Type of Market Research, Scope, Objectives & Limitations

Marketing Research Techniques, Survey Questionnaire design & drafting, Pricing Research, Media

Research, Qualitative Research

**Data Analysis:** Use of various statistical tools – Descriptive & Inference Statistics, Statistical Hypothesis

Testing, Multivariate Analysis - Discriminant Analysis, Cluster Analysis, Segmenting and Positioning, Factor

Analysis


## UNIT – V

**Internet Marketing:** Introduction to Internet Marketing. Mapping fundamental concepts of Marketing

(7Ps, STP); Strategy and Planning for Internet Marketing

## Text Books:


1. Marketing Management (Analysis, Planning, Implementation & Control) – Philip Kotler
2. Fundamentals of Marketing – William J. Stanton & Others

  
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3. Marketing Management – V.S. Ramaswamy and S. Namakumari
4. Marketing Research – Rajendra Nargundkar
5. Market Research – G.C. Beri
6. Market Research, Concepts, & Cases – Cooper Schindler

**Reference Books:**

1. Marketing Management – Rajan Saxena
2. Marketing Management – S.A. Sherlekar

  
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<b>BCO 023A</b>	<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>	<b>3-0-0 [3]</b>
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### OBJECTIVES:

At the end of the course, the student should be able to:

- Design effective, efficient, elegant, and readable algorithms for various classes of computing problems
- Determine space and time complexity of algorithms by the use various algorithm design techniques like (divide and conquer, backtracking, greedy, etc.)

<b>UNIT 1</b>	Introduction, algorithms specification, time and space complexity, performance analysis, recurrence relations. Divide and Conquer – finding max min.
<b>UNIT 2</b>	Dynamic Programming and Greedy Methods – Huffman tree construction, Knapsack problem, 0/1 Knapsack problem, least common subsequence, matrix chain multiplication. Backtrack: 4-queen problem, Branch and Bound: assignment problem
<b>UNIT 3</b>	Graph algorithms–flow problems, String Matching Algorithms: Naive algorithm, automata and KMP matcher algorithms, Boyer-Moore algorithm
<b>UNIT 4</b>	Number Theory Problems – CRT, GCD algorithms, modular arithmetic, Lower Bound Theory; Approximate Algorithms – Set cover, vertex cover, .Randomized Algorithms – Las Vegas and Monte Carlo methods
<b>UNIT 5</b>	NP Completeness: Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems..

**OUTCOMES:** After study of this subject student will be able to know

CO1: Various methods of calculating complexity

CO 2: Finding out the best method for different algorithms

CO3: About computational geometry, like Lower bound theory, modular arithmetic and CRT

CO4: Various Decision Problems like NP Complete, NP hard

CO5: Knowledge of Graph and its algorithm

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

<i><b>Cours e Outco me</b></i>	Program Outcome												Program Specific Outcome		
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO1 2	PS O1	PS O2	PS O3
CO1	H	H	M		M			M				L	H	M	
CO2	H	H			H							L	H	M	M
CO3	M	H	L		M			M				M			M
CO4	H	L	M		M							L	M	H	

CO5	H	M	M		M			L				L	M	M	L
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**Textbooks:**

1. Cormen, Leizerson&Rivest, Introduction to algorithms, Prentice-Hall. 2002
2. Horowitz & Sahni, Fundamentals of Computer Algorithms, Galgotia Publication. 1999

**Reference Books:**

1. Aho, Hopcroft, Ullman, The Design and Analysis of Computer Algorithms, Addison-Wesley. 2001.
2. Introduction to Design and Analysis of Algorithms, Anny Levitin, Person Education Press. 2007.
3. Gilles Brassard & Paul Bratley, Fundamental Algorithms, Prentice-Hall. 1998

  
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<b>BCO 017A</b>	<b>FORMAL LANGUAGES &amp; AUTOMATION THEORY</b>	<b>3-1-0 [4]</b>
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**Objective:**

- To understand various Computing models like Finite State Machine, Pushdown Automata, and Turing Machine.
- To understand Decidability and Undesirability of various problems
- To construct pushdown automata and the equivalent context free grammars.
- To prove the equivalence of languages described by pushdown automata and context free grammars.
- To construct Turing machines and Post machines and prove the equivalence of languages described by Turing machines and Post machines.

<b>UNIT 1</b>	Basics of Strings and Alphabets, Finite Automata – DFA, transition graphs, regular languages, non-deterministic FA, equivalence of DFA and N DFA, Mealy and Moore Machine, minimization of Finite Automata,
<b>UNIT 2</b>	Regular grammars, regular expressions, equivalence between regular languages, properties of regular languages, pumping lemma. Relationship between DFA and Regular expression.
<b>UNIT 3</b>	Context Free Languages – Leftmost and rightmost derivation, parsing and ambiguity, ambiguity in grammar and languages, simplification of CFG, Normal forms
<b>UNIT 4</b>	Pushdown Automata – NDPDA, DPDA, context free languages and PDA, comparison of deterministic and non-deterministic versions, closure properties, pumping lemma for CFL,
<b>UNIT 5</b>	Turing Machines, variations, halting problem, PCP, Chomsky Hierarchy, Recursive and Recursive enumerable language, Rice Theorem.

**Course Outcomes:** At the end of the course, the student should be able to:

CO1: Understand and construct finite state machines and the equivalent regular expressions.

CO2: Prove the equivalence of languages described by finite state machines and regular expressions.

CO3: Construct pushdown automata and the equivalent context free grammars.

CO4: Prove the equivalence of languages described by pushdown automata and context free grammars.

CO5: Construct Turing machines and Post machines and prove the equivalence of languages described by Turing machines and Post machines

  
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Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H		L										H		
CO2		H											L		
CO3	H		H												M
CO4		H		M											
CO5	H											H		L	


H = Highly Related; M = Medium L = Low

### **Text Books:**

1. Hopcroft J.E., Motwani R. and Ullman J.D, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2008.

### **Reference Book:**

1. Mishra K L P and Chandrasekaran N, "Theory of Computer Science – Automata, Languages and Computation", Third Edition, Prentice Hall of India, 2004.
2. Harry R Lewis and Christos H Papadimitriou, "Elements of the Theory of Computation", Second Edition, Prentice Hall of India, Pearson Education, New Delhi, 2003.
3. Peter Linz, "An Introduction to Formal Language and Automata", Third Edition, Narosa Publishers, New Delhi, 2002.
4. Kamala Krithivasan and Rama. R, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education 2009.
5. John C Martin, "Introduction to Languages and the Theory of Computation", Third Edition, Tata McGraw Hill Publishing Company, New Delhi, 2007.

  
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BCO 019A	ARTIFICIAL INTELLIGENCE	4-0-0 [4]
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### Objective:

- To explain the basic principles of artificial intelligence;
- To apply logic and structured concepts in knowledge representation;
- To discuss the applications of artificial intelligence;
- To implement heuristic search algorithms;
- To design a natural language processor and implement a simple expert system.

<b>UNIT 1</b>	Introduction- What is intelligence? Foundations of artificial intelligence (AI), Task of artificial intelligence, Techniques of artificial intelligence, Problem Solving- Formulating problems, problem types, states and operators, state space, Expert system and its components.
<b>UNIT 2</b>	Uninformed Search Strategies- Breath First Search, Depth First Search, Depth Limited Search, Informed Search Strategies- Heuristic Functions, Best First Search, Hill Climbing Algorithm, Problems and solutions of Hill Climbing, Iterative Deepening (IDA), A* algorithm, AO* Algorithm.
<b>UNIT 3</b>	Game playing- Introduction, Types of games, Minimax game algorithm, Alpha Beta cut-off procedure. Knowledge Representation- Role of Knowledge, Declarative Knowledge, Procedural Knowledge, Knowledge representation.
<b>UNIT 4</b>	Logics- propositional logics, First Order Predicate Logics (FOPL), Syntax of First Order Predicate Logics, Properties of Wff, Clausal Forms, Conversion to clausal forms.
<b>UNIT 5</b>	Planning- Introduction, Basic representation of plans, partial order planning, planning in the blocks world, Goal Stack Planning, Non-linear planning using constraint posting (TWEAK method).

### Outcomes:

*Upon the end of this course, student will be able to:*

CO1 : Familiar basic principles of artificial intelligence;

CO2 : Able to use logic and structured concepts in knowledge representation;

CO3 : To discuss the applications of artificial intelligence;

CO4 : To implement heuristic search algorithms;

CO5 :To design a natural language processor and implement a simple expert system.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	H	L		H	H	L	M	M	M	M	L	H	L	M	
CO2	H	H		H	H	L	M	M	M	M	M	H		H	
CO3	H	M	M	H	H	L	M	H	M	M	L	H		H	
CO4	H	H	H	H	H	L	M	M	M	M	M	H	H	M	H

CO5	H	H	H	H	H	L	M	H	M	M	L	H	H	M	M
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***Text Books:***

1. Stuart Russell and Peter Norvig. *Artificial Intelligence – A Modern Approach*, Pearson Education Press, 2001.
2. Kevin Knight, Elaine Rich, B. Nair, *Artificial Intelligence*, McGraw Hill, 2008.

***Reference Books:***

1. George F. Luger, *Artificial Intelligence*, Pearson Education, 2001.
2. Nils J. Nilsson, *Artificial Intelligence: A New Synthesis*, Morgan Kaufman, 2002.

  
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BCO 035B	Programming in Java	4:0:0 [4]
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<b>UNIT 1</b>	<b>Java Fundamentals:</b> Features of Java ,OOps concepts , Java virtual machine , Reflection byte codes ,Byte code interpretation , Data types, variable, arrays, expressions, operators, and control structures , Objects and classes
<b>UNIT 2</b>	<b>Java Classes:</b> Abstract classes ,Static classes ,Inner classes ,Packages,Wrapper classes Interfaces ,This ,Super ,Access control
<b>UNIT 3</b>	<b>Exception handling:</b> Exception as objects ,Exception hierarchy ,Try catch finally ,Throw, throws
<b>UNIT 4</b>	<b>IO package:</b> Input streams ,Output streams ,Object serialization ,De serialization ,Sample programs on IO files ,Filter and pipe streams
<b>UNIT 5</b>	<b>Multi threading:</b> Thread Life cycle ,Multi threading advantages and issues ,Simple thread program ,Thread synchronization .GUI: Introduction to AWT programming, Layout and component managers ,Event handling ,Applet class ,Applet life-cycle ,Passing parameters embedding in HTML ,Swing components – JApplet, JButton, JFrame, etc. Sample swing programs

#### Course Outcome:

At the end of this course student will:

CO1:Understand how object-oriented concepts are incorporated into the Java programming language

CO2: Develop problem-solving and programming skills using OOP concept

CO3:Understand the benefits of a well structured program

CO4:Develop the ability to solve real-world problems through software development in high-level programming language like Java

CO5:Develop efficient Java applets,threading and applications using OOP concept

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1		M		M	H				M		H		M	H	
CO2	L		M		H		L	L		M		M		H	M
CO3		M		H	M	L		L		M	H		M	H	
CO4			H	M			L		M		H		M	H	
CO5			H	M		L						M	H	H	

H = Highly Related; M = Medium L = Low

#### References:

1. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. Java Programming John P. Flynt Thomson 2nd
3. Java Programming Language Ken Arnold Pearson
4. The complete reference JAVA2, Herbert schildt. TMH

BCO 007A	COMPUTER GRAPHICS	3-0-0 [3]
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#### OBJECTIVE:

- To provide students with a foundation in graphical applications programming
- To introduce students with fundamental concepts and theory of computer graphics
- To give basics of application programming interface (API) implementation based on graphics pipeline approach

<b>UNIT 1</b>	<b>Introduction to Computer Graphics:</b> Overview of Computer Graphics, Computer Graphics Application and Software, Description of some graphics devices, Input Devices for Operator Interaction, Active and Passive Graphics Devices, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, Random-Scan Display Processor, LCD displays.
<b>UNIT 2</b>	<b>Scan conversion – lines, circles and ellipses; Filling polygons and clipping algorithms:</b> Scan Converting Lines, Mid-point criteria, Problems of Aliasing, end-point ordering and clipping lines, Scan Converting Circles, Scan Converting Ellipses, Filling Polygons, edge data structure, Clipping Lines algorithms Cohen-Sutherland and Liang-Barsky, Clipping Polygons, problem with multiple components.
<b>UNIT 3</b>	<b>Two-Dimensional Transformations:</b> Transformations and Matrices, Transformation Conventions, 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Translations and Homogeneous Coordinates, Rotation, Reflection, Scaling, Combined Transformation, Transformation of Points, Transformation of The Unit Square, Solid Body Transformations, Rotation About an Arbitrary Point, Reflection through an Arbitrary Line, A Geometric Interpretation of Homogeneous Coordinates, The Window-to-Viewport Transformations.
<b>UNIT 4</b>	<b>Three-Dimensional Transformations:</b> Introduction, Three-Dimensional Scaling, Three-Dimensional Shearing, Three-Dimensional Rotation, Three-Dimensional Reflection, Three-Dimensional Translation, Multiple Transformation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, Matrix Representation of 3D Transformations, Composition of 3D Transformations, Affine and Perspective Geometry, Perspective Transformations, Techniques for Generating Perspective Views, the Perspective Geometry and camera models, Orthographic Projections, Axonometric Projections, Oblique Projections, View volumes for projections
<b>UNIT 5</b>	<p><b>Visible-Surface Determination :</b> Techniques for efficient Visible-Surface Algorithm Categories of algorithms, Back face removal, The z-Buffer Algorithm, Scan-line method Painter's algorithms (depth sorting), Area sub-division method, BSP trees, Visible-Surface Ray Tracing, comparison of the methods.</p> <p><b>Illumination and Shading</b> Illumination and Shading Models for Polygons, Reflectance properties of surfaces, Ambient, Specular and Diffuse reflections, Atmospheric attenuation Phong's model, Gouraud shading, some examples.</p>

#### Course Outcome (CO):

At the ends of this course students will have:

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CO1: Understand the structure of modern computer graphics system  
 CO2: Understand the basic principles of implementing computer graphics primitives.  
 CO3: Familiarity with key algorithms for modeling and rendering graphical data  
 CO4: Develop design and problem solving skills with application to computer graphics

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H			M	L								M		
CO2			M	L					L		L			L	
CO3			L		L						M	L	L		M
CO4			H							L					L

H = Highly Related; M = Medium L = Low

**Text Books:**

1. Donald Hearn and Pauline Baker, Computer Graphics with OpenGL (third edition), Prentice Hall, 2003

**Reference Books:**

1.F. S. Hill Jr. and S. M. Kelley, Computer Graphics using OpenGL (third edition), Prentice Hall, 2006  
 2. Peter Shirley and Steve Marschner, Computer Graphics(first edition), A. K. Peters, 2010  
 3. Edward Angel, Interactive Computer Graphics. A Top-Down Approach Using OpenGL (fifth Edition), PearsonEducation, 2008

  
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BCO 015B	COMPUTERGRAPHICS LAB	0-0-2 [2]
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### List of Experiments

- 1 Write a Program to Show basic Transformation with OpenGL
- 2 Write a Menu Driven Program with OpenGL
- 3 Write a Program to draw a line using Bresenham's Algorithm with OpenGL
- 4 Write a Program to implement midpoint algorithm to draw circle
- 5 Write a Program to implement midpoint algorithm to draw ellipse
- 6 Program to implement 2d scaling about an arbitrary axis.
- 7 Write a program to implement DDA line Algorithm
- 8 Program to implement 2d rotation about an arbitrary axis.
- 9 Program to implement translation of a line and triangle.
- 10 Program to implement Cohen Sutherland line clipping.
- 11 Program to implement Sutherland Hodgeman polygon clipping.
- 12 Program to draw Bezier curve.
- 13 Program to draw b-spline curve.
- 14 Program to implement a line using slope intercept formula.
- 15 Write a program to implement Bresenham 's Algorithm

### **Course Outcome (CO):**

At the ends of this course studentswill have:

CO1: Understand the structure of modern computer graphics system

CO2: Understand the basic principles of implementing computer graphics primitives.

CO3: Familiarity with key algorithms for modeling and rendering graphical data

CO4: Develop design and problem solving skills with application to computer graphics

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specifice Outcome		
	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H			M	L								M		
CO2			M	L					L		L			L	
CO3			L		L						M	L	L		M
CO4			H							L					L

H = Highly Related; M = Medium L = Low

BCO 068B	Programming in Java Lab	0-0-2
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### 1. Operators and Expressions

- d. To write a java program to find the area of rectangle
- e. To write a java program to find the result of the following expressions
  - i)  $(a < 2) + (b > 2)$
  - ii)  $(b > 0)$
  - iii)  $(a + b * 100) / 10$
  - iv)  $a \& b$
 Assume  $a=10$  and  $b=5$
- f. To write a java program to print the individual digits of a 3 digit number.

### 2. Decision Making Statements

- a. write a java program to read two integers and print the larger number followed by the words "is larger". If the numbers are equal print the message "These numbers are equal".
- b. To write a java program to read an integer and find whether the number is odd or even
- c. To write a java program find the biggest of three integers.

### 3. Looping Statements

- a. To write a java program to find the sum of digits of a given number
- b. To write a java program to find the first 15 terms of Fibonacci sequence.
- c. To write a java program to print the Armstrong numbers.

### 4. Array

- a. To write a java program to find the largest and smallest number in an array.

### 5. Strings

- a. To write a java program that creates a string object and initializes it with your name and performs the following operations
  - i) To find the length of the string object using appropriate String method.
  - ii) To find whether the character 'a' is present in the string. If yes find the number of times 'a' appear in the name and the location where it appears

### 6. String Buffer

- a. To write a java program to create a StringBuffer object and illustrate how to append characters and to display the capacity and length of the string buffer
- b. To write a java program to create a StringBuffer object and illustrate how to insert characters at the beginning
- c. To write a java program to Create a StringBuffer object and illustrate the operations of the append () and reverse () methods.

### 7. Classes and Objects

- a. To write a java program to display total marks of 5 students using student class. Given the following attributes: Regno(int), Name(string), Marks in subjects(Integer Array), Total (int).

b. To write a program in java with a class Rectangle with the data fields width, length, area and colour. The length, width and area are of double type and colour is of string type. The methods are get\_length(), get\_width(), get\_colour() and find\_area().

Create two objects of Rectangle and compare their area and colour. If the area and colour both are the same for the objects then display “Matching Rectangles”, otherwise display “Non-matching Rectangle”.

## **8. Inheritance**

a. write a java program to create a Player class and inherit three classes Cricket\_Player, Football\_Palyer and Hockey\_Player.

## **9. Interfaces**

a. To write a java program to show how a class implements two interfaces.  
b. To write a java program to show that the variables in an interface are implicitly static and final and methods are automatically public

## **10. Packages**

a. To write a java program to create a package for Book details giving Book name, Author name, price and year of publishing.

## **11. Applets & AWT**

a. To write a java applet program to change the color of a rectangle using scroll bars to change the value of red, green and blue  
b. To write an applet program for creating a simple calculator to perform Addition, subtraction, Multiplication and Division using Button, Label and TextField component.

## **12. Exception Handling**

a. To write a java program to catch more than two exception  
b. To write a java program to create our exception subclass that throws exception if the sum of two integers is greater than 99.

## **13. Multithreading**

a. To write a java program for generating two threads, one for generating even number and one for generating odd number.

## **Course Outcome:**


At the end of this course student will:

CO1: Understand how object-oriented concepts are incorporated into the Java programming language

CO2: Develop problem-solving and programming skills using OOP concept

CO3: Understand the benefits of a well structured program

CO4: Develop the ability to solve real-world problems through software development in high-level programming language like Java

  
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CO5:Develop efficient Java applets,threading and applications using OOP concept

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1		M		M	H				M		H		M	H	
CO2	L		M		H		L	L		M		M		H	M
CO3		M		H	M	L		L		M	H		M	H	
CO4			H	M			L		M		H		M	H	
CO5			H	M		L						M	H	H	

H = Highly Related; M = Medium L = Low

  
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BCO 025B	DESIGN& ANALYSIS OF ALGORITHMS LAB	0-0-2
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### List of Experiments

1. Write a Program to Explore a Binary Heap
2. Write a Program for Merging of two search trees
3. Write a program to implement Huffman tree construction
4. Write a Program for Computing a spanning tree having smallest value of largest edge
5. Write a Program for Finding the decimal dominant in linear time
6. Write a Program for Problems on Graphs. Etc.
7. Write a program to find Greatest Common Divisor
8. Write a program for fractional Knapsack problem
9. Write a program for 0/1 Knapsack problem
10. Write a program to implement Naive algorithm,
11. Write a program to implement KMP matcher algorithms,
12. Write a program to implement Boyer-Moore algorithm
13. Write a program to implement modular arithmetic
14. Write a program to implement Set cover,
15. Write a program to implement vertex cover

**OUTCOMES:** After study of this subject student will be able to know

CO1: Various methods of calculating complexity

CO 2: Finding out the best method for different algorithms

CO3: About computational geometry, like Lower bound theory, modular arithmetic and CRT

CO4: Various Decision Problems like NP Complete, NP hard

CO5: Knowledge of Graph and its algorithm

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H	M		M			M				L	H	M
CO2	H	H			H							L	H	M
CO3	M	H	L		M			M				M		
CO4	H	L	M		M							L	M	H
CO5	H	M	M		M			L				L	M	M

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<b>BCO 319A</b>	<b>Certified Ethical Hacker</b>	<b>4-0-0 [4]</b>
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### Course Outcomes:

CO1: Identify legal and ethical issues related to vulnerability and penetration testing.  
CO2: Plan vulnerability assessment and penetration test for a network.  
CO3: Determine ways to assess the effectiveness of security policies and procedures.  
CO4: Evaluate various techniques and tools used in network scanning.  
CO5: Describe best practices for securing Android, iOS, and Windows OS devices.


### Syllabus:

<b>Module 01: Introduction to Ethical Hacking</b>	Elements of Information Security, Cyber Kill Chain Methodology, MITRE ATT&CK Framework, Hacker Classes, Ethical Hacking, Information Assurance (IA), Risk Management, Incident Management, PCI DSS, HIPPA, SOX, GDPR
<b>Module 02: Footprinting and Reconnaissance</b>	Foot printing on the target network using search engines, web services, and social networking sites. Website, email, whois, DNS, and network foot printing on the target network
<b>Module 03: Scanning Networks</b>	Perform host, port, service, and OS discovery on the target network. Perform scanning on the target network beyond IDS and firewall
<b>Module 04: Enumeration</b>	NetBIOS, SNMP, LDAP, NFS, DNS, SMTP, RPC, SMB, and FTP Enumeration
<b>Module 05: Vulnerability Analysis</b>	Vulnerability research using vulnerability scoring systems and databases. Vulnerability assessment using various vulnerability assessment tools
<b>Module 06: System Hacking</b>	Online active online attack to crack the system's password. Buffer overflow attack to gain access to a remote system. Escalate privileges using privilege escalation tools. Escalate privileges in linux machine. Hide data using steganography. Clear Windows and Linux machine logs using various utilities. Hiding artifacts in Windows and Linux machines
<b>Module 07: Malware Threats</b>	Malware, Components of Malware, APT, Trojan, Types of Trojans, Exploit Kits, Virus, Virus Lifecycle, Types of Viruses, Ransomware, Computer Worms, Fileless Malware, Malware Analysis, Static Malware Analysis, Dynamic Malware Analysis, Virus Detection Methods, Trojan Analysis, Virus Analysis, Fileless Malware Analysis, Anti-Trojan Software, Antivirus Software, Fileless Malware Detection Tools
<b>Module 08: Sniffing</b>	Network Sniffing, Wiretapping, MAC Flooding, DHCP Starvation Attack, ARP Spoofing Attack, ARP Poisoning, ARP Poisoning Tools, MAC Spoofing, STP Attack, DNS Poisoning, DNS Poisoning Tools, Sniffing Tools, Sniffer Detection Techniques, Promiscuous Detection Tools
<b>Module 09: Social Engineering</b>	Social Engineering, Types of Social Engineering, Phishing, Phishing Tools, Insider Threats/Insider Attacks, Identity Theft

<b>Module 10: Denial-of-Service</b>	DoS Attack, DDoS Attack, Botnets, DoS/DDoS Attack Techniques, DoS/DDoS Attack Tools, DoS/DDoS Attack Detection Techniques, DoS/DDoS Protection Tools
<b>Module 11: Session Hijacking</b>	Session Hijacking, Types of Session Hijacking, Spoofing, Application-Level Session Hijacking, Man-in-the-Browser Attack, Client-side Attacks, Session Replay Attacks, Session Fixation Attack, CRIME Attack, Network Level Session Hijacking, TCP/IP Hijacking, Session Hijacking Tools, Session Hijacking Detection Methods, Session Hijacking Prevention Tools
<b>Module 12: Evading IDS, Firewalls, and Honeypots</b>	Bypass Windows Firewall. Bypass firewall rules using tunnelling. Bypass antivirus
<b>Module 13: Hacking Web Servers</b>	Web Server Operations, Web Server Attacks, DNS Server Hijacking, Website Defacement, Web Cache Poisoning Attack, Web Server Attack Methodology, Web Server Attack Tools, Web Server Security Tools, Patch Management, Patch Management Tools
<b>Module 14: Hacking Web Applications</b>	Web Application Architecture, Web Application Threats, OWASP Top 10 Application Security Risks – 2021, Web Application Hacking Methodology, Web API, Webhooks, and Web Shell, Web API Hacking Methodology, Web Application Security
<b>Module 15: SQL Injection</b>	SQL Injection, Types of SQL injection, Blind SQL Injection, SQL Injection Methodology, SQL Injection Tools, Signature Evasion Techniques, SQL Injection Detection Tools
<b>Module 16: Hacking Wireless Networks</b>	Wireless Terminology, Wireless Networks, Wireless Encryption, Wireless Threats, Wireless Hacking Methodology, Wi-Fi Encryption Cracking, WEP/WPA/WPA2 Cracking Tools, Bluetooth Hacking, Bluetooth Threats, Wi-Fi Security Auditing Tools, Bluetooth Security Tools
<b>Module 17: Hacking Mobile Platforms</b>	Mobile Platform Attack Vectors, OWASP Top 10 Mobile Risks, App Sandboxing, SMS Phishing Attack (SMiShing), Android Rooting, Hacking Android Devices, Android Security Tools, Jailbreaking iOS, Hacking iOS Devices, iOS Device Security Tools, Mobile Device Management (MDM), OWASP Top 10 Mobile Controls, Mobile Security Tools.
<b>Module 18: IoT Hacking</b>	IoT Architecture, IoT Communication Models, OWASP Top 10 IoT Threats, IoT Vulnerabilities, IoT Hacking Methodology, IoT Hacking Tools, IoT Security Tools, IT/OT Convergence (IIOT), ICS/SCADA, OT Vulnerabilities, OT Attacks, OT Hacking Methodology, OT Hacking Tools, OT Security Tools
<b>Module 19: Cloud Computing</b>	Cloud Computing, Types of Cloud Computing Services, Cloud Deployment Models, Fog and Edge Computing, Cloud Service Providers, Container, Docker, Kubernetes, Serverless Computing, OWASP Top 10 Cloud Security Risks, Container and Kubernetes Vulnerabilities, Cloud Attacks, Cloud Hacking, Cloud Network Security, Cloud Security Controls, Cloud Security Tools
<b>Module 20: Cryptography</b>	Cryptography, Encryption Algorithms, MD5 and MD6 Hash Calculators, Cryptography Tools, Public Key Infrastructure (PKI), Email Encryption, Disk Encryption, Cryptanalysis, Cryptography Attacks, Key Stretching

# CO-PO Mapping:

<i>Course Outcomes</i>	<i>Program Outcomes</i>												<i>Program Specific Outcomes</i>		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	L	M	M	H	H	M		H	M	L		H	H	H	H
CO2	L	M	M	H	H	M		H	M	L		H	H	H	H
CO3	L	M	M	H	H	M		H	M	L		H	H	H	H
CO4	L	M	M	H	H	M		H	M	L		H	H	H	H
CO5	L	M	M	H	H	M		H	M	L		H	H	H	H

  
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<b>BCO325B</b>	<b>NEURAL NETWORK AND DEEP LEARNING (Vision and NLP)</b>	<b>3-0-0 [3]</b>
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Software: Python, NumPy, Pandas, Matplotlib, Seaborn, SciPy, Scikit-Learn, TensorFlow, Keras

*Objectives: The objective of this course is to teach students the basic concepts of neural networks, neurons, and deep learning*

## UNIT – I

**The neural network:** The neuron, linear perceptron, feed-forward neural network, limitations of

linear neurons, sigmoid, tanh, relu neurons, softmax output layer, information theory, cross entropy,

Kullback-Leibler divergence

**Training feed-forward neural network:** Gradient Descent, delta rules and learning rates, gradient

descent with sigmoidal neurons, the backpropagation algorithms, stochastic and minibatch gradient

descent, test sets, validation sets and overfitting, preventing overfitting

## UNIT – II

**TensorFlow:** Computation graphs, graphs, sessions and fetches, constructing and managing graph,

flowing tensors, sessions, data types, tensor arrays and shapes, names, variables, placeholders and

simple optimization, linear regression and logistic regression using tensorflow

**Implement Neural Network:** Introduction to Keras, Build neural network using Keras, Evaluating

models, data preprocessing, feature engineering, feature learning, overfitting, underfitting, weight

regularization, dropout, universal workflow of deep learning

## UNIT – III

**Moving beyond gradient descent:** Local minima vs global minima vs saddle, model identifiability,

correcting gradient points in wrong directions, Momentum based optimization, second order methods, learning rate adaption, adagrad, rmsprop, adam

**Convolutional Neural Network:** Convolution operation, filters and feature maps, motivation, sparse

interactions, parameter sharing and equivariant representation, padding and stride, max pooling, full

architectural description of convolutional network, build cnn using data augmentation, using pretrained convnet, visualize what convnet learn.

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## UNIT – IV

**Embedding and Representation Learning:** Principle component analysis, working with text data, one-hot encoding of words and characters, word embedding, autoencoder architecture, denoising, sparsity, Word2vec framework, Skip-Gram architecture.

**Models for Sequence Analysis:** Analysing Variable-length inputs, Seq2seq with neural n-gram, part of speech tagger, dependency parse, syntaxnet, recurrent neural network, challenges with vanishing gradients, long short term memory units

  
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BCO428A	Compiler Design	3-0-0
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**Introduction:** Phases of compilation and overview. Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, relating regular expressions and finite automata,

scanner generator (lex, flex).

**Syntax Analysis (Parser):** Context-free languages and grammars, push-down automata, LL(1)

grammars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars

and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison)

**Semantic Analysis:** Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.

**Symbol Table:** Basic structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, scope.

**Intermediate Code Generation:** Translation of different language features, different types of intermediate forms.

**Code Improvement (optimization):** control-flow, data-flow dependence etc.; local optimization,

global optimization, loop optimization, peep-hole optimization etc.

**Architecture dependent code improvement:** instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation.

**Advanced topics:** Type systems, data abstraction, compilation of Object Oriented features and


non-imperative programming languages.

#### Books:

1. *Compilers: Principles, Techniques and Tools*, V. Aho, R. Sethi and J. Ullman.
2. *Lex & Yacc*, Levine R. John, Tony Mason and Doug Brown

#### Reference Books:

*The Design and Evolution of C++*, Bjarne Stroustrup.

  
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<b>DBA009A</b>	<b>Fundamental of Management</b>	<b>3-0-0</b>
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## **UNIT – I**

**Management Theories:** Concept and Foundations of Management, Evolution of Management Thoughts

[Pre-Scientific Management Era (before 1880), Classical management Era (1880-1930), Neo-classical

Management Era (1930-1950), Modern Management era (1950-on word). Contribution of Management

Thinkers: Taylor, Fayol, Elton Mayo etc.

## **UNIT – II**

**Functions of Management-** Planning, Organizing, Staffing, Directing, Controlling

## **UNIT – III**

**Organization Behavior:** Introduction, Personality, Perception, Learning and Reinforcement, Motivation,

Group Dynamics, Power & Influence, Work Stress and Stress Management, Decision Making, Problems in

Decision Making, Decision Making, Organizational Culture, Managing Cultural Diversity

## **UNIT – IV**

**Organizational Design:** Classical, Neoclassical and Contingency approaches to organizational design;

Organizational theory and design, Organizational structure (Simple Structure, Functional Structure,

Divisional Structure, Matrix Structure)

## **UNIT – V**

**Managerial Ethics:** Ethics and Business, Ethics of Marketing & advertising, Ethics of Finance & Accounting,

Decision – making frameworks, Business and Social Responsibility, International Standards, Corporate

Governance, Corporate Citizenship, Corporate Social Responsibility

## **Text Books:**

1. Richard L. Daft, *Understanding the Theory and Design of Organizations*

## **Reference Books:**

1. Stephen P. Robbins, Timothy A. Judge, Neharika Vohra, *Organizational Behavior*

  
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<b>DBA010A</b>	<b>Business Strategy</b>	<b>3-0-0</b>
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## **UNIT – I**

### **Introduction to Strategic Management**

- Importance of Strategic Management
- Vision and Objectives
- Schools of thought in Strategic Management
- Strategy Content, Process, and Practice
- Fit Concept and Configuration Perspective in Strategic Management

## **UNIT – II**

### **Internal Environment of Firm- Recognizing a Firm's Intellectual Assets**

- Core Competence as the Root of Competitive Advantage
- Sources of Sustained Competitive Advantage
- Business Processes and Capabilities-based Approach to Strategy

## **UNIT – III**

### **External Environments of Firm- Competitive Strategy**

- Five Forces of Industry Attractiveness that Shape Strategy
- The concept of Strategic Groups, and Industry Life Cycle
- Generic Strategies
- Generic Strategies and the Value Chain

## **UNIT – IV**

### **Corporate Strategy, and Growth Strategies**

- The Motive for Diversification
- Related and Unrelated Diversification
- Business Portfolio Analysis
- Expansion, Integration and Diversification
- Strategic Alliances, Joint Ventures, and Mergers & Acquisitions

## **UNIT – V**

### **Strategy Implementation: Structure and Systems**


- The 7S Framework
- Strategic Control and Corporate Governance

### **Text Books:**

1. Robert M. Grant (2012). *Contemporary Strategic Management*, Blackwell, 7th Edition.

### **Reference Books:**

1. M.E. Porter, *Competitive Strategy*, 1980. M.E. Porter,
2. *Competitive Advantage*, 1985 Richard Rumelt (2011),
- Good Strategy Bad Strategy: The Difference and Why It Matters*

  
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<b>BCO489A</b>	<b>Machine learning</b>	<b>3-0-0</b>
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Introduction to Machine Learning (ML); Relationship between ML and human learning; A quick survey of major models of how machines learn; Example applications of ML

Classification: Supervised Learning; The problem of classification; Feature engineering; Training and testing classifier models; Cross-validation; Model evaluation (precision, recall, F1-measure, accuracy, area under curve); Statistical decision theory including discriminant functions and decision surfaces;

Naive Bayes classification; Bayesian networks; Decision Tree and Random Forests; k-Nearest neighbor classification; Support Vector Machines; Artificial neural networks including backpropagation;

Applications of classifications; Ensembles of classifiers including bagging and boosting

Hidden Markov Models (HMM) with forward-backward and Viterbi algorithms; Sequence classification using HMM; Conditional random fields; Applications of sequence classification such as part-of-speech tagging

Regression: Multi-variable regression; Model evaluation; Least squares regression; Regularization; LASSO; Applications of regression

Association rule mining algorithms including apriori


Expectation-Maximization (EM) algorithm for unsupervised learning

Clustering: average linkage; Ward's algorithm; Minimum spanning tree clustering; K-nearest neighbors clustering; BIRCH; CURE; DBSCAN

8. Anomaly and outlier detection methods

### References:

- [1] R.O. Duda, P.E. Hart, D.G. Stork, **Pattern Classification**, 2/e, Wiley, 2001.
- [2] C. Bishop, **Pattern Recognition and Machine Learning**, Springer, 2007.
- [3] E. Alpaydin, **Introduction to Machine Learning**, 3/e, Prentice-Hall, 2014.
- [4] A. Rostamizadeh, A. Talwalkar, M. Mohri, **Foundations of Machine Learning**, MIT Press.
- [5] A. Webb, **Statistical Pattern Recognition**, 3/e, Wiley, 2011.

  
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<b>BCO359A</b>	<b>Advance Neural Network &amp; Deep learning</b>	<b>3-0-0</b>
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#### UNIT I: RNN

Gradient Descents, Recurrent Neural Network, Predicting the next character using RNNs, Hopfield Network, Gated Recurrent Unit (GRU), Bidirectional RNN

#### UNIT II Deep Learning:

Introduction to Deep Learning, Introduction to Tensorflow, creating a Deep Learning Network using Tensorflow

#### UNIT III Boltzmann Machines

Introduction to Boltzmann Machines, Restricted Boltzmann Machines, Collaborative Filtering using Boltzmann Machines, Markov Random Fields, Deep Boltzmann Machine

#### UNIT IV Deep Belief Networks

Introduction to Deep Belief Network, Stacking RBM to create Deep Belief Network, Wake Sleep Algorithm

#### UNIT V Modern Statistical Concepts

Learn about confidence intervals, define jackknife regression, Explain graphical models, Describe better goodness of fit and yield metrics

  
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<b>BCO360A</b>	<b>Advance Neural Network &amp; Deep Learning LaB</b>	<b>3-0-0</b>
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1. Build a perceptron model from Scratch
2. Write a program to visualize different activation functions and their derivative
3. Write a program for Hyperparameter Tuning and Optimization in Tensorflow
4. Write a program for simulation of Jackknife estimation of mean and median
5. Write a program for understanding different tensorflow syntax and different operations.
6. Write a program to understand Keras in Tensorflow
7. Write a program for Linear Regression in Tensorflow
8. Write a program for Logistic Regression with Tensorflow
9. Write a program for Next character prediction using RNN in Tensorflow
10. Write a program for next character prediction using Bidirectional RNN in tensorflow
11. Write a program for next word prediction using RNN in Tensorflow
12. Write a program for Collaborative Filtering using RBM in Tensorflow
13. Write a program for Classification using DBN
14. Write a program for A/B Testing using Bayesian Method in Tensorflow

  
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<b>BCO395A</b>	<b>Agile Practices</b>	<b>3-0-0</b>
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<b>UNIT 1</b>	Introduction, Challenges of Traditional Business Model, Why Digital Transformation, Design Thinking, Different Phases of Design Thinking, Divergence, Emergence and Convergence of Design Thinking, Design Thinking vs. Agile vs. Lean, Agile Practices, Design Sprint and its Phases, Design Thinking Vs Design Spirit
<b>UNIT 2</b>	Introduction to Product Management & Service Mindset, Product Manager, Building Products and services, Product lifecycle and phases, product development & Methodology; systems thinking, value chain, Introduction of Capability Optimization and Capability Maturity Model, Business Integration methods, Agile methodology, Product Marketing; User Experience Design
<b>UNIT 3</b>	Agile Methodology, Software, History of Software Engineering and Software, Development Methodologies, Traditional Software Development Models, Waterfall Model, Classical Waterfall Model, Traditional IT Organizations, Developers vs IT Operations Conflict, Birth of Agile, Four Values of the Agile Manifesto, Agile and Lean
<b>UNIT 4</b>	Scrum, Scrum Theory, Scrum Values, Scrum Roles, Scrum Master Scrum Sprints, Benefits of Scrum, Planning and Estimation, Agile Planning, Levels of Agile Planning, Conditions of Satisfaction, Velocity, Estimating Techniques, Soft Skills in Agile, Kanban Model.
<b>UNIT 5</b>	Kanban Principle, Kanban Board, Kanban Core Practices, Make work visible, Limit work in progress (WiP), Manage flow, Make progress policies explicit, Implement feedback mechanisms, Improve collaboratively (using methods and models).

#### **Course OUTCOME (CO):**

- CO1: Understand the challenges of traditional business model
- CO2: Explore the product management and service mindset
- CO3: Understand agile methodology
- CO4: Understand the scrum theory and values
- CO5: Explore the Kanban principles

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

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Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	L	L	M	L	L	L			L	L	L	L	L	L	L
CO2	L	L	M	L	L				L	L	L	L	L	L	L
CO3	L	M	L	L	L					L		L	L	L	L
CO4	L	M	L	L	L		L			L		L	L	L	L
CO5	L	L	L	L	L	M			L	L		L	L	L	L

H = Highly Related; M = Medium; L = Low

### **Text Books:**

1. Software Engineering: A Practitioner's Approach Book by Roger S. Pressman

### **Reference Books:**

2. Agile and Lean Concepts for Teaching and Learning: Bringing Methodologies from Industry to the Classroom- David Parsons, Kathryn MacCallum

  
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<b>BCO 090A</b>	<b>INTERNET OF THINGS</b>	<b>2-0-0 [2]</b>
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### Course Objectives:

The objective of the course is to:

1. Introduction to IoT concepts.
2. Understand IoT Market perspective.
3. Data and Knowledge Management and use of Devices in IoT Technology.
4. Understand State of the Art – IoT Architecture.
5. Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

<b>UNIT 1</b>	<b>M2M to IoT</b> -The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.
<b>UNIT 2</b>	<b>M2M to IoT – A Market Perspective</b> – Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. <b>M2M to IoT-An Architectural Overview</b> – Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.Sensor modules, nodes and systems.
<b>UNIT 3</b>	<b>M2M and IoT Technology Fundamentals</b> - Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management
<b>UNIT 4</b>	<b>IoT Architecture-State of the Art</b> – Introduction, State of the art, <b>Architecture Reference Model</b> - Introduction, Reference Model and architecture, IoT reference Model
<b>UNIT 5</b>	<b>IoT Reference Architecture</b> - Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. <b>Real-World Design Constraints</b> - Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control. <b>Industrial Automation</b> - Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things, <b>Commercial Building Automation</b> - Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future..

### Course Outcome (CO) of Internet of Things

At the end of this course students will have:

CO1: To provide the basic understanding of IoT concepts

CO2: To equip our students with the market perspective of IoT and have the knowledge of architectural overview of IoT.

CO3:To be familiar with contemporary issues in IoT and Data and Knowledge Management and use of Devices in IoT Technology.

CO4: To be familiar with IoT tools and to enhance analytical skills to develop innovative solutions, automation.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H											L		
CO2				H				L		M					M
CO3			M			M								L	M
CO4				H	M				M				M		

**Textbook:**

- Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, **“From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”**, 1<sup>st</sup> Edition, Academic Press, 2014.

**Reference Books:**

- Vijay Madiseti and Arshdeep Bahga, **“Internet of Things (A Hands-on-Approach)”**, 1<sup>st</sup> Edition, VPT, 2014.

Francis daCosta, **“Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”**, 1<sup>st</sup> Edition, Apress Publications, 2013

  
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<b>BCO 064B</b>	<b>CLOUD COMPUTING</b>	<b>4-0-0 [4]</b>
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**OBJECTIVE:** At the end of the course, the student should be able to:

1. To understand the architecture of Cloud.
2. To develop an understanding of various aspects of cloud computing.
3. To familiarize the students with fault Tolerance and security measures in cloud.

<b>UNIT 1</b>	<b>Understanding cloud computing:</b> Introduction to Cloud Computing - Benefits and Drawbacks - Types of Cloud Service Development - Deployment models
<b>UNIT 2</b>	<b>Cloud Architecture Technology and Architectural Requirements:</b> The Business Case for Clouds - Hardware and Infrastructure – Accessing the cloud – Cloud Storage – Standards- Software as a Service – Discovering Cloud Services Development tools. Three Layered Architectural Requirement - Provider Requirements - Service Centric Issues - Interoperability – QoS.
<b>UNIT 3</b>	Fault Tolerance - Data Management Storage and Processing - Virtualization Management - Scalability - Load Balancing - Cloud Deployment for Enterprises - User Requirement - Comparative Analysis of Requirement.
<b>UNIT 4</b>	<b>Security Management in Cloud:</b> Security Management Standards - Security Management in the Cloud Availability Management - SaaS Availability Management - PaaS Availability Management - IaaS Availability Management - Access Control - Security Vulnerability, Patch, and Configuration Management – Privacy in Cloud- The Key Privacy Concerns in the Cloud - Security in Cloud Computing.
<b>UNIT 5</b>	<b>Virtualization:</b> Objectives - Benefits - Virtualization Technologies - Data Storage Virtualization – Storage Virtualization – Improving Availability using Virtualization - Improving Performance using Virtualization- Improving Capacity using Virtualization.

**OUTCOMES:** At the end of the course, the student should be able to:

- Understand the architecture of Cloud.
- To develop an understanding of various aspects of cloud computing.
- Fault Tolerance and security measures in cloud.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Cours e Outco mes	Program OutComes	Program Specific Outcomes
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	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1															
CO2															
CO3															
CO4															
CO5															

H = Highly Related; M = Medium L = Low

#### Text books:

1. David S Linthicum, "Cloud Computing and SOA Convergence in your Enterprise A Step by Step Guide", Addison Wesley Information Technology Series.
2. Anthony T Velte, Toby J.Velte, Robert Elsenpeter, "Cloud computing A Practical Approach ", Tata McGraw Hill Publication
3. Tim Mather, Subra Kumaraswamy, Shahed Latif, "Cloud Security and Privacy –

#### Reference Books:

1. An Enterprise Perspective on Risks and Compliance", O'Reilly Publications, First Edition
2. Michael Miller, "Cloud Computing – Web-Based Applications that Change the Way You Work and Collaborate Online", Pearson Education, New Delhi, 2009.
3. Cloud Computing Specialist Certification Kit – Virtualization Study Guide

  
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BCO 028B	COMPILER CONSTRUCTION	3-0-0 [3]
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UNIT 1 Overview of compilation- The structure of a compiler and applications of compiler technology; Lexical analysis - The role of a lexical analyzer, specification of tokens, recognition of tokens, hand-written lexical analyzers, LEX, examples of LEX programs.

Introduction to syntax analysis -Role of a parser, use of context-free grammars (CFG) in the specification of the syntax of programming languages, techniques for writing grammars for programming languages (removal left recursion, etc.), non- context-free constructs in programming languages, parse trees and ambiguity, examples of programming language grammars.

UNIT 2 Top-down parsing- FIRST & FOLLOW sets, LL(1) conditions, predictive parsing, recursive descent parsing, error recovery. LR-parsing - Handle pruning, shift-reduce parsing, viable prefixes, valid items, LR(0) automaton, LR-parsing algorithm, SLR(1), LR(1), and LALR(1) parsing. YACC, error recovery with YACC and examples of YACC specifications.

UNIT 3 Syntax-directed definitions (attribute grammars)-Synthesized and inherited attributes, examples of SDDs, evaluation orders for attributes of an SDD, Dependency graphs-attributed and L-attributed SDDs and their implementation using LR-parsers and Recursive Descent parsers respectively.

UNIT 4 Semantic analysis- Symbol tables and their data structures. Representation of “scope”. Semantic analysis of expressions, assignment, and control-flow statements, declarations of variables and functions, function calls, etc., using S- and L-attributed SDDs (treatment of arrays and structures included). Semantic error recovery.

UNIT 5 Intermediate code generation - Different intermediate representations – quadruples, triples, trees, flow graphs, SSA forms, and their uses. Translation of expressions (including array references with subscripts) and assignment statements. Translation of control-flow statements – it- then-else, while-do, and switch. Short-circuit code and control-flow translation of Boolean expressions. Back patching. Examples to illustrate intermediate code generation for all constructs.

Run-time environments:- Stack allocation of space and activation records. Access to non-local data on the stack in the case of procedures with and without nesting of procedures.

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#### **Text Books:**

1. Compilers: Principles, Techniques, and Tools, by A.V. Aho, Monica Lam, Ravi Sethi, and J.D. Ullman, (2<sup>nd</sup>ed.), Addison-Wesley, 2007 (main text book, referred to as ALSU in lab assignments).
2. K.D. Cooper, and Linda Torczon, Engineering a Compiler, Morgan Kaufmann, 2004.

#### **Reference Books:**

1. K.C. Louden, Compiler Construction: Principles and Practice, Cengage Learning, 1997.
2. D. Brown, J. Levine, and T. Mason, LEX and YACC, O'Reilly Media, 1992.

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<b>BCO 037A</b>	<b>ADVANCE PROGRAMMING IN JAVA</b>	<b>4-0-0 [4]</b>
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**OBJECTIVES:-**Students will be able to know the following

- To learn the Java programming language: its syntax, idioms, patterns, and styles.
- To become comfortable with object oriented programming: Learn to think in objects
- To learn the essentials of the Java class library, and learn how to learn about other parts of the library when you need them.
- To introduce event driven Graphical User Interface (GUI) programming

<b>UNIT 1</b>	Revisited of GUI, Database Programming using JDBC Introduction to JDBC ,JDBC Drivers & Architecture CURD operation Using JDBC Connecting to non-conventional Databases. Connectivity with SQL server, Oracle and MS access.
<b>UNIT 2</b>	Networking , Networking Basics ,The Networking Classes and Interfaces InetAddress ,Factory Methods ,Instance Methods ,Inet4Address and Inet6Address, TCP/IP Client Sockets ,URL,URLConnection,Http URL Connection, The URI Class,Cookies, TCP/IP Server Sockets,Datagram, DatagramSocket ,DatagramPacket,
<b>UNIT 3</b>	RMI (Remote Method Invocation) RMI overview RMI architecture, Designing RMI application, Executing RMI application. Example demonstrating RMI
<b>UNIT 4</b>	Servlet: Web Application Basics. Architecture and challenges of Web Application.Introduction to servlet life cycle Developing and Deploying Servlets Exploring Deployment Descriptor (web.xml). Handling Request and Response Initializing a Servlet Accessing Database Servlet Chaining Session Tracking & Management Dealing with cookies Transferring Request Accessing Web Context Passing INIT and CONTEXT Parameter Sharing information using scope object Controlling concurrent access User Authentication Filtering Request and Response Programming Filter Filter Mapping Servlet Listeners .
<b>UNIT 5</b>	Basic JSP Architecture Life Cycle of JSP (Translation, compilation) JSP Tags and Expressions Role of JSP in MVC-2 JSP with Database JSP Implicit Objects Tag Libraries JSP Expression Language (EL) Using Custom Tag JSP Capabilities: Exception Handling Session Management Directives JSP with Java Bean.

**OUTCOMES:-**

Upon end of this course, students will be able to:

- About the Java programming language: its syntax, idioms, patterns, and styles.
- Become comfortable with object oriented programming: Learn to think in objects
- Learn the essentials of the Java class library, and learn how to learn about other parts of the library when you need them.
- Introduce event driven Graphical User Interface (GUI) programming

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes	Program specific Outcomes
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			H	L	H		L			M	H			H	
CO2		L	H		H	L		L					M	H	
CO3			H	M					L	L		M		H	
CO4				M	H			M			L			H	M
CO5		L			H	M			M					H	

**Text Books:**

1. J2EE: The complete Reference by James Keogh
2. Java 6 And J2Ee 1.5, Black Book by kogent
3. Java Server Programming Java EE6 (J2EE 1.6), Black Book by kogent

**Reference books:-**

1. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. Java Programming John P. Flynt Thomson 2<sup>nd</sup>
3. Java Programming Language Ken Arnold Pearson

  
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BCO 031B	Compiler Design Lab	0:0:2 [2]
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## List Of Experiments

- 1 Familiarization with LEX by writing simple specifications for tokens such as identifiers, numbers, comments in C/C++, etc. All LEX specifications must be compiled and executed with appropriate inputs. At least ten such exercises must be completed in two lab classes.
- 2 LEX specification for tokens of the small language in ALSU's book
- 3 Complete the specifications in (2) above to make a complete lexical analyzer. (1 lab class)
- 4 Familiarization with YACC by writing simple specifications for desk calculator, variable declarations in C (only numbers and array). All YACC specifications must be compiled and executed with appropriate inputs. Note that this exercise also requires LEX specifications of the tokens involved. (2 lab classes)
- 5 YACC specifications for the syntax of the small language in ALSU's book (appendix A) (1 lab class)
- 6 Adding error recovery to (5) above to make a complete parser. (1 lab class)
- 7 S-attributed specification of the semantics of the small language in ALSU's book
- 8 Adding semantic error recovery to the semantic analyzer in (7) above to make a complete semantic analyzer. (1 lab class)
- 9 Intermediate code generation for the constructs of the small language in ALSU's book (appendix A) to be incorporated into the semantic analyzer of (8) above. Students doing this last assignment may be awarded bonus marks. (3 lab classes)
- 10 Write a programme to parse using Brute force technique of Top-down parsing.
- 11 Write a program for generating for various intermediate code forms
  - i) Three address code ii) Polish notation
- 12 Develop an operator precedence parser (Construct parse table also)
- 13 Develop a recursive descent parser
- 14 Develop a lexical analyser to recognize a few patterns.

  
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<b>BCO 069A</b>	<b>Advance Programming in Java Lab</b>	<b>0-0-2</b>
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Exp.No.          Name of the Experiment

1          Design a registration page using HTML.

2          Implementing JDBC

Program 2(A) Write a program by using JDBC to execute insert, select and update query by using PreparedStatement and display the results.

Program 2(B) Write a program by using JDBC to execute an update query by using PreparedStatement and display the results.

Program 2(C) Write a program and execute ResultSetMetaData Interface by using JDBC.

3          Implementing Servlet

Program 3(A) Write a program and execute a simple servlet demonstrating servlet lifecycle.

Program 3(B) Write a program and execute a servlet program that receives input from html page.

Program 3(C) Write a program and execute ServletRequest and ServletResponse Interfaces with methods.

Program 3(D) Write a program and execute HttpServlet Class doGet() and doPost() Methods.

Program 3(E) Write a program to store the user information into Cookies. Write another program to display the above stored information by retrieving from Cookies.

4          Implementing JSP, JSP Custom Tags and Directives

Program 4(A) Write a program to connect HTML page, JSP page and mysql database.

Program 4(B) Write a program and implement custom tags in JSP

Program 4(C) Write a program and implement JSP directives.

5          Implementing JavaBean

Program 5 Write a program and implement Javabeans using JSP page.

6          Implementing JSP Standard ActionElements

Program 6 Write a program and implement JSP Standard ActionElements.

7          Implementing JSP Scripting Elements

Program 7: Write a program and execute JSP Scriptlets, Declarations and Expressions.

8          Learning session management

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Program 8(A): Write program and execute session management using URL rewriting

Program 8(B) : Write program and execute session management using Hidden Fields.

Program 8(C) : Write program and execute session management using Cookie

Program 8(D): Write a program and execute session management using Session Objects.

## 9 Remote Method Invocation (RMI)

Program 9(A): Write a program and execute Remote Method Invocation

## 10 Configure web.xml

Program 10: Write a code to deploy web.xml file

## 11 Performing Client-Server Communication and Networking

Program 11(A): WAP to implement Client-Server Program

Program 11(B): WAP to implement InetAddress.

Program 11(C): WAP for Sending Email in java

## 12. Implementing Multithreading

Program 12: WAP to implement multithreading(three threads using single run method).

<b>BCO361A</b>	<b>Natural Language Processing</b>		<b>3-0-0</b>
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## UNIT I Natural Language Processing

### Introduction to Natural Language Processing

Types of NLP systems, How computer understands text, Terminologies used in NLP, Steps Involved in NLP, Steps involved in preprocessing , Pipeline of NLP Problems o Challenges in NLP

## UNIT II Words & Vectors


Concepts of words and vectors, Techniques of converting words to numbers, GloVe Word Embeddings, Word2Vec and its types, such as Skip Gram, Model and Continuous BOW o Advanced word vectors, limitations of CBOW and Skip Gram

## UNIT III Processing Techniques

Word window classification, Dependency parsing, Constituency parsing o Machine translation, Attention, End to end models for speech processing, Deep learning for speech recognition, Tree recursive neural networks o RNN for language modelling, Dynamic neural network for question answering

## UNIT IV: Case Studies

Smart Home Services Provider Uses Natural Language Generation to Create Highly Personalized Website Copy, Online Education Company Improves Customer Support with Autosuggestion of Macros, Using Natural Language for Health care Summaries, Microsoft Gets the Pulse of Customer Sentiment with Natural Language Processing

  
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<b>BCO037A</b>	<b>Natural Language Processing Lab</b>		<b>3-0-0</b>
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1. Text Classification using Word Embeddings.
2. Find Synonyms and antonyms using Word Embeddings.
3. Introduction to Topic Modelling.
4. Converting a Foreign Language to English using Machine Translation (German to English).
5. Twitter Sentiment Analysis.
6. Explaining Lemmatization, PoS Tagging,
7. Stemming and Tokenization using an Example.
8. Understanding Dependency Parsing in a given sentence.
9. Perform Speech to Text Conversion using PyAudio and Google Speech Recognition.
10. Creating Custom Speech Recognition Corpus.
11. Introduction to Dynamic Memory Network.
12. Dialog Generation using Deep Learning.

  
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BCO 384A	Test Automation	3-1-0 [4]
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<b>UNIT 1</b>	Seven principles of Software Testing, SDLC vs STLC, Testing Life Cycle, Usability Testing, Why do we need Usability Testing, How to do Usability testing, Advantages & Disadvantages, Functional Testing, End to End Testing, Methods, Advantages & Disadvantages, Compatibility Testing, Types GUI testing, Techniques API testing, Advantages
<b>UNIT 2</b>	Selenium components, Selenium Architecture, TestNG Installing TestNg in Eclipse, TestNG annotations – Understanding usage, Setting priority of execution for test cases, Hard Assertion, Soft Assertion, TestNG Reports, ANT- Downloading & Configuring, XSLT report generation generation using TestNg and Ant
<b>UNIT 3</b>	Describe Selenium 3.x advantages and implementation, Define drivers for Firefox, IE, chrome, Iphone, Android etc, Analyse first Selenium Code, Differentiate between Close and Quit, Describe Firepath and firebug Add-ons installation in Mozilla, Inspect elements in Mozilla, Chrome and IE, Identifying WebElements using id, name, class, Generate own CssSelectors. Differentiate between performance of CssSelectors as compared to Xpaths, Define class attribute, Handle Dynamic objects/ids on the page, Analyse whether object is present on page or not
<b>UNIT 4</b>	Manual Testing, Manual Testing – How to Approach?, Manual Testing – Myth and fallacy, Defect Life Cycle, Qualities of a good Manual Tester, Manual Testing vs Automation Testing, Types, System Testing, Acceptance Testing, Unit Testing, Techniques, Integration Testing, Smoke- Sanity Testing
<b>UNIT 5</b>	Test Scenario, Test Case Design, Test Basis Traceability Matrix

#### Course OUTCOME (CO):

CO1: Understand the testing life cycle.

CO2: Learn about the selenium components.

CO3: Analyse Selenium 3.x advantages and implementation

CO4: Learn the essentials of manual testing.

CO5: Understand the test design framework.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Test Automation  
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Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	L	L	L	L	L	L			L	L	L	L	L	M	M
CO2	L	M	M	M	L				L			L	M	M	M
CO3	L	M	M	M	M							L	M	M	M
CO4	L	M	M	M	M		L					L	M	M	M
CO5	L	L	M	M	M	M			L			L	M	M	M

H = Highly Related; M = Medium; L = Low

### **Text Books:**

1. Selenium Testing Tools Cookbook (Second Edition), Unmesh Gundecha, Packt OpenSource
2. Science of Selenium, Kalilur Rahman, BPB

### **Reference Books:**

1. Flexible Test Automation - by Vitaliano Inglese, Pasquale Arpaia
2. Experiences of Test Automation: Case Studies of Software Test Automation - by Mark Fewster, Dorothy Graham

  
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<b>BCO399A</b>	<b>Application Containerization</b>	<b>3-0-0</b>
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## Unit 1 Application Containerization

Understanding Containers: Transporting Goods Analogy, Problems in Shipping Industry before Containers, Shipping Industry Challenges, Container: The Saviour, Solution by Containers in the Shipping Industry, Challenges in the Software Industry, Problems in Software Industry Before Containers, Put that in Container! Solution by containers in the Software Industry

## Unit 2 Virtualization

Introduction, Hypervisor, Scope of Virtualisation, Containers vs Virtual Machines, Understanding Containers, Containerisation Platform, Runtime and Images, Container Platform, Container Runtime, The Chroot System, FreeBSD Jails, Linux Containers (LXC), Docker

## Unit 3 Introduction to Containerization

Docker architecture, Docker Daemon (Container Platform), Docker Rest API , CLIDifferent environments: (Dev, QA and Prod), Overcoming issues with different environments, Development Environment , Testing Environment, Staging Environment, Production Environment, Virtual machines for dev/deployments, Containers for dev/deployments, Advantages and drawbacks of containerization

## Unit 4 Orchestration Tools

What is orchestration?, Need of orchestration, Case study: Need of Orchestration , Need of Orchestration: Container and Microservices, Docker Swarm and Kubernetes, Architecture, AWS (ECS,EKS), AWS Elastic Container Services Architecture, Azure Kubernetes Services, Openshift, KUBERNETES ON CLOUD, Monitoring of container, How to monitor?

  
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<b>BCO 188A</b>	<b>Cyber Forensic Investigation</b>	<b>3-0-0 (3)</b>
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**Objective:**

- To study the fundamentals of Computer Forensics
- To learn, analyze and validate Forensics Data
- To study the tools and tactics associated with Cyber Forensics

<b>UNIT 1</b>	File systems, Microsoft file structure, Examining NTFS disks, Microsoft BitLocker, Third Party Disk Encryption Tools, Windows Registry, Start-up Tasks, Virtual Machines, Macintosh file structure and boot process, UNIX and Linux disk structures and boot processes. Other Disk structures (CD, SCSI, IDE and SATA devices)
<b>UNIT 2</b>	Commercial Forensic Tools (Encase, FTK), Advanced Features of forensic tools (search, encryption and decryption, data carving), windows registry, memory analysis, advanced file system analysis (deleted and hidden data, metadata, temporary file, unknown\executable file analysis), applied decryption.
<b>UNIT 3</b>	Graphic files: recognition, lossless and lossy data compression, locating and recovering graphic files, Identifying unknown file formats.
<b>UNIT 4</b>	Virtual Machines, Network Forensics, Network tools, E-mail Investigation, E-mail forensics tools, Mobile Device Forensic.
<b>UNIT 5</b>	Computer Investigation, Evidence acquisition, Processing crime and Incidence scene, Preserving, Analysis, Digital forensic investigation procedures, Report writing, Ethics

**OUTCOMES:** At the end of the course, the student should be able to:

CO1: Understand the fundamentals of Computer Forensics

CO2: Learn the issues of Data Acquisition and Data Recovery

CO3: Explore networking in cyber forensics

CO4: Learn to analyze and validate forensics data

CO5: Be familiar with forensic tools and case studies

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	<b>Program Outcome</b>												<b>Program Specific Outcome</b>		
	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H	M		H									H		
CO2	H	H				M						H	H	L	
CO3	H	H		H									M		
CO4	H	M	H		M	L		M				M		M	H
CO5	M		H		H										H

H = Highly Related; M = Medium L=Low

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**Text Books –**

1. Computer Evidence - Collection and Preservation. Brown, C.L.T. Course Technology CENGAGE Learning.

2. Guide to Computer Forensics And Investigations Nelson, Bill ; Phillips, Amelia; Enfinger, Frank; Steuat, Christopher Thomson Course Technology.
3. Scene of the Cybercrime. Shinder, Debra Littlejohn and Tittel, Syngress

**Reference Books:**

1. Computer Forensics – Computer Crime Scene Investigation. Vacca, John R. Charles River Media
2. Bunting, Steve and William Wei. EnCase Computer Forensics: The Official EnCE: EnCase Certified Examiner Study Guide. Sybex, 2006
3. Proise, Chris, Kevin Mandia, and Matt Pepe. Incident Response: Computer Forensics. McGraw-Hill,
4. Casey, Eoghan, ed. Handbook of Computer Crime Investigation, Forensic Tools and Technology, Academic press
5. Carrier, Brian. File System Forensic Analysis. Addison-Wesley Professional

  
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BCO 189A	Web and Android Security	3-0-1 [4]
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### OBJECTIVES:

- Introduce the concept of web application security concerns and its related issues.
- To familiarize the students with various types of analysis techniques ,attacks and tools.
- To introduce the various android application architecture and Security concerns.
- To introduce the various types of mobile attacks.

<b>UNIT 1</b>	Web applications: Introduction to web applications, Web application hacking, Overview of browsers, extensions, and platforms. Attacks, detection evasion techniques, and countermeasures for the most popular web platforms, including IIS, Apache, PHP, and ASP.NET Attacks and countermeasures for common web authentication mechanisms, including password-based, multifactor (e.g., CAPTCHA), and online authentication services like Windows Live ID.
<b>UNIT 2</b>	Advanced session analysis, hijacking, and fixation techniques, cross-site scripting, SQL injection, classic categories of malicious input, Overlong input (like buffer overflows), canonicalization attacks (like the infamous dot-dot-slash), and meta characters (including angle brackets, quotes, single quote, double dashes, percent, asterisk, underscore, newline, ampersand, pipe, and semicolon), beginner-to-advanced SQL injection tools and techniques, stealth-encoding techniques and input validation/ output-encoding countermeasures.
<b>UNIT 3</b>	Introduction to Android Applications and Mobile App Security: History of Android, Understanding Android Hardware and Software Architecture, Understanding Android Security Model. Understanding Android Permission Model for Application Security, Sandboxing, Codesigning, Encryption, rooting Devices, Understanding APK Understanding Directories and Files on an APK 9
<b>UNIT 4:</b>	Mobile Application Attacks 1: Setting up Mobile App Pentesting Environment, Interact with the Devices, Starting with Drozer, Understanding AndroidManifest.xml, Configuring, Burp and Traffic Interception, Traffic Interception Bypass, Weak Server Side Controls, Insecure Data Storage, Insufficient Transport Layer Protection, Unintended Data Leakage, Poor Authentication & Authorization 10
<b>UNIT 5</b>	Mobile Application Attacks 2: Broken Cryptography, Client Side Injections, Security Decisions via Untrusted Input, Improper Session Handling, Lack of Binary Protection, Exploiting Debuggable Applications, Developer Backdoor, Location spoofing to download location restricted apps, Configuring Live Device for Penetration Testing, Mitigation Approach for all Vulnerabilities.

### OUTCOMES:-

Upon completion of this course, the student will be able to:

CO1: Learn web application security concerns and its related issues.

CO2: Develop the Secure web application with help various of analysis techniques and knowledge of different attacks and tools.

CO3: Understand android application architecture and Security issues.

CO4: Know about various types of mobile attacks and to deal with these attacks and develop the secure application

CO5: Able to under the concepts testing, debugging.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H		M									H		L
CO2	H	H	H		M	L				L		L	H	M	
CO3	H			L	M		L		L				H		M
CO4	H		H			L				M		L		M	
CO5	H	M	H		M	L				M		L	H	M	

#### Text Books:

1. Hacking Exposed Web Applications, 3rd edition, JOEL SCAMBRAY, VINCENT LIU, CALEB SIMA
2. The Web Application Hacker's Handbook Discovering and Exploiting Security Flaws By Dafydd Stuttard, Marcus Pinto
3. Mobile device security: A comprehensive guide to securing your information in a moving world. Boca Raton, FL: Auerbach Publications - Fried, S.

#### Reference Books:

1. Rich Bowen, Ken Coar, "Apache Cookbook", O'Reilly
2. Open Web Application Security Project. A Guide to Building Secure Web Applications and Web Services.  
[http://www.owasp.org/index.php/Category:OWASP\\_Guide\\_Project](http://www.owasp.org/index.php/Category:OWASP_Guide_Project)
3. 2 The web application hacker's handbook: Discovering and exploiting security flaws (2nd ed.). Indianapolis, IN: Wiley, John & Sons - Stuttard, D. & Pinto, M.


Mobile application security. New York: McGraw-Hill Companies - Dwivedi, H., Clark, C., & Thiel, D

  
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<b>BCO 189A</b>	<b>Web and Android Security Lab</b>	<b>0-0-2</b>
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1. Setting up Mobile App Pentesting Environment,interact with the Devices, Starting with Drozer
2. Configuring, Burp and Traffic Interceptionof Mobile Applications between client and server
3. Configuring Live Device for Penetration Testing,Mitigation Approach for all Vulnerabilities.
4. Performing static Analysis of Mobile Application using MOBSF
5. Perform the jailbreak/Root the Android phone and get admin level Privilege by using tools such as Superoneclick, superboot.
6. PerformingCross-application scripting error in Android Browser which leads to hacking the devices.
7. Detect application communication vulnerabilities and perform exploitation usingComDroid.
8. Perform Jailbreaking on iOS Devices.
9. Unlock the iPhone using tools such as iphonesimfree and anySIM.
10. Perform a method to send Malicious Payload to the victims iPhone and check whether you can take over the control the victim's phone.
11. Perform Man-in-the-Middle attack by intercepting the Wireless parameter of iPhone on wireless network.
12. Perform social engineering Attack method and send the malicious link and SMS tricks which contains Malicious web page.
13. Develop Backdoor,Location spoofing to download location restricted apps.
14. Performing dynamic analysis to find API/Web services vulnerabilities.
15. Performing reverse engineering on android applications
16. Performing network communication attacks in Android and iOS.
17. Performing authentication and session management attacks.

  
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<b>BCO131A</b>	<b>Machine Learning with R</b>	<b>1-0-0 [1]</b>
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## Module 1 - Machine Learning vs Statistical Modeling

Learning Objectives, Introduction to Machine Learning (1:46), Learning vs Statistical Modeling (4:05), Supervised VS Unsupervised Learning (5:02), Supervised Learning - Classification (2:37), Unsupervised Learning (1:41), Lab

## Module 2 - Supervised Learning I

Learning Objectives, K-Nearest Neighbors (7:17), Decision Trees (5:18), Random Forests (3:46), Reliability of Random Forests (3:34), Advantages & Disadvantages of Decision Trees (1:25)

## Module 3 - Supervised Learning II

Learning Objectives, Regression Algorithms (3:48), Model Evaluation (5:10), Model Evaluation Overfitting & Underfitting (2:19), Understanding Different Evaluation Models (2:38)

## Module 4 - Unsupervised Learning

Learning Objectives, K-Means Clustering plus Advantages & Disadvantages (5:06), Hierarchical Clustering plus Advantages & Disadvantages (5:59), Measuring the Distances Between Clusters - Single Linkage Clustering (2:13), Measuring the Distances Between Clusters - Algorithms for Hierarchical Clustering (4:16), Density Based Clustering (3:44)

## Module 5 - Dimensionality Reduction & Collaborative Filtering

Learning Objectives, Dimensionality Reduction - Feature Extraction & Selection (5:30), Collaborative Filtering & Its Challenges (5:01), Lab

  
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BCO 133A	MACHINE LEARNING WITH PYTHON	1:0:0 [1]
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## **Machine Learning with Python**

### **COURSE SYLLABUS**

#### **Module 1 - Intro to Machine Learning**

- Applications of Machine Learning
- Supervised vs Unsupervised Learning
- Python libraries suitable for Machine Learning

#### **Module 2 - Regression**

- Linear Regression
- Non-linear Regression
- Model evaluation methods

#### **Module 3 - Classification**

- K-Nearest Neighbour
- Decision Trees
- Logistic Regression
- Support Vector Machines
- Model Evaluation

#### **Module 4 - Unsupervised Learning**

- K-Means Clustering
- Hierarchical Clustering
- Density-Based Clustering

#### **Module 5 - Recommender Systems**

- Content-based recommender systems
- Collaborative Filtering

  
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BCO 132A	DATA VISUALIZATION WITH PYTHON	1:0:0 [1]
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## **Data Visualization with Python**

### **COURSE SYLLABUS**

#### **Module 1 - Introduction to Visualization Tools**

- Introduction to Data Visualization
- Introduction to Matplotlib
- Basic Plotting with Matplotlib
- Dataset on Immigration to Canada
- Line Plots

#### **Module 2 - Basic Visualization Tools**

- Area Plots
- Histograms
- Bar Charts

#### **Module 3 - Specialized Visualization Tools**


- Pie Charts
- Box Plots
- Scatter Plots
- Bubble Plots

#### **Module 4 - Advanced Visualization Tools**

- Waffle Charts
- Word Clouds
- Seaborn and Regression Plots

#### **Module 5 - Creating Maps and Visualizing Geospatial Data**

- Introduction to Folium
- Maps with Markers
- Choropleth Maps

  
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BCO507A	Computer Networks		3-0-0
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**Introduction:** Computer networks and distributed systems, Classifications of computer networks,

Preliminaries of layered network structures.

**Data communication Components:** Representation of data and its flow, Various Connection

Topology, Protocols and Standards, OSI model, Transmission Media.

**LAN:** Wired LAN, Wireless LAN, Virtual LAN.

**Techniques for Bandwidth utilization:** Multiplexing - Frequency division, Time division and

Wave division, Concepts on spread spectrum.

**Data Link Layer and Medium Access Sub Layer:** Fundamentals of Error Detection and Error

Correction, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols -

Stop and Wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA

**Network Layer:** Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP,

BOOTP and DHCP-Delivery, Forwarding and Unicast Routing protocols.

**Transport Layer:** Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service (QoS), QoS

improving techniques - Leaky Bucket and Token Bucket algorithms.

**Application Layer:** DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls.

**Network Security:** Electronic mail, directory services and network management, Basic concepts of Cryptography.

### Books:

1. *Computer Networks*, A. Tannenbaum.
2. *Data and Computer Communication*, William Stallings.

### Reference Books:

3. *Network Security*, Kaufman, R. Perlman and M. Speciner.
4. *UNIX Network Programming*, Vol. 1,2 & 3, W. Richard Stevens

<b>BCO509A</b>	<b>Information Security</b>	<b>3-0-0</b>
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**Overview of Security Parameters:** Confidentiality, integrity and availability; Security violation

and threats; Security policy and procedure; Assumptions and Trust; Security Assurance, Implementation and Operational Issues; Security Life Cycle.

**Access Control Models:** Discretionary, mandatory, roll-based and task-based models, unified

models, access control algebra, temporal and spatio-temporal models.

**Security Policies:** Confidentiality policies, integrity policies, hybrid policies, non-interference and

policy composition, international standards.

**Systems Design:** Design principles, representing identity, control of access and information flow,

confinement problem. Assurance: Building systems with assurance, formal methods, evaluating

systems.

**Logic-based System:** Malicious logic, vulnerability analysis, auditing, intrusion detection.

Applications: Network security, operating system security, user security, program security.

Special

Topics: Data privacy, introduction to digital forensics, enterprise security specification.

**Operating Systems Security:** Security Architecture, Analysis of Security in Linux/Windows.

**Database Security:** Security Architecture, Enterprise security, Database auditing.

### **Books:**

1. *Security Engineering*, Ross Anderson.
2. *Computer Security: Art and Science*, M. Bishop, Pearson Education.
3. *Information Security: Principles and Practice*, M. Stamp.

### **Reference Books:**

1. *Security in Computing*, C.P. Pfleeger, S.L. Pfleeger, J. Margulies.
2. *Secure Programming HOWTO*, David Wheeler.
3. *Browser Security Handbook*, Michael Zalewski.
4. *Handbook of Database Security*, M. Gertz, S. Jajodia.

  
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BCO511A	Artificial Intelligence	3-0-0
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## UNIT – I

**Introduction, Overview of Artificial intelligence:** Problems of AI, AI technique, Tic - Tac - Toe problem.

Intelligent Agents, Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.

## UNIT – II

**Problem Solving, Problems, Problem Space & search:** Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs.

## UNIT – III

**Search techniques:** Problem solving agents, searching for solutions; uniform search strategies: breadth

first search, depth first search, depth limited search, bidirectional search, comparing uniform search

strategies. Heuristic search strategies Greedy best-first search, A\* search, AO\* search, memory bounded

heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated

annealing search, local beam search

## UNIT – IV

**Constraint satisfaction problems:** Local search for constraint satisfaction problems.

Adversarial search,

Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning,

additional refinements, iterative deepening.

## UNIT – V

**Knowledge & reasoning:** Knowledge representation issues, representation & mapping, approaches to

knowledge representation. Using predicate logic, representing simple fact in logic, representing instant &

ISA relationship, computable functions & predicates, resolution, natural deduction.

Representing knowledge using rules, Procedural verses declarative knowledge, logic programming, forward verses

backward reasoning, matching, control knowledge.

## Text Books:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach
2. Artificial Intelligence, Russel, Pearson

## Reference Books:

1. Artificial Intelligence, Ritch & Knight, TMH
2. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
3. Logic & Prolog Programming, Saroj Kaushik, New Age International
4. Expert Systems, Giarranto, VIKAS

  
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<b>DEN013A</b>	<b>Business Communication &amp; Value Science</b>	<b>3-0-0</b>
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- Understand the importance of diversity in workplace
- Identify the key aspects of communicative writing
- Apply communicative writing in real life scenarios
- Use charts and graphs in communicative writing
- Understand what is emotional intelligence
- Recognize the importance of emotional intelligence in personal and professional lives
- Understand why you would need public speaking at your workplace
- Identify the best practices of public speaking
- Apply public speaking in real life scenarios
- Recognize the importance of corporate social responsibility (CSR)
- Recognize the importance of corporate social responsibility (CSR)
- Recognize the attributes needed to function and grow in a corporate environment
- Recognize the best practices to share and receive feedback
- Apply emotional intelligence in real life scenarios
- Apply knowledge of multiple intelligences and learning styles in interpersonal interactions
- Recognize the impact of conflicts
- List the basic guidelines required to manage conflicts
- Recognize the key features of corporate etiquette
- Recognize the business idioms and corporate terms
- Apply the business idioms and corporate terms
- Recognize the impact of stress in life and work
- Identify the best practices to manage stress
- Recognize the importance of time management
- Identify the best time management practices

  
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BCO513A	Data Mining and Analytics	3-0-0
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## UNIT – I

**Introduction to Data Mining:** What is data mining? Related technologies - Machine Learning, DBMS, OLAP, Statistics, Stages of the Data Mining Process, Data Mining Techniques, Knowledge Representation Methods, Applications

## UNIT – II

**Data preprocessing:** Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies, Installing Weka 3 Data Mining System, Experiments with Weka - filters, discretization

**Data mining knowledge representation:** Task relevant data, Background knowledge, Representing input data and output knowledge, Visualization techniques

**Attribute-oriented analysis:** Attribute generalization, Attribute relevance, Class comparison, Statistical measures

## UNIT – III

**Data mining algorithms - Association rules:** Motivation and terminology, Example: mining weather data,

Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis

**Data mining algorithms - Classification:** Basic learning/mining tasks, Inferring rudimentary rules: 1R, algorithm, Decision trees, covering rules

**Data mining algorithms – Prediction:** The prediction task, Statistical (Bayesian) classification, Bayesian

networks, Instance-based methods (nearest neighbor), linear models

## UNIT – IV

**Descriptive analytics:** Data Modeling, Trend Analysis, Simple Linear Regression Analysis

**Forecasting models:** Heuristic methods, predictive modeling and pattern discovery, Logistic Regression:

Logit transform, ML estimation, Tests of hypotheses, Wald test, LR test, score test, test for overall

regression, multiple logistic regression, forward, backward method, interpretation of parameters, relation

with categorical data analysis. Interpreting Regression Models, Implementing Predictive Models

**Generalized Linear model:** link functions such as Poisson, binomial, inverse binomial, inverse Gaussian, Gamma.

**Non Linear Regression (NLS):** Linearization transforms, their uses & limitations, examination of nonlinearity, initial estimates, iterative procedures for NLS, grid search, Newton-Raphson, steepest descent,

Marquardt's methods. Introduction to semiparametric regression models, additive regression models.

Introduction to nonparametric regression methods

#### **UNIT – V**

**Time Series Analysis:** Auto - Covariance, Auto-correlation and their properties. Exploratory time series

analysis, Test for trend and seasonality, Exponential and moving average smoothing, Holt – Winter

smoothing, forecasting based on smoothing

**Linear time series models:** Autoregressive, Moving Average, Autoregressive Moving Average and

Autoregressive Integrated Moving Average models; Estimation of ARMA models such as Yule-Walker

estimation for AR Processes, Maximum likelihood and least squares estimation for ARMA Processes,

Forecasting using ARIMA models

**Prescriptive Analytics:** Mathematical optimization, Networks modeling-Multi-objective optimization Stochastic modeling, Decision and Risk analysis, Decision trees.

#### **Text Books:**

1. Jiawei Han and Micheline Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann

Publishers, 3rd ed, 2010.

2. Lior Rokach and Oded Maimon, “Data Mining and Knowledge Discovery Handbook”, Springer,

2nd edition, 2010

3. Box, G.E.P and Jenkins G.M. (1970) Time Series Analysis, Forecasting and Control, Holden-Day.

#### **Reference Books:**

1. Draper, N. R. and Smith, H. (1998). Applied Regression Analysis (John Wiley) Third Edition.

Hosmer, D. W. and Lemeshow, S. (1989). Applied Logistic Regression (Wiley).

  
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DBA011A	Financial & Cost Accounting	3-0-0
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## UNIT – I

**Accounting Concept:** Introduction, Techniques and Conventions, Financial Statements- Understanding & Interpreting Financial Statements

## UNIT – II

### Accounting Process:

- Book Keeping and Record Maintenance
- Fundamental Principles and Double Entry
- Journal, Ledger, Trial Balance, Balance Sheet, Final Accounts
- Cash Book and Subsidiary Books
- Rectification of Errors

## UNIT – III

**Financial Statements:** Form and Contents of Financial Statements, Analyzing and Interpreting Financial Statements, Accounting Standards.

*Class Discussion: Corporate Accounting Fraud- A Case Study of Satyam*

## UNIT – IV

**Cash Flow and Fund Flow Techniques:** Introduction, How to prepare, Difference between them

## UNIT – V

### Costing Systems:

- Elements of Cost
- Cost Behavior, Cost Allocation, OH Allocation
- Unit Costing, Process Costing, Job Costing
- Absorption Costing, Marginal Costing, Cost Volume Profit Analysis
- Budgets
- ABC Analysis

*Class Discussion: Application of costing concepts in the Service Sector*

### Text Books:

1. Robert N Anthony, David Hawkins, Kenneth Marchant, *Accounting: Texts and Cases*, McGraw-Hill
2. Case Study Materials: To be distributed for class discussion

  
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<b>BCO 029A</b>	<b>Data Mining</b>	<b>4:0:0 [4]</b>
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<b>UNIT 1</b>	Introduction: Basic concepts of data mining, including motivation and definition; different types of data repositories; data mining functionalities; concept of interesting patterns; data mining tasks; current trends, major issues and ethics in data mining
<b>UNIT 2</b>	Data Types of data and data quality; Data Preprocessing: data cleaning, data integration and transformation, data reduction, discretization and concept hierarchy generation; Exploring Data: summary statistics, visualization, multidimensional data analysis
<b>UNIT 3</b>	Association and Correlation Analysis: Basic concepts: frequent patterns, association rules - support and confidence; Frequent itemset generation - Apriori algorithm, FP-Growth algorithm; Rule generation, Applications of Association rules; Correlation analysis.
<b>UNIT 4</b>	Clustering Algorithms and Cluster Analysis: Concept of clustering, measures of similarity, Clustering algorithms: Partitioning methods - k-means and k-medoids, CLARANS, Hierarchical methods - agglomerative and divisive clustering, BIRCH, Density based methods - Subspace clustering, DBSCAN; Graph-based clustering - MST clustering; Cluster evaluation; Outlier detection and analysis.
<b>UNIT 5</b>	Classification: Binary Classification - Basic concepts, Bayes theorem and Naïve Bayes classifier, Association based classification, Rule based classifiers, Nearest neighbor classifiers, Decision Trees, Random Forest; Perceptrons; Multi-category classification; Model over fitting, Evaluation of classifier performance - cross validation, ROC curves.

#### **Outcomes:**

*Upon end of this course, Students will be able to*

- Implementation and use of the basic concepts and techniques of Data Mining.
- Develop skills of using recent data mining software for solving practical problems.
- Expand experience of doing independent study and research.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>												<b>Program Specific Outcome</b>		
	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H												H	M	
CO2			H		M				M						L
CO3				H		M							M		
CO4				M								M		L	L
CO5	M	L		H					L				M		


Related; M = Medium L = Low

***Text Books:***

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining. Pearson (2005), India. ISBN 978-8131714720
2. Jiawei Han and MichelineKamber, Data Mining: Concepts and Techniques, Morgan Kaufmann, 3rd edition (July 2011). 744 pages. ISBN 978-0123814791

***Reference Books:***

1. T. Hastie, R. Tibshirani and J. H. Friedman, The Elements of Statistical Learning, Data Mining, Inference, and Prediction. Springer, 2nd Edition, 2009. 768 pages. ISBN 978-0387848570
  2. C. M. Bishop, Pattern Recognition and Machine Learning. Springer, 1st edition, 2006. 738 pages. ISBN 978- 0387310732
- Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann, 3rd edition (January 2011). 664 pages. ISBN 978-0123748560

  
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<b>BCO 101A</b>	<b>Salesforce - Technical Aspirants</b>	<b>4-0-0 [4]</b>
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### Course Objective (COs)

Possible usefulness of this course after its completion i.e. how this course will be practically useful to him once it is completed.

<b>CO 1</b>	Supplement the student skillset with Salesforce skills and differentiate in the job market.
<b>CO 2</b>	Benefit from the knowledge and experience of the Trailblazer Community.
<b>CO 3</b>	Build Student skills and personal brand in the Salesforce Ecosystem.
<b>CO 4</b>	Establish the student as a skilled Salesforce Developer

<b>Unit Number: 1</b>	<b>Title: Introduction to Trailhead</b>	<b>No. of hours: 5</b>
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### Content Summary:

Trailhead Basics, Trailhead Playground Management, Salesforce Platform Basics, CRM for Lightning Experience, Data Modeling, Build a Lemonade Stand App, Picklist Administration, Formulas & Validations, Data Management, Reports & Dashboards for Lightning Experience, Build a Data Model for a Recruiting App, Trailblazer Community Groups, Create Reports and Dashboards for Sales and Marketing Managers

<b>Unit Number: 2</b>	<b>Title: Lightning App Builder</b>	<b>No. of hours: 5</b>
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### Content Summary:

Lightning Experience Customization, Lightning App Builder, Salesforce Mobile App Customization, Customize the User Interface for a Recruiting App, Lightning Flow, Accounts & Contacts for Lightning Experience, Leads & Opportunities for Lightning Experience, Service Cloud for Lightning Experience, App Customization, Specialist Super badge

<b>Unit Number: 3</b>	<b>Title: Identity &amp; User Management</b>	<b>No. of hours: 5</b>
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### Content Summary:

Identity Basics, User Management, User Authentication, Data Security, Keep Data Secure in a Recruiting App, Automate Business Processes for a Recruiting App, Security Specialist

<b>Unit Number: 4</b>	<b>Title: Introduction to Process Builder</b>	<b>No. of hours: 5</b>
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### Content Summary:

Quick Start: Process Builder, Screen Flow Distribution, Platform Development Basics, Process Automation Specialist

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<b>Unit Number: 5</b>	<b>Title: Apex Programming</b>	<b>No. of hours: 10</b>
<b>Content Summary:</b> Developer Console Basics, Apex Basics & Database, Apex Triggers, Apex Testing, Asynchronous Apex, Visualforce Basics, Apex Integration Services, Apex Specialist Lightning Platform API Basics, Apex Metadata API, Salesforce Connect, Trail – Major Project, Salesforce Project		
<b>12. Brief Description of Self-learning components by students (through books/resource material etc.):</b>  <a href="https://trailblazercommunity.force.com/help/s/become-job-ready-developerediton">https://trailblazercommunity.force.com/help/s/become-job-ready-developerediton</a>		
<b>13. Books Recommended:</b>  <b>Textbooks:</b> <ul style="list-style-type: none"> <li>Advanced Apex Programming for Salesforce.com and Force.com by Dan Appleman, Desaware Publishing; 3<sup>rd</sup> edition</li> </ul> <b>Reference Websites:</b> <a href="https://trailblazercommunity.force.com/help/s/become-job-ready-developerediton">https://trailblazercommunity.force.com/help/s/become-job-ready-developerediton</a>		

#### Mapping of PO's and CO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	1	1	3	2	2	2	3	3	3	3	2	3	2	2
<b>CO2</b>	1	2	2	3	3	1	2	3	2	1	1	3	1	1
<b>CO3</b>	2	3	2	3	3	2	1	3	3	3	1	3	1	2
<b>CO4</b>	2	1	1	2	3	1	1	2	3	3	2	1	1	3

  
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<b>BCO 056A</b>	<b>WIRELESS SENSOR NETWORKS</b>	<b>4-0-0 [4]</b>
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**OBJECTIVE:** At the end of the course, the student should be able to:

- To understand the architecture of WSN.
- To identify the functionalities of layers in architecture.
- To analyse the working of main protocols of all layers.

<b>UNIT 1</b>	<b>INTRODUCTION</b> Challenges for wireless sensor networks, Comparison of sensor network with ad hoc network, Single node architecture – Hardware components, energy consumption of sensor nodes, Network architecture – Sensor network scenarios, types of sources and sinks, single hop versus multi-hop networks, multiple sinks and sources, design principles, Development of wireless sensor networks
<b>UNIT 2</b>	<b>PHYSICAL LAYER</b> Introduction, wireless channel and communication fundamentals – frequency allocation, modulation and demodulation, wave propagation effects and noise, channels models, spread spectrum communication, packet transmission and synchronization, quality of wireless channels and measures for improvement, physical layer and transceiver design consideration in wireless sensor networks, Energy usage profile, choice of modulation, Power Management.
<b>UNIT 3</b>	<b>DATA LINK LAYER</b> MAC protocols – fundamentals of wireless MAC protocols, low duty cycle protocols and wakeup concepts, contention-based protocols, Schedule-based protocols - SMAC, BMAC, Traffic-adaptive medium access protocol (TRAMA), Link Layer protocols – fundamentals task and requirements, error control, framing, linkmanagement.
<b>UNIT 4</b>	<b>NETWORK LAYER</b> Gossiping and agent-based uni-cast forwarding, Energy-efficient unicast, Broadcast and multicast, geographic routing, mobile nodes, Data-centric routing – SPIN, Directed Diffusion, Energy aware routing, Gradient-based routing – COUGAR, ACQUIRE, Hierarchical Routing – LEACH, PEGASIS, Location Based Routing – GAF, GEAR, Data aggregation – Various aggregation techniques.
<b>UNIT 5</b>	<b>CASE STUDY:</b> Target detection tracking, Habitat monitoring, Environmental disaster monitoring, Practical implementation issues, IEEE 802.15.4 low rate WPAN, Operating System Design Issues, Introduction to TinyOS – NesC, Interfaces, UNITS, configuration, Programming in TinyOS using NesC, Emulator TOSSIM.

**Course Outcome(CO):**



CO1: Understand and analyze the fundamental of sensor networks and energy efficient sensor node and network architectures.

CO2: Understand and analyze the design issues in physical Layer.

CO3: Understand and analyze different communication protocols and their performance.

CO4: The broad education necessary to understand and analyze different routing strategies.

CO5: Understand the modern tool used for wireless sensors networks.

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	M	H											H		
CO2	M	H	L										H		
CO3	M	M											H		
CO4	M	M											H		
CO5					H									M	H

### Text Books:

1. KazemSohraby, Daniel Minoli and TaiebZnati, "Wireless Sensor Networks Technology-Protocols and Applications", John Wiley & Sons, 2007.
2. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks: an information processing approach", Else vier publication, 2004.

### Referecce Books:

1. C.S.Raghavendra Krishna, M.Sivalingam and Taribznati, "Wireless Sensor Networks", Springer publication, 2004.
2. HolgerKarl , Andreas willig, "Protocol and Architecture for Wireless Sensor Networks", John wiley publication, Jan 2006.
3. K.Akkaya and M.Younis, " A Survey of routing protocols in wireless sensor networks", Elsevier Adhoc Network Journal, Vol.3, no.3,pp. 325-349, 2005.
4. Philip Levis, " TinyOS Programming", 2006 – [www.tinyos.net](http://www.tinyos.net).
5. I.F. Akyildiz, W. Su, Sankarasubramaniam, E. Cayirci, "Wireless sensor networks: a survey", computer networks, Elsevier, 2002, 394 - 422.
6. Jamal N. Al-karaki, Ahmed E. Kamal, "Routing Techniques in Wireless sensor networks: A survey", IEEE wireless communication, December 2004, 6 – 28.

BCO 102A	Salesforce - Technical Aspirants Lab	0-0-2 [2]
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Sr. No.	Title of the Experiment	Software/Hardware based	Unit covered	Time Required
1.	Applying security skills by locking down permissions and tracking changes.	Salesforce	3	8 Hours
2.	Set Up Case Escalation and Entitlements Create processes to help support teams become more efficient.	Salesforce	4	2 Hours
3.	Create Reports and Dashboards for Sales and Marketing Managers	Salesforce	5	2 Hours
4.	Manage users and optimize your business model for efficiency.	Salesforce	5	2 Hours
5.	Design powerful reports and an eye-catching dashboard to shine a light on org data.	Salesforce	5	8 Hours
6.	Equip a new business unit with the Salesforce tools the team needs to succeed.	Salesforce	6	8 Hours

  
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BCO 086A	MACHINE LEARNING	4-0-0 [4]
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## Course Objectives

- To understand the basic concepts of learning and decision trees.
- To understand the neural networks and genetic algorithms
- To understand the Bayesian techniques
- To understand the instant based learning
- To understand the analytical learning and reinforced learning

UNIT 1	INTRODUCTION, CONCEPT LEARNING AND SUPERVISED LEARNING ALGORITHMS: Introduction, Types of learning, Learning Problems – Designing Learning systems, Perspectives and Issues – Concept Learning – Version Spaces and Candidate Elimination Algorithm , Linear Regression Model, Naïve Bayes Classifier, Decision Tree, K Nearest Neighbor, Logistic Regression, Support Vector Machine, Random Forest Algorithm.
UNIT 2	UNSUPERVISED LEARNING ALGORITHM: Clustering- K-means Clustering, Hierarchical Clustering, Probabilistic Clustering, Apriori Algorithm, Association Rule Mining, Gaussian Mixture Model, Expectation Maximization. ENSEMBLE LEARNING-Bagging, Boosting and Stacking
UNIT 3	REGULARIZATION- Overfitting, Underfitting, Bias-Variance trade off, Cost Function, Regularized Linear Regression and Regularized Logistic Regression, Model Selection and train/Validation/Test Sets, VC Dimension. STATISTICAL LEARNING- Feature Extraction, Principal Component Analysis, Singular Value Decomposition, Feature Selection and subset selection.
UNIT 4	NEURAL NETWORKS AND GENETIC ALGORITHMS Neural Network Representation – Problems – Perceptron – Multilayer Networks and Back Propagation Algorithms – Gradient Descent.
UNIT 5	ANALYTICAL LEARNING AND REINFORCED LEARNING Perfect Domain Theories – Explanation Based Learning – Inductive-Analytical Approaches - FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning- Markov Decision Processes(MDP), Introduction to Natural Language Processing and Recommended System- Collaborative and Content based Filtering.

**OUTCOME:** On Completion of the course, the students will be able to

- Choose the learning techniques with this basic knowledge.
- Apply effectively neural networks and genetic algorithms for appropriate applications.
- Apply bayesian techniques and derive effectively learning rules.
- Choose and differentiate reinforcement and analytical learning techniques

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	M	M	L	H	L	L			L	L	L	L	L	M	M
CO2	M	M	M	H	L				L			L	M	M	M
CO3	M	M	M	H	M							L	M	M	M
CO4	M	M	M	H	M		L					L	M	M	M
CO5	M	L	M	H	M	M			L			L	M	M	M

H = Highly Related; M = Medium L = Low

**Required Texts:**

- Machine Learning, Tom Mitchell, McGraw Hill, 1997, ISBN 0-07-042807-7.

**TEXT BOOK:**

- Tom M. Mitchell, "Machine Learning", McGraw-Hill Education (INDIAN EDITION), 2013.

**REFERENCES:**

- Ethem Alpaydin, "Introduction to Machine Learning", 2nd Ed., PHI Learning Pvt. Ltd., 2013.
- T. Hastie, R. Tibshirani, J. H. Friedman, "The Elements of Statistical Learning", Springer; 1st edition, 2001.

  
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BCO 089A	MACHINE LEARNING LAB	0-0-2 [2]
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### **List of Experiments**

(The following tasks can be implemented in a language of your choice or any tools available)

- 1) Implement the CANDIDATE – ELIMINATION algorithm. Show how it is used to learn from training examples.
- 2) Write a program to implement Linear Regression and Logistic Regression
- 3) Implement the ID3 algorithm for learning Boolean-valued functions for classifying the training examples by searching through the space of a Decision Tree.
- 4) Design and implement Naïve Bayes Algorithm for learning and classifying TEXT DOCUMENTS.
- 5) Implement K-Nearest Neighbor algorithm to classify the iris data set. Calculate the score also.
- 6) Write a program to implement Support Vector Machine. Also discuss the confusion matrix and score of model.
- 7) Apply EM algorithm to cluster a set of data and also apply K-Means algorithm on the same data set to compare two algorithms.
- 8) Build an Artificial Neural Network by implementing Back-Propagation algorithm and test the same using appropriate data set.
- 9) Implement the Non-Parametric Locally Weighted Regression Algorithm in order to fit data points. Select appropriate data set for your experiment and draw graph.
- 10) Build a Face detection system to recognize faces in a frame or image. You can use OpenCV for this task.

  
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# **SCHOOL OF ENGINEERING**

## **Syllabi and Course Structure**

### **M.Tech. - Computer Science & Engineering with Various Specialization (Session: 2022-2023)**

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<b>MCO 056B</b>	<b>Advanced Data Structure and Algorithms Design</b>	<b>3-0-0</b>
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### Course Objective

- To understand the various algorithm design technique.
- To learn analysis techniques to analyze the algorithms.
- To understand the advanced data structures, intrinsic complexity analysis, problem settings

<b>UNIT 1</b>	<b>Advanced Data Structure:</b> Graph, B-tree, binomial heaps and, Fibonacci heap, Red black tree
<b>UNIT 2</b>	<b>Graph Algorithms:</b> Single source shortest paths-Belman-Ford algorithm, Dijkstra algorithm, all pairs shortest path and matrix multiplication, Floyd-Warshall algorithm, Johnson algorithm for sparse graph, maximum flow-Ford-Fulkerson method and maximum bipartite matching.
<b>UNIT 3</b>	<b>Number Theoretic Algorithm:</b> GCD, modular arithmetic, solving modular linear equation and Chinese remainder theorem. Amortized Analysis, Data Structures for Disjoint Sets
<b>UNIT 4</b>	<b>NP Completeness:</b> Polynomial time, polynomial time verification, NP completeness and reducibility, Cook's theorem, NP complete problems-clique problem, vertex cover problem, approximation algorithms-vertex cover problem, set covering problem, traveling salesman problem.
<b>UNIT 5</b>	<b>Probabilistic Algorithms:</b> Numerical probabilistic algorithm, Monte-Carlo algorithm and Las-Vegas algorithm, Sorting network

### Text Books:


1. Cormen T.H., Leiserson C.E., Rivest R.L., Introduction to Algorithms, Prentice Hall of India

### Reference Books:

1. Brassard G. & Bratley P., Fundamentals of Algorithmics, Prentice Hall of India

### Course Outcomes:

- CO1. Understand the various algorithm design technique.
- CO2. Learn analysis techniques to analyze the algorithms.
- CO3. Understand the advanced data structures, intrinsic complexity analysis, problem settings

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H	M									H	M	M	
CO2	H	H	M									H	M	H	
CO3	H	H	M									H	M	H	

*H = Highly Related; M = Medium L = Low*

  
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## **M.Tech. in Computer Science & Engineering Semester I**

<b>MCO 007B</b>	<b>Advanced Data Communication Network</b>	<b>3-0-0</b>
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### **Course Objective**

1. To provide a good conceptual understanding of advance computer networking
2. To understand various models and their functions
3. To have an advance understanding of performance evaluation
4. To understand network economics

UNIT 1:	The Motivation for Internetworking; Need for Speed and Quality of Service; History of Networking and Internet; TCP/IP and ATM Networks; Internet Services; TCP Services; TCP format and connection management; Encapsulation in IP; UDP Services, Format and Encapsulation in IP; IP Services; Header format and addressing; Fragmentation and reassembly; classless and subnet address extensions; sub netting and super netting; CIDR; IPv6;
UNIT 2:	Congestion Control and Quality of Service: Data traffic; Network performance; Effects of Congestion; Congestion Control; Congestion control in TCP and Frame Relay; Link-Level Flow and Error Control; TCP flow control; Quality of Service: Flow Characteristics, Flow Classes; Techniques to improve QoS; Traffic Engineering; Integrated Services;
UNIT 3:	High Speed Networks: Packet Switching Networks; Frame Relay Networks; Asynchronous Transfer Mode (ATM); ATM protocol Architecture; ATM logical connections; ATM cells; ATM Service categories; ATM Adaptation Layer;  Optical Networks: SONET networks; SONET architecture;  Wireless WANs: Cellular Telephony; Generations; Cellular Technologies in different generations; Satellite Networks;
UNIT 4:	Internet Routing: Interior and Exterior gateway Routing Protocols; Routers and core routers; RIP; OSPF; BGP; IDRP; Multicasting; IGMP; MOSPF; Routing in Ad Hoc Networks; Routing in ATM: Private Network-Network Interface;
UNIT 5:	Error and Control Messages: ICMP; Error reporting vs Error Correction; ICMP message format and Delivery; Types of messages;  Address Resolution (ARP); BOOTP; DHCP; Remote Logging; File Transfer and Access; Network Management and SNMP; Comparison of SMTP and HTTP; Proxy Server; The Socket Interface;

**Text Books:**

1. William Stallings, “High-Speed Networks and Internets, Performance and Quality of Service”, Pearson Education;
2. Douglas E. Comer, “Internetworking with TCP/IP Volume – I, Principles, Protocols, and Architectures”, Fourth Edition, Pearson Education.
- 3.

**Reference Books:**

1. B. Muthukumaran, “Introduction to High Performance Networks”, Vijay Nicole Imprints.
2. Wayne Tomasi, “Introduction to Data Communications and Networking”, Pearson Education.
3. James F. Kurose, Keith W. Ross, “Computer Networking, A Top-Down Approach Featuring the Internet”, Pearson Education.
4. Andrew S. Tanenbaum, “Computer Networks”, Pearson Education.
5. Behrouz A. Forouzan, “Data Communications and Networking”, Fourth Edition, McGraw Hill.
6. Mahbub Hassan, Raj Jain, “High Performance TCP/IP Networking, Concepts, Issues, and Solutions”, Pearson Education.

**Course Outcomes:**

- CO1. Provide a good conceptual understanding of advance computer networking
- CO2. Understand and compare various models and their functions
- CO3. Advance understanding and evaluating the performance of network
- CO4. Understand network economics /Compare and contrast various Network protocols

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>												<b>Program Specific Outcome</b>		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H										M	M		
CO2	H	H										M	M		
CO3	H	H			H				H			H	M	H	
CO4	H	H							H			H	M	H	

*H = Highly Related; M = Medium ; L = Low*

## **M.Tech. in Computer Science & Engineering Semester I**

<b>MCO 070B</b>	<b>Advanced Topics in Algorithm Lab</b>	<b>0-0-2</b>
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### **List of Experiments**

1. Write a Program to implement Efficient Matrix Multiplication
2. Write a Program to define the graphs and list all nodes and Links
3. Write a Program to implement the concept of BFS
4. Write a Program to implement the concept of DFS
5. Write a Program to implement the concept of B-tree
6. Write a Program to implement Dijkstra Algorithm
7. Write a Program to implement the concept of Binomial Heap
8. Write a program to find Greatest Common Divisor
9. Write a program using Chinese remainder theorem
- 10 Write program to solve linear equations
- 11 Write a program to solve Travelling Salesman problem
- 12 Write a program to implement Vertex cover problem
- 13 Write a program to implement all pair shortest path Algorithm


  
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## **M.Tech. in Computer Science & Engineering Semester I**

<b>MCO 036A</b>	<b>Advanced Technology Lab</b>	<b>0-0-2</b>
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The aim of this lab is to introduce the different simulation tools to the students. So that students get familiar with different simulation environment and implement their theoretical knowledge.

1. Introduction of network Simulator.
2. Experiment Based on Network Simulator.
3. Introduction of OmNet .
4. Experiment Based on OmNet.
5. Introduction of WeKa.
6. Experiment Based on Weka.
7. Introduction based on SimSE.
8. Experiment Based on SimSE.

  
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## M.Tech. in Computer Science & Engineering Semester II

MCO 003B	Advanced Operating Systems	3-0-0
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### Course Objective:

- To introduce the state of the art in operating systems and distributed systems,
- Learn how to design modern operating systems.
- To understand how to engage in systems research in general and operating systems research in particular.
- To investigate novel ideas in operating systems through a semester-long research project.

UNIT 1:	<b>Operating System:</b> Definition, Operating System as Resource Manager. Types of Operating Systems: Simple Batch Processing, Multi-programmed Batch Processing, Time Sharing, Personal Computer systems, Parallel, Distributed and Real Time Operating Systems. Operating System Components, Services, Calls, System Programs, Operating System Structure, Virtual Machines, System Design and Implementation.
UNIT 2:	<b>Process Management:</b> Concepts, Scheduling, Operations, Co-operating processes, Inter-process Communication. Threads: Thread usage, threads in User Space, threads in Kernel, Hybrid Implementation, Scheduler Activation, Pop-up threads, Multithreading.  <b>CPU Scheduling:</b> Basic Concepts, Scheduling Criteria, Algorithms, Multiple-processor Scheduling, Real Time Scheduling, Algorithm Evaluation.
UNIT 3:	<b>Process Synchronization:</b> Critical Section Problem, Synchronization Hardware, Semaphores, Classical Problem of synchronization, Critical Regions, Monitors. Deadlock: Characteristics, Necessary Conditions, Prevention, Avoidance, Detection and Recovery.  <b>Memory Management:</b> Logical and Physical Address Space, Swapping. Contiguous Allocation: Singlepartitioned, Multi-partitioned. Non-contiguous Allocation: Paging, Segmentation, and Segmentation with Paging. Virtual Memory: Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing, Demand Segmentation.

  
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UNIT 4:	<p><b>File and Directory System:</b> File Concepts, Access Methods, Directory Structure, Protection, File system Structure, Allocation Methods, Free Space Management, Directory Implementation, Recovery. <b>Secondary Storage Management:</b> Disk Structure, Dedicated, Shared, Virtual, Sequential Access and Random Access Devices, Disk Scheduling, Disk Management, Swap-space Management, Disk Reliability, Stable Storage Management.</p> <p><b>Protection and Security:</b> Threats, Intruders, Accidental Data Loss, Cryptography, User authentication, Attacks from inside the system, Attacks from outside the system, Protection Mechanism, Trusted Systems, Domain of Protection, Access Matrix, Programs Threats, System Threats.</p>
UNIT 5:	<p><b>Distributed systems,</b> topology network types, design strategies. Network operating structure, distributed operating system, remote services, and design issues. Distributed file system: naming and transparency, remote file access, Stateful v/s Stateless Service, File Replication.</p> <p><b>Distributed co-ordinations:</b> Event Ordering, Mutual Exclusion, Atomicity, Concurrency Control, Deadlock Handling, Election Algorithms, and Reaching Agreement. Case studies of Unix and MS-DOS operating system.</p>

### Suggested Books

1. Silberschatz and Galvin, "Operating System Concepts", Addison-Wesley publishing, Co.,1999.
2. A. S. Tanenbaum, "Modern Operating Systems", Pearson Education.
3. H.M. Dietel, "An Introduction to Operating System", Pearson Education.
4. D. M. Dhamdhare, "Operating Systems – A Concept Based Approach", Tata McGraw-Hill
- 5 M. Singhal, N. G. Shivaratri, "Advanced Concepts in Operating Systems", Tata McGraw-Hill.
6. William Stallings, "Operating Systems", Pearson Education

### Course Outcomes:

At the end of the course, the student should be able to:


- CO1. Understand the state of the art in operating systems and distributed systems, and how to design modern operating systems.
- CO2. Understand how to engage in systems research in general and operating systems research in particular.
- CO3. Investigate novel ideas in operating systems through a semester-long research project.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H	M	L								H	M		
CO2	H	H	M	M	H				M			H	H	H	
CO3	H	H	H	H	H				M		H	H	H	H	

H = Highly Related; M = Medium L = Low

**M.Tech. in Computer Science & Engineering Semester II**

  
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<b>MCO 014B</b>	<b>Advanced Data Mining and Warehousing</b>	<b>3-0-0</b>
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**Course Objective:**

- To compare and contrast different conceptions of data mining
- To explain the role of finding associations in commercial market basket data.
- To characterize the kinds of patterns that can be discovered by association rule mining.
- To describe how to extend a relational system
- To find patterns using association rules.

<b>UNIT 1:</b>	<b>Overview:</b> Concept of data mining and warehousing, data warehouse roles and structures, cost of warehousing data, roots of data mining, approaches to data exploration and data mining, foundations of data mining, web warehousing, web warehousing for business applications and consumers, introduction to knowledge management, data warehouses and knowledge bases.
<b>UNIT 2:</b>	<b>Data Warehouse:</b> Theory of data warehousing, barriers to successful data warehousing, bad data warehousing approaches, stores, warehouse and marts, data warehouse architecture, metadata, metadata extraction, implementing the data warehouse and data warehouse technologies.
<b>UNIT 3:</b>	<b>Data Mining and Data Visualisation:</b> Data mining, OLAP, techniques used to mine the data, market basket analysis, current limitations and challenges to DM, data visualization. <b>Designing and Building the Data Warehouse:</b> The enterprise model approach of data mining design, data warehouse project plan, analysis and design tools, data warehouse architecture, specification and development.
<b>UNIT 4:</b>	<b>Web-Based Query and Reporting:</b> Delivering information over the web, query and reporting tools and business value, architectural approaches to delivering query capabilities over the web. <b>Web Based Statistical Analysis and Data Mining:</b> Analytical tools, business value from analytical tools, humble spreadsheet, determining the business value that analytical tools will deliver, statistical products overview – statistical analysis applications, correlation analysis, regression analysis, data discovery tools overview, data discovery applications, comparison of the products, architectural approaches for statistical and data discovery tools.
<b>UNIT 5:</b>	<b>Search Engines and Facilities:</b> Search engines and the web, search engine architecture, variations in the way the search facilities work and variations in indexing schemes. <b>Future of Data Mining and Data Warehousing:</b> Future of data warehousing, trends in data warehousing, future of data mining, using data mining to protect privacy, trends affecting the future of data mining and future of data visualization.

**Text Books**



1. Jiwei Han, MichelenKamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann Publishers an Imprint of Elsevier, 2001.

### Reference Books:

1. ArunK.Pujari, Data Mining Techniques, Universities Press (India) Limited, 2001.
2. George M. Marakas, Modern Data warehousing, Mining and Visualization: core concepts, Printice Hall, First Edition,2002.

### Course Outcomes:

At the end of the course, students should be able to:

- CO1. Compare and contrast different conceptions of data mining as evidenced in both research and application.
- CO2. Explain the role of finding associations in commercial market basket data.
- CO3. Characterize the kinds of patterns that can be discovered by association rule mining.
- CO4. Describe how to extend a relational system to find patterns using association rules.
- CO5. Evaluate methodological issues underlying the effective application of data mining.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H	H	H	H							H			
CO2	H	M	M									M			
CO3	H	H	H									H	M	H	
CO4	H	H	M	M	H							H	M	H	

H = Highly Related; M = Medium L = Low

  
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# CSE

## Program Elective I

MCO 094B	Distributed Algorithms	3-0-0
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### Course Objective

1. To understand synchronous and asynchronous models
2. To learn algorithms of synchronous and asynchronous system
3. To understand shared memory concept of distributed operating system

<b>UNIT 1:</b>	Models of synchronous and asynchronous distributed computing systems: synchronous networks, asynchronous shared memory, asynchronous networks;
<b>UNIT 2:</b>	Basic algorithms for synchronous and asynchronous networks: leader election, breadth first search, shortest path, minimum spanning tree.
<b>UNIT 3:</b>	Advanced synchronous algorithms: distributed consensus with failures, commit protocols.
<b>UNIT 4:</b>	Asynchronous shared memory algorithms: mutual exclusion and consensus
<b>UNIT 5:</b>	Relationship between shared memory and network models; asynchronous networks with failures.

*At the end of the course, the student should be able to:*

CO1: Understand difference between synchronous and asynchronous system

CO2: Learn algorithms of distributed operating system

CO3: Understand shared memory concepts

CO4: Understand relation between shared memory and network models

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M											M		
CO2	H	H	H	L		L					M	M	H	M	L
CO3	M												L		L
CO4	H	M		L		L							M		


- H = Highly Related; M = Medium L = Low

***Text Book***

Nancy Lynch, "Distributed Algorithms" Morgan Kaufmann.

**Reference Books:**

Gerlad Tel, "Introduction to Distributed Algorithms" Cambridge University Press.

  
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# CSE

## Program Elective II

MCO 093A	Advance database management system	3-0-1
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### Course Objective

1. To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
2. To make a study of SQL and relational database design.
3. To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
4. To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.

<b>UNIT 1:</b>	<b>Relational Databases:</b> Integrity Constraints revisited: Functional, Multi-valued and Join Dependency, Template Algebraic, Inclusion and Generalized Functional Dependency, Chase Algorithms and Synthesis of Relational Schemes. Query Processing and Optimization: Evaluation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.
<b>UNIT 2:</b>	<b>Deductive Databases:</b> Datalog and Recursion, Evaluation of Datalog program, Recursive queries with negation. Object Oriented and Object Relational Databases: Modelling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases
<b>UNIT 3:</b>	<b>Distributed Data Storage:</b> Fragmentation and Replication, Location and Fragment Transparency, Distributed Query Processing and Optimization, Distributed Transaction Modeling and Concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.
<b>UNIT 4:</b>	<b>Advanced Transaction Processing:</b> Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.
<b>UNIT 5:</b>	<b>Active Databases:</b> Triggers in SQL, Event Constraint and Action: ECA Rules, Query Processing and Concurrency Control, Compensation and Databases Recovery. <b>Real Time Databases:</b> Temporal Constraints: Soft and Hard Constraints, Transaction Scheduling and Concurrency Control.

At the end of the course, the student should be able to

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CO1: Learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.

CO2: Make a study of SQL and relational database design.

CO3: Understand the internal storage structures using different file and indexing techniques which will help in physical DB design.

CO4: Know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H					M							H		H
CO2	H	M	H		H				L			M	M	H	
CO3	H	M		L							L	M	H		M
CO4	H	M	M								L		M	M	


- H = Highly Related; M = Medium L = Low

**Text Book**

1. Abraham Silberschatz, Henry Korth, and S. Sudarshan, Database System Concepts, McGraw-Hill.

**Reference Books:**

1. Raghu Ramakrishnan, Database Management Systems, WCB/McGraw-Hill.
2. Bipin Desai, An Introduction to Database Systems, Galgotia.
3. J. D. Ullman, Principles of Database Systems, Galgotia.
4. R. Elmasri and S. Navathe, Fundamentals of Database Systems8, Addison-Wesley.
5. Serge Abiteboul, Richard Hull and Victor Vianu, Foundations of Databases. Addison-Wesley.

  
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## Program Elective III

MCO 016B	Information System Security	3-0-0
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### Course Objective:

- To perform a risk assessment of an information system.
- To identify the security requirements for an information system.
- To use available government information system security resources when designing systems.

UNIT 1:	<b>Introduction to Securitities:</b> Introduction to security attacks, services and mechanism, Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, feistel structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES
UNIT 2:	<b>Modular Arithmetic:</b> Introduction to group, field, finite field of the form $GF(p)$ , modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA
UNIT 3:	<b>Message Authentication Codes:</b> Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Securehash algorithm (SHA) <b>Digital Signatures:</b> Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm
UNIT 4:	<b>Key Management and distribution:</b> Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. <b>Authentication Applications:</b> Kerberos <b>Electronic mail security:</b> pretty good privacy (PGP), S/MIME.
UNIT 5:	<b>IP Security:</b> Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic transaction (SET). <b>System Security:</b> Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls.

### **Outcomes:**

At the end of the course, students should be able to:

CO1: Perform a risk assessment of an information system.

CO2: Identify the security requirements for an information system.

CO3: Use available government information system security resources when designing systems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M			L	L					M		H		M
CO2			H	M			H				M			M	
CO3	H				L	M							H		

M

- H = Highly Related; M = Medium L = Low

**Suggested Books:**

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, TMH
3. Bruce Schneier, "Applied Cryptography". John Wiley & Sons
4. Bernard Menezes, "Network Security and Cryptography", Cengage Learning.
5. AtulKahate, "Cryptography and Network Security", TMH

  
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# CSE

## Program Elective IV

MCO 095B	Soft Computing	3-0-0
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### Course Objective

To introduce the concepts in Soft Computing such as Artificial Neural Networks, Fuzzy logic-based systems, genetic algorithm-based systems and their hybrid models.

UNIT 1:	<b>Introduction:</b> Introduction to soft computing, soft computing vs. hard computing, various types of soft computing techniques, Requirement of Soft computing, Major Areas of Soft Computing, applications of soft computing, Concept of Neural Network, Definition, advantage of Neural network, Application scope of Neural network, Fuzzy computing, Genetic Algorithms, Hybrid System.
UNIT 2:	<b>Neural Network:</b> Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference b/w ANN and human brain, characteristic and applications of ANN, single layer network, Mcculloch Pitts Model, learning rules – Hebbian, Delta, Perceptron learning and Windrow- Hoff, winner-take-all
UNIT 3:	<b>Perceptron:</b> Perceptron training algorithm, Linear separability, Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map and Radial Basis Function network, Recent Applications.
UNIT 4:	<b>Fuzzy Logic:</b> Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions. Fuzzy rule base system: Fuzzy propositions, formation, decomposition & aggregation of fuzzy Rules, fuzzy reasoning, fuzzy inference systems, cuts for fuzzy sets, fuzzy decision making & Applications of fuzzy logic, Defuzzification methods.
UNIT 5:	<b>Genetic Algorithm:</b> Fundamental, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods, Genetic-neuro hybrid systems, Genetic- Fuzzy rule based system.

### Course Outcomes:

- CO1. Learn soft computing techniques and their applications.
- CO2. Understand perceptrons and analyze various neural network architectures.
- CO3. Understand and explain the fuzzy systems.
- CO4. Understand and analyze the genetic algorithms and their applications.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H										H			
CO2	H	H			M										
CO3	M	M											M	H	
CO4	H	H	M		M							H	M	M	

*H = Highly Related; M = Medium; L = Low*

**Text Books**


1. S.N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", 2nd Edition, Wiley, 2011
2. Timothy J. Ross, Fuzzy Logic with engineering applications, John Wiley & Sons, 2016.
3. N. K. Sinha and M. M. Gupta, Soft Computing & Intelligent Systems: Theory & Applications-Academic Press /Elsevier. 2009.
4. Simon Haykin, Neural Network- A Comprehensive Foundation- Prentice Hall International, Inc.1998 3.
5. Driankov D., Hellendoorn H. and Reinfrank M., An Introduction to Fuzzy Control Narosa Pub., 2001.

  
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CO4		H				M	H						H		
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<b>MCO 101A</b>	<b>Neural Networks Programming Techniques</b>	<b>3-0-0</b>
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### Course Objective:

- To explain basic concepts of neuron networks
- To explain multiple models of neural networks
- To understand applications of neural networks

<b>UNIT 1:</b>	Basics of ANN: Models to Neuron; Basic learning laws. Activation and Synaptic Dynamics: Activation dynamics models; Synaptic dynamics models; Stability and Convergence.
<b>UNIT 2:</b>	Analysis of Feed forward Neural Networks: Linear associative networks for pattern association; Single layer and Multilayer Perception network for pattern classification; Multi layer feed forward neural networks for pattern mapping
<b>UNIT 3:</b>	<b>Analysis of Feedback Neural Networks:</b> Linear auto associative networks; Hopfield model for pattern storage; stochastic networks; Boltzmann machine for pattern environment storage.
<b>UNIT 4:</b>	Competitive Learning Neural Networks: Basic competitive learning laws; Analysis of pattern clustering networks; Analysis of self-organizing feature mapping networks
<b>UNIT 5:</b>	Applications of ANN: Pattern classification problems; Optimization; Control.

### **Outcomes**

At the end of this course Students will be able to:

- Explain basic concepts of neural networks
- Explain different feed forward networks
- Explain different feedback networks
- Explain competitive learning
- Understand applications of ANN

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H										H	M		M
CO2	H	H			M										
CO3	M	M											M	H	
CO4	H	H	M		M							H	M	M	L

- H = Highly Related; M = Medium; L = Low

***Texts/References:***

1. J.A. Anderson, An Introduction to Neural Networks, MIT

**Reference Books:**

1. Hagen Demuth Beale, Neural Network Design, Cengage Learning
2. Laurene V. Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms and Applications", Pearson India
3. Kosko, Neural Network and Fuzzy Sets, PHI

  
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# Cyber Security

## Program Elective I

MCO 016A	Information System Security	3-0-0
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### Course Objective:

- To perform a risk assessment of an information system.
- To identify the security requirements for an information system.
- To use available government information system security resources when designing systems.

UNIT 1:	<b>Introduction to Securitities:</b> Introduction to security attacks, services and mechanism, Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES
UNIT 2:	<b>Modular Arithmetic:</b> Introduction to group, field, finite field of the form $GF(p)$ , modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA
UNIT 3:	<b>Message Authentication Codes:</b> Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Securehash algorithm (SHA) <b>Digital Signatures:</b> Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm
UNIT 4:	<b>Key Management and distribution:</b> Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. <b>Authentication Applications:</b> Kerberos <b>Electronic mail security:</b> pretty good privacy (PGP), S/MIME.
UNIT 5:	<b>IP Security:</b> Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic, transaction (SET). <b>System Security:</b> Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls.

### **Outcomes:**

At the end of the course, students should be able to:

*CO1: Perform a risk assessment of an information system.*

*CO2: Identify the security requirements for an information system.*

*CO3: Use available government information system security resources when designing systems.*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M			L	L					M		H		M
CO2			H	M			H				M			M	
CO3	H				L	M							H		

M

- H = Highly Related; M = Medium L = Low

**Suggested Books:**

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, TMH
3. Bruce Schneier, "Applied Cryptography". John Wiley & Sons
4. Bernard Menezes, "Network Security and Cryptography", Cengage Learning.
5. AtulKahate, "Cryptography and Network Security", TMH

  
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# Cyber Security

## Program Elective II

MCO 057B	Ethical Hacking	3-0-0
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**Course Objective:** By the end of the course students will able to:

1. Learn various hacking methods.
2. Perform system security vulnerability testing.
3. Perform system vulnerability exploit attacks.
4. Produce a security assessment report
5. Learn various issues related to hacking.

UNIT 1:	<b>Hacking Windows:</b> BIOS Passwords, Windows Login Passwords, Changing Windows Visuals, Cleaning Your Tracks, Internet Explorer Users, Cookies, URL Address Bar, Netscape Communicator, Cookies, URL History, The Registry, Baby Sitter Programs.
UNIT 2:	<b>Advanced Windows Hacking:</b> Editing your Operating Systems by editing Explorer.exe, The Registry, The Registry Editor, Description of .reg file, Command Line Registry Arguments, Other System Files, Some Windows & DOS Tricks, Customize DOS, Clearing the CMOS without opening your PC, The Untold Windows Tips and Tricks Manual, Exiting Windows the Cool and Quick Way, Ban Shutdowns: A Trick to Play, Disabling Display of Drives in My Computer, Take Over the Screen Saver, Pop a Banner each time Windows Boots, Change the Default Locations, Secure your Desktop Icons and Settings.
UNIT 3:	<b>Getting Past the Password:</b> Passwords: An Introduction, Password Cracking, Cracking the Windows Login Password, The Glide Code, Windows Screen Saver Password, XOR, Internet Connection Password, Sam Attacks, Cracking Unix Password Files, HTTP Basic Authentication, BIOS Passwords, Cracking Other Passwords, .
UNIT 4:	<b>The Perl Manual:</b> Perl: The Basics, Scalars, Interacting with User by getting Input, Chomp() and Chop(), Operators, Binary Arithmetic Operators, The Exponentiation Operator(**), The Unary Arithmetic Operators, Other General Operators, Conditional Statements, Assignment Operators. The?: Operator, Loops, The While Loop, The For Loop, Arrays, THE FOR EACH LOOP: Moving through an Array, Functions Associated with Arrays, Push() and Pop(), Unshift() and Shift(), Splice(), Default Variables, \$_, @ARGV, Input Output, Opening Files for Reading, Another Special VariableS.



UNIT 5:	<b>How does a Virus Work?</b> What is a Virus?, Boot Sector Viruses (MBR or Master Boot Record), File or Program Viruses, Multipartite Viruses, Stealth Viruses, Polymorphic Viruses, Macro Viruses, Blocking Direct Disk Access, Recognizing Master Boot Record (MBR) Modifications, Identifying Unknown Device Drivers, How do I make my own Virus?, Macro Viruses, Using Assembly to Create your own Virus, How to Modify a Virus so Scan won't Catch it, How to Create New Virus Strains, Simple Encryption Methods.
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### **Course Outcome (CO):**

*At the end of this course, students will demonstrate ability to:*

1. Work on various hacking methods and use this method to stop cyber-crime.
2. Implement system security vulnerability testing and make system more secure.
3. Analyze system vulnerability exploit attacks and make some preventive measure for secure system.
4. Generate a security assessment report
5. Analyze various issues related to hacking.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>												<b>Program Specifice Outcome</b>		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M					L		M				M	M	L	
CO2	M			H	H		L	M							
CO3	M	H		H	M	L		M	L		M				H
CO4			L					M				H			
CO5			M		M	L	L	M	L			H	H		H

### **TEXT BOOKS:**

1. Patrick Engbreton: "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", 1st Edition, Syngress publication, 2011.
2. Ankit Fadia : "Unofficial Guide to Ethical Hacking", 3rd Edition , McMillan India Ltd, 2006.

### **REFERENCES:**

1. Simpson/backman/corley, "HandsOn Ethical Hacking & Network Defense International", 2nd Edition, Cengageint, 2011.

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# Cyber Security

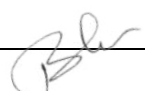
## Program Elective 3

MCO 064B	Digital Forensics	3-0-0
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### Course Objective:

1. The main objective of the course is to introduce the students to bring awareness in crimes and tracing the attackers.
2. Define digital forensics from electronic media.
3. Describe how to prepare for digital evidence investigations and explain the differences between law enforcement agency and corporate investigations.
4. Explain the various forensic technologies and protection of data.
5. To get familiarize with various Risk Management Techniques and their use.

<b>UNIT 1:</b>	Introduction & evidential potential of digital devices – Key developments, Digital devices in society, Technology and culture, Comment, Closed vs. open systems, evaluating digital evidence potential. Device Handling & Examination Principles: Seizure issues, Device identification, Networked devices, Contamination, Previewing, Imaging, Continuity and hashing, Evidence locations.
<b>UNIT 2:</b>	A sevenelement security model, A developmental model of digital systems, Knowing, Unknowing, Audit and logs , Data content, Data context. Internet & Mobile Devices The ISO / OSI model, The internet protocol suite, DNS, Internet applications, Mobile phone PDAs, GPS, Other personal technology.
<b>UNIT 3:</b>	Introduction to Computer Forensics, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources / Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps Taken by Computer Forensics Specialists, Who Can Use Computer Forensic Evidence?, Case Histories, Case Studies.
<b>UNIT 4:</b>	Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised, Internet Tracing Methods 65.
<b>UNIT 5:</b>	Homeland Security Systems. Occurrence of Cyber Crime, Cyber Detectives, Fighting Cyber Crime with Risk Management Techniques, Computer Forensics Investigative Services, Forensic Process Improvement, Course Content, Case Histories.

  
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### **Course Outcome (CO):**

**At the end of this course, students will demonstrate ability to:**

CO1: The students are aware about cyber-crimes and tracing the attackers.

CO2: Learn about digital forensics and collection of digital forensics from electronic media.

CO3: Describe how to prepare for digital evidence investigations and explain the differences between law enforcement agency and corporate investigations.

CO4: Explain the various forensic technologies and protection of data.

CO5: To get familiarize with various Risk Management Techniques and their use.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	M	M		L		M		L		M	H	M	M
CO2	H		M	H	M	H	L		L		L	L	H	M	M
CO3	M	M		M			L	L		M				M	
CO4	L		M					M		L		L	L		
CO5	M	M			M		M					L		M	


L

### **TEXT BOOKS:**

1. Angus M. Mashall, "Digital Forensics", 2nd Edition, Wiley-Blackwell, A John Wiley & Sons Ltd Publication, 2008.
2. John R. Vacca, "Computer forensics : Computer Crime Scene Investigation", 2nd Edition, Charles River Media, Inc. Boston, Massachusetts.

### **REFERENCES:**

1. Michael G. Noblett; Mark M. Pollitt, Lawrence A. Presley (October 2000), "Recovering and examining computer forensic evidence", Retrieved 26 July 2010.
2. Leigland, R (September 2004). "A Formalization of Digital Forensics". (Pdf document ).
3. Geiger, M (March 2005). "Evaluating Commercial Counter-Forensic Tools" (Pdf document).

  
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# Cyber Security

## Program Elective 4

MCO 059B	SECURITY THREATS & VULNERABILITIES	3-0-0
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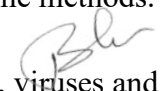
### Course Objective:

1. To impart the knowledge on various security threats and issues and how to overcome those issues.
2. To identify and explain the capability to handle various attackers and crime issues.
3. To educate various issues involved in threats overcome methods.
4. To impart the knowledge on various Forensic analysis and risk analysis.
5. To familiarize students with inner security issues involved in mail agents, viruses and worms.

UNIT 1:	Introduction: Security threats - Sources of security threats- Motives - Target Assets and Vulnerabilities. Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Cyber crimes.
UNIT 2:	Network Threats: Active/ Passive – Interference – Interception – Impersonation – Worms – Virus – Spam"s – Ad ware - Spy ware – Trojans and covert channels – Backdoors – Bots - IP Spoofing - ARP spoofing - Session Hijacking - Sabotage-Internal treats- Environmental threats - Threats to Server security.
UNIT 3:	Security Threat Management: Risk Assessment - Forensic Analysis - Security threat correlation – Threat awareness - Vulnerability sources and assessment- Vulnerability assessment tools - Threat identification - Threat Analysis - Threat Modeling - Model for Information Security Planning.
UNIT 4:	Security Elements: Authorization and Authentication - types, policies and techniques - Security certification - Security monitoring and Auditing - Security Requirements Specifications - Security Policies and Procedures, Firewalls, IDS, Log Files, Honey Pots
UNIT 5:	Access control, Trusted Computing and multilevel security - Security models, Trusted Systems, Software security issues, Physical and infrastructure security, Human factors – Security awareness, training, Email and Internet use policies.

### At the end of the course, the student should be able to:

- CO1. The Student will gain the knowledge on various security threats and issues and how to overcome those issues.
- CO2. The student will get the capability to handle various attackers and crime issues.
- CO3. Learning various issues involved in threats overcome methods.
- CO4. Learning Forensic analysis and risk analysis.
- CO5. Learn inner security issues involved in mail agents, viruses and worms.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES  
AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	M		M		L			L	M	L	M	H	
CO2		M	M		H	L	L				M	L		L	M
CO3	H	M	M	M		L		L			L		H	L	H
CO4		M					M				M		M	M	
CO5	M			H					L	L			M		

- H = Highly Related; M = Medium L = Low

**TEXT BOOKS:**

1. Swiderski, Frank and Sydex: "Threat Modeling", 1st Edition, Microsoft Press, 2004.
2. Joseph M Kizza: "Computer Network Security", 1st Edition, Springer, 2010.
3. William Stallings and Lawrie Brown: "Computer Security: Principles and Practice", 2nd Edition Prentice Hall, 2008.

**REFERENCES:**

1. Lawrence J Fennelly : "Handbook of Loss Prevention and Crime Prevention" 5th Edition, Butterworth-Heinemann,2012.
2. Tipton Ruthbe Rg : "Handbook of Information Security Management", 6th Edition, Auerbach Publications,2010.
3. Mark Egan : "The Executive Guide to Information Security" , 1st Edition, Addison-Wesley Professional,2004.

  
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# Cyber Security

## Program Elective 5

MCO 058B	Cyber Laws And Security Policies	3-0-0
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### Course Objective:

1. To introduce the various cyber laws and their legal perspective.
2. To get familiarize with various Act related to information technology.
3. To aware the students with e business and legal issues.
4. To introduce the cyber ethics in various fields.
5. To provide practical exposure on cyber crime.

<b>UNIT 1:</b>	<b>Introduction to Cyber Law Evolution of Computer Technology :</b> Emergence of Cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.
<b>UNIT 2:</b>	<b>Information technology Act :</b> Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.
<b>UNIT 3:</b>	<b>Electronic Business and legal issues:</b> Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C, E security. <b>Application area:</b> Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends.
<b>UNIT 4:</b>	<b>Cyber Ethics:</b> The Importance of Cyber Law, Significance of cyber-Ethics, Need for Cyber regulations and Ethics. Ethics in Information society, Introduction to Artificial Intelligence Ethics: Ethical Issues in AI and core Principles, Introduction to Block chain Ethics.
<b>UNIT 5:</b>	<b>Case Study on Cyber Crimes:</b> Harassment Via E-Mails, Email Spoofing (Online A Method Of Sending E-Mail Using A False Name Or E-Mail Address To Make It Appear That The E-Mail Comes From Somebody Other Than The True Sender, Cyber Pornography (Exm.MMS), Cyber-Stalking

At the end of the course, the student should be able to:

1. Familiar with various cyber laws and their legal perspective with practical aspects.
2. Know about various Act related to information technology.
3. Enhance their skills in the field e-business and legal issues in cyber space.

4. Learn the cyber ethics in various fields and their significance.
5. Get the practical exposure on cyber-security.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**


Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L			H		M					L		H	M	M
CO2							L				L		H		
CO3	M		M			M				L		M		H	
CO4							M	H						L	M
CO5	L		L		M	M					H	M	H	M	

**TEXT BOOKS :**

- 1 .K.Kumar,” Cyber Laws: Intellectual property & E Commerce, Security”,1st Edition, Dominant Publisher,2011.
2. Rodney D. Ryder, “ Guide To Cyber Laws”, Second Edition, Wadhwa And Company, New Delhi, 2007.
3. Information Security policy &implementation Issues, NIIT, PHI.

**REFERENCES :**

1. Vakul Sharma, "Handbook Of Cyber Laws" Macmillan India Ltd, 2nd Edition,PHI,2003.
2. Justice Yatindra Singh, " Cyber Laws", Universal Law Publishing, 1st Edition,New Delhi, 2003.
3. Sharma, S.R., “Dimensions Of Cyber Crime”, Annual Publications Pvt. Ltd., 1st Edition, 2004.
4. Augastine, Paul T.,” Cyber Crimes And Legal Issues”, Crecent Publishing Corporation, 2007.

  
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<b>MCO 061B</b>	<b>Ethical Hacking And Digital Forensic Tools Lab</b>	<b>0-0-2</b>
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### **Course Objectives:**

The main objective this practical session is that students will get the exposure to various forensic tools and scripting languages.

The following programs should be implemented preferably on platform Windows/Unix through perl, shell scripting language and other standard utilities available with UNIX systems.

:-

#### **Part A :**

1. Write a perl script to concatenate ten messages and transmit to remote server
  - a) Using arrays
  - b) Without using arrays.
2. Write a perl script to implement following functions:
  - a) Stack functions
  - b) File functions
  - c) File text functions
  - d) Directory functions
  - e) Shift, unshift, Splice functions.
3. Write a Perl script to secure windows operating systems and web browser by disabling Hardware and software units.
4. Write a perl script to implement Mail bombing and trace the hacker.
5. Write a shell script to crack UNIX login passwords and trace it when breaking is happened.

#### **Part B: Exposure on Forensic tools.**

1. Backup the images file from RAM using Helix3pro tool and show the analysis.
2. Introduction to Santhoku Linux operating system and features extraction.
3. Using Santoku operating system generates the analysis document for any attacked file from by taking backup image from RAM.
4. Using Santoku operating system generates the attacker injected viewing java files.
5. Using Santoku operating system shows how attackers opened various Firefox URL's and pdf document JavaScript files and show the analysis.
6. Using Santoku operating System files show how an attacker connected to the various network inodes by the specific process.
7. Using exiftool (-k) generate the any picture hardware and software.
8. Using deft\_6.1 tool recover the attacker browsing data from any computer.

#### **Using Courier tool Extract a hacker secret bitmap image hidden data.**

10. Using sg (Stegnography) cyber Forensic tool hide a message in a document or any file.
11. Using sg cyber Forensic tool unhide a message in a document or any file.
12. Using Helix3pro tool show how to extract deleted data file from hard disk or usb device.
13. Using Ghostnet tool hide a message into a picture or any image file.
14. Using kgbkey logger tool record or generate an document what a user working on system
15. Using pinpoint metaviewr tool extract a metadata from system or from image file.
16. Using Bulk Extractor tool extract information from windows file system.



**Course Outcomes:**

By the completion of this laboratory session Student

1. Will get the practical exposure to forensic tools.
2. Will gain the knowledge on perl and Unix scripting languages to implement various security attacks.
3. Will get the ideas in various ways to trace an attacker.



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<b>MCO 061 B</b>	<b>Cryptography And Security Lab</b>	<b>0-0-2</b>
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### Course Educational Objectives:

The objective of this course is that to understand the principles of encryption algorithms, conventional and public key cryptography practically with real time applications.


The following programs should be implemented preferably on platform Windows/Unix using C language (for 1-5) and other standard utilities available with UNIX systems (for 6-15) :-

1. Implement the encryption and decryption of 8-bit data using Simplified DES Algorithm (created by Prof. Edward Schaefer) in C
2. Write a program to break the above DES coding
3. Implement Linear Congruential Algorithm to generate 5 pseudo-random numbers in C
4. Implement Rabin-Miller Primality Testing Algorithm in C
5. Implement the Euclid Algorithm to generate the GCD of an array of 10 integers in C
6. a) Implement RSA algorithm for encryption and decryption in C  
b) In an RSA System, the public key of a given user is  $e=31, n=3599$ .  
Write a program to find private key of the User.
7. Configure a mail agent to support Digital Certificates, send a mail and verify the correctness of this system using the configured parameters.
8. Configure SSH (Secure Shell) and send/receive a file on this connection to verify the correctness of this system using the configured parameters.
9. Configure a firewall to block the following for 5 minutes and verify the correctness of this system using the configured parameters: (a) Two neighborhood IP addresses on your LAN (b) All ICMP requests (c) All TCP SYN Packets
10. Configure S/MIME and show email-authentication.
11. Implement encryption and decryption with openssl.
12. Implement Using IP TABLES on Linux and setting the filtering rules.
13. Implementation of proxy based security protocols in C or C++ with features like Confidentiality, integrity and authentication.
14. Working with Sniffers for monitoring network communication (Ethereal)
15. Using IP TABLES on Linux and setting the filtering rules

### Course Outcomes:

By the end of the course students will

1. Know the methods of conventional encryption.
2. Understand the concepts of public key encryption and number theory
3. Understand various applications of cryptography and security issues practically.

  
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# Cyber Security

## Program Elective 6

<b>MCO 069B</b>	<b>Information Security Risk Management</b>	<b>3-0-0</b>
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### Course Objective

To understand and development of concepts required for risk-based planning and risk management of computer and information systems

UNIT 1:	An Introduction to Risk Management: Introduction to the Theories of Risk Management; The Changing Environment; The Art of Managing Risks.
UNIT 2:	The Threat Assessment Process: Threat Assessment and its Input to Risk Assessment; Threat Assessment Method; Example Threat Assessment
UNIT 3:	Vulnerability Issues: Operating System Vulnerabilities; Application Vulnerabilities; Public Domain or Commercial Off-the-Shelf Software; Connectivity and Dependence; Vulnerability assessment for natural disaster, technological hazards, and terrorist threats; implications for emergency response, vulnerability of critical infrastructures
UNIT 4:	The Risk Process: What is Risk Assessment? Risk Analysis; Who is Responsible?
UNIT 5:	Tools and Types of Risk Assessment: Qualitative and Quantitative risk Assessment; Policies, Procedures, Plans, and Processes of Risk Management; Tools and Techniques; Integrated Risk Management; Future Directions: The Future of the Risk Management.

**At the end of the course, the student should be able to:**

CO1: The ability to identify, analyse and articulate the importance of managing IS-related risk and security issues in organizations, and the relationship between these and the achievement of business value from IS/IT investments

CO2: The ability to identify, analyse, synthesize and evaluate the costs of not appropriately identifying and managing risk and security concerns in projects and organizations, resulting in IS/IT failures, dysfunctional systems, and systems which fail to deliver value to key stakeholders

CO3: The practical ability to develop and document IS/IT risk and security management plans that detail contingency planning strategies and practices

CO4: The ability to identify, analyze, synthesize and articulate the major theories and concepts associated with IS failure and the management of IS risk, including factors argued to lead to unsatisfactory outcomes with respect to IS/IT and Information Security

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES  
AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H		M		L					L		H	M	
CO2				M	M		L	M		M		L	M		M
CO3			H			M				M		L		M	
CO4				M	M		M	M			H		M		M

**Text books:**

1. Malcolm Harkins, Managing Risk and Information Security, Apress, 2012.
2. Daniel Minoli, Information Technology Risk Management in Enterprise Environments, Wiley, 2009.

**Reference books:**

1. Andy Jones, Debi Ashenden, Risk Management for Computer Security: Protecting Your Network & Information Assets, , 1st Edition, Butterworth-heinemann, Elsevier, 2005.
2. Andreas Von Grebmer, Information and IT Risk Management in a Nutshell: A pragmatic approach to Information Security, 2008, Books on Demand Gbh.

  
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# Artificial Intelligence


## Program Elective 1

MCO 117A	Principles of Artificial Intelligence & Machine Learning	3-0-0
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### Course Objective:

- Able to explain the basic principles of artificial intelligence
- Students can apply logic and structured concepts in knowledge representation and discuss the applications of artificial intelligence
- To implement and analyze uninformed and informed Search Strategies
- To implement and apply various game playing algorithms to different problems
- Understand and represent various types of logics and their forms
- To Understand various Learning techniques

<b>UNIT 1:</b>	<b>Introduction-</b> What is intelligence? Foundations of artificial intelligence (AI), Task of artificial intelligence, Techniques of artificial intelligence, Problem Solving Formulating problems, problem types, states and operators, state space.  <b>Knowledge Representation-</b> Role of Knowledge, Declarative Knowledge, Procedural Knowledge, Knowledge representation Techniques; conceptual graphs; structured representations; frames, scripts; issues in knowledge representation
<b>UNIT 2:</b>	<b>Uninformed &amp; Informed Search Strategies-</b> Breadth First Search, Depth First Search, Depth Limited Search, Heuristic Functions, Best First Search, Hill Climbing Algorithm, Problems and solutions of Hill Climbing, Iterative Deepening (IDA), A* algorithm, AO* Algorithm.
<b>UNIT 3:</b>	<b>Game playing-</b> Introduction, Types of games, Minimax game algorithm, Alpha Beta cut-off procedure. Case Study of Games
<b>UNIT 4:</b>	<b>Logics-</b> Propositional logics, First Order Predicate Logics (FOPL), Syntax of First Order Predicate Logics, Properties of Wff, Clausal Forms, Conversion to clausal forms.
<b>UNIT 5:</b>	<b>Machine Learning-</b> Definition of learning systems, Goals and applications of machine learning. Aspects of developing a learning system- Training data, Concept representation, Function approximation, Issues in machine learning. Types of machine learning-Learning associations. Supervised learning - Classification and regression trees, Support vector machines. Unsupervised learning - Clustering, Instance-based learning, K-nearest neighbor, Locally weighted regression, Radial basis function, Reinforcement learning

  
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**Course Outcomes:** Upon the end of this course, student will be :

CO1: Familiar with the basic principles of artificial intelligence

CO2: To implement and analyze Uninformed and Informed Search algorithms

CO3: Able to represent and apply various logics and structured concepts in knowledge representation

CO4: To implement and apply various game playing algorithms to different problems

CO5: To understand various Learning techniques

**COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	L	L	M								H	L		
CO2	H	H	H	M	H				H		M	H	M		
CO3	H	M	M	H	H	L		L	M		M	H	M	M	
CO4	H	M	M	H	H	L		L	H		M	H	H	M	
CO5	H	M							M			H	L		M

**H = Highly Related; M = Medium L = Low**

**Text Books:**

1. Stuart Russell and Peter Norvig. Artificial Intelligence – A Modern Approach, Pearson Education Press, 2001.
2. Kevin Knight, Elaine Rich, B. Nair, Artificial Intelligence, McGraw Hill, 2008.
3. Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (INDIAN EDITION), 2013.

**Reference Books:**

1. George F. Luger, Artificial Intelligence, Pearson Education, 2001.
2. Nils J. Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kauffman, 2002.

# Artificial Intelligence

## Program Elective 2

MCO 090B	Knowledge Engineering and Expert Systems	3-0-0
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**Course Objective:** At the end of the course, the student should be able to:

- To explain and describe the concepts central to the creation of knowledge bases and expert systems.
- Knowledgeable about the tools and the processes used for the creation of an expert system.
- Student will know methods used to evaluate the performance of an expert system.
- Students will be able to examine properties of existing systems in a case-study manner, comparing differing approaches and software tools

<b>UNIT1</b>	<b>Introduction To Knowledge Engineering:</b> The Human Expert And An Artificial, Expert Knowledge Base And Inference Engine, Importance of Expert System, features of Expert System, Knowledge Acquisition And Knowledge Representation, Components of a Knowledge in Expert system
<b>UNIT2</b>	<b>Knowledge Acquisition &amp; Problem Solving process:</b> Introduction, Knowledge Acquisition and domain Expert, Selection of the domain, Selection of the Knowledge Engineers, Meetings and Plans, Organization of Meetings ,Documentation, Multiple domain Experts. Selecting the appropriate Problem, Rule Based Systems, and Heuristic Classifications Constructive Problem Solving.
<b>UNIT3</b>	<b>Design of Expert System:</b> Introduction, Stages in the Developing Expert System, Errors in Development stages, Software Engineering and Expert Systems, The Expert System Life Cycle, Expert System Design Examples, Case Based Reasoning, Semantic of Expert, Systems.
<b>UNIT4</b>	<b>Inference Engine:</b> Inference Engine, Insight of Inference Engine, Search Strategies, Forward Chaining Algorithm, Algorithms for forward Chaining- Baseline Version, Backward Chaining Algorithm, Algorithms for Backward Chaining-Baseline Version, Mixed Modes of Chaining, Work sheets for Forward and Backward Chaining
<b>UNIT 5</b>	<b>Software Tools:</b> Overview of Expert System Tools, Expert System Shells, Multiple Paradigm Environments, Abstract architectures, Potential Implementation Problems, Selecting a Software Tool, Implementation Mechanism of tools, Black Board Architecture, Reasoning under uncertainty and Truth Maintenance Systems, Case-study : DENDRAL and MYCIN

**Course Outcome:**


- CO1. To get introduced to the basic knowledge representation in Expert system
- CO2. Understand the Knowledge Acquisition & Problem Solving methods
- CO3. Understand, analyze and evaluate the performance of an expert system.
- CO4. Understand and identify various rules in inference engine
- CO5. Identify ,apply and compare Expert system software tool to solve real life problems

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H	M									H			
CO2	H	H	H									M		M	
CO3	H	M	M	M	M						M	H	M	M	
CO4	H	M	M	M	M							M		M	
CO5	H	M	M	M	M	M					M	M	H	H	

*H = Highly Related; M = Medium; L = Low*

**Text Books:**

1. Peter Jackson, “Introduction to Expert Systems”,3rd Edition, Pearson Education 2007.
2. Robert I. Levine, Diane E. Drang, Barry Edelson: “ AI and Expert Systems: a comprehensive guide, C language”, 2nd edition, McGraw-Hill 1990.
3. Jean-Louis Ermine: “Expert Systems: Theory and Practice”, 4th printing, Prentice-Hall of India , 2001.
4. Stuart Russell, Peter Norvig: “Artificial Intelligence: A Modern Approach”,2nd Edition,Pearson Education, 2007.
5. Padhy N.P.: “Artificial Intelligence and Intelligent Systems”,4th impression , Oxford University Press, 2007.

  
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# Artificial Intelligence

## Program Elective 3

MCO 082B	Pattern Recognition	3-0-0
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### Course Objective

- Understand how to generate pattern and explain how to analyze pattern features
- Understand how to build classifiers using non parametric methods.
- Learn and compare principles of parametric and non parametric classification
- Implement pattern recognition and machine learning theories
- Able to apply the pattern recognition theories to applications of interest

Module 1:	<b>Pattern Recognition Overview</b> Overview of Pattern Recognition- Relations of PR with other Systems, PR Applications, Different Approaches to Pattern Recognition, Classification and Description—Patterns and feature extraction with Examples—Training and Learning in PR systems—Pattern recognition Approaches.
Module 2:	<b>Statistical Pattern Recognition</b> Introduction to statistical Pattern Recognition, Gaussian Case and Class Dependency, Discriminate Function, Examples, Classifier Performance,
Module 3:	<b>Linear Discriminant Functions and Unsupervised Learning and Clustering</b> Introduction—Discrete and binary Classification problems—Techniques to directly obtain linear Classifiers, Formulation of Unsupervised Learning Problems—Clustering for unsupervised learning and classification.
Module 4:	<b>Syntactic Pattern Recognition</b> Overview of Syntactic Pattern Recognition—Syntactic recognition via parsing and other grammars, Graphical Approaches to syntactic pattern recognition, Learning via grammatical inference.
Module 5:	<b>Recognition of Syntactic Description</b> Recognition by Matching, Recognition by Parsing, CYK Parsing Algorithm, Augmented Transition Nets in Parsing, Graph Based structure representation, Structured Strategy to Compare Attributed Graphs

At the end of the course, the student should be able to:

### Course Outcomes:

- CO1. Understand and explain the process of Pattern Recognition.
- CO2. Apply probability theory to estimate classifier performance.
- CO3. Describe and analyze the principles of parametric and non parametric classification methods.
- CO4. Compare pattern classifications and pattern recognition techniques.
- CO5. Apply Pattern Recognition techniques to real world problems & Design systems

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Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1	H	M										H			
CO2	M	M	M										M	M	
CO3	H	H		H	H							H			
CO4					H	N			M				H	M	
CO5					H	M			M			H	H	H	

***H = Highly Related; M = Medium L = Low***

### References:

1. Robert Schalkoff, "Pattern Recognition: Statistical Structural and Neural Approaches", John Wiley & Sons, Inc, 1992.
2. Earl Gose, Richard Johnsonbaugh, Steve Jost, "Pattern Recognition and Image Analysis", Prentice Hall of India, Pvt Ltd, New Delhi, 1996.
3. Duda R.O., P.E. Hart & D.G. Stork, "Pattern Classification", 2nd Edition, J. Wiley Inc 2001.
4. Duda R.O. & Hart P.E., "Pattern Classification and Scene Analysis", J. Wiley Inc, 1973.

  
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# Artificial Intelligence


## Program Elective 4

<b>MCO 118A</b>	<b>Artificial Neural Network and Deep Learning</b>	<b>3-0-0</b>
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### Course Objectives

- To understand the concepts of Artificial neural networks
- To explore in-depth deep neural architectures for learning and inference
- To evaluate the performance of neural architectures in comparison to other machine learning method
- Familiar with the fundamental principles, theory and approaches for learning with deep neural networks
- Discuss Convolution Neural Network models to Applications

<b>UNIT1</b>	<b>Introduction to Artificial Neural Network :</b> Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability, Convergence theorem for Perceptron Learning Algorithm, Type of network architecture, Activation functions, Basic Learning rules
<b>UNIT2</b>	<b>Feed forward Networks:</b> Multilayer Neural Network, Gradient Descent learning, Back propagation, Empirical Risk Minimization, regularization, Radial Basis Neural Network bias-variance trade off, regularization - over fitting - inductive bias regularization - drop out - generalization.
<b>UNIT3</b>	<b>Recurrent neural networks:</b> Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs
<b>UNIT4</b>	<b>Deep Neural Networks:</b> Introduction, Difficulty of training deep neural networks, Greedy layer wise training. • Generative models: Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines. • Convolutional Neural Networks: LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided Back propagation, Deep Dream, Deep Art, Fooling Convolutional Neural Networks. • Auto Encoders • Deep Reinforcement Learnin
<b>UNIT 5</b>	<b>Convolutional Neural Network:</b> Basic structure of Convolutional Network, Case studies: Alex net, VGGNet, GoogLeNet, Applications of CNN

  
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## Course Outcomes

- CO1. Explain the basic concepts in Neural Networks and applications
- CO2. Discuss feed forward networks and their training issues
- CO3. Distinguish different types of ANN architectures
- CO4. Apply fundamental principles, theory and approaches for learning with deep neural networks
- CO5. Discuss & Apply Convolution Neural Network models to Applications

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	M	L										M			
CO2	M	L										M			
CO3	H	M	M	M								H	L	M	
CO4	H	M	M	M	M							H	H	H	
CO5	H	M	M	M	M							H	H	H	

*H = Highly Related; M = Medium ; L = Low*

## Text Books

1. Simon Haykin, “Neural Networks, A Comprehensive Foundation”, 2nd Edition, Addison Wesley Longman, 2001.
2. Bishop, Christopher M. Pattern Recognition and Machine Learning. Springer, 2006
3. Charu C. Aggarwal “Neural Networks and Deep learning” Springer International Publishing, 2018
4. Satish Kumar, “Neural Networks, A Classroom Approach”, Tata McGraw -Hill, 2007.

  
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<b>MCO 089B</b>	<b>Pattern Recognition Lab</b>	<b>0-0-2</b>
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### Course Objectives:

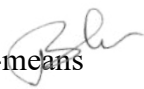
- To introduce the most important concepts, techniques, and algorithms • Assess and understand the challenges behind the design of machine vision systems.
- Understand the general processes of image acquisition, storage, enhancement, segmentation, representation, and description.
- Implement filtering and enhancement algorithms for monochrome as well as color images.

### Course Outcomes:


- CO1. To implement efficient algorithms for nearest neighbour classification, Linear Discriminate Function
- CO2. Able to identify the strengths and weaknesses of different types of classifiers & implement them on simple applications.
- CO3. Validate and assess and implement different clustering techniques
- CO4. Be able to combine various classifiers using fixed rules or trained combiners and boost their performance
- CO5. Understand the possibilities and limitations in implementation of pattern recognition techniques to different applications

### Course Contents: Exercises that must be done in this course are listed below:

- Lab 1. Implement a function for extracting the colour histogram of an image.
- Lab 2. Read all the images from the training set. For each image compute the colour histogram with general bin size  $m$  and save it as a row in the feature matrix  $X$ . Save the corresponding class label in the label vector  $y$ .
- Lab 3. Implement the  $k$ -NN classifier for an unknown image and for a general  $K$  value. Evaluate the classifier on the test set by calculating the confusion matrix and the overall accuracy.
- Lab 4. Try out different values for the number of bins for the histogram and the parameter  $K$  to see which feature attains the best performance. Convert the input image into Luv or HSV color-space before histogram calculation.
- Lab 5. Data visualization, central limit theorem, multivariate normal distribution, data whitening, non-parametric
- Lab 6. Implement Hierarchical clustering,  $k$ -means, fuzzy c-means
- Lab 7. Implementation of Bayesian classifier,  $k$ -NN classifier
- Lab 8. Linear regression, MMSE, MAP, MLE, quality measures
- Lab 9. Apply various dimensionality reduction methods whether through feature selection or feature extraction. Assess classifier complexity and regularization parameters

  
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Lab 10. Combine various classifiers using fixed rules or trained combiners and boost their performance using some test data set from real world



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<b>MCO 120A</b>	<b>Artificial Neural Network and Deep Learning Lab</b>	<b>0-0-2</b>
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### Course Objectives:

At the end of the course

- The students should be able to design and implement machine learning solutions
- Understand classification, regression, and clustering problems;
- Able to evaluate and interpret the results of the algorithms.

### Course Outcomes:

CO1. Create a custom feed-forward network.

CO2. Design Constructing Layers and Setting Transfer Functions

CO3. Implement Discriminative Learning models: Logistic Regression, Perceptrons, Artificial Neural Networks.

### List of Experiments

Lab 1. Create a custom feed-forward network .It consists of the following sections:

Constructing Layers , Connecting Layers , Setting Transfer Functions, Weights and Biases , Training Functions & Parameters , Performance Functions , Train Parameters

Lab 2. Write a program to plot various membership functions.

Lab 3. Generate AND, NOT function using McCulloch-Pitts neural net program.

Lab 4. Generate XOR function using McCulloch-Pitts neural net.

Lab 5. Write a program for Perceptron net for an AND function with bipolar inputs and targets

Lab 6. Write a program of Perceptron Training Algorithm

Lab 7. Write a program of Back Propagation Algorithm.

Lab 8. Implement ANN and compare , regularization, overfitting, underfitting and drop out

**Lab 9.** Implement Convolutional Neural Networks (CNNs) and overcome overfitting with dropout.

**Lab 10.** Implement Convolutional Neural Networks (CNNs) for Object detection

  
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# Artificial Intelligence

## Program Elective 5

MCO 121A	Application of Artificial Intelligence in Industries	3-0-0
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### Course Objectives

- Able to apply the concept of Artificial intelligence in various sectors
- Familiarize with applications of Artificial intelligence in banking applications.
- Appreciate the various applications in Communication and Education Industry.
- Identify the applications in Health care and Government sectors.
- Recognize the applications in Manufacturing industry and Transportations.

Module 1:	<b>AI in Banking :</b> Use of AI in banking and finance, Fraud detection, , Risk modeling and investment banks, Customer data management, Decreased customer experience and loyalty, Personalized marketing, Role of machine learning: Challenges of banking sector and securities, Widely used machine learning algorithms in banking and security, Fraud prevention and detection systems, Rule based and machine learning based approach in fraud detection, Anomaly detection: Ways to expose suspicious transactions in banks, Advanced fraud detection systems, Risk management systems, Current challenges and opportunities: Banking and security domain.
Module 2:	<b>AI in Communication, Media &amp; Healthcare:</b> Usage of AI in media and entertainment industry, Machine learning techniques for customer sentiment analysis, Real-time analytics in communication, Real time analytics and social media, Recommendations engines. The most important applications of machine learning in healthcare, Role of machine learning in drug discovery, Medical image analysis, Why deep learning for medical image analysis and Predictive medicine: Prognosis and diagnostics accuracy, Predictive medicine
Module 3:	<b>AI in Education &amp; Manufacturing:</b> Advantages of AI in education, learning analytics, Academic analytics, Action research, Educational data mining, Personalized adaptive learning, Learning analytics process, Case study: Application of ML in predicting students' performance. Applications in manufacturing industry, Deep learning for smart manufacturing, Machine learning for quality control in manufacturing, Case study, Construction of CNN, Experimental results, Efficiency of CNN for defect detection, Comparative experiments, Machine learning for fault assessment, Machinery failure prevention technology.



Module 4:	<b>AI in Government Administration:</b> Type of government problems appropriate for AI applications, AI for citizen services use cases, Answering questions, Routing requests, Translation, Drafting documents, Chat bots for communication between citizen and government, Media richness theory, Chatbots in the public sector, Case study, Data management services, Knowledge processing services, Application services.
Module 5:	<b>AI in Transportation &amp; Energy Sector:</b> Applications of ML and artificial intelligence in transportation, Incident detection, Predictive models, Application of AI in aviation and public transportation, Aviation, Shared mobility, Buses, Intelligent urban mobility, Autonomous vehicles, Autonomous transportation, Artificial intelligence use cases in logistics, Back office AI, Cognitive customs, Predictive logistics, Predictive risk management, Seeing thinking and speaking logistics operations, ML powered customer experience, Limitations of AI techniques in transportation, AI in Smart grid technologies, Key characteristics of smart grid, Machine learning applications in smart grid, Machine learning techniques for renewable energy generation, Forecasting etc Case studies

### Course Outcomes

- CO1. Familiarize, compare and analyze the role of AI in banking applications
- CO2. Analyze the applications in Media and Health care Industry
- CO3. Appreciate the various applications in manufacturing industry and Education sectors.
- CO4. Identify the problems in public sectors and role of AI in the solutions
- CO5. Recognize the applications and challenges in Transportation and Energy Sectors

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	M			H							H	H	H	
CO2	H	H			H	M						H	H	H	H
CO3	H	H			H	M						H	H	H	H
CO4	H	H			H							H	M	M	
CO5	H	H			H							H	M	M	

### TEXT BOOK

- David Beyer, Artificial Intelligence and Machine Learning in Industry, O'Reilly Media, Inc., ISBN: 9781491959336

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2. Doug Hudgeon, Richard Nichol, Machine Learning for Business , December 2019 , ISBN 9781617295836
3. Application of machine learning in industries (IBM ICE Publications).
4. Andreas François Vermeulen, “Industrial Machine Learning”, Apress, Berkeley, CA,2020

H = Highly Related; M = Medium; L = Low

  
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## Cloud Computing Program Elective 1

<b>MCO 024B</b>	<b>Grid Computing</b>	<b>3-0-0</b>
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**Objective: The objectives of this course are to:**

1. Introduce a thorough understanding of Grid Computing concepts and how these can be applied in cloud computing.
2. Discuss and understand the Architecture and Applications of Grid Computing.
3. Develop the understanding of designing Grid Computing enabled software applications.

<b>UNIT 1:</b>	<b>Grid Computing:</b> values and risks – History of Grid computing, Grid computing model and protocols, Overview and types of Grids.
<b>UNIT 2:</b>	<b>Desktop Grids :</b> Background, Definition, Challenges, Technology, Suitability, Grid server and practical uses, Clusters and Cluster Grids, HPC Grids, Scientific in sight, Application and Architecture, HPC application, Development Environment and HPC Grids, Data Grids, Alternatives to Data Grid, Data Grid architecture.
<b>UNIT 3:</b>	<b>The open Grid services Architecture,</b> Analogy, Evolution, Overview, Building on the OGSA platform, Implementing OGSA based Grids, Creating and Managing services, Services and the Grid, Service Discovery, Tools and Toolkits, Universal Description Discovery and Integration .
<b>UNIT 4:</b>	<b>Desktop Supercomputing,</b> Parallel Computing, Parallel Programming Paradigms, Problems of Current parallel Programming Paradigms, Desktop Supercomputing Programming Paradigms, Parallelizing Existing Applications, Grid Enabling Software Applications, Needs of the Grid users, methods of Grid Deployment, Requirements for Grid enabling Software, Grid Enabling Software Applications.
<b>UNIT 5:</b>	Application integration, Application classification, Grid requirements, Integrating applications with Middleware platforms, Grid enabling Network services, Managing Grid environments, Managing Grids, Management reporting, Monitoring, Data catalogs and replica management, Portals, Different application areas of Grid computing.

### Course outcomes:

At the end of the course, the student should be able to:

- CO1. Compare modern concepts of Grid Computing.
- CO2. Analyse and understand the challenges in creating and managing Grid service Architecture.
- CO3. Build understanding of parallel and supercomputing programming paradigms.
- CO4. Integrate applications with middleware platforms.

**Mapping course outcomes leading to the achievement of program outcomes and program specific outcomes:**

<i>Course Outcome</i>	<i>Program Outcome</i>											<i>Program Specific Outcome</i>			
	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>	<i>PO7</i>	<i>PO8</i>	<i>PO9</i>	<i>PO10</i>	<i>PO11</i>	<i>PO12</i>	<i>PSO1</i>	<i>PSO2</i>	<i>PSO3</i>
<i>CO1</i>	H	H	M						L				H		
<i>CO2</i>				H			M					H		H	
<i>CO3</i>		H					H			H			H		H
<i>CO4</i>		H					H	L							H

*H = Highly Related; M = Medium L = Low*

### Text Books:

1. Ahmar Abbas, “Grid Computing: A Practical Guide to Technology and Applications”, Firewall Media, 2004.

### Reference Books:

1. Joshy Joseph and Craig Fellenstein, “Grid Computing”, Pearson Education, 2001.
2. Ian Foster and Carl Kesselman, “Grid Blue Print for New Computing Infrastructure”, Morgan Kaufmann, 2000.

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# Cloud Computing

## Program Elective 1

<b>MCO 104B</b>	<b>Cloud Security: Course Outlines</b>	<b>3-0-0</b>
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**Objective: The objectives of this course are to:**

1. Introduce a thorough understanding of cloud security concepts and how these can be applied in the cloud computing.
2. Discuss and understand the legal and compliance issues for cloud provider and compliance for the cloud consumer.
3. Develop the understanding in designing backup/recovery, data replication solutions and tools that will serve to build, configure, protect, troubleshoot and manage the virtual resources in virtual environment.

<b>Unit I</b>	SECURITY CONCEPTS: Confidentiality, privacy, integrity, authentication, non-repudiation, availability, access control, defence in depth, least privilege, how these concepts apply in the cloud, what these concepts mean and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud; Cryptographic Systems- Symmetric cryptography, stream ciphers, block ciphers, modes of operation, public-key cryptography, hashing, digital signatures, public-key infrastructures, key management, X.509 certificates, OpenSSL.
<b>Unit II</b>	MULTI-TENANCY ISSUES: Isolation of users/VMs from each other. How the cloud provider can provide this; Virtualization System Security Issues- e.g. ESX and ESXi Security, ESX file system security, storage considerations, backup and recovery; Virtualization System Vulnerabilities- Management console vulnerabilities, management server vulnerabilities, administrative VM vulnerabilities, guest VM vulnerabilities, hypervisor vulnerabilities, hypervisor escape vulnerabilities, configuration issues, malware (botnets etc).
<b>Unit III</b>	VIRTUALIZATION SYSTEM-SPECIFIC ATTACKS: Guest hopping, attacks on the VM (delete the VM, attack on the control of the VM, code or file injection into the virtualized file structure), VM migration attack, hyperjacking.
<b>Unit IV</b>	TECHNOLOGIES FOR VIRTUALIZATION-BASED SECURITY ENHANCEMENT: IBM security virtual server protection, virtualization-based sandboxing; Storage Security- HIDPS, log management, Data Loss Prevention. Location of the Perimeter.
<b>Unit V</b>	LEGAL AND COMPLIANCE ISSUES: Responsibility, ownership of data, right to penetration test, local law where data is held, examination of modern Security Standards (eg PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloud provider vs. compliance for the customer.

### Course outcomes:

At the end of the course, the student should be able to:

- CO5. Compare modern security concepts as they are applied to cloud computing
- CO6. Assess the security of virtual systems.
- CO7. Evaluate the security issues related to multi-tenancy,
- CO8. Appraise compliance issues that arise from cloud computing

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**Mapping course outcomes leading to the achievement of program outcomes and program specific outcomes:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H	M						L				H		
CO2				H			M					H		H	
CO3					M					L	H		M		H
CO4		H					H	L							H

*H = Highly Related; M = Medium L = Low*

**Text Book:**

1. Cloud Security: A Comprehensive guide to secure cloud computing by Ronald L. Krutz and Russell Dean Vines

**References:**

2. Ronald L. Krutz, Russell Dean Vines, "Cloud Security" [ISBN: 0470589876], 2010.
3. John Rittinghouse, James Ransome, "Cloud Computing" CRC Press; 1 edition [ISBN: 1439806802], 2009.
4. J.R. ("Vic") Winkler, "Securing the Cloud" Syngress [ISBN: 1597495921] 2011. 12 SRM-M.Tech Cloud Computing 2015 – 16
7. Cloud Security Alliance 2010, "Top Threats to Cloud Computing" Microsoft 2013.
8. Timothy Grance; Wayne Jansen; NIST "Guidelines on Security and Privacy in Public Cloud Computing", 2011.

  
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## Cloud Computing Program Elective 2

MCO 105A	Managing Virtual Environment: Course Outlines	3-0-0
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### Objective: The objectives of this course are to:

1. Familiarize student about the role and applications of virtual environment in cloud computing.
2. Incorporate the knowledge of advanced technologies to configure, manage and secure virtual resources.
3. Develop the concepts and tools that will serve to build, configure, protect, troubleshoot and manage the virtual resources in virtual environment.

UNIT I	PERFORMANCE MANAGEMENT IN A VIRTUAL ENVIRONMENT : Management techniques, methodology and key performance metrics used to identifying CPU, memory, network, virtual machine and application performance bottlenecks in a virtualized environment.
UNIT II	CONFIGURATION AND CHANGE MANAGEMENT : Configuration and change management goals and guidelines, tools and technologies in virtualized environments
UNIT III	SECURE VIRTUAL NETWORKING : Configuration and change management goals and guidelines, tools and technologies in virtualized environments; Virtual network security architecture, network segmentation and traffic isolation to secure a virtual network configuration
UNIT IV	PROTECTING THE MANAGEMENT ENVIRONMENT: Server authentication, authorization, and accounting, SSL certificates, server hardening; Protecting the host system: security architecture, controlling access to storage, hardening hosts, Hardening virtual machines; Virtual machine security architecture, security parameters; Protecting the host and virtual machine systems using server authentication, authorization, and accounting techniques.
UNIT V	TROUBLESHOOTING VIRTUAL ENVIRONMENTS: Interpreting host, network, storage, cluster and virtual machine log files. Network troubleshooting, traffic sniffing, storage access problems, iSCSI authentication and digests. Virtual machine migration, cluster errors with shares, pools, and limits; Command line interfaces and syntax, interpreting host, network, storage, cluster, virtual machine log files and network traces.

### Course Outcomes: Through this course students should be able to:

CO1: Identify and explain basic concepts and key performance matrices of virtualized computing resources.

CO2: Build understanding of statistics involved in virtual network security architecture and its configuration.

CO3: Formulate the core issues in troubleshooting and protecting virtual environment such as authentication, 10 authorization, privacy, and interoperability.

CO4: Solve common problems that can be encountered during virtual machine and virtual storage migration.

**Mapping course outcomes leading to the achievement of program outcomes and program specific outcomes:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					H			L			M	M		L	
CO2		H				M	H						H		H
CO3				H						H					M
CO4	H		H		M				M				H	H	


*H = Highly Related; M = Medium L = Low*

**Text books:**

1. Massimo Cafaro (Editor), Giovanni Aloisio (Editor), “Grids, Clouds and Virtualization” Springer; edition [ISBN: 978-0857290489] 2011.
2. Chris Wolf and Erick M. Halter, “Virtualization” A press; 1 edition [ISBN: 978-1590594957] 2005.

**Reference books:**

3. Gaurav Somani, “Scheduling and Isolation in Virtualization”, VDM Verlag Dr. Müller [ISBN: 978-3639295139], Muller Publishers, Germany, Sept. 2010
4. LatifaBoursas (Editor), Mark Carlson (Editor), Wolfgang Hommel (Editor), Michelle Sibilla (Editor), KesWold (Editor), “Systems and Virtualization Management: Standards and New Technologies” [ISBN: 978-3540887072], October 14, 2008
5. Edward L. Haletky, “VMware ESX Server in the enterprise” [ISBN: 978- 0132302074]. Prentice Hall; 1 edition 29 Dec 2007.
6. Edward Haletky, “VMware ESX and ESXi in the Enterprise - Planning Deployment of Virtualization Servers” [ISBN: 978-0137058976]., Prentice Hall; 2 edition February 18, 2011.

  
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## Cloud Computing Program Elective 3

<b>MCO 102A</b>	<b>Cloud Storage Infrastructure: Course Outlines</b>	<b>3-0-0</b>
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**Objective: The objectives of this course are to:**

1. Incorporate a thorough understanding of virtualized data-center architecture, services, interface, and environment in student.
2. Familiarize student about the security regulations and governance in designing secure storage in virtualized and cloud environment.
3. Develop the understanding in designing backup/recovery, data replication solutions and tools that will serve to build, configure, protect, troubleshoot and manage the virtual resources in virtual environment.

<b>UNIT I</b>	<b>VIRTUALIZED DATA CENTER ARCHITECTURE:</b> Cloud infrastructures; public, private, hybrid. Service provider interfaces; SaaS, PaaS, IaaS. VDC environments; concept, planning and design, business continuity and disaster recovery principles. Managing VDC and cloud environments and infrastructures.
<b>UNIT II</b>	<b>INFORMATION STORAGE SECURITY &amp; DESIGN:</b> Storage strategy and governance; security and regulations. Designing secure solutions; the considerations and implementations involved. Securing storage in virtualized and cloud environments. Monitoring and management; security auditing and SIEM.
<b>UNIT III</b>	<b>STORAGE NETWORK DESIGN:</b> Architecture of storage, analysis and planning. Storage network design considerations; NAS and FC SANs, hybrid storage networking technologies (iSCSI, FCIP, FCoE), design for storage virtualization in cloud computing, host system design considerations.
<b>UNIT IV</b>	<b>OPTIMIZATION OF CLOUD STORAGE:</b> Global storage management locations, scalability, operational efficiency. Global storage distribution; terabytes to petabytes and greater. Policy based information management; metadata attitudes; file systems or object storage.
<b>UNIT V</b>	<b>INFORMATION AVAILABILITY DESIGN:</b> Designing backup/recovery solutions to guarantee data availability in a virtualized environment. Design a replication solution, local remote and advanced. Investigate Replication in NAS and SAN environments. Data archiving solutions; analyzing compliance and archiving design considerations.

### Outcomes:

At the end of the course, the student should be able to:

- CO1. Identify the philosophy, architecture, and practical use of virtualized data-center in cloud computing environment.
- CO2. Present fundamental skills, and techniques in optimization of cloud storage.
- CO3. Solve common problems that can be encountered during design and setup of backup/recovery and replication solutions virtualized environment.
- CO4. Build understanding of key privacy concerns in storage strategy and governance, security and regulations in cloud security management.



1. Mapping course outcomes leading to the achievement of program outcomes and program specific outcomes:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1				L	H	M					M			M	
CO2			H						H						L
CO3	H		H									M	M	H	M
CO4		H					H			H			H		H

*H = Highly Related; M = Medium L = Low*

  
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## Cloud Computing Program Elective 4

MCO 011A	Cloud Computing: Course Outlines	3-0-2
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### Course Objective:

5. To familiarize the philosophy, power, practical use of cloud.
6. To introduce fundamental principles, technology, and techniques of CC
7. To Discuss common problems that can be best solved with/in cloud
8. To Eliminate misconceptions about cloud computing

Module 1:	Understanding cloud computing: Introduction to Cloud Computing - Benefits and Drawbacks - Types of Cloud Service Development - Deployment models
Module 2:	Cloud Architecture Technology and Architectural Requirements: The Business Case for Clouds - Hardware and Infrastructure – Accessing the cloud – Cloud Storage – Standards- Software as a Service – Discovering Cloud Services Development tools. Three Layered Architectural Requirement - Provider Requirements
Module 3:	Service Centric Issues - Interoperability - QoS - Fault Tolerance - Data Management Storage and Processing - Virtualization Management - Scalability - Load Balancing - Cloud Deployment for Enterprises - User Requirement - Comparative Analysis of Requirement.
Module 4:	Security Management in Cloud: Security Management Standards - Security Management in the Cloud Availability Management - SaaS Availability Management - PaaS Availability Management - IaaS Availability Management - Access Control - Security Vulnerability, Patch, and Configuration Management – Privacy in Cloud- The Key Privacy Concerns in the Cloud - Security in Cloud Computing.
Module 5:	Virtualization: Objectives - Benefits - Virtualization Technologies - Data Storage Virtualization – Storage Virtualization – Improving Availability using Virtualization - Improving Performance using Virtualization-Improving Capacity using Virtualization.

### **Outcomes:**


At the end of the course, the student should be able to:

CO1: Identify the philosophy, power, and practical use of cloud.

CO2: Present fundamental principles, technology, and techniques of CC

CO3: Solve common problems that can be encountered during setup of virtual server and storage.

CO4: Build understanding of key privacy concerns in cloud security management.

  
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**Mapping course outcomes leading to the achievement of program outcomes and program specific outcomes:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H		L		H							M			L
CO2									H		L		H	L	
CO3			H											H	H
CO4		H				M	H						H		

*H = Highly Related; M = Medium L = Low*

**Text books:**

1. David S Linthicum, “Cloud Computing and SOA Convergence in your Enterprise A Step by Step Guide”, Addison Wesley Information Technology Series.
2. Anthony T Velte, Toby J.Velte, Robert Elsenpeter, “Cloud computing A Practical Approach “, Tata McGraw Hill Publication

**References:**

1. Tim Mather, Subra Kumara swamy, Shahed Latif, “Cloud Security and Privacy –
2. An Enterprise Perspective on Risks and Compliance” , O’Reilly Publications, First Edition
3. Michael Miller, “Cloud Computing – Web-Based Applications that Change the Way You Work and Collaborate Online”, Pearson Education, New Delhi, 2009.
4. Cloud Computing Specialist Certification Kit – Virtualization Study Guide.

  
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## Cloud Computing Program Elective 5

<b>MCO 114B</b>	<b>Design and Development of Cloud Application: Course Outlines</b>	<b>3-0-2</b>
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**Objective: The objectives of this course are to:**

1. Incorporate the knowledge of functional design, tools and technology decisions in developing cloud applications.
2. Describe the working of third party APIs and their interconnectivity in cloud ecosystems.
3. Develop the conceptual thinking in designing Use Case to develop and deploy an advanced cloud application using framework and platform of choice to demonstrate an understanding of database,

<b>UNIT 1</b>	DESIGNING CLOUD BASED APPLICATIONS: Role of business analyst, requirements gathering, UML, use of state diagrams, wire frame prototypes, use of design tools such as Balsamiq. Selecting front end technologies and standards, Impact of growth in mobile computing on functional design and technology decisions
<b>UNIT 2</b>	CLOUD APPLICATION DEVELOPMENT: Technical architecture considerations – concurrency, speed and unpredictable loads. Agile development, team composition (including roles/responsibilities), working with changing requirements and aggressive schedules. Understanding Model View Controller (MVC). Advanced understanding of “views”, location, and the presentation layer: Advanced Ajax and JQuery. Presenting to different browsers and devices. Localization and internationalization; Understanding client location and device type. Mobile application development – Android, iOS, WP, RIM, Symbian
<b>UNIT 3</b>	STORING OBJECTS IN THE CLOUD Session management. Advanced database techniques using MySQL and SQL Server, blob storage, table storage. Working with Third Party APIs: Overview of interconnectivity in cloud ecosystems. Working with Twitter API, Flickr API, Google Maps API. Advanced use of JSON and REST.
<b>UNIT 4</b>	CLOUD APPLICATIONS AND SECURITY ISSUES: Understanding cloud based security issues and threats (SQL query injections, common hacking efforts), SSL, encrypted query strings, using encryption in the database. Authentication and identity. Use of OAuth. OpenID; Understanding QA and Support: Common support issues with cloud apps: user names and passwords, automated emails and spam, browser variants and configurations. Role of developers in QA cycle. QA techniques and technologies. Use of support forums, trouble ticketing.
<b>UNIT 5</b>	USE CASES: Design, develop and deploy an advanced cloud app using framework and platform of choice to demonstrate an understanding of database, presentation and logic. Application should demonstrate integration with third party API, sensitivity to geography of user (language, currency, time and date format), authentication of user, security, and awareness of client device/browser. Case Studies: Salesforce, Basecamp, Xero.com, Dropbox

**Course outcomes:**

At the end of the course, the student should be able to:

CO1 : Design and develop MVC inspired cloud based application.

CO2 : Assess the security issues and threat using encryption in cloud based database.

CO3 : Demonstrate the integration of cloud application of with third party API.

CO4 : Compare different architecture, frameworks and modern technologies in cloud based application development.

**Mapping course outcomes leading to the achievement of program outcomes and program specific outcomes:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	L			H	H							H	L	H
CO2			M		M		H							H	
CO3									H	L		M	H		M
CO4				H							H			H	


*H = Highly Related; M = Medium L = Low*

**Text:**

1. Jim Webber, Savas Parastatidis, Ian Robinson, “REST in Practice” O'Reilly Media; 1 edition, [ISBN: 978-0596805821] 2010.

**Reference:**

1. Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, Matias Woloski, “Developing Applications for the Cloud on the Microsoft Windows Azure Platform” Microsoft Press; 1 edition, [ISBN: 9780735656062] 2010.
2. Dan Wellman, “jQuery UI 1.6” Packt Publishing [ISBN: 9781847195128] 2009.
3. Peter Lubbers, Brian Albers, Frank Salem, Ric Smith, “Pro HTML5 Programming” A

  
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**Data Analytics**  
**Program Elective 1**

<b>MCO 127A</b>	<b>Advance Data Mining</b>	<b>3-0-0</b>
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**Pre-requisite** NIL

**Course Objectives**

1. Study the sequential patterns algorithms
2. Study the patterns from time series data.
3. Study the Temporal Patterns algorithms
4. Analysis of computing frameworks for Big Data analytics.

**Syllabus**

Unit 1	Sequential Pattern Mining concepts, primitives, scalable methods; Transactional Patterns and other temporal based frequent patterns, Mining Time series Data, Periodicity Analysis for time related sequence data, Trend analysis, Similarity search in Time-series analysis;
Unit 2	Mining Data Streams, Methodologies for stream data processing and stream data systems, Frequent pattern mining in stream data, Sequential Pattern Mining in Data Streams, Classification of dynamic data streams, Class Imbalance Problem; Graph Mining, Mining frequent subgraphs, finding clusters, hub and outliers in large graphs, Graph Partitioning;
Unit 3	Web Mining, Mining the web page layout structure, mining web link structure, mining multimedia data on the web, Automatic classification of web documents and web usage mining;
Unit 4	Distributed Data Mining, Distributed data mining framework, Distributed data source, Distributed data mining techniques, Distributed classifier learning, distributed clustering, distributed association rule mining and Challenges of distributed data mining;
Unit 5	Social Network Analysis, characteristics of social Networks.

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**Course Outcomes:** At the end of the course the student will be able to:

- CO1 Analyze Algorithms for sequential patterns.  
 CO2 Extract patterns from time series data.  
 CO3 Develop algorithms for Temporal Patterns.  
 CO4 Identify computing frameworks for Big Data analytics.  
 CO5 Extend the Graph mining algorithms to Web Mining.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

Course Outcome	Program Outcome													Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		L									L		L		
CO2	L	L		L	L	M				L			M		
CO3											M		M	L	
CO4	M					L					M				L
CO5	L	M				M						L			

*H = Highly Related; M = Medium L = Low*

**Text Book & Reference Books:**

1. Jiawei Han and M Kamber , *Data Mining Concepts and Techniques*, , Second Edition, Elsevier Publication, 2011.
2. Vipin Kumar, *Introduction to Data Mining* - Pang-Ning Tan, Michael Steinbach, Addison Wesley, 2006.
3. G Dong and J Pei, *Sequence Data Mining*, Springer, 2007.
4. Research Papers

  
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## Data Analytics

### Program Elective 2


<b>MCO 122A</b>	<b>Domain Specific Predictive Analytics</b>	<b>3-0-0</b>
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**Pre-requisite NIL**

### Course Objectives

1. It introduces theoretical foundations, algorithms, methodologies for analysing data in various domains such Retail, Finance, Risk and Healthcare.

<b>UNIT 1</b>	<b>Retail Analytics</b> Understanding Customer Profiling and Segmentation, Modelling Churn. Modelling Lifetime Value, Modelling Risk, Market Basket Analysis. <b>Risk Analytics</b> Risk Management and Operational Hedging An Overview, Supply Chain Risk Management, A Bayesian Framework for Supply Chain Risk Management, Credit Scoring and Bankruptcy Prediction
<b>UNIT 2</b>	<b>Financial Data Analytics</b> Financial News analytics Framework, techniques, and metrics, News events impact market sentiment, Relating news analytics to stock returns <b>Financial Time Series Analytics</b> Financial Time Series and Their Characteristics, Common Financial Time Series models, Autoregressive models, Markov chain models, Time series models with leading indicators, Long term forecasting
<b>UNIT 3</b>	<b>Introduction HealthcareAnalytics</b> An Introduction to Healthcare Data Analytics, Electronic Health Records, Privacy-Preserving Data Publishing Methods in Healthcare, Clinical Decision Support Systems
<b>UNIT 4</b>	<b>Healthcare Data Analytics</b> Natural Language Processing and Data Mining for Clinical Text Core NLP Components, Information Extraction and Named Entity Recognition, Social Media Analytics for Healthcare Tracking of Infectious Disease Outbreaks, Readmission risk Prediction
<b>UNIT 5</b>	<b>Genomic Data Analytics</b> Microarray Data, Microarray Data Analysis, Genomic Data Analysis for Personalized Medicine, Patient Survival Prediction from Gene Expression Data, Genome Sequence Analysis

  
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### Course Outcome



CO1.Recognize challenges in dealing with data sets in domains such as finance, risk and healthcare.

CO2. Identify real-world applications of machine learning in domains such as finance, risk and healthcare.

CO3.Identify and apply appropriate algorithms for analyzing the data for variety of problems in finance, risk and healthcare.

CO4.Make choices for a model for new machine learning tasks based on reasoned argument

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L		L								M	M		L	
CO2	L		M			L					M	L	M		
CO3		M									M	L			L
CO4		M	M		H	L					L	L		L	

H = Highly Related; M = Medium L = Low

### Text Book(s)

1. Chris Chapman, Elea McDonnell Feit "R for Marketing Research and Analytics", Springer, 2015.
2. Olivia Parr Rud "Data Mining Cookbook Modeling Data for Marketing, Risk, and Customer Relationship Management", Wiley, 2001.
3. Chandan K. Reddy, Charu C. Aggarwal "Healthcare Data Analytics", CRC Press, 2015.
4. Rene Carmona "Statistical Analysis of Financial Data in R", Springer, 2014.
5. James B. Ayers "Handbook Of Supply Chain Management" Auerbach Publications, 2006.
6. PanosKouvelis, Lingxiu Dong, OnurBoyabatli, Rong Li "The Handbook of Integrated Risk Management in Global Supply Chains", Wiley, 2012.

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## Data Analytics Program Elective 2

MCO 123A	Exploratory Data Analysis	3-0-0
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### Course Objectives

- 1.This course introduces the methods for data preparation and data understanding.
- 2.It covers essential exploratory techniques for understanding multivariate data by summarizing it through statistical methods and graphical methods.
- 3.Supports to Summarize the insurers use of predictive analytics, data science and Data Visualization

<b>UNIT 1</b>	<b>Introduction To Exploratory Data Analysis:</b> Data Analytics lifecycle, Exploratory Data Analysis(EDA) Definition, Motivation, Steps in data exploration, The basic data types Data Type Portability
<b>UNIT 2</b>	<b>Preprocessing-Traditional Methods And Maximum Likelihood Estimation</b> Introduction to Missing data, Traditional methods for dealing with missing data, Maximum Likelihood Estimation – Basics, Missing data handling, Improving the accuracy of analysis <b>Preprocessing Bayesian Estimation</b> Introduction to Bayesian Estimation, Multiple Imputation-Imputation Phase, Analysis and Pooling Phase, Practical Issues in Multiple Imputation, Models for Missing Notation Random Data
<b>UNIT 3</b>	<b>Data Summarization &amp; Visualization</b> Statistical data elaboration, 1-D Statistical data analysis, 2-D Statistical data Analysis, ND Statistical data analysis
<b>UNIT 4</b>	<b>Outlier Analysis</b> Introduction, Extreme Value Analysis, Clustering based, Distance Based and Density Based outlier analysis, Outlier Detection in Categorical Data
<b>UNIT 5</b>	<b>Feature Subset Selection</b> Feature selection algorithms filter methods, wrapper methods and embedded methods, Forward selection backward elimination, Relief, greedy selection, genetic algorithms for features election <b>Dimensionality Reduction</b> Introduction, Principal Component Analysis(PCA), Kernel PCA, Canonical Correlation Analysis, Factor Analysis, Multi dimensional scaling, Correspondence Analysis

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### Course Outcome

CO1.Handle missing data in the real world data sets by choosing appropriate methods.

CO2.Summarize the data using basic statistics. Visualize the data using basic graphs and plots. CO3.Identify the outliers if any in the data set.

CO4.Choose appropriate feature selection and dimensionality reduction

CO5.Techniques for handling multi-dimensional data


## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L											L			L
CO2		L			M							L		L	
CO3	L					L						M			
CO4		L			M							L		L	
CO5						L						L			

H = Highly Related; M = Medium L = Low

### Reference Books

1. Charu C. Aggarwal ,“Data Mining The Text book”, Springer, 2015.
2. Craig K. Enders, “Applied Missing Data Analysis”, The Guilford Press, 2010.
3. Inge Koch, “Analysis of Multivariate and High dimensional data”, Cambridge University Press, 2014.
4. Michael Jambu, “Exploratory and multivariate data analysis”, Academic Press Inc. , 1990.
5. Charu C. Aggarwal, “Data Classification Algorithms and Applications”, CRC press, 2015

  
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## Data Analytics

### Program Elective 3

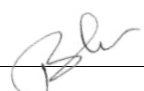
MCO 124A	BIG DATA FRAMEWORKS	3-0-1
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Pre-requisite NIL

### Course Objectives

1. To understand the need of Big Data, challenges and different analytical architectures
2. Installation and understanding of Hadoop Architecture and its ecosystems
3. Processing of Big Data with Advanced architectures like Spark.
4. Describe graphs and streaming data in Spark Expected

<b>UNIT 1</b>	<b>Introduction To Big Data</b> Data Storage and Analysis - Characteristics of Big Data – Big Data Analytics - Typical Analytical Architecture – Requirement for new analytical architecture – Challenges in Big Data Analytics – Need of big data frameworks
<b>UNIT 2</b>	<b>Hadoop Framework</b> - Hadoop – Requirement of Hadoop Framework - Design principle of Hadoop –Comparison with other system - Hadoop Components – Hadoop 1 vs Hadoop 2 – Hadoop Daemon's – HDFS Commands – Map Reduce Programming I/O formats, Map side join, Reduce Side Join, Secondary sorting, Pipelining MapReduce jobs
<b>UNIT 3</b>	<b>Hadoop Ecosystem</b> Introduction to Hadoop ecosystem technologies Serialization AVRO, Co-ordination Zookeeper, Databases HBase, Hive, Scripting language Pig, Streaming Flink, Storm
<b>UNIT 4</b>	<b>Spark Framework</b> Introduction to GPU Computing, CUDA Programming Model, CUDA API, Simple Matrix, Multiplication in CUDA, CUDA Memory Model, Shared Memory Matrix Multiplication, Additional CUDA API Features <b>Data Analysis with Spark Shell</b> Writing Spark Application - Spark Programming in Scala, Python, R, Java - Application Execution
<b>UNIT 5</b>	<b>Spark SQL and GraphX</b> SQL Context – Importing and Saving data – Data frames – using SQL – GraphX overview – Creating Graph – Graph Algorithms <b>Spark Streaming</b> Overview – Errors and Recovery – Streaming Source – Streaming live data with spark

  
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## Course Outcome

1. Discuss the challenges and their solutions in Big Data
2. Understand and work on Hadoop Framework and eco systems and Explain and Analyse the Big Data using Map-reduce programming in Both Hadoop and Spark framework.
3. Demonstrate spark programming with different programming languages.
4. Demonstrate the graph algorithms and live streaming data in Spark
5. Analyse and implement different frame work tools by taking sample data sets.


## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L			L	L	M				L		L	L		
CO2						M					M		L	L	
CO3	M	L									H		L		L
CO4		L				L					M		L		
CO5	L	M									L		M		

H = Highly Related; M = Medium L = Low

## Text Book & Reference Books

1. Mike Frampton, “Mastering Apache Spark”, Packt Publishing, 2015.
2. TomWhite, “Hadoop TheDefinitiveGuide”, O’Reilly, 4th Edition, 2015.
3. NickPentreath, MachineLearningwithSpark, PacktPublishing, 2015.
4. Mohammed Guller, Big Data Analytics with Spark, Apress, 2015
5. Donald Miner, Adam Shook, “Map Reduce Design Pattern”, O’Reilly, 2012

  
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## Data Analytics

### Program Elective 4

<b>MCO 125A</b>	<b>Advance Python Programming for Data Analytics</b>	<b>3-0-1</b>
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### Prerequisites

Basic Knowledge of Python Programming

### Course Objectives

The course should enable the students

1. Describe the semantics of Python programming language and Illustrate the process of structuring the data using lists, dictionaries, tuples, strings and sets.
2. Illustrate the Object-oriented Programming concepts in Python.
3. Demonstrate the basic database design for storing data as part of a multi-step data gathering, analysis, and processing.
4. Familiarize the basics of machine learning using an approachable, and also understand the advantage of using Python libraries for implementing Machine Learning models.

### SYLLABUS

<b>UNIT-1</b>	<b>Introduction to Python</b> , use IDLE to develop programs, Basic coding skills, working with data types and variables, working with numeric data, working with string data, Python functions, Boolean expressions, selection structure, iteration structure, working with lists, work with a list of lists, work with tuples, work with dates and times, get started with dictionaries
<b>UNIT-2</b>	<b>Classes in Python</b> OOPS Concepts, Classes and objects , Classes in Python, Constructors, Data hiding, Creating Classes, Instance Methods, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes, Iterators, generators and decorators.
<b>UNIT-3</b>	<b>I/O and Error Handling In Python</b> Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Handling IO Exceptions, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, Working with Directories.
<b>UNIT-4</b>	<b>An Introduction to relational databases</b> SQL statements for data manipulation, Using SQLite Manager to work with a database, Using Python to work with a database, Creating a GUI that handles an event, working with components.
<b>UNIT-5</b>	<b>Implement Machine Learning algorithms</b> Usage of Numpy for numerical Data, Usage of Pandas for Data Analysis, Matplotlib for Python plotting, Seaborn for Static plots, interactive Dynamic visualizations, SciKit for Machine learning.

## Course Outcomes

CO1 Interpret the basic principles of Python programming language

CO2 Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python

CO3 Identify the commonly used operations involving file systems and regular expressions.

CO4 Implement database and GUI applications

CO5 Implement Machine Learning algorithms

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L					L					L	M		L	
CO2	L		L								L			M	
CO3	L		M			L					L		L		
CO4	L		L								L				
CO5	L		H	H							L			L	

H = Highly Related; M = Medium L = Low

## TEXT BOOKS

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Haltermannpython
3. Mark Lutz, Programming Python, O'Reilly, 4th Edition, 2010

## ONLINE RESOURCES

<https://www.w3schools.com/python>

<https://docs.python.org/3/tutorial/index.html>

  
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## Data Analytics Program Elective 5

<b>MCO 126A</b>	<b>Text, Web and Social Media Analytic</b>	<b>3-0-0</b>
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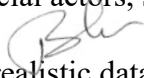
### Course Objectives

1. To provide an overview of common text mining and social media data analytic activities.
2. To understand the complexities of processing text and network data from different datasources.
3. To enable students to solve complex real-world problems for sentiment analysis and Recommendation systems.

<b>UNIT 1</b>	<b>Introduction to Text Mining</b> Text Representation- tokenization, stemming, stop words, TF-IDF, Feature Vector Representation, NER,N-gram modeling.
<b>UNIT 2</b>	<b>Mining Textual Data</b> Text Clustering, Text Classification, Topic Modeling-LDA,HDP
<b>UNIT 3</b>	<b>Introduction to Web-Mining</b> Inverted indices and Boolean queries.PLSI,Query optimization,pageranking. <b>Web Usage Web content Mining</b> Essentials of Social graphs,Social Networks,Models,Information Diffusion in Social Media.
<b>UNIT 4</b>	<b>Introduction to Social Media Network</b> Mining Social Media,Behavioral Analytics, Influence and Homophily,Recommendation in Social Media <b>Sentimental Mining</b> Sentiment Classification ,feature based opinion mining, comparative sentence and relational mining, Opinion spam.
<b>UNIT 5</b>	<b>Recent Threads</b> : Recent Trends in Text, Web and Social Media Analytics

### Course Outcome

1. Interpret the terminologies, metaphors and perspectives of social media analytics.
2. Apply a wide range of classification, clustering, estimation and prediction algorithms on Textual data.
3. Perform social network analysis to identify important social actors, subgroups and network properties in social media sites.
4. Apply state of the art web mining tools and libraries on realistic data sets as a basis for business decisions and applications.
5. Provide solutions to the emerging problems with social media such as behaviour analytics and Recommendation systems.

  
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## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		L				L					L			L	
CO2	L	L	M										L		
CO3		M			M	L					L			M	
CO4	L	M	M										M		
CO5		H			L						L				

**H = Highly Related; M = Medium L = Low**

### Text and Reference Books

1. BingLiu, “WebDataMining-ExploringHyperlinks,Contents,andUsageData”, Springer, Second Edition, 2011.
2. RezaZafarani, MohammadAliAbbasi and HuanLiu, “SocialMediaMining-AnIntroduction”, Cambridge University Press, 2014.
3. Bing Liu, “Sentiment Analysis and Opinion Mining”, Morgan & Claypool Publishers, 2012.
4. NitinIndurkha, FredJDamerau, “HandbookofNaturalLanguageProcess”, 2ndEdition, CRC Press, 2010.
5. Matthew A. Russell,

  
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## Department of Electronics and Communication Engineering

**1.1.3** Total number of courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year

**1.2.1** Number of new courses introduced of the total number of courses across all programs offered during the year

School Name	Name of the Programme	Total Number of Courses
School of Engineering & Technology	B. Tech - Electronics & Communication Engineering	21

### LIST OF COURSES AND SYLLABUS

S.NO.	1.1.3 Name of the Course focusing on employability/ entrepreneurship/ skill development offered by the University during the year	Course Code	Year of introduction
1	Engineering Workshop (EE & ECE)	DEL010B	2022
2	Engineering Graphics and Design	DM011A	2022
3	Communication Skills	DEN 001C	2021
4	Computer Programming and Logical Thinking	DCO013A	2021
5	Professional Skills	DEN 002C	2018
6	Life Skills - 1 (Personality Development)	DEN003A	2022
7	Electronics Devices	BEE001A	2013
8	Digital Electronics	BEE002A	2013
9	Data Structure and Algorithm	BCO 002B	2018

  
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10	Electronics Devices Lab	BEE005A	2013
11	Digital Electronics Lab	BEE006A	2013
12	Life Skills - 2 (Aptitude)	DMA011A	2022
13	Principle of Communication	BEE014A	2014
14	Electronic Workshop	BEE017A	2013
15	Microprocessors and applications	BEE081A	2014
16	Programming in Python	BCO035A	2022
17	Basic Simulation Lab	BEE024A	2015
18	Control System	BEE035B	2015
19	VLSI System	BEE034B	2016
20	Project	BEE053A	2016
21	Industry Internship	BEEL063B	2016

S.NO.	1.2.1 Name of the new courses introduced during the year	Course Code	Year of introduction
1	Engineering Workshop (EE & ECE)	DEL010B	2022
2	Engineering Graphics and Design	DM011A	2022
3	Life Skills - 1 (Personality Development)	DEN003A	2022
4	Life Skills - 2 (Aptitude)	DMA011A	2022
5	Programming in Python	BCO035A	2022

  
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# **SYLLABUS**

## **Engineering Workshop (ELECTRICAL AND ELECTRONICS MODULE) (DEL010B)**

CODE- DEL010B	<b>ENGINEERING WORKSHOP (MODULE OF ELECTRONICS)</b>	0-0-2
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Experiment 01 ( ON VIRTUAL LAB)	Electronics Work Bench Software-Designing of Electronic Circuits and PCB designing using software.  <b>LINK FOR VIRTUAL LAB:</b> <a href="http://vlabs.iitkgp.ac.in/be/exp5/index.html"><u>http://vlabs.iitkgp.ac.in/be/exp5/index.html</u></a>
Experiment 02	Breadboard Circuit Designing -Circuit designing and to determine static resistance and dynamic resistance of p-n junction diode and plot the-I characteristics.
Experiment 03	PCB Designing: (a) Artwork & printing of a simple PCB. (b) Etching & drilling of PCB.
Experiment 04	C.R.O and Function Generator –To Generate a sine wave using a function generator and measure its amplitude and frequency using C.R.O.
Experiment 05	Digital Multimeter-Measurement of AC and DC voltage, current, capacitance and resistance using Digital Multimeter
Experiment 06 ( ON VIRTUAL LAB)	Generation of output waveform of half wave rectifier with and without filter capacitor and measure DC voltage, DC current, ripple factor with and without filter capacitor.  <b>LINK FOR VIRTUAL LAB:</b> <a href="http://vlabs.iitkgp.ac.in/be/exp6/index.html"><u>http://vlabs.iitkgp.ac.in/be/exp6/index.html</u></a>
Experiment 07 ( ON VIRTUAL LAB)	Generation of output waveform of full wave rectifier with and without filter capacitor and measure DC voltage, DC current, ripple factor with and without filter capacitor.  <b>LINK FOR VIRTUAL LAB:</b> <a href="http://vlabs.iitkgp.ac.in/be/exp7/index.html"><u>http://vlabs.iitkgp.ac.in/be/exp7/index.html</u></a>
Experiment 08	Designing of Bridge rectifier with and without filter capacitor and measure DC

  
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	voltage, DC current, ripple factor with and without filter capacitor.
Experiment 09	Design a half wave rectifier using discrete components on a breadboard and measure DC voltage, DC current, ripple factor, with and without filter capacitor
Experiment 10	Design full wave rectifier using discrete components on a breadboard and measure DC voltage, DC current, ripple factor with and without filter capacitor.


### **IOT (INTERNET OF THINGS ) LAB EXPERIMENTS**

Experiment 1	Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
Experiment 2	To interface LED/Buzzer with Arduino/Raspberry Pi and WAP{ to turn ON LED for 1 Sec after every 2 seconds.
Experiment 3	To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and WAP to turn ON LED when push button is pressed or at sensor detection.
Experiment 4	To interface DHT11 sensor with Arduino/Raspberry Pi and WAP to print temperature and humidity readings.
Experiment 5	To interface motor using relay with Arduino/Raspberry Pi and WAP turn ON motor when push button is pressed.
Experiment 6	To interface OLED with Arduino/Raspberry Pi and WAP to print temperature and humidity readings on it.
Experiment 7	To interface Bluetooth with Arduino/Raspberry Pi and WAP to send sensor data to smartphone using Bluetooth.
Experiment 8	To interface Bluetooth with Arduino/Raspberry Pi and WAP to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
Experiment 9	Write a program on Arduino/Raspberry Pi to upload temperature and humidity data from thingspeak cloud
Experiment 10	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.
Experiment 11	To install MySQL database on Raspberry Pi and perform basic SQL queries.
Experiment 12	Write a Program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
Experiment 13	Write a Program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
Experiment 14	Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
Experiment 15	Write a Program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

  
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## ENGINEERING WORKSHOP (MODULE OF ELECTRICAL)

Experiment 01	Assemble house wiring including earthing for 1- phase energy meter, MCB, ceiling fan, tube light, three pin sockets and a lamp operated from two different positions. Basic functional study of components used in house wiring.
Experiment 02	To make house wiring for a lamp operated from two different positions.
Experiment 03	Prepare the connection of ceiling fan along with the regulator and vary the speed.
Experiment 04	Prepare the connection of single phase induction motor through 1- phase Auto transformer and vary the speed.
Experiment 05	Prepare the connection of three phase squirrel cage induction motor through 3- phase Autotransformer and vary the speed.
Experiment 06	Prepare the connection of Fluorescent Lamp, Sodium Vapor and Halogen Lamp and measure voltage, current and power in the Circuit.
Experiment 07	To verify the transformation ratio by measuring primary and secondary sides voltages of single phase transformer by using phase auto transformer.
Experiment 08	To find out relation b/w primary voltages and secondary voltages at different configurations and also relation b/w line voltage & phase voltage in & phase transformer.
Experiment 09	To run 3Q motor induction motor at varying speed by using 3 phase auto transformer.
Experiment 10	To measure power 3Q load. (a) By one watt meter method. (b) By two watt meter method. (c) By three watt meter method.

  
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## Engineering Graphics and Design (DM011A)

### ❖ Course Overview:

The course provides the fundamental knowledge on engineering graphics and design, which is used for technical communication in the industry. The practical expertise of L&T has been leveraged for the course development to help the learners understand and apply the knowledge as it is being done in the field. This course covers the fundamentals of engineering graphics involving geometrical 1D, 2D, and 3D objects. The knowledge of engineering graphics gained through this course can be applied to design and draw simple machine parts, small office and residential buildings. Computer Aided Design is introduced and discussed in a practical way with an exposure to Building Information Modelling. This course facilitates the learners to have a clear understanding on how to apply the knowledge of graphics in their respective disciplines for engineering design.

### ❖ Course Objective:

To help learners draw engineering drawings of objects in manual and computer aided drafting methods, read and interpret the drawing of simple machine components, buildings, etc., and apply the knowledge for creative engineering design

### ❖ Key Topics:

Drawing Codes | Manual Drafting | Traditional Engineering Graphics | Computer Graphics and Computer Aided Design | Solid Modelling | Building Information Modelling | Design Project

### ❖ Syllabus:

#### **Basics of Engineering Graphics, Projection of Points**

Introduction to Engineering Drawing, Manual & Computer Aided Design and Drafting, Lettering, Dimensioning, Geometrical Constructions, Plane Curves, Conic Sections, Cycloidal Curves, Involute – Projection of point placed in a quadrant – Projection of a line using first angle projection method, rotating line method, trapezoidal plane method – Solve & draw projections of a line kept inclined to two planes – Determination of true length, true inclinations & traces of a straight line

#### **Projection of Planes & Solids**

Description of plane shapes & solids - Drawing plane projections & solids using change of position and auxiliary plane method – Projection of solids with inclined axis – Drawing projection of solids using change of position and auxiliary plane method.

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## Orthographic Projections & Sections of Solids

Visualization & drawing orthographic projections – Description & drawing of Plan, elevation, side elevation of objects, simple machine parts using first angle projection method – Description of section plane & portion of solid – Drawing sectional top view, front view, true shape of section on an auxiliary plane

## Isometric & Perspective Projection, Development of Surfaces

Drawing isometric view of solids (Box method) – Drawing isometric scale & construction of isometric projection from orthographic projection – Drawing perspective projection of small, large objects and building components using suitable methods – Drawing section plane & determining lateral surface – Determination of shortest distance between points – Drawing & determining shape of metal sheet to cut objects.

## Building Drawing, Solid Modeling, Building Information Modeling

Drawing plan, elevation and sectional elevation of a small residential & office building – Description & creation of Solid models in general and with respect to engineering – Designing and creating a new product & generating various views – Basics of Building Information Modeling (BIM)

### ❖ Case Studies

1. Building drawing of a small office building
2. Building drawing of a small office building

### ❖ Software used: AUTOCAD

  
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L-T-P	Communication Skills (DEN001C)	Credits 2-0-1 3
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### **Syllabus: Theory**

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> <i>Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture</i>
<b>UNIT 2</b>	<b>Basic Writing Skills:</b> <i>Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration</i>
<b>UNIT 3</b>	<b>Composition:</b> <i>Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,</i>
<b>UNIT 4</b>	<b>Vocabulary Building:</b> <i>Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms</i>
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> <i>Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation</i>

### **Syllabus: Lab**

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> <i>Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time-management, Following Deadlines etc</i>
<b>UNIT 2</b>	<b>Write Dialogue from the different contexts of corporate culture:</b> <i>Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc</i>
<b>UNIT 3</b>	<b>Composition:</b> <i>Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc</i>
<b>UNIT 4</b>	<b>Vocabulary Building:</b> <i>Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc</i>
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> <i>Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making</i>

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DCO013A	Computer Programming and Logical Thinking	3: 0:0	3
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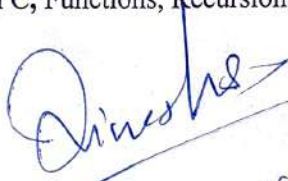
**Unit-1** Computer Fundamentals, Functional units of Computer: I/O devices, Primary and secondary memories Number System: Decimal, Binary, Octal, and hexadecimal, Fixed and floating Points, Character Representations, ASCII, EBCDIC, Binary Arithmetic, Negative Numbers and their Arithmetic, Floating point representation, Binary Codes, Cyclic Codes

**Unit-2** Programming Fundamentals, Algorithm development, Techniques of Problem-solving, Flowcharting, Stepwise Refinement.

**Unit -3** Basic of C Programming, Introduction of C language, Representation of Integer, Character, real, Data Types: Constants and Variables, Operators, Arithmetic Expression, Logical expression, Assignment statement, Structure of a C program, Header files, Directives

**Unit-4** Programming in C, Decision Control Structure, Alteration, and Iterations (While, do while, for loop, switch case), Arrays, String processing,

**Unit-5** Advance Concepts in C, Functions, Recursion, Pointers, Structure, Union, Files

  
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L-T-P	Professional Skills (DEN002C)	Credits 2-0-1 3
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### Syllabus: Theory

UNIT 1	<b>Professional Grooming and Professional Culture:</b> Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management
UNIT 2	<b>Advanced Grammar:</b> Common errors related to prepositions, articles, models , Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents
UNIT 3	<b>Composition:</b> , Memo, Notice, Circular, Book Review, Research Article, Reports
UNIT 4	<b>Vocabulary Building:</b> Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms
UNIT 5	<b>Reading Comprehension:</b> Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction,

### Syllabus: Lab

L-T-P	Professional Skills Lab	Credits 2-0-1 3
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UNIT 1	<b>Professional Grooming and Professional Culture:</b> Role plays and Activities on Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management
UNIT 2	<b>Advanced Grammar:</b> Exercise Sessions for Common errors related to prepositions, articles, models , Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents
UNIT 3	<b>Composition:</b> , Memo, Notice, Circular, Book Review, Research Article, Reports – Giving Assignments based on practical applications, Practice sessions on different topics
UNIT 4	<b>Vocabulary Building:</b> Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms- Activities related to the appropriate use of words
UNIT 5	<b>Reading Comprehension:</b> Practice Reading Unseen Paragraphs- Finding Suitable title, Summarizing, Analyzing, Finding new words etc

  
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**Life Skills-I (Personality Development)**

**(Course Code- DEN003A)**

**Semester-III**

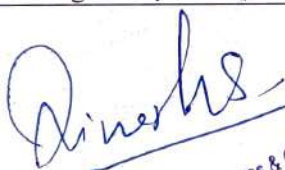
**All UG Programs**

**Common to all disciplines**

**Contact Hours (L-T-P): 1-0-2**

<b>L-T-P</b>	<b>Life Skills I</b>	<b>Credits 1-0-1 2</b>
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<b>UNIT 1</b>	<ul style="list-style-type: none"><li>• Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion</li><li>• Basics of Narrating and describing things</li></ul>
<b>UNIT 2</b>	<ul style="list-style-type: none"><li>• Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview</li><li>• CV/Resume Drafting and HR Interview advance theory</li><li>• Basics of Video Interviews and Video Profiles for Job</li></ul>
<b>UNIT 3</b>	<ul style="list-style-type: none"><li>• Types of listening, advantages and disadvantages</li></ul>
<b>UNIT 4</b>	<ul style="list-style-type: none"><li>• Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report</li></ul>
<b>UNIT 5</b>	Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc



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### Electronics Devices (BEE001A)

**Unit 1:** Semiconductor physics: Allowed and forbidden energy bands, electrical conduction in solids, Density of state function, Statistical mechanics, Charge carriers in semiconductors, dopant atoms and energy levels, Extrinsic semiconductors, Statistics of donors and acceptors, charge neutrality, position of Fermi level, Carrier drift, Carrier diffusion, graded impurity distribution, Hall effect, Carrier generation and recombination, characteristics of excess carriers, A bipolar Transport.

**Unit 2:** The pn junction: basic structure of pn junction, zero applied bias, non-uniformly doped junctions, pn junction current, small signal model of the pn junction, generation and recombination currents, junction breakdown, charge storage and diode transients, the tunnel diode, schottky barrier diode, metal semiconductor ohmic contacts, heterojunctions.

**Unit 3:** The bipolar transistor: The bipolar transistor action, minority carrier distribution, low frequency common base current gain, non-ideal effects, Ebers-Moll model, Gummel-poon model, Hybrid equivalent model, Hybrid- $\pi$  Model, frequency limitations, large signal switching, polysilicon emitter BJT, silicon- germanium base transistor, heterojunction bipolar transistors.

**Unit 4:** Fundamentals of MOS field effect transistors: The two terminal MOS structure, capacitance voltage characteristics, basic MOSFET operation, Frequency limitations, CMOS technology, non ideal effects, MOSFET scaling, threshold voltage modifications, additional electrical characteristics, radiation and hot electron effects.

**Unit 5:** Discrete transistor amplifiers: Common-emitter fixed bias configuration, Voltage-divider bias, CE emitter bias configuration, Emitter follower configuration, Common-base configuration, Collector feedback configuration, Collector DC Feedback Configuration, Determining Current Gain, Effect of  $R_L$  and  $R_S$ , Two port systems approach, Cascaded systems, Darlington Connection.

  
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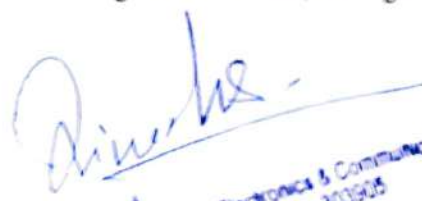
## Digital Electronics (BEE002A)

**Unit 1:** Introduction- Digital Systems; Data representation and coding; Logic circuits, integrated circuits; Analysis, design and implementation of digital systems; CAD tools. Number Systems and Codes- Positional number system; Binary, octal and hexadecimal number systems; Methods of base conversions; Binary, octal and hexadecimal arithmetic; Representation of signed numbers; Fixed and floating point numbers; Binary coded decimal codes; Gray codes; Error detection and correction codes - parity check codes and Hamming code.

**Unit 2:** Combinatorial Logic Systems- Definition and specification; Truth table; Basic logic operation and logic gates. Boolean Algebra and Switching Functions- Basic postulates and fundamental theorems of Boolean algebra, Standard representation of logic functions - SOP and POS forms; Simplification of switching functions - K-map and Quine-McCluskey tabular methods, Synthesis of combinational logic circuits.

**Unit 3:** Logic families-Introduction to different logic families; Operational characteristics of BJT in saturation and cut-off regions; Operational characteristics of MOSFET as switch; TTL inverter - circuit description and operation; CMOS inverter - circuit description and operation; Structure and operations of TTL and CMOS gates; Electrical characteristics of logic gates – logic levels and noise margins, fan-out, propagation delay, transition time, power consumption and power-delay product. Combinational Logic Modules and their applications-Decoders, encoders, multiplexers, demultiplexers and their applications, Parity circuits and comparators, Arithmetic modules- adders, subtractors and ALU, Design examples.

**Unit 4:** Sequential Logic systems- Definition of state machines, state machine as a sequential controller; Basic sequential circuits- latches and flip-flops: SR-latch, D-latch, D flip-flop, JK flip-flop, T flip-flop; Timing hazards and races; Analysis of state machines using D flip-flops and JK flip-flops; Design of state machines - state table, state assignment, transition/excitation table, excitation maps and equations, logic realization; Design examples. State machine design approach-Designing state machine using ASM charts, Designing state machine using state diagram, Design examples.

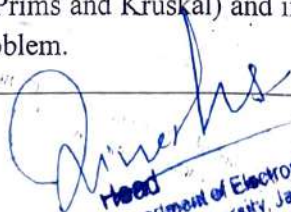
  
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**Unit 5:** Sequential logic modules and their applications- Multi-bit latches and registers, counters, shift register, application examples. Memory- Read-only memory, read/write memory – SRAM and DRAM. Programmable Logic Devices-PLAs, PALs and their applications; Sequential PLDs and their applications; State- machine design with sequential PLDs; Introduction to field programmable gate arrays (FPGAs).

### **DATA STRUCTURES AND ALGORITHMS (BEE079A)**

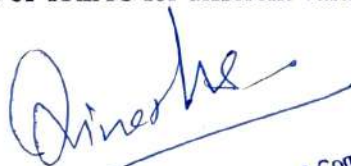
<b>UNIT 1</b>	Introduction: Notions of data type, abstract data type and data structures. Importance of algorithms and data structures in programming. Notion of Complexity covering time complexity, space complexity, Worst case complexity & Average case complexity. BigOh Notation, Omega notation, Theta notation. Examples of simple algorithms and illustration of their complexity. Sorting- Bubble sort, selection sort, insertion sort, Quick sort; Heap sort; Merge sort; Analysis of the sorting methods. Selecting the top k elements. Lower bound on sorting.
<b>UNIT 2</b>	Stack ADT, Infix Notation, Prefix Notation and Postfix Notation. Evaluation of Postfix Expression, conversion of Infix to Prefix and Postfix Iteration and Recursion- Problem solving using iteration and recursion with examples such as binary search, Fibonacci numbers, and Hanoi towers. Tradeoffs between iteration and recursion.
<b>UNIT 3</b>	List ADT. Implementation of lists using arrays and pointers. Stack ADT. Queue ADT. Implementation of stacks and queues. Dictionaries, Hash tables: open tables and closed tables. Searching technique- Binary search and linear search, link list- single link list, double link list, Insertion and deletion in link list.
<b>UNIT 4</b>	Binary Trees- Definition and traversals: preorder, post order, in order. Common types and properties of binary trees. Binary search trees: insertion and deletion in binary search tree worst case analysis and average case analysis. AVL trees. Priority Queues -Binary heaps: insert and delete min operations and analysis.
<b>UNIT 5</b>	Graph: Basic definitions, Directed Graphs- Data structures for graph representation. Shortest path algorithms: Dijkstra (greedy algorithm) and Operations on graph, Worshall's algorithm , Depth first search and Breadth-first search. Directed acyclic graphs. Undirected Graphs, Minimal spanning trees and algorithms (Prims and Kruskal) and implementation. Application to the travelling salesman problem.

  
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## Electronics Devices Lab (BEE005A)

### List of Experiments

1. Design and test diode clipping circuits on breadboard, using discrete components for peak clipping and peak detection.
  - i) Positive and Negative Clipping Circuit.
  - ii) Diode series positive and negative Clipping Circuit.
2. Design and test positive and negative clamping circuit on breadboard, using discrete components for a given reference voltage.
3. Graphical measurement of forward and reverse resistance in Zener diode characteristics.
4. Application of Zener diode: Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.
5. Plot the I-V characteristics of BJT in CB and CE configuration using suitable discrete components.
6. Design discrete transistor amplifier with common-emitter fixed bias configuration and plot the frequency response.
7. Design discrete transistor amplifier with Voltage-divider bias configuration and plot the frequency response.
8. Design and setup an RC Coupled amplifier using BJT & to plot the frequency response of the RC-Coupled amplifier.
9. Design a BJT Darlington Emitter Follower and determine the Gain and plot the frequency response.
10. Verify Thevenin's theorem for DC Circuits.
11. Characteristic of FET: FET in common source configuration. Graphical measurement of its parameters  $g_m$  and  $r_d$  from input and output characteristics.
12. Characteristic of silicon-controlled rectifier.
13. To plot V-I Characteristics of DIAC.
14. To draw V-I characteristics of TRIAC for different values of Gate Currents.



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### Digital Electronics Lab (BEE006A)

#### **List of Experiments**

1. To study and verify the truth table of logic gates.
2. Design and implementation of Adder and Subtractor using logic gates.
3. Design and implementation of BCD to excess-3 code converter using logic gates.
4. Design and implementation of Binary to gray code converter using logic gates.
5. Design and implementation of 4 bit binary Adder/ subtractor using IC 7483
6. Design and implementation of 4 bit binary BCD adder using IC 7483
7. Design and implementation of 2 bit Magnitude Comparator using logic gates.
8. Design and implementation of 16 bit odd/even parity checker generator using IC74180.
9. Design and implementation of multiplexer using logic gates, IC74150 and IC74154.
10. Design and implementation of De-multiplexer using logic gates, IC74150 and IC74154
11. Design and implementation of encoder using logic gates, IC7445 and IC74147
12. Design and implementation of decoder using logic gates, IC7445 and IC74147
13. Construction and verification of 4 bit ripple counter.
14. Design and implementation of 3-bit synchronous up/down counter.
15. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops

#### Life Skills - 2 (Aptitude)

(COURSE CODE- DMA011A)

**Common to all disciplines**

**Contact Hours (L-T-P): 1-0-2**

L-T-P	Life Skills-II	Credits 1-0-1 2
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UNIT 1	<b>Number System:</b> a. Number system b. Power cycle c. Remainder cycle d. Factors, Multiples e. HCF and LCM
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<b>UNIT 2</b>	<b>Data Arrangements and Blood Relations:</b> a. Linear Arrangement b. Circular Arrangement c. Multi-dimensional Arrangement d. Blood Relations
<b>UNIT 3</b>	<b>Time and Work:</b> a. Work with different efficiencies b. Pipes and cisterns c. Work equivalence d. Division of wages
<b>UNIT 4</b>	<b>Coding &amp; Decoding, Series, Analogy, Odd Man Out and Visual Reasoning:</b> a. Coding and Decoding b. Series c. Analogy d. Odd Man Out e. Visual Reasoning
<b>UNIT 5</b>	<b>Percentages, Simple Interest and Compound Interest:</b> a. Percentages as Fractions and Decimals b. Percentage Increase / Decrease c. Simple Interest d. Compound Interest e. Relation Between Simple and Compound Interest
<b>UNIT 6</b>	<b>Permutation, Combination and Probability:</b> a. Fundamental Counting Principle b. Permutation and Combination c. Computation of Permutation d. Circular Permutations e. Computation of Combination f. Probability
<b>UNIT 7</b>	<b>Data Interpretation and Data Sufficiency:</b> a. Data Interpretation – Tables b. Data Interpretation - Pie Chart c. Data Interpretation - Bar Graph d. Data Sufficiency
<b>UNIT 8</b>	<b>Profit and Loss, Partnerships and Averages:</b> a. Basic terminologies in profit and loss b. Partnership c. Averages d. Weighted average e. Mixtures and allegations



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## **Principles of Communication (BEE014A)**

### **Module-1 AMPLITUDE MODULATION**

10 hours

**AMPLITUDE MODULATION:** Introduction, Amplitude Modulation: Time & Frequency – Domain description, Switching Modulator, Envelope detector. **DOUBLE SIDE BAND-SUPPRESSED CARRIER MODULATION (DSB-SC):** Time and Frequency–Domain description, Ring modulator, Coherent detection, Costas Receiver, Quadrature Carrier Multiplexing. **SINGLE SIDE-BAND SUPPRESSED CARRIER (SSB-SC) AND VESTIGIAL SIDEBAND METHODS OF MODULATION:** SSB Modulation, VSB Modulation, Frequency Translation, Frequency-Division Multiplexing, Theme Example: VSB Transmission of Analog and Digital Television.

### **Module-2 ANGLE MODULATION**

**10 hours**

**ANGLE MODULATION:** Basic definitions, Frequency Modulation: Narrow Band FM, Wide Band FM, Transmission bandwidth of FM Signals, Generation of FM Signals, Demodulation of FM Signals, FM Stereo Multiplexing, Phase-Locked Loop: Nonlinear model of PLL, Linear model of PLL, Nonlinear Effects in FM Systems, Super heterodyne Receiver.

### **Module-3 RANDOM VARIABLES & PROCESS 10 hours**

**RANDOM VARIABLES & PROCESS:** Introduction, Probability, Conditional Probability, Random variables, Several Random Variables. Statistical Averages: Function of a random variable, Moments, Random Processes, Mean, Correlation and Covariance function: Properties of autocorrelation function, Cross-correlation functions. **NOISE:** Shot Noise, Thermal noise, White Noise, Noise Equivalent Bandwidth, Noise Figure.

### **Module-4 NOISE IN ANALOG MODULATION 10 hours**

**NOISE IN ANALOG MODULATION:** Introduction, Receiver Model, Noise in DSB-SC receivers, Noise in AM receivers, Threshold effect, Noise in FM receivers, Capture effect, FM threshold effect, FM threshold reduction, Pre-emphasis and De-emphasis in FM.

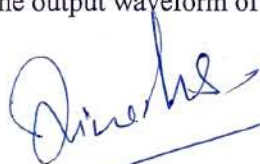
### **Module-5 DIGITAL REPRESENTATION OF ANALOG SIGNALS 10 hours**

**DIGITAL REPRESENTATION OF ANALOG SIGNALS:** Introduction, Why Digitize Analog Sources, The Sampling process, Pulse Amplitude Modulation, Time Division Multiplexing, Pulse-Position Modulation, Generation of PPM Waves, Detection of PPM Waves. The Quantization Process, Quantization Noise, Pulse-Code Modulation: Sampling, Quantization, Encoding, Regeneration, Decoding, Filtering, Multiplexing.

  
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### Electronic Workshop (BEE017A)

1. Introduction & Hands on experience to use circuit creation & simulation software like TINAPRO, P-SPICE or ORCAD.
2. Design a half wave rectifier using ORCAD software. Calculate its  $V_{rms}$ , PIV, and Form Factor.
3. Design a full wave rectifier using ORCAD software. Calculate its  $V_{rms}$ , PIV, and Form Factor.
4. Design a Hartley oscillator and to observe its output waveform using ORCAD software. Find its frequency of oscillation.
5. Design a Colpitts oscillator and to observe its output waveform using ORCAD software. Find its frequency of oscillation.
6. Design a Wien-Bridge oscillator and to observe its output waveform using ORCAD software. Find its frequency of oscillation.
7. Design and obtain the frequency response of second order low pass filter using IC-741 by ORCAD software.
8. Design and obtain the output waveform of Integrator and Differentiator circuit IC-741 by ORCAD software.
9. Design and obtain the output waveform of Inverting, Non-inverting amplifier using IC - 741 by ORCAD software.
10. Design differential amplifier using BJT using ORCAD software. Calculate its CMRR.
11. Design of single stage class-C single tuned amplifier using ORCAD software. Plot its frequency response.
12. Design of current series feedback amplifier using ORCAD software. Plot its frequency response.
13. Design of voltage series feedback amplifier using ORCAD software. Plot its frequency response.
14. Design and obtain the output waveform of CMOS inverter by using ORCAD software.
15. Design and obtain the output waveform of CMOS NOR gate by using ORCAD software.
16. Design and obtain the output waveform of CMOS NAND gate by using ORCAD software.



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## Microprocessor & Microcontroller System (BEE020A)

**Unit 1:** Evolution of microprocessors, technological trends in microprocessor development. The Intel family tree. CISC Versus RISC. Applications of Microprocessors. 8086 Block diagram; description of data registers, address registers, pointer and index registers, PSW, Queue, BIU and EU. 8086 Pin diagram descriptions. Microprocessor BUS types and buffering techniques, 8086 minimum mode and maximum mode CPU module. Instruction formats, addressing modes.

**Unit 2:** Data transfer instructions, string instructions, logical instructions, arithmetic instructions, transfer of control instructions, process control instructions; Assembler directives. Writing assembly Language programs for logical processing, arithmetic processing, timing delays; loops, data conversions. Writing procedures, Data tables, modular programming, Macros.

**Unit 3:** 8086 Interrupt types and interrupt vector table. DOS interrupt INT 21 h functions. INT 10h and INT 16h functions. Intel 8086 bus cycles, instruction queue, 8086 CPU Read/Write timing diagrams in minimum mode and maximum mode, reset operation, wait state, halt state, hold state, lock operation, interrupt processing. Address decoding techniques.

**Unit 4:** Intel's 8255 description, 8255 different modes operation and interfacing with 8086. Interfacing ADC(0808/0809), DAC-(0808) using 8255. Wave form generation. Intel's 8251 description and operation. Intel's 8259. DMA operation. Intel's 8237. Intel's 8279. Intel's 8253. Introduction to i3, i5, i7 processors.

**Unit 5:** 8051 microcontroller pin diagram, Block diagram, Flag, RAM configuration, Register Banks, addressing modes, instruction set, 8051 programming & interfacing.

### Course Outlines

### BCO035A- PROGRAMMING in PYTHON

UNIT 1	<b>Introduction:</b> Features of Python, History of Python, installing Python; basic syntax, interactive shell, editing, saving, and running a script. The concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages
UNIT 2	Introduction to Operators, Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation. <b>Strings:</b> subscript operator, indexing, slicing a string, String methods & operations; strings and number system: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers. <b>Text files;</b> manipulating files and directories, os and sys modules; reading/writing text and numbers from/to a file; creating and reading a formatted file
UNIT 3	<b>Lists, tuples, and dictionaries;</b> basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. <b>Design with functions:</b> hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments. Program structure and design. Recursive

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	functions.
<b>UNIT 4</b>	<b>Classes and OOP:</b> classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects <b>OOP, continued:</b> inheritance, polymorphism Operator overloading ( <code>_eq_</code> , <code>_str_</code> , etc); abstract classes; Exception handling, try block
<b>UNIT 5</b>	<b>Graphical user interfaces;</b> Event-driven programming paradigm; tkinter module,,turtle module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames Multithreading, CSV(Accesing, updating, Creating)

### Basic Simulation Lab (BEE024A)

(Simulation Lab. Experiments may be carried out using MATLAB/ SCILAB)

1. Creating a One-Dimensional Array (Row / Column Vector) Exercise – Creating a vector of even whole numbers between 31 and 75; Creating a Two-Dimensional Array (Matrix of given size) and (A). Performing Arithmetic Operations - Addition, Subtraction, Multiplication and Exponentiation. (B). Obtaining Modified Matrix - Inverse, Transpose, with Appended and Deleted Elements;

2. Performing Matrix Manipulations - Concatenating, Indexing, Sorting, Shifting, Reshaping, Resizing and Flipping about a Vertical Axis / Horizontal Axis; Creating Arrays X & Y of given size (1 x N) and Performing

(A) Relational Operations - `>`, `<`, `==`, `<=`, `>=`, `~=`

(B) Logical Operations - `~`, `&`, `|`, XOR

3. Generating a set of Commands on a given Vector (Example: X = [1 8 3 9 0 1]) to

(A) Add up the values of the elements (Check with **sum**)

(B) Compute the Running Sum (Check with **sum**), where Running Sum for element j = the sum of the elements from 1 to j, inclusive.

(C) Compute the Sine of the given X-values (should be a vector).

Also, Generating a Random Sequence using **rand()** / **randn()** functions and plotting them.

  
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4. Evaluating a given expression and rounding it to the nearest integer value using Round, Floor, Ceil and Fix functions; Also, generating and Plots of

(A) Trigonometric Functions -  $\sin(t)$ ,  $\cos(t)$ ,  $\tan(t)$ ,  $\sec(t)$ ,  $\csc(t)$  and  $\cot(t)$  for a given duration 't'.

(B) Logarithmic and other Functions –  $\log(A)$ ,  $\log_{10}(A)$ , Square root of A, Real  $n^{\text{th}}$  root of A.

5. Write a MATLAB program to generate an exponential Sequence.

$$X(n) = (a)^n \quad \text{for} \quad (i) 0 \leq a \leq 1 \quad (ii) -1 \leq a \leq 0 \quad (iii) a \leq -1 \quad (iv) a > 1$$

6. Write a MatLab program to generate the signal  $S(n) = 2 * n * (0.8^n)$  corrupted by the noise  $d(n)$  resulting the signal  $X(n)$ .

$$X(n) = s(n) + d(n).$$

Also down sample the corrupted signal

7. Creating a vector X with elements,  $X_n = (-1)^{n+1}/(2n-1)$  and Adding up 100 elements of the vector, X; And, plotting the functions, x, x3, ex and exp(x2) over the interval  $0 < x < 4$  (by choosing appropriate mesh values for x to obtain smooth curves), on

(A) A Rectangular Plot

(B) A Semi log Plot

(C) A log-log Plot

8. Generating a Sinusoidal Signal of a given frequency (say, 100Hz) and Plotting with Graphical Enhancements - Titling, Labelling, Adding Text, Adding Legends, Adding New Plots to Existing Plot, Printing Text in Greek Letters, Plotting as Multiple and Sub- Plots; Also, Making Non-Choppy and Smooth Plot of the functions,

$$f(x) = \sin(1/x) \text{ for } 0.01 < x < 0.1 \text{ and } g(x) = (\sin x) / x$$

9. To Plot the following Functions:

$$h(n) = \{4rn \cos[\pi * n(1+r)/m] + m \sin[\pi * n(1-r)/m]\} / [1 - 4rn/m]^2 * \pi * nm$$

$$h(0) = (1/m) + (r/(m * 4/\pi - 1))$$

$$h(|m/4|) = (-r/m) * [(2 * \cos\{(\pi/4 * r) * (1+4)\} - \cos\{\pi * (1-r)/4 * r\})]$$

*[Signature]*  
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Given: -  $m=4$ ,  $r=0.1$

10. Creating A Structure, An Array of Structures and Writing Commands to Access Elements of the created Structure and Array of Structures; Also, Solving First Order Ordinary Differential Equation using Built-in Functions; And, Creating an  $M \times N$  Array of Random Numbers using **rand** and setting any value that is  $< 0.2$  to 0 and any value that is  $\geq 0.2$  to 1 by moving through the Array, Element by Element.

11. Write a MatLab/SciLab program to generate a Fibonacci series up-to 20.

12. Write a MatLab/SciLab program to check whether a number is prime or not.

13. Write a MatLab/SciLab program to convert a decimal number to binary.

14. Generating normal and integer random numbers ( $1 - D$  &  $2 - D$ ) and plotting them; Also, Writing a Script (which keeps running until no number is provided to convert) that asks for Temperature in degrees Fahrenheit and Computes the Equivalent Temperature in degrees Celsius. [Hint: Function **is empty** is useful]

15. Writing brief Scripts starting each Script with a request for input (using input) to Evaluate the function  $h(T)$  using if-else statement, where

$$\begin{aligned} h(T) &= (T - 10) \text{ for } 0 < T < 100 \\ &= (0.45 T + 900) \text{ for } T > 100 \end{aligned}$$

Exercise: Testing the Scripts written using

(A)  $T = 5$ ,  $h = -5$

(B)  $T = 110$ ,  $h = 949.5$

Also, Creating a Graphical User Interface (GUI); And, Curve Fitting using

(A) Straight line Fit

(B) Least Squares Fit

16. Interpolation based on following Schemes (A) Linear (B) Cubic (C) Spline Also, Generating the first Ten Fibonacci numbers according to the relation  $F_n =$

$F_{n-1} + F_{n-2}$  with  $F_0 = F_1 = 1$ , and computing the ratio  $F_n / F_{n-1}$  for the first 50 Fibonacci numbers.

  
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JECRC University, Jaipur-303205



### Control System (BEE035A)

**Unit 1: Introduction to Control Systems-** Introduction to Control system, control system terminology, classification of Control Systems. Mathematical Models of Systems- Differential equations of physical systems, transfer function of linear systems, block diagram models, block diagram reduction technique, Signal flow graph.

**Unit 2: Time Response Analysis-** Time response analysis - First Order Systems – Impulse, Ramp and Step Response analysis of second order systems - Steady state errors – P, PI, PD and PID Compensation.

**UNIT 3: Stability Analysis-** Stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Stability, Dominant Poles, Application of Root Locus Diagram -

**UNIT 4: Frequency Response Analysis-** Frequency Response - Bode Plot, Polar Plot, Nyquist Stability Criterion - Relative Stability- Frequency Domain specifications, Parallel, series-parallel Compensators - Lead, Lag, and Lead Lag Compensators.

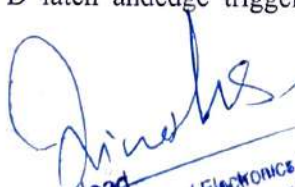
**Unit5: State Variable Models-** State variables of a dynamic system, state equation, transfer function from the state equation and vice-versa. State Transition Matrix, Controllability, Observability, Ackerman's formula, limitations of state variable feedback. Introduction to P/I/D and ON-OFF control actions.

### VLSI System (BEE034B)

**Unit 1:** Basic MOS transistors, Enhancement Mode transistor action, Depletion Mode transistor action, NMOS and CMOS fabrication.  $I_{ds}$  versus  $V_{ds}$  relationship, Aspects of threshold voltage, Transistor Transconductance  $g_m$ . Inverter, nMOS inverter, Pull up to Pulldown ratio for a NMOS Inverter and CMOS Inverter ( $B_n/B_p$ ), MOS transistor circuit Model, Noise Margin.

**Unit 2:** Combinational MOS Logic Circuit: NAND, NOR gate, Compound Gates, 2 input CMOS Multiplexer, Transmission Gate, Gate delays, CMOS-Gate Transistor sizing, Power dissipation.

**Unit 3:** Sequential MOS Logic Circuits: Behavior of Bistable Elements, SR Latch, clocked Latch and flip flop circuits, CMOS D latch and edge triggered flip flop, Basic Principles of Pass Transistor Circuits.

  
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**Unit 4:** MOS Layers Stick/Layout Diagrams; Layout Design Rules, Issues of Scaling, Scaling factor for device parameters. Layout issues for inverter, Layout for NAND and NOR Gates, Complex Logic gates Layout, Layout optimization for performance.

**Unit 5:** Verilog and other design tools. VHDL Code for simple Logic gates, flip-flops, shift registers.

<b>PROJECT</b>	<b>BEE053A</b>
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### Course Objectives:


1. Identifying real-life problems and suggest possible solutions.
2. Apply the technical knowledge gained from previous courses for project development.
3. Apply project management skills in development of project.
4. Show an ability to communicate technical information by means of written reports and oral presentation.
5. Design an electronic circuit with specified needs using hardware-software interfacing.

<b>Industry Internship</b>	<b>BEEL063B</b>
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Department of ECE provides Six months INTERNSHIP Program in curriculum which not only bridges the gap between Industry and Academia but also provides the opportunity to work in the Industrial Environment. This Internship aims at building a strong interface between the industry and the University and help students to realize their full potential.

- The cell has a systematic contact program with corporate where companies are invited to interview JU students for internship, on and off campus. It's a matter of great pleasure that figure of 100% internship placement has been achieved with more than 35% are getting stipend. Training cell also provide a hand holding to the interns, to successfully complete their internship. This is executed by Faculty Internship Guides (FIG's), who maintain a regular review rhythm (Telephonic, Email and Personal Visit) as per Internship guidelines with Industry guides.

Quality Internships possess five screening steps. Each and every student is assigned to one Internal (FIG – Faculty Internship Guide) and External (Industry Guide) Mentor for assessment of Internship.

  
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**Unit 4:** MOS Layers Stick/Layout Diagrams; Layout DesignRules, Issues of Scaling, Scaling factor for device parameters. Layout issues for inverter, Layout for NAND and NOR Gates, Complex Logic gates Layout, Layout optimization for performance.

**Unit 5:** Verilog and other design tools. VHDL Code for simple Logic gates, flip-flops, shift registers.

<b>PROJECT</b>	<b>BEE053A</b>
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### Course Objectives:


1. Identifying real-life problems and suggest possible solutions.
2. Apply the technical knowledge gained from previous courses for project development.
3. Apply project management skills in development of project.
4. Show an ability to communicate technical information by means of written reports and oral presentation.
5. Design an electronic circuit with specified needs using hardware-software interfacing.

<b>Industry Internship</b>	<b>BEEL063B</b>
----------------------------	-----------------

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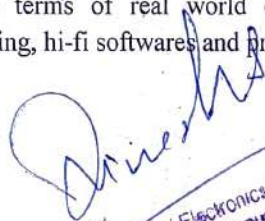
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Quality Internships possess five screening steps. Each and every student is assigned to one Internal (FIG – Faculty Internship Guide) and External (Industry Guide) Mentor for assessment of Internship.

  
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- First step involved the email feed-back by Industry guide on a scale of 0-10. More than 80% students got more than 8.
- Second step is first internal evaluation where presentation was given by students on research work progress. Proper feedback was given to students so that objectives of Internship is achieved.
- Third step deals with Telephonic talk with Industry Guide. Most of the guides were all praise for the students.
- Fourth step is Physical verification by Internal FIG visiting the Industry and rate the hands on training of the Intern. It is the most critical part of program for monitoring. Currently FIG's are in Industries for verification and we are getting great feedbacks by Industry personnel's
- Final step is the presentation of the project to Subject Expert External Examiner and other members of evaluation committee.

Internship transform students as best brain of the country where maximum are trend setters. These kind of Internships are unique in terms of real world exposure to industry work culture, sophisticated equipment's, machine learning, hi-fi softwares and practical training.

  
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M.Tech 1.1.3 & 1.2.1

## Department of Electronics and Communication Engineering

**1.1.3** Total number of courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year


**1.2.1** Number of new courses introduced of the total number of courses across all programs offered during the year

School Name	Name of the Programme	Total Number of Courses
School of Engineering & Technology	M. Tech - Electronics & Communication Engineering	21

### **LIST OF COURSES AND SYLLABUS**

S.NO.	1.1.3 Name of the Course focusing on employability/ entrepreneurship/ skill development offered by the University during the year	Course Code	Year of introduction
1	Digital VLSI Circuit Design	MEE022A	2018
2	Microcontroller System Design	MEE046A	2018
3	Research Methodology & Technical Communication	MES001A	2022
4	Quantitative Techniques & Computer Applications Lab	MES002A	2022
5	Computer Aided Design for VLSI Circuits	MEE023A	2018
6	Project	MEE071A	2018
7	Testing & Testability of VLSI Circuits	MEE039A	2018
8	Dissertation Part – II	MEE068A	2018

S.NO.	1.2.1 Name of the new courses introduced during the year	Course Code	Year of introduction
1	Research Methodology & Technical Communication	MES001A	2022
2	Quantitative Techniques & Computer Applications Lab	MES002A	2022

  
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# **SYLLABUS**

JECRC University  
Faculty of Engineering & Technology  
M.Tech. in VLSI & Embedded System Semester I  
Contact Hours (L-T-P) : 4-0-0

Hours: 48

## **Digital VLSI Circuits Design**

**Unit I MOS Transistor**-First Glance at the MOS device, MOS Transistor under static conditions, threshold voltage, Resistive operation, saturation region, channel length modulation, velocity saturation, Hot carrier effect-drain current Vs voltage charts, sub threshold conduction, equivalent resistance, MOS structure capacitance, CMOS logic.

**Unit II MOS Inverter, Switching characteristics & Interconnect Effects**- Delay Time, Interconnect Parasitic Capacitances, Resistance, RC Delays, Inductances, Gate Delays, Stage Ratio, Power Dissipation, CMOS Logic Gate Design, Transmission Gate, BiCMOS.

**Unit III Combinational Circuit Design**: NAND Gate, NOR Gate, Transient Analysis of NAND & NOR Gate. Sequential MOS Logic Gates: Behavior of Bistable element, CMOS latches & Clocked Flip-Flops, Clock Skew, Clocking Strategies.

**Unit IV CMOS Dynamic Logic Circuits**: Pass Transistor, 0 and 1 transfer, Charge Storage & Leakage, Voltage Bootstrapping, High Performance Dynamic CMOS Circuits: Domino CMOS Logic, NORA CMOS Logic, Zipper CMOS Circuits, TSPC Dynamic CMOS.

**Unit V Semiconductor Memories**: ROM, DRAM, SRAM, PLA, Cell, Leakage Circuit and Input/output Circuit.

### ***Course Outcome (CO):***

At the end of this course students will have:

CO1-Ability to understand MOSFET and their fabrication.

CO2- Ability to understand any combinational circuit analysis using MOSFET

CO3-Ability to understand & analyse sequential MOS circuits

CO4-Ability to draw layout of any circuit.

CO5-Ability to understand hardware description language.

  
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**MICROCONTROLLER SYSTEM DESIGN**

**Unit I: 8051 MICROCONTROLLER** Architecture of 8051 - Signals - Operational features - Memory and I/O addressing - Interrupts - Instruction set - Applications - The software model - functional description - central processing unit pin descriptions - reduced instruction set computer concepts - bus operations - superscalar architecture - pipelining - branch prediction - the instruction and caches - floating point unit - protected mode operation - segmentation - paging, protection, multi tasking, exception and interrupts, input/ output.

**Unit II: 8096 MICROCOMPUTER**

8096 CPU Structure - 8096 Interrupts Structure - Interrupt Control - Priorities - Critical Register - Programmable Timers - Interrupts Density and Interval Considerations - Real Time Clock.

**Unit III: MOTOROLA MICROCONTROLLER** Instructions and addressing modes of 68HC11 - operating modes - hardware reset, interrupt system - parallel I/O ports - flats - real time clock - programmable timer - pulse accumulator - serial communication interface - analog to digital converter - hardware expansion - basic assembly language programming.

**Unit IV : PIC MICROCONTROLLER:** Central processing unit architecture - instruction set - interrupts - timers - memory - I/O port expansion - integrated circuit bus for peripheral chip access - A/D converter - universal asynchronous receiver transmitter - advanced risc machine architecture - advanced risc machine organization and implementation, advanced risc machine instruction set, thumb instruction set, basic advanced risc machine Assembly language program, advanced risc machine central processing unit cores.

**Unit V: ARM CONTROLLER**

Architecture - Memory Organization - Pipeline and cache concepts - ARM (32 bit) Architecture - Instruction set and Assembly Language Programming - ARM instruction set and THUMB instruction set - Switching between ARM and THUMB instructions.

**Course Outcome (CO):**

At the end of this course students will have:


CO1- an ability to program a microcontroller to perform various tasks

CO2- an ability to interface a microcontroller to various devices.

CO3- an ability to effectively utilize microcontroller peripherals

CO4- an ability to design and implement a microcontroller-based embedded system.

CO5- Understanding of Embedded system, programming, Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits.

  
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JECRC University, Jaipur-303005

JECRC University  
Faculty of Engineering & Technology  
M.Tech. in VLSI & Embedded System *Semester II*  
Contact Hours (L-T-P): 3-0-0

hours- 36

Research Methodology & Technical Communication

UNIT 1:	<b>Research Methodology-Introduction</b> Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India
UNIT 2:	<b>Defining the Research Problem</b> What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem <b>Research Design</b> Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs
UNIT 3:	<b>Sampling Design</b> Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample?, Random Sample from an Infinite Universe, Complex Random Sampling Designs <b>Measurement and Scaling Techniques</b> Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques

  
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JECRC University, Jaipur-303905



UNIT 4:	<b>Methods of Data Collection</b> Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method <b>Processing and Analysis of Data</b> Processing Operations, Some Problems in Processing, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry (Skewness), Measures of Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation, Association in Case of Attributes
UNIT 5:	<b>Sampling Fundamentals</b> Need for Sampling, Some Fundamental Definitions, Important Sampling Distributions, Central Limit Theorem, Sampling Theory, Sandler's A-test, Concept of Standard Error, Estimation, Estimating the Population Mean ( $\mu$ ), Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level, Determination of Sample Size through the Approach Based on Bayesian Statics

**Course Outcome (CO):**

At the end of the course, the student should be able to:

CO1 - Gain insights into how scientific research is conducted.

CO2 - Help in critical review of literature and assessing the research trends, quality and extension potential of research and equip students to undertake research.

CO3 - Learn and understand the basic statistics involved in data presentation.

CO4 - Identify the influencing factor or determinants of research parameters.

CO4 - assess critically the following methods: literature study, case study, structured surveys, interviews, focus groups, participatory approaches, narrative analysis, cost-benefit analysis, scenario methodology and technology foresight.

*Ainsha*  
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 JSSCE University, Mysore-576002

M.Tech. in VLSI & EMBEDDED SYSTEM Semester II

	Quantitative Techniques & Computer Applications Lab	0-0-1
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**Various Methods and Uses of Advance Excel Formulas:** V lookup, Hlookup, Sumif, Sumifs, Sumproduct, Dsum, Countif, Countifs, If, If error, Iserror, Isna, Isnumber, Isnontext, Isblank, Istext, Getpivotdata, Decount, Decounta, Or, And, Search, Index, Match Etc

**Various Methods and Uses of IF Conditions:** When should use the "IF" Conditions?, Creation of Multiple IF Conditions in One Cell, Use the IF Conditions with the Other Advance Functions, How to use nested IF statements in Excel with AND, OR Functions

**ADVANCED EXCEL OPTIONS :** Various Methods of Filter and Advance Filter options, Creating and Updating Subtotals, Various Methods of Text to Column options, Uses of Data Grouping and Consolidation options, Uses of Goal Seek and Scenarios Manager, Various Method of Sorting Data, Creating, Formatting and Modifying Chart, Data Validation, Creating drop down lists using different data sources, Linking Workbooks and Uses of Edit Link options, Excel Options, Customizing the Quick Access Tool Bar, Formula Auditing features and Trace formula error

**Pivot Tables & Charts :** Various Methods and Options of Pivot Table, Using the Pivot Table Wizard, Changing the Pivot Table Layout, Subtotal and Grand total Options, Formatting, Grouping Items, Inserting Calculated Fields, Pivot Table Options, Calculation in Pivot Table, Display and Hide Data in Field, Select, Move & Clear Pivot Data, Creating and Modifying Pivot Chart

**Advance Use of Function:** Mixing Function to get Various MIS Outputs, Creating Data Table, Advance Data Validation, Using conditional formatting with Formulas and Function, Using Name Manager, Array Formulas

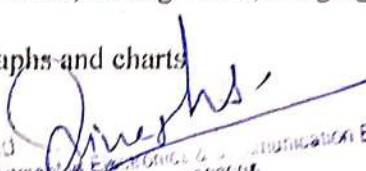
**Importing Data from External Sources: Macros,** What is a Macro?, Creating Excel Macro, Running Macros and Editing, Automating Tasks with Macro

**(A)SPSS Package**

**An Overview of SPSS :** Mouse and keyboard processing, frequently –used dialog boxes, Editing output, Printing results, Creating and editing a data file

**Managing Data:** Listing cases, replacing missing values, computing new variables, recording variables, exploring data ,selecting cases, sorting cases, merging files

**Graphs:** Creating and editing graphs and charts

  
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JECRC University, Jaipur-303005

**Frequencies:** Frequencies, bar charts, histograms, percentiles

**Descriptive Statistics:** measures of central tendency, variability, deviation from normality, size and stability, Cross Tabulation and chi-square analyses, The means Procedure

**Bivariate Correlations:** Bivariate Correlation, Partial Correlations and the correlation matrix

**The T-test procedure:** Independent -samples, paired samples, and one sample tests

**The one-way ANOVA procedure:** One-way analysis of variance

**General Linear model:** Two-way analysis of variance

**General Linear model:** three-way analysis of variance and the influence of covariates, Simple Linear Regression, Multiple regression analysis, Multidimensional scaling, Factor analysis, Cluster analysis

**Course Outcome (CO):**

At the end of this course students will have:

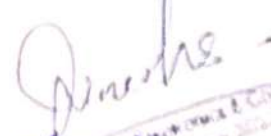
CO1. Identify system components and utilize computer hardware and software.

CO2. Become proficient in using the features of word processing in Microsoft Word.

CO3. Become proficient in using spreadsheet software and be able to create technical and complex spreadsheets for data analyses using Microsoft Excel.

CO4. Develop effective and professional business presentations using Microsoft Power Point.

CO5. Use the internet to research information and enhance their documents.

  
Head  
Department of Basic and Applied Sciences  
MCCRC, Hyderabad, August 2022



Faculty of Engineering and Technology  
M.Tech. in VLSI & Embedded System Semester I

Hours: 48

Contact Hours(L-T-P) : 4-0-0

**Computer Aided Design for VLSI Circuits**

**Unit I: Introduction to VLSI Design methodologies** - Review of Data structures and algorithms, Review of VLSI Design automation tools, Algorithmic Graph Theory and Computational Complexity, Tractable and Intractable problems, general purpose methods for combinatorial optimization.

**Unit II: Design rules: Layout Compaction** - Design rules, problem formulation, algorithms for constraint graph compaction, placement and partitioning, Circuit representation, Placement algorithms, Partitioning

**Unit III: Floor planning:** Floor planning concepts, shape functions and floorplan sizing, Types of local routing problems - Area routing, channel routing, global routing, algorithms for global routing.

**Unit IV: Simulation:** Simulation, Gate-level modeling and simulation, Switch-level modeling and simulation, Combinational Logic Synthesis, Binary Decision Diagrams, Two Level Logic Synthesis.

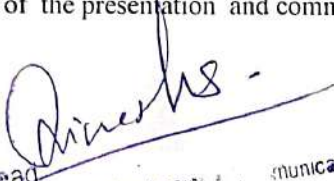
**Unit V: Modelling and synthesis:** High level Synthesis, Hardware models, Internal representation, Allocation assignment and scheduling, Simple scheduling algorithm, Assignment problem, High level transformations.

**Dissertation Part – II**

**MEE068A**

**Syllabus**

1. Identify a problem suitable to carry out dissertation work through literature
2. Apply the knowledge of writing skill on report writing.
3. Formulate the problem and identify suitable modeling paradigm.
4. Analyze the Problem and identify the solution Methodology
5. Analyze the Enhancement of the presentation and communication skill

  
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**1.1.3 Total number of courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year**

**Contact Hours (L-T-P): 2-0-2**

<b>L-T-P</b>	<b>DEN001C - Communication Skills</b>	<b>Credits 2-0-1 3</b>
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**Course Objectives**

1. To enhance English language competence in reading, writing, listening and speaking.
2. Switch the approach from teacher-centred to student-centred one.
3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. To link communication skills with the organizational behaviour.
6. To inculcate skills that are very much required for employability and adjust in the professional Environment.

**Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in different contexts.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

CO5: Ability to showcase employability skills and professional writing skills

**Syllabus: Theory**

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
<b>UNIT 2</b>	<b>Basic Writing Skills:</b> Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
<b>UNIT 3</b>	<b>Composition:</b> , Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms

<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation
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### Syllabus: Lab

<b>UNIT 1</b>	<b>Basics of Organizational Communication:</b> Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time-management, Following Deadlines etc
<b>UNIT 2</b>	<b>Write Dialogue from the different contexts of corporate culture:</b> Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
<b>UNIT 3</b>	<b>Composition:</b> , Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
<b>UNIT 5</b>	<b>Professional and Technical Communication :</b> Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

### Methodology for Evaluation

1. *Internal Assessment (Theory)*
  - a) *Home Assignments: One from each Unit* : 15 Marks
  - b) *In Semester Tests (Minimum two)* : 30 Marks
  - c) *Attendance* : 05 Marks
2. *Term End (Theory)* : 50 Marks
3. *Internal Assessment (Lab)*
  - (a) *Daily Performance in the Lab* : 50 Marks
4. *Term End (Lab)* : 50 Marks

### Course Articulation Matrix: (Mapping of COs with POs andPSOs)

Course Outcome	Program Outcome							Program Specific Outcome					
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3					2	3	3	2	3	3
CO2	2	3	3					1	2	3	3	3	2
CO3	3	2	1				3		1	3	2	2	3
CO4	2	3	3					2	2	3	3	3	3
CO5	3	3	3				3	3	1	1	3	3	3

### Suggested Reading:

- A. *Practical English Usage*. Michael Swan. OUP. 1995
- B. *Remedial English Grammar*. F.T. Wood. Macmillan. 2007
- C. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
- D. *On Writing Well*. William Zinsser. Harper Resource Book. 2001
- E. *Study Writing*. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
- F. *Communication Skills*. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
- G. *Exercises in Spoken English*. Parts. I-III, Hyderabad. Oxford University Press.
- H. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006
- I. More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.
- J. The BBC and British Council online resources

### B. Tech. (common to all disciplines)-I Semester

Contact Hours (L-T-P): 3-1-0

DMA001A	Engineering Mathematics-I	3: 1:0	4
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### OBJECTIVE:

The objectives of this course are to make the students:

- To increase the student's appreciation of the basic role played by mathematics in modern technology.
- Incorporate the knowledge of advanced mathematics to support their concurrent and subsequent engineering studies.

- To develop the concepts and tools that will serve as building blocks towards tackling more advanced level of mathematics that they are likely to find useful in their profession when employed in the firm/industry/corporation in public or private sector
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<b>UNIT 1</b>	Point of inflexion and curve tracing (Cartesian coordinates only), curvature, convexity, concavity, point of inflexion and curve tracing.
<b>UNIT 2</b>	Limit, continuity and partial derivatives, Euler's theorem on homogenous functions, total derivative, approximate calculations; Maxima and minima of two and more independent variables; Method of Lagrange multipliers.
<b>UNIT 3</b>	Beta and Gamma functions and their properties. Surface and volumes of solids of revolutions. Double integrals, change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes.
<b>UNIT 4</b>	Vectors covering, laws of vector algebra, operations- dot, cross, triple products; Vector limits, continuity and derivatives, geometric interpretation; Gradient, divergence and curl formulae.
<b>UNIT 5</b>	Line integrals, simply connected regions, Line integrals, surface integrals, volume integral, Green's theorem, Stokes theorem and Gauss theorem.

#### **Text Books:**

1. B.V.Ramana, *Higher Engineering Mathematics*, Tata McGraw Hill, 2011.

#### **Reference Books:**

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, Wiley 9th Edition, 2008
2. Maurice D. Weir and Joel Hass, *Thomas Calculus*, Pearson, 11th Edition, 2005.
3. *Higher Engineering Mathematics- B. S. Grewal*, Khanna Publications.

#### **Course Outcomes**

Upon successful completion of this course, the student will be able to:

- CO1 Understand the concepts of Asymptotes, curvature and curve tracing.
- CO2 Understand the functions of more than one independent variable and calculate partial derivatives along with their applications. Also obtain an idea for finding the extreme values of functions of more than one variable.
- CO3 Will be able to integrate a continuous function of two or three variables over a bounded region and be able to trace the curves.
- CO4 Understand the representation of vector and its properties.
- CO5 Understand line integral, surface integrals, volume integral, Green's theorem, Stokes theorem and Gauss theorem

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**



Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H	H			M		M					M	H	L	
CO2		M		L	M		H				L	M	M		
CO3	H	H		M	M		H			L		M	M	M	
CO4	H	M		M	L		M					M		M	
CO5	H	H			M		H					M	H	M	

H = Highly Related; M = Medium L = Low

**B. Tech. (common to all disciplines)-I/II Semester**

**Contact Hours (L-T-P): 3-0-0**

<b>DPH001A</b>	<b>APPLIED PHYSICS</b>	<b>Total Credits: 3</b>
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**Course Objectives:**

1. Students will be able to demonstrate competency and profound understanding of the concepts in Quantum Mechanics and its applications, and band formation.
2. Students will be able better to understand and learn to design the laser system and its component, or process to meet desired needs within realistic constraints such as health and safety, manufacturability.
3. The graduates will able to understand the applications of quantum optics through Holography and communication through optical fibers.
4. Students will be able to know the application of optical technologies and the development of new technologies like photonics, spintronics, quantum computing and Nano-technology.

<b>UNIT 1</b>	<b>Quantum Mechanics:</b> Overview- Development of Quantum Mechanics, Compton Scattering, Wave Particle Duality, Uncertainty's Principle, Phase and Group velocities, Wave Packet, - Physical significance and its properties, Operators, Expectation values. Schrödinger's Time dependent and time independent Equations. <b>Applications:</b> Schrödinger's Equation and its Solution for particle in one-dimensional box and three-dimensional box. Degeneracy. Quantum statistics. *Overview of <b>AlphaDecay, Scanning and Tunnelling Microscopes.</b>
<b>UNIT 2</b>	<b>Free Electron Gas Model and its Applications:</b> Overview – Classical theory of Free electron, Quantum theory of free electrons, Density of energy states, Fermi energy levels. Band Theory of solids: formations of band, Band Gap in solids, Semiconductors: Intrinsic and Extrinsic, Carrier Concentrations, Position of Fermi levels in semiconductors, Conductivity and Mobility due to electrons and holes. <b>Solar cells and Photo cells.</b>
<b>UNIT 3</b>	<b>Quantum Optics: Coherence:</b> Spatial and Temporal coherence, Coherence length, Coherence time. Visibility as a Measure of Coherence. Spatial Coherence and Size of the Source. Temporal Coherence and Spectral Purity.

	<b>Laser:</b> Einstein's coefficients, Threshold conditions for laser action. Types of Lasers-Ruby laser, He-Ne laser. Semiconductor laser. Elementary ideas of Q-switching and Mode Locking. Idea of Homojunction and Hetrojunction lasers.
<b>UNIT 4</b>	<b>Holography:</b> Holography versus photography. Basic theory of Holography. Applications of Holography in Microscopy and Interferometry. <b>Optical Communication:</b> Optical fiber as optical wave-guide. Construction, Numerical Aperture and Angle of Acceptance. Applications and Types of optical fibres.
<b>UNIT 5</b>	<b>Applications of Optical Technologies:</b> Determination of thickness of thin films using interference technique. Elementary idea of anti-reflection coating. Optical filters. Applications of Diffraction: Bragg's law of X-Ray Diffraction. Polaroids and their industrial applications. <b>Overview of Upcoming Technologies</b> * Photonics * Spintronics * Quantum Computers * Nanotechnology and Nano-materials. Carbon Nano-tubes (CNTs).

### Course Outcomes

Upon successful completion of this course, the student will be able to:

- CO1: To learn the fundamental concepts on Quantum behaviour of matter in its micro state and its applications.
- CO2: Analyze and apply band theory of Solids in Solid State Physics and Electronics.
- CO3: Understand and apply techniques of LASER and coherent radiations in industry, medical, and day-to-day life activities.
- CO4: Apply concepts learnt in Quantum optics in Industry and in real life.
- CO5: Understand and importance of Spintronics to develop storage device with low threshold power, spin based transistor, Photonics for techno-farming, and Nano-technology for saving environment, advances in medical and energy efficiency in fuel cell.

### Suggested Books

1. Arthur Beiser, **Perspectives in Modern Physics**, McGraw Hill International.
2. H. S. Mani and G. K. Mehta, **Modern Physics**, East-West Press.
3. H Malik and AK Singh, **Engineering Physics**, McGraw Hill Education.
4. A. K. Ghatak, **Optics**, Tata McGraw Hill.
5. D. K. Bhattacharya and A. Bhaskaran: **Engineering Physics**, Oxford University Press.
6. S. Mani Naidu, **Engineering Physics**, Pearson.
7. A. K. Ghatak and Thyagrajan, **Fiber Optics**, Oxford University Press.
8. S. O. Pillai, **Solid State Physics**, Wiley Eastern.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1			H		L		H		L					L	
CO2			L		M		L		M	H		L		H	
CO3		M								L		M			M
CO4					H								H		
CO5			H				M						H		

H = Highly Related; M = Medium L = Low

**B. Tech. (common to all disciplines)-I/II Semester**  
**Contact Hours (L-T-P): 3-0-0**

<b>DCO013A</b>	<b>Computer Programming and Logical Thinking</b>	<b>3: 0:0</b>	<b>3</b>
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**Course Objectives**

1. To impart adequate knowledge on the need for programming languages and problem-solving techniques.
2. To develop an in-depth understanding of functional and logical concepts of Programming Language
3. To provide exposure to problem-solving through programming skills
4. To familiarize the basic syntax and semantics of programming Language
5. To familiarize the different Operations on arrays, functions, pointers, structures, unions and files

**Unit I**

**Unit-1** Computer Fundamentals, Functional units of Computer: I/O devices, Primary and secondary memories Number System: Decimal, Binary, Octal, and hexadecimal, Fixed and floating Points, Character Representations, ASCII, EBCDIC, Binary Arithmetic, Negative Numbers and their Arithmetic, Floating point representation, Binary Codes, Cyclic Codes

**Unit-2** Programming Fundamentals, Algorithm development, Techniques of Problem-solving, Flowcharting, Stepwise Refinement.

**Unit –3** Basic of C Programming, Introduction of C language, Representation of Integer, Character, real, Data Types: Constants and Variables, Operators, Arithmetic Expression, Logical expression, Assignment statement, Structure of a C program, Header files, Directives

**Unit–4** Programming in C, Decision Control Structure, Alteration, and Iterations (While, do while, for loop, switch case), Arrays, String processing,

**Unit–5** Advance Concepts in C, Functions, Recursion, Pointers, Structure, Union, Files

### Course Outcomes (CO)

- CO1 Understand the basic structure of computer and numbering methods
- CO2 Understand the representations of data and various algorithm
- CO3 Choose the right data representation formats based on the requirements of the problem
- CO4 Develop programming skills using the fundamentals and basics of Programming Language
- CO5 Implement different Operations on arrays, functions, pointers, structures, unions and files

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M												M		
CO2			H		H									H	<u>L</u>
CO3			H		M				M		M		H		
CO4				L								M		L	
CO5	H		H	M							M		H	M	L

### Reference Books:

1. Introduction to computer by Alexis Leon, Leon Press, Channai.
  2. Computer fundamentals And C programming by E. Balagurusamy, The MsGraw-Hill publishing company Ltd.
  3. Let us C by Yaswant Kanitkar.
- Exploring in C by Yaswant Kanatkar.

### **B. Tech. (common to all disciplines)-I/II Semester**

**Contact Hours (L-T-P): 0-0-2**

<b>DPH002A</b>	<b>APPLIED PHYSICS LAB</b>	<b>Total Credits: 1</b>
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### **List of Experiments**

Students are required to perform any ten experiments out of the following list of experiments.

1	To convert a Galvanometer into an Ammeter of given range and calibrate it.
2	To convert a Galvanometer into a Voltmeter of given range and calibrate it.
3	To study the variation in resistance of a Semiconductor with temperature and to determine its energy bandgap.
4	To determine specific Resistance of a wire by Carrey-Foster's Bridge.
5	To determine the height of an unknown object using Sextant.
6	To determine Resolving power of Telescope.
7	To determine Dispersive Power of a Prism using Mercury light source and Spectrometer.
8	To determine the wavelength of prominent lines of Mercury by using plane Diffraction Grating and Spectrometer.
9	To measure Numerical Aperture of an Optical Fiber.
10	To determine the profile of He-Ne LASER beam.
11	To determine wavelength of Sodium light source using Newton's Rings experiment.
12	To study shift in fringes in interference experiment using Michelson's interferometer
13	To study the characteristics of Solar Cell
14	To study the photoelectric effect and determine the Planck's constant "h".
15	To verify the Brewster's law and to find the Brewster's angle
16	To study the polarization of Laser light using polarimeter.

### **Course Outcomes-**

While graduating, students of the Applied Physics Lab program would be able to:

CO1: Demonstrate the working knowledge of fundamental Physics, that of Electricity, Electronics and Mechanics and their applications in engineering disciplines.

CO2: The ability to formulate, conduct, analyze and interpret experiments in engineering physics.

CO3: Use modern engineering physics techniques and tools, including laboratory instrumentation.

CO4 Communicate their ideas effectively, both orally and in writing; and function effectively in multidisciplinary teams.

CO5: Able to establish strong correlation between theory and experiments for better experiential learning.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1			H		L		H		L					L	
CO2			L		M		L		M	H		L		H	
CO3		M								L		M			M
CO4					H								H		

H = Highly Related; M = Medium L = Low

**B. Tech. (common to all disciplines)-I/II Semester**

**Contact Hours (L-T-P): 3-0-0**

<b>DME001A</b>	<b>Engineering Graphics and Design</b>	<b>3: 0: 0 3</b>
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**❖Course Overview:**

The course provides the fundamental knowledge on engineering graphics and design, which is used for technical communication in the industry. The practical expertise of L&T has been leveraged for the course development to help the learners understand and apply the knowledge as it is being done in the field. This course covers the fundamentals of engineering graphics involving geometrical 1D, 2D, and 3D objects. The knowledge of engineering graphics gained through this course can be applied to design and draw simple machine parts, small office and residential buildings. Computer Aided Design is introduced and discussed in a practical way with an exposure to Building Information Modelling. This course facilitates the learners

to have a clear understanding on how to apply the knowledge of graphics in their respective disciplines for engineering design.

### ❖Course Objective:

To help learners draw engineering drawings of objects in manual and computer aided drafting methods, read and interpret the drawing of simple machine components, buildings, etc., and apply the knowledge for creative engineering design

### ❖Key Topics:

Drawing Codes | Manual Drafting | Traditional Engineering Graphics | Computer Graphics and Computer Aided Design | Solid Modelling | Building Information Modelling | Design Project

### ❖Syllabus:

#### **Basics of Engineering Graphics, Projection of Points**

Introduction to Engineering Drawing, Manual & Computer Aided Design and Drafting, Lettering, Dimensioning, Geometrical Constructions, Plane Curves, Conic Sections, Cycloidal Curves, Involute – Projection of point placed in a quadrant – Projection of a line using first angle projection method, rotating line method, trapezoidal plane method – Solve & draw projections of a line kept inclined to two planes – Determination of true length, true inclinations & traces of a straight line

#### **Projection of Planes & Solids**

Description of plane shapes & solids - Drawing plane projections & solids using change of position and auxiliary plane method – Projection of solids with inclined axis – Drawing projection of solids using change of position and auxiliary plane method.

#### **Orthographic Projections & Sections of Solids**

Visualization & drawing orthographic projections – Description & drawing of Plan, elevation, side elevation of objects, simple machine parts using first angle projection method – Description of section plane & portion of solid – Drawing sectional top view, front view, true shape of section on an auxiliary plane

#### **Isometric & Perspective Projection, Development of Surfaces**

Drawing isometric view of solids (Box method) – Drawing isometric scale & construction of isometric projection from orthographic projection – Drawing perspective projection of small, large objects and building components using suitable methods – Drawing section plane & determining lateral surface – Determination of shortest distance between points – Drawing & determining shape of metal sheet to cut objects.

#### **Building Drawing, Solid Modeling, Building Information Modeling**

Drawing plan, elevation and sectional elevation of a small residential & office building – Description & creation of Solid models in general and with respect to engineering – Designing and creating a new product & generating various views – Basics of Building Information Modeling (BIM)

### ❖Case Studies

1. Building drawing of a small office building

2. Building drawing of a small office building

❖ **Software used: AUTOCAD**

<b>DCO014AA</b>	<b>Computer Programming and Logical Thinking Lab</b>	<b>0:0:2</b>
<b>1 Credit</b>		

1. Write a program to print a hello world in c .
2. Write a program in c to check even or odd.
3. Write a program to find odd numbers in c.
4. Write a program to print Armstrong numbers from 1 to 500.
5. Write a program for prime numbers between 1 to 100.
6. Write a program to check a palindrome number.
7. Factorial program in c using for loop
8. Write a c program to reverse a given number.
9. Write a program to add the two numbers.
10. Write a program to swap a number using a third variable.
11. write a program to make personal information as in CV.
- 12 Write a program to print the following pattern.

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\* \*

\* \* \*

- 14 Write a program to print the following pattern.

\* \* \*

\* \*

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- 15 Write a program to reverse an input string in c .
- 16 Write a program to print addition, multiplication, division, and subtraction of the numbers.
- 17 Write a program to print a table of any number.
18. Write a program to implement switch case .
19. Write a program to implement Function.
20. Write a program to implement Recursive Function.
21. Write a program to implement structure in C.
22. Write a program to implement UNION in C.
23. Write a program to implement ENUM in C.

**Contact Hours (L-T-P): 2-0-0**

<b>L-T-P</b>	<b>DIN001A - Cultural Education I</b>	<b>Credits</b>	<b>2-0-0</b>	<b>2</b>
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### **Course Objectives**

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

### **Course Outcomes (CO):**

**At the end of this course students will have:**

- CO1: Ability to acknowledge and appreciate the richness of Indian Culture  
 CO2: Ability to represent the culture ethics in real life

### **UNIT-I Holy Scriptures-A**

1. Introduction to Vedanta and Bhagavad Gita, Goals of Life – Purusharthas, Introduction to different DharmGranthas (Various religious scriptures from Hindu, Muslim, Christian, Bodh, Jain religions)
2. Introduction to Yoga, Overview of Patanjali's Yoga Sutras

### **UNIT-II Society and Culture-I**

3. Introduction to Indian Culture and Major Symbols of Indian Culture
4. Major Indian Cultural and Ethical Values- Respect, Compassion, Kindness, Forgiveness, Introspection, Honesty, Justice, Loyalty, Devotion, Self Sacrifice, Hospitality, VasudhevKutumbkum

### UNIT-III India in Progress-I

5. Education , Science and Technology in Ancient India
6. Values from Indian History- War of Mahabharata, War of Kalinga, Freedom Struggle of India, Major Farmer Movements, Major Religious and Social Upliftment Movements

### UNIT-IV Great Indian Personalities-I

7. Life and works of the Great People of India- Sushruta, Dadhichi, Ashtvakra, Anusuya, Panini, Charaka, Kalidas, Aryabhatta, Samudragupta, Ashoka, Chandragupt Mourya, Porus, Satyabhama, Dhruv, Prahlad, Chankya, Varahmihira, Bhism, Karan, Dronacharya, Meera Bai, Surdas, Dadudayal, Kabir, Mahatma Budhha, Mahavir, Guru Nanak Dev, Guru Gobind Singh, Mohammad Saheb, Jesus Christ, Veer Shivaji, Maharana Pratap, Maharani Laxmi Bai, Maharani Padmini, Hadi Rani Shal Kanwar, Panna Dhai

\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by committee of teachers.

### Suggested Reading:

1. Glory of Indian Culture (English) Paperback by Giriraj Shah
2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies by Saroj Bala , Kulbhushan Mishra

### References

<https://knowindia.gov.in/culture-and-heritage/lifestyle-values-and-beliefs.php>

### Contact Hours (L-T-P): 2-0-2

L-T-P	DEN002C - Professional Skills	Credits 2-0-1 3
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### Course Objectives

1. To enhance Professional competence in reading, writing, listening and speaking.
2. Switch the approach from providing information about the language to use the language.

3. Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
4. Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
5. Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
6. Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

#### Course Outcomes (CO):

**At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in professional scenario.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels as per the demand of the corporate culture

CO5: Ability to enhance professional writing skills in tune with professional scenario.

#### Syllabus: Theory

<b>UNIT 1</b>	<b>Professional Grooming and Professional Culture:</b> Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management
<b>UNIT 2</b>	<b>Advanced Grammar:</b> Common errors related to prepositions, articles, models , Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents
<b>UNIT 3</b>	<b>Composition:</b> , Memo, Notice, Circular, Book Review, Research Article, Reports
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms
<b>UNIT 5</b>	<b>Reading Comprehension:</b> Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction,

#### Syllabus: Lab

L-T-P	Professional Skills Lab	Credits	2-0-1	3
UNIT 1	<b>Professional Grooming and Professional Culture:</b>			

	Role plays and Activities on Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management
<b>UNIT 2</b>	<b>Advanced Grammar:</b> Exercise Sessions for Common errors related to prepositions, articles, models, Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents
<b>UNIT 3</b>	<b>Composition:</b> Memo, Notice, Circular, Book Review, Research Article, Reports – Giving Assignments based on practical applications, Practice sessions on different topics
<b>UNIT 4</b>	<b>Vocabulary Building:</b> Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms- Activities related to the appropriate use of words
<b>UNIT 5</b>	<b>Reading Comprehension:</b> Practice Reading Unseen Paragraphs- Finding Suitable title, Summarizing, Analyzing, Finding new words etc

### Methodology for Evaluation

1. Internal Assessment (Theory)
  - a) Home Assignments: One from each Unit : 15 Marks
  - b) In Semester Tests (Minimum two) : 30 Marks
  - c) Attendance : 05 Marks
2. Term End (Theory) : 50 Marks
3. Internal Assessment (Lab)
  - (a) Daily Performance in the Lab : 50 Marks
4. Term End (Lab) : 50 Marks

### Course Articulation Matrix: (Mapping of COs with POs andPSOs)

Course Outcome	Program Outcome							Program Specific Outcome					
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3					2	3	3	2	3	3
CO2	2	2	3					1	2	3	3	3	M
CO3	3	2	1				3		1	3	2	2	3
CO4	2	3	3					2	M	3	3	3	3
CO5	3	3	1					2	2	3	3	3	3

### Suggested Readings:

1. Felixa Eskey. Tech Talk, University of Michigan. 2005
2. Michael Swan. Practical English Usage, Oxford University Press. 2005
3. Anderson, Paul. Technical Communication: A Reader Centered Approach, V Edition, Hercourt, 2003.

4. Thampi, G. Balamohan. Meeting the World: Writings on Contemporary Issues. Pearson, 2013.
5. Lynch, Tony. Study Listening. New Delhi: CUP, 2008.
6. Kenneth, Anderson, Tony Lynch, Joan Mac Lean. Study Speaking. New Delhi: CUP, 2008.
7. Marks, Jonathan. English Pronunciation in Use. New Delhi: CUP, 2007.
8. Syamala, V. Effective English Communication For You (Functional Grammar, Oral and Written Communication): Emerald, 2002.

**Contact Hours (L-T-P): 3-1-0**

<b>DMA002A</b>	<b>Engineering Mathematics-II</b>	<b>3:1:0 [4]</b>
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**Objective:** At the end of the course, the student should be able to:

- To provide a brief, hands-on overview of ordinary differential equations and Higher order linear differential equation with constant coefficients.
- To understand the second order linear differential equations with variable coefficients.
- To make utilization of Linear Partialdifferential equations–someimportantequations Heat, wave and Laplace equation.
- To understand the Laplace transform, Inverse Laplace transform and their applications
- To familiarize and Analyzenumerical solution of a differential equation by Euler's, Modified Euler's, Predictor Corrector and Runge Kutta fourth order Methods.

<b>UNIT1</b>	Introduction, Elementary row and column transformations ,Linear dependence, Consistency of linear system of equations, Inverse of a matrix, Rank of a Matrix, System of linear equations (Homogenous and Non-homogeneous);Eigenvaluesandeigenvectors, Cayley's Hamilton theorem.
<b>UNIT2</b>	Convergence of sequence and series, tests for convergence, power series, Taylor's series. Series for exponential, trigonometric and logarithmic functions.
<b>UNIT3</b>	Ordinarydifferential equation (first order first degree), Homogenous differential Equation, Linear differential equation, Exact differential equation, Higher order linear differential equation with constant coefficients.
<b>UNIT4</b>	Linearequations withvariablecoefficients: Homogenous form, Exact form, Change of dependent variable, Normal form, Change of independent variable and method of variation of parameters.
<b>UNIT 5</b>	Series solutions of second order linear differential equations with variable coefficients (Complementary functions only). First order partial differential equations, solutions of first order linear and non-linear PDEs.

**Text Books:**

1. B.V.Ramana, Higher Engineering Mathematics, Tata McGraw Hill, 2011.

**Reference Books:**

**Recommended Books:**

1. Erwin Kreyszig , Advanced Engineering Mathematics, Wiley 9th Edition, 2008
2. Thomas and Finney, Calculus and Analytical Geometry, Narosa Publishing House. New Delhi, 2002.
3. M.Ray and Chaturvedi, A Text Book of Differential Equations, Students Friends & Co.

Publisher, Agra, 1998.

4. Maurice D. Weir and Joel Hass, Thomas Calculus, Pearson, 11th Edition, 2005.

### Outcomes:

**At the end of this course, students will be able to:**

CO1: Use matrices, determinants and techniques for solving systems of linear equations in the different areas of Linear Algebra. Understand the definitions of Vector Space and its linear Independence. Solve Eigen value problems and apply Cayley Hamilton Theorem.

CO2: Understanding convergence of sequence and series.

CO3: Identify, analyze and subsequently solve physical situations whose behavior can be described by First order and first degree ordinary differential equations and Higher order linear differential equation with constant coefficients.

CO4: Determine solutions to second order linear differential equations with variable coefficients.

CO5: Understanding the series solutions of second order linear differential equations with variable coefficients

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H	M	L	L	M				L			L	M		
CO2	H	M	M	M	M				L			L	H		
CO3	H	M	M	M	M		M		L			L		H	M
CO4	H	H	M	M	M			L	L			L			M
CO5	H	H	M	M	M	L			L			L	H		

H = Highly Related; M = Medium L=Low

### B. Tech. (common to all disciplines)-II Semester

Contact Hours (L-T-P): 3-0-0

DEE002A	Basic Electrical and Electronics Engineering	3-0-0
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### Objective

- To understand basic concepts required in understanding electrical and electronic circuits
- To understand the concept of Semiconductor Diode and their applications.

- The student will be able to understand fundamental circuit analysis techniques and basic electronics backgrounds, including PN Diode and Opto-Electronic Devices.
- To understand basic concepts of construction and working of single phase Transformer.
- To understand basic concepts of Electrical DC Circuit.
- The student will be able to understand the concept of Various Binary Number Systems and conversions.
- To understand Logic Gates and Logic Circuit focusing on basic and universal gates.

<b>UNIT 1</b>	<b>Electrical-DC Circuit</b> – Ohm’s law, Kirchoff’s Current Law( KCL) & Kirchoff’s Voltage Law (KVL), Voltage & Current Sources, Star-Delta and Delta-Star transformations, Nodal & Mesh Analysis.
<b>UNIT 2</b>	<b>Transformers</b> - Principle of operation and construction of single phase transformers (core and shell types). EMF equation, losses, efficiency and voltage regulation
<b>UNIT 3</b>	<b>Semiconductors</b> - Comparison of Insulator, conductor and semiconductor with energy band diagrams. Semiconductor materials-Intrinsic and Extrinsic semiconductor (P-type and N-type SC), Crystal structures of p-type and N type materials, resistivity, conductivity, mobility.
<b>UNIT 4</b>	<b>Electronics Devices</b> - Diode, PN diode-construction, working and V-I plot, Diode as a Rectifier, Half Wave and Full Wave Rectifiers, Zener Diode – construction, Operation, characteristics; Opto-Electronic Devices – LEDs, Photo Diode.
<b>UNIT 5</b>	<b>Digital Electronics</b> -Number Systems: Binary system, Hexadecimal System, Octal system, Decimal system, Code conversions.  <b>Basic Logic Gates</b> (AND, OR , NOT), Universal Gates(NAND and NOR) and other gates(EX-OR,EX-NOR), Truth Tables.

### **Course Outcome (CO):**

At the end of this course students will have:

CO1- To understand, analyze and solve DC electrical circuits

CO2- To understand basic concepts of construction and working of single phase Transformer.

CO3- Ability to understand the physical properties of different types of semiconductors used in fabricating devices.

CO4- Ability to understand the functioning of PN junction diode and explains its main application as rectifiers and opto-electronic devices.



CO5- Ability to understand the concept of Various Binary Number Systems and Codes, Logic Gates and Logic Circuit.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	PSO 2	PSO3
CO1	H	H										H	H	H	H
CO2	H	L				L		H				H	H	H	H
CO3	H	L	H	M	L							H	H	H	H
CO4	H			H	H				H			H	H	H	H
CO5	H	L				M	M					H	H	H	H

H = Highly Related; M = Medium L = Low

**Text Books:**

R. L. Boylestad & Louis Nashlesky (2007), *Electronic Devices & Circuit Theory*, Pearson Education

**Reference Books**

Santiram Kal (2002), *Basic Electronics- Devices, Circuits and IT Fundamentals*, Prentice Hall, India

David A. Bell (2008), *Electronic Devices and Circuits*, Oxford University Press

Thomas L. Floyd and R. P. Jain (2009), *Digital Fundamentals*, Pearson Education

R. S. Sedha (2010), *A Text Book of Electronic Devices and Circuits*, S.Chand & Co. R. T. Paynter (2009), *Introductory Electronic Devices & Circuits – Conventional Flow Version*, Pearson Education.

**B. Tech. (common to all disciplines)-I/II Semester**  
**Contact Hours (L-T-P): 3-0-0**

DCO001A	Computer Programming in C++	3: 0:0	3
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**OBJECTIVE:**



- *To perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members*
- *To demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance*
- *To demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems*
- *To learn syntax and features of exception handling*
- *To demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using applets*

<b>UNIT 1</b>	C++ Overview, C++ Characteristics, Object-Oriented Terminology, Polymorphism, encapsulation ,inheritance, Object-Oriented Paradigm, Abstract Data Types, I/O Services, Standard Template Library, Standards Compliance, Functions and Variables. Declaration and Definition
<b>UNIT 2</b>	Variables: Dynamic Creation and Derived Data, Arrays and Strings in C++,Classes in C++, Defining Classes in C++, Classes and Encapsulation, Member Functions, Friend function ,Inline function
<b>UNIT 3</b>	Using Constructors, Multiple Constructors and Initialization Lists, Using Destructors to Destroy Instances, Using Destructors to Destroy Instances, Operator Overloading: operator overloading of unary and binary operator, Function Overloading, Working with Overloaded Operator Methods
<b>UNIT 4</b>	Constant and Static Class Members, Inheritance, Overview of Inheritance, Defining Base and Derived Classes, Single, Multiple, multilevel, hybrid hierarchical inheritance. Constructor and Destructor Calls in inheritance, virtual function, virtual base class,
<b>UNIT 5</b>	Input and Output in C++ Programs, Standard Streams, Manipulators, Unformatted Input and Output. Working with files.

### **Course Outcome (CO):**

At the end of this course, students will demonstrate ability to:

CO1: Understand object-oriented programming features in C++,

CO2: Apply these features to program design and implementation,

CO3: Develop applications using Object Oriented Programming Concepts.

CO4: Implement features of object oriented programming to solve real world problems.

CO5: Develop the ability to implement software in high-level programming language like C++

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M												M		
CO2			H		H									H	<u>L</u>
CO3			H		M				M		M		H		
CO4				L								M		L	

**Text Books**

1. *Let Us C: BalaGuruswamy, TATA McGraw Hill.*
2. *Programming with C, C++: Yashwant Kanetkar*

**Reference Books**

1. C++:The Complete Reference.
2. The C++ Programming Language:Bjarne Stroustrup

<b>DCH002A</b>	<b>Engineering Chemistry</b>	<b>3-0-0</b>
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**Objectives of Chemistry**

- 1.The purpose of this course is to emphasize the relevance of fundamentals and applications of chemical sciences in the field of engineering.
- 2.The courses have been conceived in such a way that they take into account appropriate combinations of old and new emerging concepts in the chemical sciences area and their current and potential uses in engineering.
- 3.The Course attempt to address the principles of general chemistry and specific topics relevant to various engineering disciplines, wherein the students can apply this learning in their respective areas of expertise.

<b>UNIT 1</b>	<p><b>Water and Analysis :</b> Types of impurities in Water, Hardness of Water, Disadvantages of Hard Water, Temporary and Permanent hardness. Units and inter conversions of Units. Estimation of hardness by EDTA Methods.. Methods of Treatment of Water for Domestic Purposes - Sedimentation, Coagulation, Filtration, Disinfection, Sterilization, Chlorination, Break point chlorination, Ozonization. Water for Industrial purpose, Water for Steam Making-Boiler Troubles, Carry Over, Priming and Foaming, Boiler Corrosion, Scales and Sludges, Caustic Embrittlement.</p> <p><b>Water Treatment:</b> Internal Treatment methods, Colloidal, Phosphate, Calgon,</p>
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	Carbonate, Sodium aluminate Conditioning of Water. External Treatment methods, Lime-Soda Process, Zeolite Process, Ion- Exchange Process, Numerical Problems on EDTA Methods and Lime-Soda process.
<b>UNIT 2</b>	<p><b>Fuels :</b>Classification of Fuels, Calorific value,Determination of calorific value of a solid and liquid fuel, Bomb &amp; Boy's Gas Calorimeter, Carbonization, Beehive Oven Method, Ottohaffman's Byproduct Method, Petroleum,Cracking- fluidized catalytic cracking. Reformation of petrol, Knocking, Octane number, Cetane number, Synthetic petrol, Bergius process and Fischer-Tropsch process.</p> <p><b>Lubricants:</b> Principles and function of lubricants - Types of Lubrication and Mechanism -Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants-Viscosity, flash and fire point, cloud and pour point, aniline point and Neutralization Number, Precipitation No.</p>
<b>UNIT 3</b>	<p><b>Electrochemistry and Corrosion</b></p> <p>Electrochemical Cell, EMF of Cell, Electrode potential. Electrochemical Series. Chemical (Dry) and Electrochemical(Wet) corrosion. Types of corrosion; stress corrosion, stress cracking, water line corrosion, bimetallic corrosion etc. Factors affecting corrosion, Protection from corrosion, Protective coatings, cathodic protection, sacrificial Anodic protection and modification in designs.</p>
<b>UNIT 4</b>	<p><b>Nano particles&amp; New engineering materials:</b> Terminology- scales of nano-systems- nanoparticles: introduction-atoms to molecules-quantum dots-shrinking of bulk materials to quantum dots. Different types of nanoparticles. Various approaches in nanoparticle synthesis Characterisation of nanomaterials : Important methods for the characterisation of nanomaterials Applications of nanomaterials :Catalysis, Electronics &amp; Telecommunication, Medicines, Composites, Energy sciences Molecular electronic devices, An Introduction to polymers for electronic industry, Organic conducting polymers</p>
<b>UNIT 5</b>	<p><b>Principles and Concepts of Green Chemistry:</b> Sustainable development, atom economy, reducing toxicity. Waste: production, problems and prevention. Green Synthesis and Catalysis; Environmentally benign processes,Green oxidation and photochemical reactions, Microwave and Ultrasound assisted reactions. Water as a reaction medium. Green chemistry in material science, synthesis of porous polymers, green nanotechnology.</p> <p>Green energy sources, efficiency and sustainability, energy from biomass and solid waste, Biofuels, alcohol, hydrogen production technology, biofuels from Jatropa. Industrial case studies.</p>

### Suggested Books

1. Engineering Chemistry by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004)
2. B.K. Sharma, "Engineering Chemistry", Krishna Prakasam Media (P) Ltd., Meerut, 2001.
3. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi(15 Edition) (2006).
4. An introduction to Electrochemistry by Samuel Glasstone, Affiliated east west press private Ltd.
5. C. N. R. Rao and A. Govindraj, Nanotubes and Nanowires, Royal Society of Chemistry
6. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd. 2007.
7. Text book of Engineering Chemistry by Shashi Chawala, Dhanpat Rai Publishing Company, 15th edition New Delhi (2004).
8. Green Chemistry: An Introductory Text: Edition 3 Author: Mike Lancaster

### **Course outcome**

CO-1 Students will be able to explain the impurities of water (mainly hardness) and boiler troubles and also different methods to remove hardness of water.

CO-2 Students will be able to analyze the basic knowledge of various types of Fuels, Lubricants their properties and Industrial Applications.

CO-3 Students will be able to understand relate electrochemistry and corrosion.

CO-4 Students will be able to understand about different types of nano materials and polymers

CO-5 Students will be able to understand the basic concept of Green chemistry and its emerging applications in Industries and for protection of environment.

### **Engineering Chemistry Lab-**

<b>DCH003A</b>	<b>Chemistry Lab</b>	<b>0-0-2</b>
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### **List of Experiments**

1. Determination of cell constant and conductance of solutions.
2. Calibration of pH meter and determination of pH of a solution
3. Identification of a drugs using thin layer chromatography (TLC) and Column chromatography
4. Estimation of total hardness of water-EDTA method
5. Estimation of dissolved oxygen by Winkler's method
6. Estimation of chloride in water

7. Estimation of fluoride content in water by SPANDANS method
8. Determination of the viscosity of a lubricating oil by using Redwood viscometer
9. Determination of the Flash & Fire point of a lubricating oil by using Pensky Martin's apparatus
10. Determination of the Cloud & pour point of a lubricating oil
11. Determination of wavelength of absorption maximum and colorimetric estimation of  $\text{Fe}^{3+}$  in solution
12. Flame photometric estimation of  $\text{Na}^+$  to find out the salinity in sand
13. Synthesis of polymers (a) Urea-formaldehyde resin (b) Phenol-formaldehyde resin and their characterization
14. Adsorption of acetic acid on charcoal and Isotherm study
15. Preparation of Biodiesel from vegetable oil

#### Suggested Books

1. Text book of Engineering Chemistry Practicals by Shashi Chawala, Dhanpat Rai Publishing Company, 15th edition New Delhi (2004).
2. Vogel's text book for quantitative analysis
3. Vogel's text book for qualitative analysis

	<b>ENGINEERING WORKSHOP</b>	<b>0-0-2(1)</b>
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#### DME010A - Mechanical Engineering Group

<b>Module 1 :</b> (Compulsory for Mechanical Engineering Students )	
	To Prepare a job on lathe machine by performing turning, facing and chamfering as per given drawing. To drill holes in metal sheet as per given drawing.
	To make a Square fit from the given mild steel pieces. To Prepare cylinder as per given drawing by using sheet metal working
	To Prepare a T-lap/Cross lap joint using carpentry.
	To Prepare a /butt joint in arc welding shop. To join and cut thin metal sheet with the help gas welding.
<b>Module 2 :</b> (Optional for All )	
	To prepare NC Part Programming for Given Drawing . To prepare the Job on CNC Milling M/C
	Fault Analysis of House hold Refrigerator Analysis of Air Conditioner of Air Conditioner

	Maintenance Service of Petrol Engine with assembly procedures. Maintenance Services of Diesel Engine with assembly procedures
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### **DEL010A - Electrical Engineering Group:**

Experiment 1: Dismantling and assembly of ceiling fan.

Experiment 2: Dismantling and assembly of geyser.

Experiment 3: Dismantling and assembly of blower.

Experiment 4: Dismantling and assembly of AC/refrigerator.

### **DEE002A - Electronics Engineering Group:**

Experiment 01	Electronics Work Bench Software-Designing of Electronic Circuits and PCB designing using software.
Experiment 02	Breadboard Circuit Designing -Circuit designing and to determine static resistance and dynamic resistance of p-n junction diode and plot the-I characteristics.
Experiment 03	Digital ICs- Verification of Truth table of basic & universal Logic Gates using Bread board and Integrated Circuits (ICs).
Experiment 04	C.R.O and Function Generator –To Generate a sine wave using a function generator and measure its amplitude and frequency using C.R.O.
Experiment 05	Digital Multimeter-Measurement of AC and DC voltage, current, capacitance and resistance using Digital Multimeter
Experiment 06	Observe output waveform of half wave rectifier with and without filter capacitor and measure DC voltage, DC current, ripple factor with and without filter capacitor.
Experiment 07	Observe output waveform of full wave rectifier with and without filter capacitor and measure DC voltage, DC current, ripple factor with and without filter capacitor.
Experiment 08	Designing of Bridge rectifier with and without filter capacitor and measure DC voltage, DC current, ripple factor with and without filter capacitor.
Experiment 09	Design a half wave rectifier using discrete components on a breadboard and measure DC voltage, DC current, ripple factor, with and without filter capacitor

Experiment 10	Design full wave rectifier using discrete components on a breadboard and measure DC voltage, DC current, ripple factor with and without filter capacitor.
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### DCO006A - Computer Science & Engineering Group:

1. Introduction to PC Hardware
  - a. RAM, ROM, Motherboard, SMPS, Processor
2. Hardware installation and assembly of PC
  - a. Desktop
  - b. Laptop
3. PC debugging, troubleshooting and Maintenance
4. Software installation and Configuration
  - a. Installation of operating System (Windows, Linux/UNIX, Server)
  - b. Basic utility and maintenance software
5. Working and functioning of different Buses, I/O Ports, graphic cards.
6. Installation of printer / modem /scanner and other input and output devices.
7. Configuring BIOS set up, Recovery, Preventive maintenance & Anti-Virus
8. Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool
9. Configuring and Practically implement Network Devices
  - a. Repeater
  - b. Hub
  - c. Switch
  - d. Bridge
  - e. Router
  - f. Gate Way
10. Install and Configure Wired and Wireless NIC and transfer files between systems in LAN and Wireless LAN.
11. Connect the computers in Local Area Network.
12. Transfer files between systems in LAN using FTP Configuration, install Print server in a LAN and share the printer in a network
13. Installation of Ms Office 200x.

### DCI007A - Civil Engineering Group:

#### Experiments

1. To study about measurement units, equipment and their application.
2. Drawing and setting out of a building (single room only) as per the given existing building/plan respectively.
3. Visual representation & identification of construction materials, equipment and building components.
4. Mixing, handling and placing of cement mortar and concrete.
5. Masonry, plastering and finishing of wall.
6. Application of wall putty and paint.
7. Application of base coat and laying of tile flooring of one square meter.
8. To study about installation of various water supply and sanitary fittings.
9. To determine pH, hardness and turbidity of the given sample of water.

#### Course Outcomes:



**At the end of this course, students will be able to:**

CO1: use conventional surveying tools such as chain/tape, compass, level in the field.

CO2: know about construction materials, equipment, components and their uses.

CO3: use of exterior materials on walls and floors.

CO4: install of various water supply and sanitary fittings.

CO5: find properties of water

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
<b>CO1</b>	H		H		H			M	H		M		H	H	
<b>CO2</b>	H	H		M	H	L			H			M	H	H	L
<b>CO3</b>	H	H		M				M	H		H		H	H	
<b>CO4</b>	H	H		M	H		M	M		L	H		H	L	
<b>CO5</b>	M	H	M		H			M	H		H	L	H	H	

H = Highly Related

M = Medium

L=Low

### **Cultural Education II**

**Common to all disciplines**

**Contact Hours (L-T-P): 2-0-0**

<b>L-T-P</b>	<b>DIN002A - Cultural Education II</b>	<b>Credits 2-0-0 2</b>
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#### **Objectives**

1. To make the students feel gratitude towards the rich religious and cultural heritage of India.
2. To understand the role of great personalities and movements in the progress of India.

#### **Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to acknowledge and appreciate the richness of Indian Culture

CO2: Ability to represent the culture ethics in real life

### **UNIT-I Holy Scriptures-II**

1. Bhagavad Gita and Life Management



2. Highlights of Indian Scriptures - Major Incidents and terms from various religious scriptures including Ramayana, Mahabharata, Guru Granth Saheb, Bible, Quran, Jain Scriptures, Bodh Scriptures
3. Historicity of Ramayana and Mahabharata

### **UNIT-II Society and Culture-II**

4. Indian Society: Its Strengths and Weaknesses
5. Health and Lifestyle related issues
6. Conservation of cultural heritage

### **UNIT-III India in Progress-II**

7. Role & Position of Women in Indian Society- Rituals like Sati, Dakin, Kanyavadh, Pardah, Devdasi, Child Marriage, Measures of Women Empowerment including Education, Constitutional and other Rights
8. Indian Models of Economy, Business and Management

### **UNIT-IV Great Indian Personalities-II**

9. Life and works of the Great People of India- Raja Ram Mohan Roy, Swami Vivekanand, Madan Mohan Malviya, Ishwarchand VidyaSagar, Jyotiba Phule, Homi Bhabha, B.R. Ambedkar, Mahatma Gandhi, Chandra Shekhar Aazad, Abdul Hamid, Badshah Khan, Bhagat Singh, Ashfaqullah, Vir Sawarkar, Vir Banda Bahadur, Vir Haqiqat Rai, Subhash Chandra Bose, Mother Teresa, Jagdish Chandra Basu, JRD Tata, Ratan Tata, Dada Saheb Phalke, Major Dhyan Chand, A P J Abdul Kalam, Kailash Satyarthi, Aruna Roy, Mahasweta Devi, Udaya Kumar, Narayan Murthy, Azim Premji

\*Each student shall write a detailed Report/ Critique on one topic from section -A to C and one Great Personality from Section- D leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce by a committee of teachers.

### **Suggested Reading:**

1. Glory of Indian Culture (English) Paperback by Giriraj Shah
2. Historicity of Vedic and Ramayan Eras: Scientific Evidences from the Depths of Oceans to the Heights of Skies by Saroj Bala , Kulbhushan Mishra

### **References**

<https://knowindia.gov.in/culture-and-heritage/lifestyle-values-and-beliefs.php>

<b>DCO002A</b>	<b>Computer Programming in C++Lab</b>	<b>0:0:2</b>
<b>1 Credit</b>		

1. Write a program for understanding of C++ program structure without any CLASS declaration. Program may be based on simple input output, understanding of keyword using.
2. Write a Program to Understand Structure & Unions.
3. Write a C++ program to demonstrate concept of declaration of class with public & private member, constructors, object creation using constructors, access restrictions, defining member functions within and outside a class. Scope resolution operators, accessing an object's data members and functions through different type of object handle name of object, reference to object, pointer to object, assigning class objects to each other.
4. Write a Program, involving multiple classes (without inheritance) to accomplish a task & demonstrate composition of class.
5. Write a Program to Demonstrate Friend function, classes and this pointer.
6. Write a Program to Demonstrate Inline functions.
7. Write a Program to Demonstrate pointers to derived classes.
8. Write a Program to demonstrate dynamic memory management using new & delete & static class members.
9. Write a Program to demonstrate an operator overloading, operator functions as member function and/ or friend function, overloading stream insertion and stream extraction, operators, overloading operators etc.
10. Write a Program to demonstrate use of protected members, public & private protected classes, multilevel inheritance etc.
11. Write a Program for multiple inheritance, virtual functions, virtual base classes, abstract classes
12. Write a Program to Demonstrate use of Constructors and Destructors.
13. Write a Program to Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism.

<b>L-T-P</b>	<b>DLW005A – A Professional's Approach to Law and Ethics</b>	<b>Credits: 3</b>
<b>3-0-0</b>		

❖ **Course overview:**

This course is structured keeping in mind the need to familiarize the learners with various laws they would be required to apply in their professional life on a day-to-day basis. The contents of the course are divided into lessons that deal with various areas of law, such as:

- Study of professional ethics
- Insights into law of contract
- Study on dispute resolution
- Study on labour laws
- Study on Intellectual Property Rights and Taxation.
- Insights into basic laws governing companies.

❖ **Course Objectives:**

The Course aims addressing the following aspects:

- to enable learners to make informed ethical and legal choices in their professional capacity.
- to sensitize the learners to the legal and ethical issues that may arise during the course of their employment.
- To provide adequate exposure to the various laws that are relevant in their day-to-day professional life.

❖ **Syllabus:**

**General Principles of Contracts Management:**

Performance, Joint Liabilities, Impossibility, Excusable Non-performance and Doctrine of Frustration. Breach of Contract, Consequences, Remedies and different forums for Enforcement of Contract. Performance, Joint Liabilities, Impossibility, Excusable Non-performance and Doctrine of Frustration.

**Professional Ethics, Arbitration and Mediation:**

Evolution and Salient Provisions of the Arbitration Act. Salient Features of Arbitration: Notice invoking arbitration, Eligibility of an arbitrator, Seat vs Venue, Challenging the Arbitral Award. Alternate Dispute Resolution methods and Confidentiality.

Resource Allocation and Resource Levelling, Case Study on Schedule Compression, PERT to Predict the Probability of Project Completion.

**Corporate and Commercial Laws:**

Definitions and Terms under Company Law, and authentication of contracts. Company Act and the Landmarks under this act. Basic Definitions and Terms under Insolvency Code and Corporate Insolvency Resolution Process (CIRP). Competition Law, Anti-Competitive agreements and abuse of dominant position

**Taxation, Labour Laws:**

Basic terms under Income Tax Act and Sources of Income. Overview of (Foreign Exchange Management Act) FEMA, Foreign Trade Policy and other Special Scenarios.

Industrial Disputes Act, Building and Other Construction Workers Act. Social Security Laws and Health and Safety Laws.

**Environmental Protection laws, IPR:**

Overview of Environmental Laws in India, Environment Impact Assessment and understanding Sustainable Development, Overview of International Conventions on Environment Protection.

An Introduction to Intellectual Property Law, Copyrights and Trademarks, General legal recourse for Copyright infringement, Trademark infringement, Design infringement and IP Issues, Software and Business Method Patenting in India & in other Jurisdictions.

**Non Credit Course**

<b>DCH001A</b>	<b>Environmental Sciences</b>	<b>2-0-0</b>	<b>0</b>
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**The objectives of Environment science are to-**

1. Create an awareness about environmental problems among students
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate public through students to participate in environment protection and environment improvement.
5. Acquiring skills to help the concerned individuals in identifying and solving environmental problems.

<b>UNIT 1</b>	<b>The Multidisciplinary Nature of Environmental Studies:</b> The Multidisciplinary Nature of Environmental Studies Definition, scope and importance need for public awareness.
<b>UNIT 2</b>	<p><b>Natural Resources Renewable and Non-renewable Resources:</b> •Natural resources and associated problems.</p> <p>(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.</p> <p>(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.</p> <p>(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.</p> <p>(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, Case studies. (e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.</p> <p>(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.</p> <p>• Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.</p>
<b>UNIT 3</b>	<p><b>Ecosystems, Biodiversity and Its Conservation:</b> •Concept of an ecosystem.</p> <p>•Structure and function of an ecosystem.</p> <p>•Producers, consumers and decomposers.</p> <p>•Energy flow in the ecosystem. Ecological succession.</p> <p>•Food chains, food webs and ecological pyramids.</p> <p>•Introduction, types, characteristic features, structure and function of the following ecosystem: (a) Forest ecosystem (b) Grassland ecosystem (c) Desert</p>

	<p>ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)</p> <p><b>Biodiversity and Its Conservation</b></p> <ul style="list-style-type: none"> <li>• Introduction, definition: genetic, species and ecosystem diversity.</li> <li>• Biogeographical classification of India.</li> <li>• Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.</li> <li>• Biodiversity at global, National and local levels.</li> <li>• India as a mega-diversity nation. Hot-spots of biodiversity.</li> <li>• Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.</li> <li>• Endangered and endemic species of India.</li> <li>• Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.</li> </ul>
<b>UNIT 4</b>	<p><b>Environmental Pollution:</b> • Definition, Causes, effects and control measures of</p> <p>(a) Air pollution                      (b) Water pollution                      (c) Soil pollution  (d) Marine pollution      (e) Noise pollution                      (f) Thermal pollution  (g) Nuclear hazards</p> <ul style="list-style-type: none"> <li>• Solid waste management: Causes, effects and control measures of urban and industrial wastes.</li> <li>• Role of an individual in prevention of pollution. • Pollution case studies.</li> <li>• Disaster management: Floods, earthquake, cyclone and landslides.</li> </ul>
<b>UNIT 5</b>	<p><b>Social Issues and the Environment, Human Population and the Environment, Field Work:</b> • From unsustainable to sustainable development.</p> <ul style="list-style-type: none"> <li>• Urban problems related to energy.</li> <li>• Water conservation, rain water harvesting, watershed management.</li> <li>• Resettlement and rehabilitation of people; its problems and concerns. Case studies.</li> <li>• Environmental ethics: Issues and possible solutions.</li> <li>• Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.</li> <li>• Wasteland reclamation.</li> <li>• Consumerism and waste products.</li> <li>• Environment Protection Act.</li> <li>• Air (Prevention and Control of Pollution) Act.      • Water (Prevention and Control of Pollution) Act.</li> <li>• Wildlife Protection Act.                      • Forest Conservation Act.</li> <li>• Issues involved in enforcement of environmental legislation.</li> <li>• Public awareness.</li> </ul> <p><b>Human Population and the Environment</b></p> <ul style="list-style-type: none"> <li>• Population growth, variation among nations.</li> <li>• Population explosion—Family Welfare Programme.</li> <li>• Environment and human health.</li> <li>• Human rights.</li> </ul>

	<ul style="list-style-type: none"> <li>•Value education.</li> </ul> <p>HIV/AIDS.</p> <ul style="list-style-type: none"> <li>• Women and Child Welfare. •Role of Information Technology in environment and human health.</li> </ul> <p><b>Field Work</b></p> <ul style="list-style-type: none"> <li>• Visit to a local area to document environmental assets—river/forest/grassland/hill/ mountain.</li> <li>• Visit to a local polluted site—Urban/Rural/Industrial/Agricultural.</li> <li>• Study of common plants, insects, birds.</li> <li>•Study of simple ecosystems—pond, river, hill slopes, etc.</li> </ul> <p>(Field work equal to <b>5 lecture hours</b>) • Case Studies.</p>
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### **Course Outcome (CO)**

**After the completion of the course, student will be able to:**

**CO-1:** Recognize the history, structure, function, interactions and trends of key socio-environmental systems on personal, organizational and intellectual level regarding our surroundings through different media.

**CO-2:** Examine the generation of scientific knowledge and how that knowledge is presented, evaluated, framed and applied for environmental protection by conservation of Natural resources.

**CO-3:** Articulate a coherent philosophy of the environment and consider ethical bases for responding to environmental questions.

**CO-4:** Understand the role of conservation of resources and public awareness in prevention of pollution and ultimately for the sustainable development of society.

**CO-5:** Understand the social responsibility towards protection of environment and society

### **CO/PO Mapping**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO-1	H	M	H	H	H	H	M
CO-2	M	H	H	M	M	H	M
CO-3	M	H	H	L	H	H	H
CO-4	M	M	H	M	H	H	H
CO-5	H	H	H	H	H	H	H

<b>L-T-P</b>	<b>DEN003A- LIFE SKILLS I</b>	<b>CREDITS: 2</b>
<b>1-0-2</b>		

### **COURSE OBJECTIVE**

- To prepare the students as per the industry demands.
- Switching to Activity and Task based Teaching modules.
- To focus on the linguistic aspects in relation to life situations.
- Facilitating the aspects of behavioral skills in language.
- Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
- Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

#### **UNIT 1**

- Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion
- Basics of Narrating and describing things

#### **UNIT 2**

- Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview

#### **UNIT 3**

- CV/Resume Drafting and HR Interview advance theory
- Basics of Video Interviews and Video Profiles for Job
- Types of listening, advantages and disadvantages

#### **UNIT 4**

- Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report



**UNIT 5** Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc

<b>L-T-P</b>	<b>DIN003A - VALUE EDUCATION AND ETHICS I</b>	<b>CREDITS: 1</b>
<b>1-0-0</b>		

### **COURSE OBJECTIVE**

- To give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.
- Making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

#### **Lessons from the Ramayana**

Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

#### **Lessons from the Mahabharata**

Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

#### **Lessons from the Upanishads**

Introduction to the Upanishads: Sruti versus Smrti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, SatyakamaJabala, Aruni, Shvetaketu.

#### **Message of the Bhagavad Gita**

Introduction to Bhagavad Gita – Brief storyline of Mahabharata - Context of Kurukshetra War – The anguish of Arjuna – Counsel by Sri. Krishna – Key teachings of the Bhagavad Gita – Karma Yoga, Jnana Yoga and Bhakti Yoga - Theory of Karma and Reincarnation – Concept of Dharma – Concept of Avatar - Relevance of Mahabharata for modern times.

#### **Life and Message of Swami Vivekananda**

Brief Sketch of Swami Vivekananda's Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji's life.



### **Life and Teachings of Spiritual Masters India**

Sri Rama, Sri Krishna, Sri Buddha, AdiShankaracharya, Sri Ramakrishna Paramahansa, Swami Vivekananda.

### **Insights into Indian Arts and Literature**

The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

\*Each student shall write a detailed Report/ Critique on one topic leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will be required to make a Power Point Presentation on the learning and face Viva-voce. Alternatively a Student may undertake a Project on any one of the topics and submit a detail Project Report leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. If the topic is related to Performing Arts including Yoga, the performance on stage may be given instead of PPT. In case of Fine Arts, an exhibition or a portfolio may be presented in place of PPT.

**On the basis of the above points, a panel of experts from the department will award the credits.**

### **Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to acknowledge and appreciate the ethical beauty of India

CO2: Ability to incorporate the values of human lives in real life applications

<b>L-T-P</b>	<b>BES016A- Solid Mechanics</b>	<b>Credits:4</b>
<b>3-1-0</b>		

### **Course Objective:**

- To gain knowledge of simple stresses, strains and deformation in components due to external loads.
- To assess stresses and deformations through mathematical models of beams twisting bars or combinations of both.
- Effect of component dimensions and shape on stresses and deformations are to be understood.
- The study would provide knowledge for use in the design courses

### **Unit-I Introduction to Simple Stress and Strain**

**(8 Hours)**

Introduction of mechanics, definition of strength of materials, deformable body concept, Loads and their classification. Stresses, unit, difference between stress and pressure, classification and

brief discussion. Strain, classification and brief discussion, elastic constant, elastic constant relationship.

Stress vs strain diagram for different material, Strain energy principle, material properties such as resilience, proof resilience, modulus of resilience, toughness, hardness, ductility, malleability, brittleness, difference between hardness and brittleness.

Principal of superposition Bars in series and parallel, bars fixed at both the ends, Thermal stresses and strains.

## **Unit-II Compound Stresses and Strains**

**(8 Hours)**

Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain. Relationship between elastic constants.

## **Unit-III Analysis of Beams**

**(8 Hours)**

Beam, type of beams, Supports reaction, shear force and bending moment, sign convention, relationship between rate of loading, shear force and bending moment, Shear force and Bending Moment diagram for Cantilever, Simply supported and Overhanging beams.

Theory of Pure bending, derivation and analysis of pure bending equation, Effect of cross sectional shape on beam strength, Shear stresses in beams.

## **Unit-IV Analysis of Pure Torsion**

**(8 Hours)**

Pure torsional couple, derivation of pure torsion equation, analysis of pure torsion equation. Torsional shear stress distribution, shear stresses in solid and hollow shaft.

Shaft/ circular bars in series, parallel and fixed in both the ends. Strain energy in circular bar due to torsion. Application to close-coiled helical springs – Maximum shear stress in spring section including Wahl's Factor – Deflection of helical coil springs under axial load

## **Unit-V Deflection of Beam**

**(8 Hours)**

Elastic curve of Neutral axis of the beam under normal loads – Evaluation of beam deflection and slope: Double integration method, Macaulay Method, and Moment area Method, Strain Energy Method

Thin and Thick cylindrical and spherical shells, Deformation in thin cylindrical and spherical shells, Concept of Auto-fritage and Wire Binding, Theories of Failure.

**Course Outcomes:** After learning the course the students should be able to:-

- CO1. Apply the principles of equilibrium, superposition, and compatibility to estimate the stress-strain behavior of linear elastic solids under axial and torsional loading
- CO2. Analyze stresses at inclined planes and construct Mohr's circle to predict the principal and maximum shear planes and apply the theories of failure
- CO3. Construct shear force and bending moment diagrams, to estimate the bending stress distribution in beams of various cross sections

- CO4. Apply torsion equation to find torsional stresses in circular shafts in series and parallel.  
 CO5. Use different analytical method to find deflection in beam of various cross section under bending.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO 1	PO2	PO3	PO4	PO5	PO6	PO 7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PS O2
CO1	H	M	M	H			M					H	M	M
CO2	H	M	M			L			L	M		M		
CO3	M	L	H	M			H			L		M	L	M
CO4	H	M	L	M		L			L	L			M	
CO5	H	M	L	M		L			L	L			M	

H = Highly Related; M = Medium L = Low

**Text Books:**

1. Rattan S.S., Strength of Materials, Publisher, Tata McGraw-Hill Education, 2008.

**Reference Books:**

1. Nash W.A, "Theory and problems in Strength of Materials", Schaum Outline Series, McGraw-Hill Book Co, New York, 1995
2. Ryder G.H, "Strength of Materials, Macmillan India Ltd", Third Edition, 2002
3. Timoshenko S.P, "Elements of Strength of Materials", Tata McGraw-Hill, New Delhi, 1997.

<b>L-T-P</b>	<b>BES017A- THERMODYNAMICS</b>	<b>CREDITS:4</b>
<b>3-1-0</b>		

**COURSE OBJECTIVE**

To present a comprehensive and rigorous treatment of classical thermodynamics while retaining an engineering perspective. To lay the groundwork for subsequent studies in such

fields as Fluid mechanics, Heat transfer, IC Engine and to prepare the students to effectively use thermodynamics in the practice of engineering.

### **UNIT-I Fundamental Concepts:**

**(7 Hours)**

Macroscopic and Microscopic Approach, Thermodynamic systems - closed, open and isolated. Surrounding and Boundary, Thermodynamic Property, Thermodynamic Equilibrium, state, path, processes and cycles, Quasi-static process, Concept of temperature, Thermodynamic Work and Heat, work transfer to different processes. Zeroth law of thermodynamics, Concept of ideal and real gases.

### **UNIT-II First Law of Thermodynamics:**

**(8 Hours)**

Energy and its Forms, Concepts of Internal Energy, First Law of Thermodynamics, Specific Heat Capacities, Enthalpy. Perpetual Motion Machine of First Kind, 1st Law Applied to Non-Flow Process, Steady Flow Process & Transient Flow Process. Steady-Flow Engineering Devices, Limitations of First Law.

### **UNIT-III Second Law of Thermodynamics:**

**(8 Hours)**

Thermal Reservoir Heat Source and Sink, Heat Kelvin- Planck and Clausius Statements, Heat Engine, efficiency of Heat Engine, Refrigerator and Heat Pump, COP, Perpetual Motion Machine of Second Kind, Carnot Cycle, the Carnot Theorem and its Corollaries, the thermodynamic temperature scale. Reversible and irreversible processes,

### **UNIT-IV Entropy principle:**

**(8 Hours)**

Clausius inequality, concept of entropy, entropy principle, Temperature Entropy Plot, Entropy Change in Different Processes, Introduction to Third Law of Thermodynamics. Available energy , Availability, Irreversibility, Thermodynamic Relations: Tds Relations, Enthalpy and Internal Energy as a Function of Independent Variables, Specific Heat Capacity Relations, Clapeyron Equation, Maxwell Relations.

### **UNIT-V Properties of Pure Substance:**

**(8 Hours)**

Properties of pure substances. Thermodynamic properties of pure substances in solid, liquid and vapour phases. Phase rule, P-V, P-T, T-V, T-S, H-S diagrams, Properties of Dry, Wet and Superheated Steam, Property Changes during Steam Processes and Measurement of Dryness Fraction of Steam.

### **Text Books::**

1. Nag.P.K., “Engineering Thermodynamics”, Tata McGraw-Hill, New Delhi 2020.

### **Reference Books:**

1. YunusCengel and Michael Boles, “Thermodynamics (SI Units)”, 7th Edition, Tata McGraw Hill, 2012
2. Moran, M. J., Shapiro, H. N., Boettner, D. D., & Bailey, M. Fundamentals of Engineering Thermodynamics: John Wiley & Sons. 2008

3. Engineering Thermodynamics Third Edition SI Units Version Engineering Series R. K. Rajput 2016

**Course Outcomes:** After learning the course the students should be able to:-

- CO1. Students will be able to analyze and evaluate various thermodynamic cycles used for energy production - work and heat, within the natural limits of conversion  
 CO2. Formulate the first law of thermodynamics for a closed systems and arrange the change in energy in the closed systems via heat and work transfer  
 CO3. Analyze the problems on heat engines, refrigeration and entropy by applying second law of thermodynamics  
 CO4. Apply the principle of increase of entropy to evaluate the feasibility of a thermodynamic process, and third law of thermodynamics.  
 CO5. Illustrate the T-v, P-T diagrams and P-v-T surfaces of pure substances., Applying, Analyze the processes on T-v diagrams to solve advanced engineering problems

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	H	M	L	M	L		L		L			M	H	M	
CO2	H		M	M		L	L			M			M		L
CO3	H		L		M	L			L			H		M	
CO4	H	M	M					L					M		
CO5	M	M	L		M			L					H	H	M

H = Highly Related; M = Medium L = Low

<b>-T-P</b>	<b>BES018A - Engineering Materials</b>	<b>CREDITS:3</b>
3-0-0		

**Prerequisite:** Engineering Physics and Engineering Chemistry.

**COURSE OBJECTIVE:**

- Give an introduction to metals, ceramics and polymeric materials in the context of a molecular level understanding of bonding.

- Give the beginning student an appreciation of recent developments in materials science & engineering within the framework of this class.

### **UNIT-I Basic crystallography and crystal structures**

**07 Hrs**

Atomic structure and inter-atomic bonding, Crystal systems, Bravais lattice, Space lattice, Lattice Structure, unit cells, Co-ordination number, atomic packing factor, Structure of crystalline solids, Indexing of directions and planes, Inter-planar spacing and angles.

### **UNIT-II Crystal defects and their significance**

**08 Hrs**

Point defects and their role in materials processing, performance and failure. Point defects: thermodynamics, Schottky and Frenkel defect. Dislocations, Burgers vector, types of dislocations, Dislocation movement, slip systems. Planar defects: stacking faults, grain boundaries (low angle and high angle), Twinning. Surface defects, non-equilibrium structures such as metallic glasses.

### **UNIT-III Mechanical Properties**

**08 Hrs**

Mechanical Properties of Materials, Concepts of stress and strain, Stress-Strain diagrams, Properties obtained from the Tensile test, Elastic deformation, Plastic deformation. Impact Properties, Strain rate effects and Impact behaviour. Hardness of materials.

### **UNIT-IV Phase Diagram**

**10 Hrs**

Introduction to Solid Solution, Hume-Rothery rule, Solid-solution Strengthening mechanism, Phase, Gibbs' Phase rule, Equilibrium and Non-Equilibrium diagrams, Classification of Equilibrium phase diagrams, Iron-carbon equilibrium diagram. Classification of Non-Equilibrium phase diagrams (TTT & CCT). Heat Treatment: Various types of heat treatment processes such as Annealing, Normalizing, Quenching, Tempering and Case hardening.

### **UNIT-V Ceramics and Composite**

**07 Hrs**

Introduction of Ceramic Materials, ceramic structures, silicate structures, processing of ceramics, Properties of ceramics, Glasses, Introduction of Composite Materials, development routes of composite materials, Natural and synthetic Composites. Classification of Composite (MMC, CMC, PMC), Properties and Applications.

**Course Outcomes:** After learning the course the students should be able to:

<b>Course Outcomes</b>	<b>Statement</b>	<b>Bloom's Knowledge Level</b>
<b>CO1</b>	Analyze the structure of materials and basic concepts of materials like unit cell, FCC, BCC, HCP, etc.	Analyze
<b>CO2</b>	Develop a basic understanding of the structure-property relationship of a variety of materials	Apply
<b>CO3</b>	Describe and discriminate concept of mechanical behavior of materials	Evaluate

- CO4** Understand how to tailor material properties of ferrous and non-ferrous alloys. Construction and identification of phase diagrams and reactions to create desired microstructure. **Create**
- CO5** Describe metals, ceramics, polymers, and their composite materials. **Evaluate**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H				L							H		L	
CO2	M		L			M					L		L		
CO3	M		H		H				H			M		M	
CO4	L		M			L		M		L					L
CO5	L	M		M			L			L		L	M		

H = Highly Related; M = Medium L = Low

**Text Books:**

1. Raghavan V. - Materials Science & Engineering - Phi Learning Pvt ltd.

**References Books:**

1. W.D. Callister, Jr.- Material Science and Engineering – John Wiley& sons Inc.
2. K.G. Budinski- Engineering Materials – Properties and Selection –PHI Learning Pvt. Ltd

<b>L-T-P</b>	<b>BME131A- Mechanisms &amp; Machines</b>	<b>CREDITS: 4</b>
<b>3-1-0</b>		

**COURSE OBJECTIVE:**

- This is an introductory course on mechanism. Students will gain exposure to various methods of analysis and synthesis of mechanisms.

**UNIT-I: Introduction of Four Bar chains mechanism**

**(12 Hours)**

Introduction- General Concepts, Introduction of Simple mechanism, Different types of Kinematics pair, Grublers rule for degree of freedom, Grashof's Criterion for mobility determination. Inversions of 3R-P, 2R-2P chains.

**UNIT-II: Kinematic & Dynamic Analysis of Four Bar chains mechanism**

**(10 Hours)**



Kinematic Analysis- Concepts of vectorial analysis. Velocity and Acceleration Analysis of planar mechanisms.

Dynamic Analysis- Slider-crank mechanisms, turning moment computations.

### UNIT-III: Gears

(10 Hours)

Gears- Geometry of tooth profiles, Law of gearing, Involute profile, interference, helical, spiral and worm gears, simple, compound gear trains. Epicyclic gear trains – Analysis by tabular and relative velocity method, fixing torque.

### UNIT-IV: Governors

(10 Hours)

Governors Terminology, Centrifugal governors-Watt governor, Dead weight governors-Porter & Proell governor, Spring controlled governor-Hartnell governor, Sensitivity, Stability, Hunting, Isochronism, Effort and Power of governor, Controlling force diagrams for Porter governor and Spring controlled governors

### UNIT-V: Gyroscopes

(10 Hours)

Gyroscopes : Gyroscopic Motion Principles, Gyroscopic torque, Effect of gyroscopic couple on the stability of aero planes, naval ships & automobiles.

#### Text Book:

1. Rattan.S.S., “Theory of Machines”, McGraw-Hill Education (India) Pvt. Ltd.”, IV Edition 2017.

#### References Books:

1. Wilson, Charles E., “ Kinematics and dynamics of machinery” Pearson Education, 2008
2. R.L. Narton , “Kinematics and dynamics of machinery”, McGraw-Hill Education (India) Pvt. Ltd.”, 2009.

**Course Outcomes:** After learning the course the students should be able to:-

CO1. Analyze various inversion of mechanism.

CO2. Describe the kinematic and dynamic study of motion in four bar chain mechanism.

CO3. Analyze motion transmission elements like gears, gear trains.

CO4. Describe the concepts of governors, its force analysis and related terminologies.

CO5. Describe the concepts of gyroscope, its force analysis and related terminologies.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	L	M							H				M	
CO2		M		H										L



CO3	H					H								
CO4		L		M					L					H
CO5	M	L		M					L					H

H = Highly Related; M = Medium L = Low

<b>L-T-P</b>	<b>DMA003A– Life Skills - 2 (Aptitude)</b>	<b>Credits: 2</b>
<b>1-0-2</b>		

### Course Objectives

1. Students will be able to interpret and communicate quantitative information and mathematical and statistical concepts using language appropriate to the context and intended audience.
2. Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
3. Students will be able to reason, model, and draw conclusions or make decisions with mathematical, statistical, and quantitative information.
4. Students will be able to critique and evaluate quantitative arguments that utilize mathematical, statistical, and quantitative information.
5. Students will be able to use appropriate technology in a given context.

### Syllabus: Theory

#### UNIT 1 Number System:

- a. Number system
- b. Power cycle
- c. Remainder cycle
- d. Factors, Multiples
- e. HCF and LCM

#### UNIT 2 Data Arrangements and Blood Relations:

- a. Linear Arrangement
- b. Circular Arrangement
- c. Multi-dimensional Arrangement
- d. Blood Relations

#### UNIT 3 Time and Work:

- a. Work with different efficiencies
- b. Pipes and cisterns
- c. Work equivalence
- d. Division of wages

#### UNIT 4 Coding & Decoding, Series, Analogy, Odd Man Out and Visual Reasoning:

- a. Coding and Decoding
- b. Series
- c. Analogy
- d. Odd Man Out
- e. Visual Reasoning
- UNIT 5 Percentages, Simple Interest and Compound Interest:**
  - a. Percentages as Fractions and Decimals
  - b. Percentage Increase / Decrease
  - c. Simple Interest
  - d. Compound Interest
  - e. Relation Between Simple and Compound Interest
- UNIT 6 Permutation, Combination and Probability:**
  - a. Fundamental Counting Principle
  - b. Permutation and Combination
  - c. Computation of Permutation
  - d. Circular Permutations
  - e. Computation of Combination
  - f. Probability
- UNIT 7 Data Interpretation and Data Sufficiency:**
  - a. Data Interpretation – Tables
  - b. Data Interpretation - Pie Chart
  - c. Data Interpretation - Bar Graph
  - d. Data Sufficiency
- UNIT 8 Profit and Loss, Partnerships and Averages:**
  - a. Basic terminologies in profit and loss
  - b. Partnership
  - c. Averages
  - d. Weighted average
  - e. Mixtures and allegations

## Methodology for Evaluation

1. Internal Assessment
  - a) Class/ Home Assignments (Minimum One from each Unit) : 30 Marks
  - b) In Semester Tests (Minimum two) : 30 Marks
2. Term End : 40 Marks

\*Note: Minimum one class assignment shall be given in each turn in the Lab which will be attempted by the students in the class itself and evaluated by the end of the day. Balance work shall be completed at home and submitted at the beginning of the next turn in Lab.

## Suggested Reading:

1. Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;
2. The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;
3. How to Ace the Brainteaser Interview, by John Kador, Mc Graw Hill Publishers.
4. Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
5. Quicker Maths, by M tyra& K Kundan, BSC Publishing Co. Pvt. Ltd., Delhi;
6. Owl Purdue University online teaching resources.

### **Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Demonstrate procedural fluency with real number arithmetic operations and use those operations to represent real-world scenarios and to solve stated problems. Demonstrate number sense, including dimensional analysis and conversions between fractions, decimals, and percentages. Determine when approximations are appropriate and when exact calculations are necessary.

CO2: Solve linear equations, graph and interpret linear models, and read and apply formulas. Demonstrate a basic understanding of displays of univariate data such as bar graphs, histograms, dotplots, and circle graphs, including appropriate labeling.

CO3: Take charge of their own learning through good classroom habits, time management, and persistence. Participate in the classroom community through written and oral communication.

<b>L-T-P</b>	<b>DIN004A-Value Education and Ethics II</b>	<b>Credits: 1</b>
<b>1-0-0</b>		

### **Course Objectives**

1. To give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.

2. Making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

### **Yoga and Meditation**

The objective of the course is to provide practical training in YOGA ASANAS with a sound theoretical base and theory classes on selected verses of Patanjali's Yoga Sutra and Ashtanga Yoga. The coverage also includes the effect of yoga on integrated personality development.

### **Rajasthan Mural Art and Painting**

Mural painting is an offshoot of the devotional tradition in Rajasthan. A mural is any piece of artwork painted or applied directly on a wall, ceiling or other large permanent surface. In the

contemporary scenario Mural painting is not restricted to the permanent structures and are being done even on canvas. Rajasthani mural paintings are the frescos depicting mythology and legends, which are drawn on the walls of temples, principally in Rajasthan. Ancient temples and tourists places in different States of Rajasthan, display an abounding tradition of mural paintings mostly dating back between the 9th to 12th centuries when this form of art enjoyed Royal patronage. Learning Mural painting through the theory and practice workshop is the objective of this course.

### **Course on Organic Farming and Sustainability**

Organic farming is emerging as an important segment of human sustainability and healthy life. 'Haritamritam' is an attempt to empower the youth with basic skills in tradition of organic farming and to revive the culture of growing vegetables that one consumes, without using chemicals and pesticides. Growth of Agriculture through such positive initiatives will go a long way in nation development. It is a big step in restoring the lost harmony of nature.

### **Benefits of Indian Medicinal Systems**

Indian medicinal systems are one of the most ancient in the world. Even today society continues to derive enormous benefits from the wealth of knowledge in Ayurveda of which is recognised as a viable and sustainable medicinal tradition. This course will expose students to the fundamental principles and philosophy of Ayurveda and other Indian medicinal traditions.

### **Traditional Fine Arts of India**

India is home to one of the most diverse Art forms world over. The underlying philosophy of Indian life is 'Unity in Diversity' and it has led to the most diverse expressions of culture in India. Most art forms of India are an expression of devotion by the devotee towards the Lord and its influence in Indian life is very pervasive. This course will introduce students to the deeper philosophical basis of Indian Art forms and attempt to provide a practical demonstration of the continuing relevance of the Art.

### **Science of Worship in India**

Indian mode of worship is unique among the world civilisations. Nowhere in the world has the philosophical idea of reverence and worshipfulness for everything in this universe found universal acceptance as it in India. Indian religious life even today is a practical demonstration of the potential for realisation of this profound truth. To see the all-pervading consciousness in everything, including animate and inanimate, and constituting society to realise this truth can be seen as the epitome of civilizational excellence. This course will discuss the principles and rationale behind different modes of worship prevalent in India

### **Insights into Indian Classical Music**

The course introduces the students into the various terminologies used in Indian musicology and their explanations, like Nadam, Sruti, Svaram – svara nomenclature, Stayi, Graha, Nyasa, Amsa, Thala,- Saptatalas and their angas, Shadangas, Vadi, Samavadi, Anuvadi. The course takes the students through Carnatic as well as Hindustani classical styles.

### **Insights into Traditional Indian Painting**

The course introduces traditional Indian paintings in the light of ancient Indian wisdom in the fields of aesthetics, the Shadanga (Six limbs of Indian paintings) and the contextual stories from

ancient texts from where the paintings originated. The course introduces the painting styles such as Madhubani, Kerala Mural, Pahari, Cheriya, Rajput, Tanjore etc.

### **Insights into Indian Classical Dance**

The course takes the students through the ancient Indian text on aesthetics the Natyasastra and its commentary the AbhinavaBharati. The course introduces various styles of Indian classical dance such as Bharatanatyan, Mohiniyattam, Kuchipudi, Odissi, Katak etc. The course takes the students through both contextual theory as well as practice time.

### **Indian Martial Arts and Self Defense**

The course introduces the students to the ancient Indian system of self-defense and the combat through various martial art forms and focuses more on traditional Kerala's traditional KalariPayattu. The course introduces the various exercise technique to make the body supple and flexible before going into the steps and techniques of the martial art. The advanced level of this course introduces the technique of weaponry.

### **Social Awareness Campaign**

The course introduces the students into the concept of public social awareness and how to transmit the messages of social awareness through various media, both traditional and modern. The course goes through the theoretical aspects of campaign planning and execution.

### **Organic Farming in Practice**

Organic agriculture is the application of a set of cultural, biological, and mechanical practices that support the cycling of farm resources, promote ecological balance, and conserve biodiversity. These include maintaining and enhancing soil and water quality; conserving wetlands, woodlands, and wildlife; and avoiding use of synthetic fertilizers, sewage sludge, irradiation, and genetic engineering. This factsheet provides an overview of some common farming practices that ensure organic integrity and operation sustainability.

### **Ayurveda for Lifestyle Modification**

Ayurveda aims to integrate and balance the body, mind, and spirit which will ultimately leads to human happiness and health. Ayurveda offers methods for finding out early stages of diseases that are still undetectable by modern medical investigation. Ayurveda understands that health is a reflection of when a person is living in harmony with nature and disease arises when a person is out of harmony with the cycles of nature. All things in the universe (both living and non-living) are joined together in Ayurveda. This leaflet endow with some practical knowledge to rediscover our pre- industrial herbal heritage.

### **Life Style and Therapy using Yoga**

Yoga therapy is the adaptation of yogic principles, methods, and techniques to specific human ailments. In its ideal application, Yoga therapy is preventive in nature, as is Yoga itself, but it is also restorative in many instances, palliative in others, and curative in many others. The therapeutic effect comes to force when we practice daily and the body starts removing toxins and the rest is done by nature.

\*Each student shall write a detailed Report/ Critique on one topic leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. In addition to s/he will

be required to make a Power Point Presentation on the learning and face Viva-voce.

Alternatively a Student may undertake a Project on any one of the topics and submit a detail Project Report leading to publication of Newspaper/ Magazine article or a review paper in a Research Journal. If the topic is related to Performing Arts including Yoga, Marshal Arts etc. the performance on stage may be given instead of PPT. In case of Fine Arts, an exhibition or a portfolio may be presented in place of PPT.

**On the basis of the above points, a panel of experts from the department will award the credits.**

**Course Outcomes (CO):**

**At the end of this course students will have:**

CO1: Ability to acknowledge and appreciate the ethical beauty of India

CO2: Ability to incorporate the values of human lives in real life applications

<b>L-T-P</b>	<b>BME108B- DESIGN OF MACHINE ELEMENTS-I</b>	<b>Credits:4</b>
<b>3-1-0</b>		

**Course Objective:**

The primary objective of this course is to demonstrate how engineering design uses the many principles learned in previous engineering science courses and to show how these principles are practically applied.

**Unit I:Introduction:** Design Considerations, Design Methods, Engineering Materials and their Mechanical properties, types of codes & standards in Design. Design considerations in castings, Forgings & welded assemblies. Behavior of ductile & brittle material, Stress-Strain diagram for various materials. Factor of safety.

**Design for Static Loading:** Introduction: Stresses in members subjected to axial, shear, Bending, Torsion & Eccentric loading. Stress tensor, Uni-axial, Biaxial & Tri-axial stress state, Principal Stresses in members subjected to combination of static loads.

**Theories of Failure:** Failure Criterion & problems - Maximum Normal Stress theory, Maximum Shear stress theory, Distortion energy theory

**Cotter & Knuckle Joints:** Design procedure

**Unit: IIStress Concentration:** Definition, Reason for occurrence, Methods to reduce, Stress concentration factor. Design of stress concentrated members subjected to various loads.

**Design for Variable Loading:** Types of variable/Cyclic loads, Mean & amplitude Stresses, Fatigue Failure, Endurance Limit & Strength, S-N Diagram. Goodman and Soderberg criterion,

**Modifying factors:** Size effect, surface effect, Reliability, stress concentration effects etc. Problems on design of members for finite & infinite life in members subjected to individual & combined loading. Cumulative damage in fatigue.

**Unit III:Riveted Joints: Introduction, method of riveting, material and qualities of rivets,** types of rivet head and riveted joint, design of lap and butt joint and important term used in riveted joint, caulking and fullering, failure, strength and efficiency of riveted joint, Design of longitudinal & circumferential joint for various types, eccentric loaded riveted joint.

**Welded joints:** Introduction, advantages and disadvantages of welded joint over riveted joint, basic and supplementary elements of weld simple, types of welded joint, polar moment of inertia

and section modulus. Strength of Butt, parallel, transverse welds, eccentrically loaded welded joint subjected to torsion & Bending moment.

#### Unit IV:

**Threaded joint:** Introduction, important terms used in screw threads, forms of screw thread, location of screw joint, common types of screw fastening, designation of screw thread, and standard dimensions of screw thread, stresses due to static loading, external forces and combined forces. Bolt of uniform strength, design of nut, bolted joint under eccentric loading (Load acting parallel and perpendicular to the axis of the bolt), eccentric load on a bracket with circular base and eccentric load acting in the plane contain the bolts.

**Power screws:** Forms of threads, terminology, Torque in lifting & lowering the load, self locking screw, efficiency of screw (Square, ACME, self-locking), Design of screw & Nut for power screw

**Unit V: Shafts keys and coupling:** Design of shaft under combined bending, twisting and axial loading; shock and fatigue factors, design for rigidity, Design of shaft subjected to dynamic load, Design of keys and coupling.

**Course Outcomes:** After learning the course the students should be able to: -

CO1. Understand design considerations and standards Describe the design process, material selection, Design under static loading condition

CO2. Understand the concept of stress concentrations, design under variable loading conditions.

CO3. Understand design of fastening (permanent and temporary) and their load analysis in different fields of applications

CO4. Understand standards and terminology of threaded fasteners with important design consideration and practices. Design and applications of power screws

CO5. Understand standards of design shafts keys and coupling.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H	M		H	L									L
CO2	H	H	H	H	M									H
CO3	H	M	H											
CO4	H				H								H	
CO5		H		M	H								H	

*H = Highly Related; M = Medium L = Low*

#### Text Book:

1. V.B. Bhandari- Design of Machine Elements - TMH Publications



**References Books:**

1. Shingley J.E; Machine Design; TMH
2. Sharma and Purohit; Design of Machine elements; PHI
3. Ganesh Babu K and Srithar k; Design of Machine Elements; TMH

<b>L-T-P</b>	<b>BME009B – Fluid Mechanics &amp; Machines</b>	<b>CREDITS: 3</b>
<b>3-0-0</b>		

**COURSE OBJECTIVE:**

To give the student a foundation in the fundamentals of fluid mechanics and machines practice in the analytical formulation of fluid mechanics problems using Newton's Laws of motion and thermodynamics.

**UNIT I: Basic Concepts and Properties****(7 Hours)**

Fluid—definition, distinction between solid and fluid Modules and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillary and surface tension, Buoyancy. Fluid statics concept of fluid static pressure, absolute and gauge pressures – pressure measurements by manometers and pressure gauges. Hydrostatic forces on submerged surfaces, Stability of floating bodies.

**UNIT II: Fluid Kinematics and Fluid Dynamics****(8 Hours)**

Fluid Kinematics - Flow visualization – lines of flow - types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms)- Equation of streamline - stream function - velocity potential function - circulation - flow net. Fluid dynamics - equations of motion - Euler's equation along a streamline - Bernoulli's equation, applications - Venturi meter, Orifice meter, Pitot tube. Dimensional analysis - Buckingham's Pi theorem- applications - similarity laws and models. Reynolds transport theorem, Sub sonic and Super sonic flow, similitude.

**UNIT III: Incompressible Fluid Flow****(8 Hours)**

Viscous flow - Navier - Stoke's equation (Statement only)-Shear stress, pressure gradient relationship - laminar flow between parallel plates - Laminar flow through circular tubes. (Hagen Poiseuille's equation). Hydraulic and energy gradient – flow through pipes - Darcy -Weisback's equation – pipe roughness -friction factor- Moody's diagram-minor losses - flow through pipes in series and in parallel - power transmission. Boundary layer flows, boundary layer thickness and boundary layer separation. Drag and lift coefficients. Rayleigh and Fanno lines.

**UNIT IV: Hydraulic Turbines****(8 Hours)**

Fluid machines definition and classification - exchange of energy-Euler's equation for turbo machines - Construction of velocity vector diagram's - head and specific work - components of energy transfer - degree of reaction. Hydro turbines definition and classifications - Pelton turbine -



Francis turbine - propeller turbine Kaplan turbine .Working principles - velocity triangles - work done - specific speed – efficiencies -performance curve forturbines.

## UNIT V: Hydraulic Pumps

(8 Hours)

Pumps definition and classifications. Centrifugal pump classifications, working principles, velocity triangles, specific speed, efficiency and performance curves. Reciprocating pump classification, m principles, indicator diagram, work saved by air vessels and performance curves, cavitation in pumps Rotary pumps working principles of gear and vane pumps. Dimensionless numbers and their significance.

### Text Books:

1. A Textbook of Fluid Mechanics, by RK Rajput, S. Chand Publishing, 2019, ISBN 9352837207, 9789352837205. 2011

### Reference Books:

1. Som S.K– Introduction to Fluid Mechanics – TMH 2008
2. Bedford Wylie Streeter – Fluid Mechanics – Tata McGraw Hill.2011
3. Fluid Mechanics & Machines by R.K Bansal, Laxmi Publications 2016

**Course Outcomes:** After learning the course the students should be able to:-

Understand the basic concept of fluid and properties of fluid.

- |     |   |
|-----|---|
| CO1 | To identify and analyze the variation in properties of fluids with pressure.  |
| CO2 | Analyze the basic concepts of fluid-statics, kinematics and dynamics with their applications.   |
| CO3 | Understand and the implementation of continuity equation, discharge of flow in major and minor losses through pipes and to learn the hydraulic gradient energy. |
| CO4 | Implement the fluid concept in viscous and tursoniklent flow.   |
| CO5 | Analyze and evaluate the performance of pumps and turbine.  |

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H		M				L				M			

CO2		H		M	H	L			M	L				
CO3	M	L	H		M			L			L		L	
CO4	H					H			M		L	M	L	M
CO5	H	H	M		L		M			H	L		M	M

H = Highly Related; M = Medium L = Low.

<b>L-T-P</b>	<b>BME181A- Manufacturing Process</b>	<b>Credits:3</b>
<b>3-0-0</b>		

### Course Objective:

The objective of the course is to impart fundamental knowledge on production process such as casting, joining forming and sheet metal working processes and their applications.

### Unit-I: Introduction of Production Engineering

(6 Hours)

Introduction to manufacturing Processes, historical background, Classification of manufacturing Processes, Importance of manufacturing. Economic & technological considerations in manufacturing. Various types of Production, Job Shop, Batch type, Continuous, Discrete, selection of manufacturing Process. Role of computers in manufacturing. Introduction of casting process, classification of casting process, Sand mould casting, advantages and limitation of casting process. Types of Sand, composition, Properties and testing methods

### Unit-II: Casting Process

(8 Hours)

Sand mold casting:- Basic principles with simple examples of a solid casting and a hollow casting Mold preparation, Core and Core making Gating system and its design, pouring basin, sprue, runner and risers. Gating ratio and its applications. Advantages, limitations and applications of top gate, bottom gate, parting gate and step gate; Estimation of pouring time for top gate and bottom gate type molds, Riser design and its placement, Melting, Pouring and Fluidity.CO<sub>2</sub> molding ,shell molding ,centrifugal casting , investment casting ,Permanent mold casting ,slush casting, Hot chamber and cold chamber Die casting; methods, Slush casting; principle and use, Casting defects; types, causes and remedy

### Unit-III : Metal Forming Processes:

(10 Hours)

Introduction of metal forming, classification, advantage and limitation. Plastic deformation of metals, stress-strain relationships, Hot working and Cold working, principle, purpose, relative advantages and applications. Forging:-Definition and classification giving few example of application; work materials different forging operations, drop forging and press forging (pressing)

methods and use; Forging dies ;types and materials Rolling:-Introduction ; basic principles and general applications; types of rolling mills & rolled-sections , Characteristics and applications of hot rolling and cold rolling; various rolling processes and applications and rolled products; Roll pass design for different products Wire drawing and Extrusion:- Basic principles and requirements; Classification, methods and applications, Forward and Backward Extrusion , wire/tube drawing and its application. Defects in metal forming processes.

#### **Unit- IV: Sheet metal Working processes**

**(8 Hours)**

Description and operation of processes, process of shearing, punching, piercing, blanking, trimming, perfecting, notching, lancing, embossing, coining, bending, forging and drawing press, tool dies, auxiliary equipment, safety devices, stock feeders, scrap cutters, forces, pressure and power requirements .different types of Die and Punch set used in sheet metal working . Powder Metallurgy: Powder production methods, compaction and sintering. Applications of powder metallurgy

#### **Unit-V: Welding Processes**

**(8 Hours)**

Introduction of welding process, welding classification, principal of an arc generation. Fusion welding: - Introduction; basic principle, definition and major classification; characteristics and applications of different fusion welding processes arc welding, Shielded metal arc welding. Principles. Methods, requirements and application of other arc welding processes like TIG,MIG ,Resistance welding, Gas welding , Solid state welding such as Friction, pressure and explosion welding,, plasma arc welding, Laser welding , electron beam welding , ultrasonic welding ,Brazing, Soldering and their applications.

#### **Text Books:**

1. Dr. P.C.Sharma –A Text Book of Production Technology S.Chand & Company New Delhi Edition: 2021-22,

#### **Reference Book:**

1. Rao P.N. - Manufacturing Technology VOL-I & II - Tata Mc Graw Hill, New Delhi Edition: 2017
2. Manufacturing Engineering and Technology – Kalpakjian (Addison Wesley) Edition: 2018
3. Principles of Metal Casting – RW Heine, CR Loper and PC Rosenthal (Tata-McGraw Hill ,1986)

**Course Outcomes:** After learning the course the students should be able to:-

CO1: To understand fundamentals of manufacturing Process and acquiring knowledge of Sand molding processes.

CO-2To acquire knowledge of various Casting Processes & and their applications.

CO-3 To acquire knowledge of various metal forming processes used in manufacturing.

CO-4 To understand fundamentals of various sheet metal working processes used in manufacturing.

CO5 -To acquire the knowledge of various types of welding operations and its importance

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome													Program Specific Outcome
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO2
CO1	L			M			H			M				
CO2		M									H		L	
CO3					H				L			M		
CO4	H													L
CO5		H		M			H		L		M		L	

H = Highly Related; M = Medium L = Low

<b>L-T-P</b>	<b>BME132A- <u>MECHANICS OF MACHINES LAB</u></b>	<b>Credits: 1</b>
<b>0-0-2</b>		

**List of Experiments**

1. Experiment on Gears tooth profile, interference etc.
2. Experiment on Gear trains
3. Experiment on longitudinal vibration
4. Experiment on transverse vibration
5. Experiment on Watt governor
6. Experiment on Porter governor
7. Experiment on Proell governor

8. Experiment on Hartnell governor
9. Experiment on critical speed of shaft
10. Experiment on gyroscope
11. Experiment on static balancing
12. Experiment dynamic balancing
13. Experiment on Brake
14. Experiment on clutch
15. To determine radius of Gyration “K” of given pendulum.

**Course Outcomes:** After learning the course the students should be able to:-

CO1. Analyze planar mechanism how it works and what output takes place.

CO2. Analyze various inversion of mechanism.

CO3. Describe the concepts of machines, mechanisms and related terminologies.

CO4. Analyze various motion transmission elements like gears, gear trains, cams, belt drive and rope drive.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO1	PSO2
CO1	L								H				M	
CO2		M		H										L
CO3	H					H								
CO4		L		M					L					H

H = Highly Related; M = Medium L = Low

<b>L-T-P</b>	<b>BME152A – Metallurgy</b>	<b>Credits:3</b>
<b>3-0-0</b>		

**Prerequisite:** Engineering Chemistry and Engineering Materials.

**Learning Objectives:**

- The module provides a systematic overview of the major principles of metallurgy.
- Students successfully completing the module will have a critical awareness of how these principles relate to current issues in exploiting structural alloys in engineering applications.

**UNIT-I Introduction****08 Hrs**

Introduction to metallurgy, the impact of materials on progress, classifications of materials, extraction of iron from iron ores, types of ores, cupola furnace, blast furnace, their reactions, pig iron production, the manufacture of steel, basic oxygen steelmaking (BOS), electric arc steelmaking, the microstructural nature of carbon steels, the uses of plain carbon steels, hot working vs cold working of metals, recovery and recrystallization temperature.

**UNIT-II The Formation of Alloys****08 Hrs**

Introduction to solid solution, Hume-Rothery rule, solid-solution strengthening mechanism, phase, Gibb's phase rule, equilibrium and non-equilibrium diagrams, classification of equilibrium phase diagrams, iron-carbon equilibrium diagram. Classification of non-equilibrium phase diagrams (TTT & CCT), various types of heat treatment processes, the solid solution, intermediate phases, eutectics and eutectoids, strengthening mechanisms in alloys, exercises.

**UNIT-III Modern Steel Alloy Developments****08 Hrs**

Nickel steels, chromium steels, nickel-chromium, steels containing molybdenum, steels containing vanadium, heat-resisting steels, manganese steels, steels containing tungsten, steels containing cobalt, steels containing boron, steels containing silicon, steels containing copper, high-strength low-alloy (HSLA) steels and other 'micro-alloyed' steels.

**UNIT-IV Other Non-ferrous Metals and Alloys****08 Hrs**

Magnesium-base alloys, zinc-base die-casting alloys, nickel-chromium high-temperature alloys, bearing metals, fusible alloys, titanium and its alloys, uranium, some uncommon metals, exercises.

**UNIT-V Metallic Corrosion and Its Prevention****08 Hrs**

The mechanism of corrosion, electrolytic action or wet corrosion involving mechanical stress, electrolytic action or wet corrosion involving electrolytes of non-uniform composition, the prevention of corrosion, the use of a metal or alloy which is inherently corrosion-resistant, protection by metallic coatings, protection by oxide coatings, protection by other non-metallic coatings, cathodic protection, properties and applications.

**Course Outcomes:** After learning the course the students should be able to:

Course Outcomes	Statement	Bloom's Knowledge Level
CO1	To develop students' knowledge of current methods to recover base metals from natural ores.	Apply
CO2	To understand structure insensitive and physical properties of materials, recovery, recrystallization and grain growth phenomenon in metals and alloys.	Analyze
CO3	To develop students' individual skills at performing relevant heat, mass and thermodynamic calculations for the extraction of base metals.	Evaluate

- CO4** Phase rules, phase diagrams, solid state reactions, analyze the microstructure of iron and steels using phase diagram and modify the microstructure and properties using different heat treatments. Create
- CO5** To develop the students' decision-making skills as required for the design, improvement, operation, and profitability of non-ferrous extractive metallurgical processing. Evaluate

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	H				L		L			M		H		L	
CO2		M	L			M					L		L		
CO3	M		H		H		M		H			M		M	
CO4	L		M			L		M		L					L
CO5		M	L	L	L	M			L		M		L	L	

H = Highly Related; M = Medium L = Low

#### Text Books:

1. Engineering Metallurgy-Part -I, Applied Physical Metallurgy (Sixth Edition) by Raymond A. Higgins
2. Introduction to Physical Metallurgy by Sidney H. Avner McGraw Hill Education (India) Private Limited.

#### References Books:

1. W.D. Callister, Jr.- Material Science and Engineering – John Wiley& sons Inc.
2. Raghavan V. - Materials Science & Engineering - Phi Learning Pvt ltd.
3. K.G. Budinski- Engineering Materials – Properties and Selection –PHI Learning Pvt. Ltd

1.

<b>L-T-P</b>	<b><u>BME021C - MECHANICAL VIBRATION</u></b>	<b>CREDITS:3</b>
<b>3-0-0</b>		

### **Course Objective:**

At the end of this course, the student will fully understand and appreciate the importance of vibrations in mechanical design of machine parts that operate in vibratory conditions, be able to obtain linear vibratory models of dynamic systems with changing complexities (SDOF, MDOF).

### **UNIT-I**

**Introduction:** Vibration Terminology, Kinematics of simple vibrating motion Simple harmonic motions, and Representation of harmonic motion. Degree of freedom, Types of Vibration, Addition of Simple Harmonic Motions, phenomenon of Beats, Work done by a Harmonic Force (Problems)

### **UNIT-II Free vibrations of single degree of freedom:**

Undamped free vibration, Equations of motions, general solution of free vibration, Torsional vibrations, Springs in Series & Parallel, Energy Methods (Problems), Damped free vibration, Types of Damping, Free Vibration with Viscous Damping, Logarithmic Decrement.

### **UNIT-III Forced vibrations:**

Forced Vibration with constant harmonic excitation, forced vibration with rotating and reciprocating mass, Vibration isolation and Transmissibility, Vibration measuring instruments. (Problems) Two Degree of Freedom System: Two Degree of Freedom System, Principal modes, Torsional System, Vibration absorbers.

### **UNIT-III Multi Degree of Freedom System:**

Equation of Motion, Influence coefficients, Eigen Values and Eigen Vectors, Torsional Vibration of Multi-Rotor System. (Problems) Geometric method, Stability of equilibrium points, Method of harmonic balance.

Numerical Methods: Rayleigh's method, Dunkerley's equation, Stodola's Method, Rayleigh-Ritz's method, Method of Matrix iteration, Holzer's method (Problems)

### **UNIT-V Continuous systems:**

Transverse vibration of strings, longitudinal vibrations of bars, Lateral vibration of beams, Torsional vibration of circular shafts, whirling of shafts.



**Course Outcome (CO):**

At the end of this course students will have:

CO1:Appreciating the need and importance of vibration analysis in mechanical design of machine parts that operation vibratory conditions.

CO2: Ability to analyze the mathematical model of a linear vibratory system to determine its response

CO3: Understand the variations of magnification factor and phase angles with the frequency of excitation and the phenomena of resonance and beats.

CO4: Formulate the equations of motion of MDOF systems using Newton's second law, influence coefficients, the natural frequencies of vibration and the modal vectors by solving the eigenvalue problem.

CO5: Determine the free-vibration solution for continuous system using a linear superposition of the mode shapes and the initial conditions.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1				H	L				L						M
CO2	H		L		M					H			M		
CO3		M					L							H	
CO4					H								H		
CO5		H			M									M	

H = Highly Related; M = Medium L = Low

**Text Books:**

1. Mechanical Vibration by V.P. Singh – Dhanpat Rai Publication

**Reference Books:**

1. Thomson , W.T., Theory of Vibration with Applications , C.B.S Pub & distributors
2. G.K. Grover, Mechanical Vibration , Nem chand and Bross , Roorkee
3. Singiresu Rao, Mechanical Vibrations , Pearson Education

<b>L-T-P</b>	<b>BME114B – DESIGN OF MACHINE ELEMENTS-II</b>	<b>Credits:3</b>
<b>3-0-0</b>		

### **Course Objective:**

The primary objective of this course is to demonstrate how engineering design uses the many principles learned in previous engineering science courses and to show how these principles are practically applied.

**Unit I Springs:** Design of helical compression and tension springs, consideration of dimensional and functional constraints, leaf springs and torsion springs; fatigue loading of springs, surge in spring; special springs.

**Unit II Brakes & Clutches:** Materials for friction surface, uniform pressure and uniform wear theories, Design of friction clutches: Disk , plate clutches, cone & centrifugal clutches.

**Unit III Spur and Helical Gears:** Force analysis of gear tooth, modes of failure, beam strength, Lewis equation, form factor, formative gear and virtual number of teeth; Gear materials; Surface strength and wear of teeth; strength against wear; Design of straight tooth spur and Helical Gears. Bevel Gears: Application of bevel, formative gear and virtual number of teeth; Force analysis; Lewis equation for bevel gears; Strength against wear; Design of bevel gear.

#### **Unit IV:**

**Journal Bearing:** Types of lubrication, viscosity, hydrodynamic theory, design factors, temperature and viscosity considerations, Reynold's equation, stable and unstable operation, heat dissipation and thermal equilibrium, boundary lubrication, dimensionless numbers, Design of journal bearings, Rolling-element Bearings: Types of rolling contact bearing, bearing friction and power loss, bearing life; Radial, thrust & axial loads; Static & dynamic load capacities; Selection of ball and roller bearings; lubrication and sealing.

**Unit V Design of I.C. Engine Components:** General design considerations in I C engines; design of cylinder; design of piston and piston-rings; design of connecting rod; design of crankshaft.

**Course Outcomes:** After learning the course the students should be able to: -

- CO1. Understanding of standards and various parameters in design consideration of helical and leaf springs.
- CO2. Describe the design process friction clutches in power transmission system and calculation of stresses.
- CO3. Understanding of standards and terminology of gears with important design consideration and practices.
- CO4. Understanding of standards and various parameters in design consideration of sliding and rolling contact bearings.
- CO5. Understanding of standards and terminology of IC engine prominent components with important design consideration and practices.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M		H	L									L	
CO2	M	H	H	H	M									H	L
CO3	H	M	H												L
CO4	M				H								H		
CO5		M		H										H	

H = Highly Related; M = Medium L = Low

### Text Book:

1. V.B. Bhandari- Design of Machine Elements - TMH Publications

### References Books:

1. Shingley J.E; Machine Design; TMH
2. Sharma and Purohit; Design of Machine elements; PHI
3. Ganesh Babu K and Srihar k; Design of Machine Elements; TMH

<b>L-T-P</b>	<b>BME115B–PRODUCTION ENGINEERING</b>	<b>CREDITS:3</b>
<b>3-0-0</b>		

### COURSE OBJECTIVE:

The objective of the course is to impart fundamental knowledge on metal cutting, machine tool and unconventional processes and their applications.

### UNIT-I

Metal Cutting: Mechanics of metal cutting. Designation of single point cutting tool according to ASA system, Orthogonal Vs oblique cutting. Mechanics of chip formation, types of chips. Shear angle relationship. Merchant's circle analysis. Cutting forces, power required.

**UNIT-II** Tool wear and wear mechanism, Taylor's tool life, tool failure criterion, Basic idea of machinability. Tool economics, maximum production criterion and minimum cost criterion, Cutting fluids/lubricants, Tool material.

**UNIT-III:**Multi edged tools: Simple mechanics of multi edge cutting tool, calculation of machining time, geometry of twist drills, Form tools-application. Milling process, classification, Up milling vs down milling. Calculation of maximum chip thickness.Broaching process, tools-type's materials and applications, Grinding & Super-finishing: Grinding wheel, abrasive & bonds.Grinding wheel specifications. Grinding wheel wear, attritions wear & fracture wear. Dressing & truing. Surface grinding, cylindrical grinding & centerless grinding.honing, lapping

**UNIT- IV:** Machine Tools: Working principle, constructions and operations of Turret and capstan lathe, shaper and planer machine, milling. Dividing head and types of indexing and tool layout Turret and capstan lathe.

**UNIT-V:** Metrology and Inspection: Standards of linear measurement, line and end standards, Limit, fits and tolerances. Interchangeability and standardization. Linear and angular measurements devices, sine bar and system comparators: Sigma, Johansson's Microkrator. Measurement of geometric forms like straightness, flatness, roundness.Tool maker's microscope, profile projector, autocollimator.

Interferometry: principle and use of interferometry, optical flat. Measurement of screw threads and gears.

Surface texture: Surface roughness, quantitative evaluation of surface roughness and its measurement

**Course Outcomes:** After learning the course the students should be able to:-

CO1. Understand about various metal cutting operation there mechanics.

CO2. Discuss features and applications of reciprocating machine tools like shaper, planer and slotting machine.

CO3. Explain the features and applications of lathe, milling, drilling and broaching machines

CO4. Identify suitable metrological methods for measuring the components.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				L	H									L
CO2			M		M					H				H
CO3	L							L						

CO4					L				M				M	
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- *H = Highly Related; M = Medium L = Low.*

#### **Text Books:**

1. Rao P.N. - Manufacturing Technology VOL-I & II - Tata Mc Graw Hill, New Delhi

#### **Reference Book:**

1. Manufacturing Engineering and Technology – Kalpakjian (Addison Wesley)
2. Modern Production Engineering - Groover
3. Principles of Metal Casting – RW Heine, CR Loper and PC Rosenthal (Tata-McGraw Hill).

<b>L-T-P</b>	<b>BME117B – Internal Combustion Engines</b>	<b>CREDITS: 3</b>
<b>3-0-0</b>		

#### **COURSE OBJECTIVE:**

The objective of the course is to understand the operation of internal combustion engines and perform theoretical calculations to obtain thermodynamic efficiencies and then assess operating losses, calculate engine operating parameters.

#### **UNIT-I Heat engines**

**(8 Hours)**

Basic Concepts-Air standard cycles and fuel-air cycles Assumptions, Otto, Diesel & Dual cycles, comparison of cycles, fuel air cycle, Valve Timing diagram, Actual engine cycle.

#### **UNIT-II S.I. Engines**

**(8 Hours)**

Theory of Carburetion, Types of carburetors. Combustion in spark Ignition engines, stages of combustion, flame propagation, rate of pressure rise, abnormal combustion. Phenomenon of Detonation in SI engines, effect of engine variables on Detonation. Combustion chambers. Rating of fuels in SI engines. Additives.

### **UNIT-III C.I. Engines**

**(8 Hours)**

Fuel supply system, types of fuel pump, injector and distribution system, Combustion in compression ignition engines, stages of combustion, factors affecting combustion, Phenomenon of knocking in CI engine. Effect of knocking. Types of combustion chambers rating of fuels in CI engines. Additives; Comparison of knocking in SI & CI engines, Concepts of Supercharging and Turbo charging.

### **UNIT-IV IC Performance characteristics & Testing of I.C. Engines**

**(8 Hours)**

Introduction to Indian Standards for testing of I.C. Engine, Mean effective pressure, indicated power, brake power, friction power, Methods to determine power and efficiencies Variables affecting performance of engine, characteristic curves, heat balance sheet, Methods of improving engine performance; super & turbocharged engines.

### **UNIT-V Fuels and Emissions**

**(8 Hours)**

Chemical structure & important qualities of the Engine fuels - (SI & CI engines), Diesel, and Gasoline fuels- Indian specifications. Alternate fuels (SI & CI engines)- Liquid fuels, gaseous fuels, hydrogen engines (LPG, HC NG (15%, 20%, 25 % Blends Hydrogen and Biofuels), Air pollution due to IC engine, Engine emissions, Hydrocarbon emissions, (HC) & PPM & Carbon monoxide emissions (CO), oxides of Nitrogen (NO<sub>x</sub>) Euro norms , Bharat stage norms, Emission control methods for SI and CI engines, Electronic control module, Catalytic converters.

#### **Text Book:**

1. Ganesan.V., “Internal combustion engines”, Tata McGraw-Hill Publishing Company Limited, IV Edition 2012.

#### **Reference Books:**

1. Heywood, John B, “Internal combustion engine fundamentals”, Tata McGraw-Hill Publishing Company Limited, 2017.

2. R.K. Rajput, “Internal combustion engines”, Laxmi Publications, 2005.

**Course Outcomes:** After learning the course the students should be able to:-

CO1. Understand the principle of heat engine.

CO2. Understand the normal & abnormal combustion in spark ignition engines.

CO3. Understand the normal & abnormal combustion in compression ignition engines.

CO4. Understand the performance characteristics & testing of I.C. Engines.

CO5. Understand the Phenomenon of engine emissions & alternate Fuels.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H		M				L				M			
CO2		H		M	H	L			M	L				
CO3	M	L	H		M			L			L		L	
CO4	H					H			M		L	M	L	M
CO5	H	H	M		L		M			H	L		M	M

<b>L-T-P</b>	<b>BME120B – <u>PRODUCTION ENGINEERING LAB</u></b>	<b>Credits:1</b>
<b>0-0-2</b>		

**List of experiments**

- 1 Introduction to Machining operations
- 2 Introduction to Centre Lathe Machine.
- 3 Introduction to Capstan Lathe Machine
- 4 Introduction to Shaper Machine
- 5 To perform various cutting operation on Lathe
- 6 To make a 10 T.P.I. (R.H.) thread on M.S. bar for hexagonal bolt with the help of centre lathe machine as per given figure.
- 7 Machining of hexagon in shaping machine
- 8 Machining of square in shaping machine

- 9 Measurement of angle using sinebar& slip gauges. Study of limit gauges.
- 10 To do angular measurement using level protector
- 11 Adjustment of spark plug gap using feeler gauges.

**Course Outcomes:** After learning the course the students should be able to:-

CO1. Understand the various cutting operation on Lathe.

CO2. Understand the cutting operation on shaper machine.

CO3. Illustrate on different metrological tools and perform measurements in quality impulsion..

CO4. Locate appropriate measuring instrument according to a specific requirement.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1				H	L									M
CO2			L		L									L
CO3		M		M										
CO4					L								H	

*H = Highly Related; M = Medium L = Low*

<b>L-T-P</b>	<b>BME121B – <u>INTERNAL COMBUSTION ENGINE LAB</u></b>	<b>Credits:1</b>
<b>0-0-2</b>		

**List of Experiments:**

1. To study of CI Engine (Two stroke and four stroke)
2. To study of SI Engine (Two stroke and four stroke)
3. Determination of Valve timing diagram



4. Heat Balance of SI engine
5. Heat Balance of CI Engine
6. Study of Battery Ignition system and Electronic Ignition System
7. Study of Diesel fuel pump
8. Study of Diesel fuel injectors
9. Study of Carburetors
10. Study of Fuel Injection system in SI Engine
11. Study of lubricating system in CI Engines
12. Study of MPFI system.

**Course Outcomes:** After learning the course the students should be able to:-

CO1. Demonstrate a basic understanding of engine function, performance, and design methodology

CO2. Understand the functionality of two stroke and four stroke SI and CI engine.

CO3. Understand the various injection systems and various ignition systems used in IC Engine.

CO4. Understand the impact of IC Engine on environment .

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				H	L									L
CO2			L		M									H
CO3		M												
CO4					H								H	

*H = Highly Related; M = Medium L = Low*

<b>L-T-P</b>		<b>Credits: 1</b>
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0-0-2	BME122B - <u>Computer Aided Engineering Lab</u>	
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### **Course Objective:**

- The course will enable students to use powerful design tools in their future classes and work. These are sustained by numerous practical examples to provide the student with intensive hands-on experience with CAD Package (Creo /Solid Work).
- Knowledge acquired will likely reflect in the way that students express and implement engineering ideas.

Exercise 1: Assembly Drawings(Part drawings should be given)

1. Plummer block (Pedestal Bearing)2. Rams Bottom Safety Valve 3.1.C. Engine connecting rod4. Screw jack (Bottle type)5.*Tailstock of lathe*6. *Machine vice*7. *Tool Head of a shaper*

Exercise 2. Create 3D sheet models using Miter Flange, Hem, Jog Creating Break, Corner/Corner Trim , Closed Corners, Rip, Fold/Unfold, Forming Tools. Inserting Cross Break, Welded Corner, Adding Corner Trim, Lofted bend, Conversion of Solid Body To Sheet Metal.  
( 5 models)

Exercise 4: Create 3D models using Fillet features, Inserting Hole types, Creating Chamfer Creating Shell & Draft, Rib( 5 Models)

Exercise 6: Verify Grashof law (four bar link mechanisms) constraint analysis.

Exercise 7: Determine weight of 3D model by defining the physical properties of material and applying different materials.

Exercise 8: Determine the stresses in the members of truss.

Exercise 9. Determine the deformation of bar when subjected to tensile/compressive load.

Exercise 10. Design and create 3d model of knuckle joint to connect two circular rods subjected to an axial tensile load. Select suitable materials for the parts.

Exercise 11. Determine the thermal stresses in composite bar.

**Course Outcomes:** After learning the course the students should be able to:-

- CO1 Ability to use standard software tools to create part assemblies.
- CO2 Ability to create fully constrained solid models that can be quickly modified using standard software tools.
- CO3 Ability to use, identify and explain standard features in solid modeling including protrusions, revolutions, cutouts, and patterns.

- CO4 Ability to use standard software tools to create engineering drawings, or other documents, to fully describe the geometries and dimensions of parts, as well as to document assemblies according to standard practice.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M			H	L									L
CO2		M	L		M								H	L
CO3								H						
CO4	H				H								H	

*H = Highly Related; M = Medium L = Low*

<b>L-T-P</b>	<b>BME121B – <u>INTERNAL COMBUSTION ENGINE LAB</u></b>	<b>Credits:1</b>
<b>0-0-2</b>		

**List of Experiments:**

13. To study of CI Engine (Two stroke and four stroke)
14. To study of SI Engine (Two stroke and four stroke)
15. Determination of Valve timing diagram
16. Heat Balance of SI engine
17. Heat Balance of CI Engine
18. Study of Battery Ignition system and Electronic Ignition System
19. Study of Diesel fuel pump
20. Study of Diesel fuel injectors

21. Study of Carburetors
22. Study of Fuel Injection system in SI Engine
23. Study of lubricating system in CI Engines
24. Study of MPFI system.

**Course Outcomes:** After learning the course the students should be able to:-

CO5. Demonstrate a basic understanding of engine function, performance, and design methodology

CO6. Understand the functionality of two stroke and four stroke SI and CI engine.

CO7. Understand the various injection systems and various ignition systems used in IC Engine.

CO8. Understand the impact of IC Engine on environment .

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				H	L									L
CO2			L		M									H
CO3		M												
CO4					H								H	

*H = Highly Related; M = Medium L = Low*

<b>L-T-P</b>	<b>BME023B - <u>MECHANICAL VIBRATION LAB</u></b>	<b>Credits:1</b>
<b>0-0-2</b>		

**LIST OF EXPERIMENTS** (Minimum 12 experiment of the following)

1. Determination of the time period of a thread pendulum having different lengths and material
2. Determination of the time period of a Rod pendulum with a length of 800mm

3. Determination of the time period of a rod and thread pendulum with same centre of gravity distance
4. Determination of the reduced pendulum length of a reversible pendulum
5. Determination of the time period of a pendulum with bifilar suspension, having different suspended mass
6. Determination of spring constants
7. Determination of Natural Frequencies of Free Un-Damped Oscillations
8. Determination of Natural Frequencies of Free Damped Oscillations
9. Determination of the Amplitude of Forced Un-Damped Oscillations
10. Determination of the Amplitude of Forced Damped Oscillations
11. Determination of the Natural Frequency of Un-Damped Torsional Vibrations
12. Determination of the Natural Frequency of Damped Torsional Vibrations.
13. To determine the radius of gyration of given bar using bifilar suspension.
14. To verify the dunker ley's rule
15. To determine the radius of gyration of a compound pendulum.

**Course Outcomes:** At the end of this course students will be:

CO 1: Able to practically relate learned fundamental information about vibration phenomenon

CO 2: Able to gain skills of modeling of vibration problems encountered in application and examining vibration response, establishing relation between real system and physical model, and to be formed mathematical model from physical model, methods used examining of vibrations and its usage fields.

CO3: Able to calculate solution of mathematical model and to be interpreted of its results

CO4: Able to apply general information about definition and finding remedy of the vibration problems encountered in machineries.

***MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:***

<i>Course Outcome</i>	<i>Program Outcome</i>												<i>Program Specific Outcome</i>	
	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>	<i>PO7</i>	<i>PO8</i>	<i>PO9</i>	<i>PO10</i>	<i>PO11</i>	<i>PO12</i>	<i>PSO1</i>	<i>PSO2</i>
<i>CO1</i>	<i>M</i>	<i>M</i>	<i>L</i>										<i>M</i>	<i>L</i>

CO2	L	M	L	L	M								M	H
CO3	M	L	L										M	L
CO4	H	M	L		H								L	M

<b>L-T-P</b>	<b>BME020B – HEAT AND MASS TRANSFER</b>	<b>Credits:3</b>
<b>3-0-0</b>		

### Course Objective:

- To train students with good scientific and engineering breadth so as to comprehend, analyze, design and create novel products and provide solution for the real life problems

**Unit-1 Basic Concepts:** Modes of heat transfer, Fourier's law, Newton's law, Stefan Boltzman law; thermal resistance and conductance, analogy between flow of heat and electricity, combined heat transfer process; Conduction: Fourier heat conduction equation, its form in rectangular, cylindrical and spherical coordinates, thermal diffusivity, linear one dimensional steady state conduction through a slab, tubes, spherical shells and composite structures, electrical analogies, critical-insulation-thickness for pipes, effect of variable thermal conductivity.

**Unit 2 Extended surfaces (fins):** Heat transfer from a straight and annular fin (plate) for a uniform cross section; error in measurement of temperature in a thermometer well, fin efficiency, fin effectiveness, applications; Unsteady heat conduction: Transient and periodic conduction, heating and cooling of bodies with known temperatures distribution, systems with infinite thermal conductivity, response of thermocouples.

**Unit 3 Convection:** Introduction, free and forced convection; principle of dimensional analysis, Buckingham 'pie' theorem, application of dimensional analysis of free and forced convection, empirical correlations for laminar and turbulent flow over flat plate and tubular geometry; calculation of convective heat transfer coefficient using data book.

**Unit 4 Heat exchangers:** Types- parallel flow, counter flow; evaporator and condensers, overall heat transfers coefficient, fouling factors, log-mean temperature difference (LMTD), method of heat exchanger analysis, effectiveness of heat exchanger, NTU method; Mass transfer: Fick's law, equi-molar diffusion, diffusion coefficient, analogy with heat transfer, diffusion of vapour in a stationary medium.

**Unit 5 Thermal radiation:** Nature of radiation, emissive power, absorption, transmission, reflection and emission of radiation, Planck's distribution law, radiation from real surfaces; radiation heat exchange between black and gray surfaces, shape factor, analogical electrical network, radiation shields. Boiling and condensation: Film wise and drop wise condensation;

Nusselt theory for film wise condensation on a vertical plate and its modification for horizontal tubes; boiling heat transfer phenomenon, regimes of boiling, boiling correlations.

**Course Outcome (CO):**

At the end of this course students will have:

CO1: describe and explain the different types of reciprocating internal combustion engine and their typical design features and performance characteristics.

CO2: describe and explain the gas exchange process and power boosting by means of turbo charging.

CO3: describe and explain the heat transfer and its relation to thermal loading of engine component and cooling.

CO4: computer rate of heat release based on measured dynamic cylinder pressure.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H							M						L
CO2			L		L						H			H
CO3	M								H					
CO4			M		H								H	

*H = Highly Related; M = Medium L = Low*

**Text Books:**

1. Holman J.P. Heat Transfer – McGraw Hill Book Company, 1989
2. Rajput.R.K, Heat and Mass transfer – S.Chand& Co

**Reference Books:**

1. Kothandaraman C.P. Fundamentals of Heat and Mass Transfer - New Age International (P) Ltd., 1998
2. Sachdeva R.C. Fundamentals of Heat and Mass Transfer - New Age International (P) Ltd.

<b>L-T-P</b>	<b>BME038B - <u>FINITE ELEMENT ANALYSIS</u></b>	<b>Credits:3</b>
<b>3-0-0</b>		

### **Course Objective:**

**UNIT I: Basic concepts-** The standard discrete system, Plane stress and plane strain problems, Computer procedures for Finite element analysis

**UNIT II: Finite elements of direct approach problems** – spring network, fluid flow through circular pipes, torsion of circular shafts, resistance network etc. Assemblage coefficient matrix

**UNIT III: Shape function of 1D and 2D elements-** Element Types- Triangular, rectangular, quadrilateral, iso-parametric elements, Automatic mesh generation schemes

**UNIT IV: Application to structural mechanics' problems-** Generalization of the finite element concepts- weighted residual and vibrational approaches. 1D Bar elements, truss, beams Axisymmetric stress analysis.

**UNIT V: FEA in Steady State Field Problems-** Introduction, heat conduction, FEA of fins, composite walls, fluid mechanics, vibration analysis.

### **Text Books:**

1. Rao S.S. The Finite Element Method in Engineering, Pergamon Press.

### **Reference Books:**

1. Robert D. Cook., David S., Malkus Michael E Plesha , Concepts and Applications of Finite Element Analysis.
2. Reddy J.N, An Introduction to Finite Element Method, McGraw-Hill International Student Edition
3. O.C. Zienkiewicz and R.L. Taylor, The Finite Element Methods, Vol.1. The basic formulation and linear problems, Vol.1, Butterworth Heineman.

**COURSE OUTCOMES:** At the end of this course students will be:

CO1: Able to obtain and understand the fundamental theory of FEA method.

CO2: Able to develop the ability to generate the governing FE Equations for systems governed by partial differential equations.

CO3: Able to understand the use of basic Finite elements for structural application using truss, beam, frame and plane elements.



CO4: Able to understand the application and use of FE methods for heat transfer problems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M	M	L										M	L
CO2	L	M	L	L	M								M	H
CO3	M	L	L										M	
CO4	H	M	L		H								H	

<b>L-T-P</b>	<b>BME123B – REFRIGERATION AND AIR CONDITIONING</b>	<b>CREDITS: 3</b>
<b>3-0-0</b>		

**COURSE OBJECTIVE:**

- This course deals with the design and implementation of refrigeration and air conditioning systems, to understand the principles of refrigeration and air conditioning.
- To calculate the cooling load for different applications.
- o select the right equipment for a particular application.
- To design and implement refrigeration and air conditioning systems using standards.

**UNIT-I Introduction:** Principles and methods of refrigeration, freezing, mixture cooling by gas reversible expansion, throttling, evaporation, Joule Thomson coefficient of performance, Vortex tube and Thermoelectric refrigeration, Adiabatic demagnetization, Air refrigeration cycles- Joule's cycle, Bell-Coleman cycle, Boot-strap cycle, reduced ambient cycle and regenerative cooling cycles.

**UNIT-II Vapour Compression refrigeration System:** Vapour compression cycle, P-h and T-S diagrams, deviation from Theoretical cycle, sub-cooling and superheating, effects of condenser and evaporator pressure on COP, Removal of flash gas, multiple expansion and compression with

flash inter cooling, low temperature refrigeration, Cascade Refrigeration system, Dry ice, production of dry ice, Air liquefaction system.

**UNIT-III Vapour Absorption refrigeration System:** Theoretical and practical systems such as aqua-ammonia, Electrolux and other systems, Refrigerants: Nomenclature and Classification, Desirable properties, comparative study, leak detection methods, common refrigeration, environment friendly refrigerants and refrigerant mixtures, Brine and its properties.

**UNIT-IV Psychrometry:** Calculation of psychrometric properties on air by table and charts, Psychrometric processes, Sensible heating and cooling, evaporative cooling, cooling dehumidification, heating and humidification, mixing of air stream, sensible heat factor, principle of air conditioning, requirements of comfort air conditioning, ventilation standards, infiltrated air loads, fresh air load human comfort, effective temperature and chart, heat production and regulation of human body.

**UNIT-V Air Conditioning Loads:** Calculation of summer and Winter Air conditioning loads, Bypass factor of coil, calculation of supply air rate and its condition, room sensible heat factor, grand sensible heat factor, effective sensible heat factor, dehumidified air quantity, Problems on cooling load calculation, Air distribution and ventilation systems.

**Course Outcomes:** After learning the course the students should be able to:-

CO1. Understand the basic principle of refrigeration.

CO2. Understand the types of refrigeration system and their application on various aspect of engineering.

CO3. Understand the basic principle and working of air conditioning.

CO4. Understand the impact of refrigeration on environment.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				H	L									L
CO2			L		M									H
CO3		M												
CO4					H								H	

*H = Highly Related; M = Medium L = Low*

**Text Books:**

1. C.P Arora - Refrigeration & Air Conditioning; TMH
2. Manohar Prasad - Refrigeration & Air Conditioning; New Age Publications

**Reference Books:**

1. Heywood, Jhohn B. - Internal Combustion Engine Fundamentals – TMH,
  2. Ballaney P I - Refrigeration & Air Conditioning - Khanna Book Publishing Co. (I) Ltd.
- Taylor, Charles F - Internal Combustion Engine Vol-1 & Vol-2 - Mit Press London

<b>L-T-P</b>	<b>BME047B - Robotics: Mechanics &amp; Control</b>	<b>Credits:3</b>
<b>3-0-0</b>		

**Course Objective:**

To train students with good scientific and engineering breadth so as to comprehend, analyze, design and create novel products and provide solution for the real life problems.

UNIT I: Introduction to Robotics- Robot, Robotics, Types of Robot, Robot classification, Types of Robot, Degrees of freedom.

UNIT II: Kinematics and Dynamics of Robotic linkages (open ended type manipulators)-

Frames, Transformations: Translation and rotation, Denavit-Hartenberg parameters, Forward and Inverse Kinematics, Jacobian, Dynamics: Equations of motion, Newton-Euler formulation.

UNIT III: Sensors and actuators- Strain gauge, resistive potentiometers, Tactile and force sensors, tachometers, LVDT, Piezoelectric accelerometer, Hall effect sensors, Optical Encoders, Pneumatic and Hydraulic actuators, servo valves, DC motor, stepper motor, drives.

UNIT IV: Control of Manipulators- Feedback control of II order linear systems, Joint control, Trajectory control, Controllers, PID control

UNIT V: Robot Programming-Language-overview, commands for elementary operations.

**Text Books:**

1. John J. Craig, Introduction to Robotics: Mechanics and Control, Addison-Wesley.

**Reference Books:**

1. Spong M. W., and Vidyasagar M., Robot Dynamics and Control, John Wiley & Sons.
2. Murray R. M., et al, A Mathematical Introduction to Robotic Manipulation, CRC Press,
3. Waldron K. J., and Kinzel G. L., Kinematics, Dynamics and Design of Machinery, John Wiley

Course Outcome:

**Course Outcomes:** After learning the course the students should be able to:-

- CO1. Familiarize with anatomy, specifications and applications of Robots
- CO2. Obtain kinematic model of robotic manipulators
- CO3. Choose the appropriate sensors and actuators for robots
- CO4. Choose appropriate Robotic configuration and gripper for a particular application
- CO5. Familiarize with Robot Programming-Language

<b>L-T-P</b>	<b>BME124B NON CONVENTIONAL ENERGY RESOURCES</b>	<b>Credits:3</b>
<b>3-0-0</b>		

### **UNIT 1: Introduction:**

Fossil fuel based systems. Impact of fossil fuel based systems. Non-conventional energy – Seasonal variations and availability. Renewable energy – sources and features. Hybrid energy systems Distributed energy systems and dispersed generation (DG)

### **UNIT 2: Traditional Energy Systems:**

Sources.Features and characteristics. Applications: Transport – bullock cart, horse carriage, camels; Agriculture – ox plough, water lifting devices; Human power – bicycle, cycle rickshaw etc.; House hold – cooking (bio mass), lighting etc.

### **UNIT 3: Solar Thermal Systems**

Solar radiation spectrum.Radiation measurement.Technologies. Applications: Heating, Cooling, Drying, Distillation, Power generation

**Solar Photovoltaic Systems:** Operating principles. Photovoltaic cell concepts. Cell, module, array. Series and parallel connections. Maximum power point tracking. Applications: Battery charging, Pumping, Lighting, and Peltier cooling

#### **UNIT 4: Micro-Power generation system**

**Micro-hydel:** Operating principles. Components of a micro-hydel power plant. Types and characteristics of turbines. Selection and modification. Load balancing.

**Wind:** Wind patterns and wind data. Site selection. Types of windmills. Characteristics of wind generators. Load matching

**Biomass:** Operating principles. Combustion and fermentation. Anaerobic digester. Wood gasifier. Pyrolysis. Applications: Biogas, Wood stoves, Bio diesel, Combustion engine.

**Wave Energy Systems:** Shoreline systems. Near shore systems. Off shore systems

#### **UNIT : 5: Economics of non-conventional energy system**

**Costing:** Life cycle costing (LCC). Solar thermal system LCC. Solar PV system LCC. Microhydel LCC. Wind system LCC. Biomass system LCC

**Hybrid Systems:** Need for Hybrid Systems. Range and type of Hybrid systems. Case studies of Diesel-PV, Wind-PV, Microhydel-PV, Biomass-Diesel systems, electric and hybrid electric vehicles.

**Course Outcomes:** After learning the course the students should be able to:-

- CO1. Understand the need of non convention energy resources.
- CO2.
- CO3. Understand the basic principle and working of air conditioning.
- CO4. Understand the impact of refrigeration on environment.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	<i>Program Outcome</i>												<i>Program Specific Outcome</i>	
	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>	<i>PO7</i>	<i>PO8</i>	<i>PO9</i>	<i>PO10</i>	<i>PO11</i>	<i>PO12</i>	<i>PSO1</i>	<i>PSO2</i>
<i>CO1</i>				<i>H</i>	<i>L</i>									<i>L</i>

CO2			L		M									H
CO3		M												
CO4					H								H	

*H = Highly Related; M = Medium L = Low*

#### Reference Books:

1. Khan B. H., Non-Conventional Energy Resources, TMH
2. Rai G.D., Non - Conventional Energy Sources 5 Edition, Khanna Publication.

<b>L-T-P</b>	<b>BME024B - <u>Heat and Mass transfer lab</u></b>	<b>Credits:1</b>
<b>0-0-2</b>		

#### **LIST OF EXPERIMENT** (Minimum 12 experiment of the following)

1. Conduction - Composite wall experiment
2. Conduction - Composite cylinder experiment
3. Convection - Pool Boiling experiment
4. Convection - Experiment on heat transfer from tube-natural convection.
5. Convection - Heat Pipe experiment.
6. Convection - Heat transfer through fin-natural convection .
7. Convection - Heat transfer through tube/fin-forced convection.
8. Any experiment on Stefan's Law, on radiation determination of emissivity, etc.
9. Any experiment on solar collector, etc.
10. Heat exchanger - Parallel flow experiment
11. Heat exchanger - Counter flow experiment
12. Any other suitable experiment on critical insulation thickness.
13. Conduction - Determination of thermal conductivity of fluids.
14. Conduction - Thermal Contact Resistance Effect.
15. Determination of specific heat of air

**Course Outcomes:** At the end of this course students will be:

CO 1: Able practically relate to concepts discussed in the Heat & Mass Transfer course

CO 2: Able to conduct various experiments to determine thermal conductivity and heat transfer coefficient in various material

CO3: Able to calculate solution of mathematical model and to be interpreted of its results

CO4: Able to apply general information about definition and finding in heat transfer area

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M	M	L										L	L
CO2	L	M	L	L	M								M	H
CO3	M	L	L										M	L
CO4	H	M	L		H								H	L

<b>L-T-P</b>	<b>BME126B-FINITE ELEMENT ANALYSIS LAB</b>	<b>Credits:1</b>
<b>0-0-2</b>		

**List of Experiments**

- Study of a FEA package and modeling stress analysis of
  - Bars of constant cross section area, tapered cross section area and stepped bar
  - Trusses – (Minimum 2 exercises)
  - Beams – Simply supported, cantilever, beams with UDL, beams with varying load etc
- Stress analysis of a rectangular plate with a circular hole
- Thermal Analysis – 1D & 2D problem with conduction and convection boundary conditions.
- Dynamic Analysis
  - Fixed – fixed beam for natural frequency determination

b. Bar subjected to forcing function

c. Fixed – fixed beam subjected to forcing function

**COURSE OUTCOMES:** At the end of this course students will be:

CO1: Able to obtain and understand the fundamental theory of FEA method.

CO2: Able to develop the ability to generate the governing FE Equations for systems governed by partial differential equations.

CO3: Able to understand the use of basic Finite elements for structural application using truss, beam, frame and plane elements.

CO4: Able to understand the application and use of FE methods for heat transfer problems.

***MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:***

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M	M	L										M	L
CO2	L	M	L	L	M								M	H
CO3	M	L	L										M	
CO4	H	M	L		H								H	

L-T-P	BME026B – Automobile Engineering	CREDITS: 3
3-0-0		

**Course Objective:**

- To understand the construction and working principle of various parts of an automobile.
- To have the practice for assembling and dismantling of engine parts and transmission system



## **UNIT I Vehicle Structure and Engines**

Types of automobiles, vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics (various resistances and moments involved), IC engines –components functions and materials, variable valve timing (VVT).

## **UNIT II Engine Auxiliary Systems**

Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system (Unit injector system, Rotary distributor type and common rail direct injection system), Electronic ignition system (Transistorized coil ignition system, capacitive discharge ignition system), Turbo chargers (WGT, VGT), Engine emission control by three way catalytic converter system, Emission norms (Euro and BS).

## **UNIT III Transmission Systems**

Clutch-types and construction, gear boxes and their classification - manual and automatic, gear shift mechanisms, automobile drive system, Over drive, transfer box, transaxle, types of flywheel, torque converter, propeller shaft, slip joints, universal joints ,Differential and rear axle, Hotchkiss Drive and Torque Tube Drive.

## **UNIT IV Steering, Brakes and Suspension Systems**

Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of Suspension Systems, Types of braking system such as Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS), electronic brake force distribution (EBD) and Traction Control.

## **UNIT V Alternative Energy Sources**

Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles, Engine modifications required –Performance, Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and Hybrid Vehicles, Fuel Cell Note: Practical Training in dismantling and assembling of Engine parts and Transmission Systems should be given to the students.

**COURSE OUTCOMES:** at the end of this course students are able to:

CO1:understand the working of different parts of automobile.

CO2: assemble or dismantle the Automobile Engine.

CO3: understand the environmental implications of automobile emissions.

CO4: understand how the different fuels can be used in various automobiles.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome												Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	H	H	L	H	H	M		L	L		M	L	M	
CO2		H			H								M	
CO3		H		M	H							H		M
CO4	H	M	L		H								H	M
CO5	L			M		M		L	M	L		L		

**Text Book:**

- 1- Ganesan V. **Internal combustion engines**, Tata McGraw-Hill Education

**Reference Books:**

- 1- Joseph Heitner, Automotive Mechanics, Principles and Practices, CBS Pub.
- 2- Kripal Singh, Automotive Engineering Khanna Pub.
- 3- Newton & Steeds, Automotive Engineering 7. Emission standards from BIS and Euro –I and Euro-III

<b>L-T-P</b>	<b>BME128A – CIM &amp; NTM</b>	<b>Credits:3</b>
<b>3-0-0</b>		

**Learning Objectives:**

- To build concrete foundation for their core branch as a thinker, inter disciplinary thoughts
- To educate students by covering different aspects of computer Aided Manufacturing.

- To create strong skills of writing CNC programs, PLC programs.
- To educate students to understand different advances in manufacturing system like: GT, CAPP and FMS

**Unit: 1 Computer Aided Manufacturing:** CAM Concepts, Objectives & scope, Nature & Type of manufacturing system, Evolution, Benefits of CAM, Role of management in CAM, Concepts of Computer Integrated Manufacturing, Impact of CIM on personnel, Role of manufacturing engineers, CIM Wheel to understand basic functions.

**Unit: 2 NC/CNC Machine Tools:** NC and CNC Technology: Types, Classification, Specification and components, Construction Details, Controllers, Sensors and Actuators, CNC hardware: Re circulating ball screw, anti friction slides, step/servo motors. Axis designation, NC/CNC tooling. Fundamentals of Part programming, Types of format, Part Programming for drilling, lathe and milling machine operations, subroutines, do loops, canned Cycles, parametric sub routines.

**Unit: 3 Group Technology and CAPP:** Introduction, part families, part classification and coding systems: OPITZ, PFA, FFA, Cell design, rank order clustering, composite part concepts, Benefits of group technology. Approaches to Process Planning, Different CAPP system, application and benefits.

**Unit:4 Flexible Manufacturing System:** Introduction & Component of FMS, Needs of FMS, general FMS consideration, Objectives, Types of flexibility and FMS, FMS lay out and advantages. Automated material handling system: Types and Application, Automated Storage and Retrieval System, Automated Guided Vehicles, Cellular manufacturing, Tool Management, Tool supply system, Tool Monitoring System, Flexible Fixturing, Flexible Assembly Systems.

**Unit:5 Integrated Production Management System:** Introduction, PPC fundamentals, Problems with PPC, MRP-I, MRP-II. Just in Time philosophy: JIT & GT applied to FMS, concepts of Expert System in Manufacturing and Management Information System.

**COURSE OUTCOME: after learning the course the students should be able to:**

1. Students will describe basic concepts of CAM application and understand CAM wheel. Can suggest best material with better wear properties
2. Students will prepare CNC programs for manufacturing of different geometries on milling and lathe machines.
3. Students will prepare logic diagram for different application of automation.
4. Students will prepare Process planning for different components

***MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:***

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H									L				L
CO2	H		L						L					H
CO3		H					M							
CO4					H								H	

### Text Books:

1. CAD/CAM, Principles and Applications –P N Rao, McGraw Hill, 2010
2. CAD/CAM, Introduction, -Ibrahim Zeid, Tata McGraw Hill, 2007

### Reference Books:

1. Computer Aided Manufacturing by Tien Chien Chang, Pearson Education
2. Automation, Production Systems and Computer Integrated Manufacturing by Mikell P Groover, Pearson Education
3. Robotics Technology and Flexible Automation, by S R Deb, S Deb, McGraw Hill Education Private Limited.
4. Computer Aided Manufacturing- Rao, Tewari, Kundra, McGraw Hill, 1993

<b>L-T-P</b>	<b>BME027B - OPERATION RESEARCH</b>	<b>CREDITS:4</b>
<b>3-1-0</b>		

### COURSE OBJECTIVE:

Students enable to apply mathematical, computational and communication skills needed for the practical utility of Operations Research.

Identify and develop operational research models from the verbal description of the real system.

**UNIT-I Introduction and History of Operation Research:** Development of operations Research, characteristics and scope of operations Research, operations Research in Management, Models in operations Research, Model Formulation, Types of mathematical models, Limitations of operations Research.

**Linear Programming Methods:** L.P. models, simplex method, Algebra of simplex method, Big M method, unconstrained variables, sensitivity analysis, Duality, essence of duality theory, Application of sensitivity analysis.

**UNIT-II Transportation:** Introduction to model, matrix terminology, Formulation and solution of Transportation model north west corner method (NWCM), row and column minima (LCET), VAM, optimality test-stepping stone, and MODI method.

Assignment Models: Introduction, Formulation and solution of assignment model, Hungarian method. Typical assignment problems like optimal assignment of crews and travelling salesman problem.

**UNIT-III Network Problems:** Introduction to network logic, Numbering of events (Fulkerson Rule), PERT calculations - Forward path, back-ward path. Slack, probability, comparison with PERT, Critical path, floats. Project cost, crashing the network, updating (PERT and CPM).

**UNIT-III Queuing Theory:** Introduction, Applications of queuing Theory, Waiting time and idle time costs, single channel queuing theory and multi-channel queuing theory with Poisson, Arrivals and exponential services, Numerical on single channel and multi-channel queuing theory

Sequencing Problems: Introduction, processing jobs through two machines, three machines, Replacement theory

**UNIT-V Game theories and techniques:** Theory of games, competitive games, Rules and Terminology in game Theory, Rules for game theory- saddle point, dominance, mixed strategy (2 x2 games) , mixed strategy (2 x n games or m x 2 games), mixed strategy (3 x3 games), two person zero sum games, n-person zero sum games.

**COURSE OUTCOMES:** AT THE END OF THIS COURSE STUDENTS WILL BE:

CO1: Able to identify and develop operational research models from the verbal description of the real system.

CO2: Able to understand the mathematical tools that are needed to solve optimization problems.

CO3: Able to use mathematical software to solve the proposed models.

CO4: Able to develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision making processes in management engineering.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome				Program Outcome										Program Specific Outcome
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M	M	L			M	M	M	M		M		M	L
CO2	L	M	L	L	M		M	H		L		L	M	H
CO3	M	L	L						M		M		M	L
CO4	H	M	L		H	M				L			H	L

**Text Books:**

1. Hira and Gupta – Operation Research – S. Chand Publication

**Reference Books:**

2. Ebert, Ronald J – Production and operation mangment concept models and behavior – PH
3. Gillet Billy E – Introduction to operation research – TMH
4. Hillier and Lieberman - Introduction to operation research- McGraw-Hill

<b>L-T-P</b>	<b>BME127A – <u>TRIBOLOGY AND MAINTENANCE</u></b>	<b>Credits:4</b>
<b>3-1-0</b>		

**Course Objective:**

- To train students with good scientific and engineering breadth so as to comprehend, analyze, design and create novel products and provide solution for the real life problems

**UNIT I:** Surfaces and Friction- Topography of Engineering surfaces- Contact between surfaces - Sources of sliding Friction -Adhesion Ploughint- Energy dissipation mechanisms, Friction Characteristics of metals - Friction of non-metals. Friction of lamellar solids - friction of Ceramic materials and polymers - Rolling Friction. Source of Rolling Friction - Stick slip motion - Measurement of Friction.

**UNIT II:** Wear- Types of wear - Simple theory of Sliding Wear Mechanism of sliding wear of metals - Abrasive wear. Materials for Adhesive and Abrasive wear situations - Corrosive wear - Surface Fatigue wear situations - Brittle Fracture wear - Wear of Ceramics and Polymers - Wear Measurements.

**UNIT III:** Lubricants and Lubrication Types- Types and properties of Lubricants – Testing methods - Hydrodynamic Lubrication – Elasto hydrodynamic lubrication- Boundary Lubrication - Solid Lubrication Hydrostatic Lubrication.

**UNIT IV:** Film Lubrication Theory- Fluid film in simple shear - Viscous flow between very close parallel plates - Shear stress variation, Reynolds Equation for film Lubrication - High speed unloaded journal bearings - Loaded journal bearings - Reaction torque on the bearings -Virtual Coefficient of friction - The Somerfield diagram.

**UNIT V:**Surface Engineering and Materials for Bearings- Surface modifications - Transformation Hardening, surface fusion - Thermo chemical processes - Surface coatings Plating and anodizing Fusion Processes - Vapour Phase processes - Materials for rolling Element bearings - Materials for fluid film bearings - Materials for marginally lubricated and dry bearings.

**COURSE OUTCOME:**

1. Can analyze the wear of material in different application
2. Can suggest best material with better wear properties
3. Can understand the role of Tribology in different application
4. Can suggest better lubricant for particular application

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H									L				L
CO2	H		L						L					H
CO3		H					M							
CO4					H								H	

*H = Highly Related; M = Medium L = Low*

**Text Books:**

1. I.M. Hutchings, Tribology, Friction and Wear of Engineering Material, Edward Arnold

**Reference Books:**

1. E. P.Bowden and Tabor.D., Friction and Lubrication , Heinemann Educational Books Ltd

2. A. Cameron, Basic Lubrication theory , Longman, U.K., 1981.

<b>L-T-P</b>	<b>BME129A – CIM &amp; NTM Lab</b>	<b>Credits:2</b>
<b>0-0-2</b>		

**List of Experiments:**

1. Study of Computer Integrated System: Basics, Types of Manufacturing, role of management and CIM wheel
2. NC/CNC technology: Definition, Classification, Specification, Construction details, Sensors and Actuators, and different controllers.
3. CNC part Programming: Lathe and Milling jobs
4. Exercise on PLC for Simple problems.
5. Problems on GT and Industrial case problems on coding
6. Problems on CAPP and Industrial case problems
7. Study of Flexible Manufacturing system
8. Study of Robotics Technology
9. Problems on MRP-I, MRP-II
10. Study of Expert System in Manufacturing and MI

**COURSE OUTCOME:** after learning the course the students should be able to:

1. Students will describe basic concepts of CAM application and understand CAM wheel.  
Can suggest best material with better wear properties
2. Students will prepare CNC programs for manufacturing of different geometries on milling and lathe machines.
3. Students will prepare logic diagram for different application of automation.
4. Students will prepare Process planning for different components

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>	<b>Program Specific Outcome</b>
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H									L				L
CO2	H		L						L					H
CO3		H					M							
CO4					H								H	

<b>L-T-P</b>	<b>BME029B - <u>Automobile Engineering Lab</u></b>	<b>Credits:2</b>
<b>0-0-2</b>		

### **List of Experiments**

1. Study/ demonstration of Valve mechanism.
2. Assembling and dismantling of Gear Box.
3. Study of Gear Mechanism of Rear Axle.
1. Study/ demonstration of Steering and suspension mechanism.
2. Study/ demonstration of Automobile Braking System.
3. Study/ demonstration of Chassis and Suspension System.
4. Study/ demonstration of Ignition system of I.C. Engine.
5. Study/ demonstration of Fuel Supply System of C.I. Engines- Injector & Fuel Pump.
6. Study/ demonstration of engine cooling system.
7. Comparative study of technical specifications of common small cars (such as Maruti Swift, Hyundai i20, Chevrolet Aveo, Tata Indica, Ford Fusion etc.
8. Comparative study & technical features of common scooters & motorcycles available in India.
9. Visit of an Automobile factory.
10. Visit to a Modern Automobile Workshop.
11. Experiment on Engine Tuning.

### **COURSE OUTCOME:after learning the course the students should be able to:**

1. Students will describe basic concepts of CAM application and understand CAM wheel.  
Can suggest best material with better wear properties
2. Students will prepare CNC programs for manufacturing of different geometries on milling and lathe machines.

3. Students will prepare logic diagram for different application of automation.
4. Students will prepare Process planning for different components

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>												<b>Program Specific Outcome</b>	
	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>	<i>PO7</i>	<i>PO8</i>	<i>PO9</i>	<i>PO10</i>	<i>PO11</i>	<i>PO12</i>	<i>PSO1</i>	<i>PSO2</i>
<i>CO1</i>	<i>H</i>									<i>L</i>				<i>L</i>
<i>CO2</i>	<i>H</i>		<i>L</i>						<i>L</i>					<i>H</i>
<i>CO3</i>		<i>H</i>					<i>M</i>							
<i>CO4</i>					<i>H</i>								<i>H</i>	

1.1.3 Total number of courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year

## **M. Tech.**

### **Course Contents for M. Tech Program**

<b>L-T-P</b>	<b>DMA017A – Research Methodology</b>	<b>Credits: 2</b>
<b>2-0-0</b>		

### **Course Objectives**

1. To understand basic concepts of research and its methodologies
2. To Identify appropriate research topics
3. To Select and define appropriate research problem and parameters
4. To understand hypothesis formulation and testing
5. To learn fundamentals of thesis writing

<b>UNIT 1</b>	<b>Research Fundamentals and Terminology</b> Importance of Research in Management Decisions Defining Research Problems and Formulation of Hypothesis
	<b>Research Design</b> Type of Research Design, Natural Experiments , Formal Type of Experiments,
<b>UNIT 2</b>	Evaluation of Experiments , Selecting Relevant Variables, Validity of Experiments. Sample design , Steps in sample design, Criteria for selection of sample ,Different types of sample design ,The Sampling Process
<b>UNIT 3</b>	<b>Data Analysis</b> Methods and Techniques of Data Collection
	Type of Data , Distinction between primary Data and Secondary, Data Collection Procedure for primary Data, Data preparation and Preliminary Analysis, Presentation of Data, Oral Presentation Statistical Analysis and Interpretation of Data
<b>UNIT 4</b>	<b>Hypothesis Testing:</b> Null and alternative hypothesis, Level of significance, Type I and type II error, Two-tailed and one-tailed tests, Procedure of hypothesis testing, Power of hypothesis test, difference Hypothesis Testing, Multivariate Analysis of Data, Multiple Linear Regression,

## UNIT 5

### Report writing and Presentation

Fundamental of Report Writing and Formatting of Reports ,Additional Statistics in Research

#### Course Outcome :

1. Student will able to understand basic concepts of various research areas
2. Student will able to identify appropriate research topics concerned to Engineering field
3. Student will select and define appropriate research problem and its related parameters
4. Student will able to prepare the hypothesis and testing of hypothesis.
5. Student will able to develop skill of thesis /Dissertation writing .

#### Text Books

1. Bhattacharya K. Dipak, Research Methodolgy , , Excel Books , New Delhi
2. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan, 2006
3. Ranjit Kumar, Research Methodology- A Step-By-Step Guide for Beginners,(Pearson Education, Delhi)
4. Bendat and Piersol, Random data: Analysis and Measurement Procedures, Wiley Interscience, 2001

#### References

1. Montgomery, Douglas C. &Runger, George C. (2007) – Applied Statistics & Probability
2. Trochim, William M.K., (2003), 2/e, Research Methods, (Biztantra, Dreamtech Press, New Delhi)
3. Richard I Levin amp; David S. Rubin, Statistics for Management, 7/e. Pearson Education, 2005
4. Krishnaswamy, K. N., Sivakumar, Appa Iyer and Mathirajan, M. (2006), Management Research Methodology: Integration of Principles, Methods and Techniques (Pearson Education, New Delhi) Montgomery, Douglas C. (2007) – Design & Analysis of Experiments, 5/e. (New Delhi)
5. Donald R. Cooper, Pamela S. Schindler, Business Research Methods, 8/e, Tata McGraw-Hill Co. Ltd., 2006

<b>L-T-P</b>	<b>MME102B-<u>Advance Manufacturing Process I</u></b>	<b>Credits:3</b>
<b>3-0-0</b>		

#### Course Objective:-

- To impart students with the knowledge of the various aspects of the manufacturing and machining terminologies and to expose them to the mechanics of machining.

**UNIT I. Introduction to Manufacturing and Machining:** Identify the necessity of “manufacturing”, Define with examples the concept of “manufacturing”, List the main classifications of the manufacturing processes with examples , State the main purposes of “machining” , Define with examples the concept of “machining” , State with example the principles of “machining”, Define the concept of “machine tools”.

**UNIT II. Basic working principle, configuration, specification and classification of machine tools:** (a) Describe the basic functional principles of machine tools (i) Illustrate the concept of Generatrix and Directrix (ii) Demonstrate Tool – work motions (iii) Give idea about machine tool drives (b) Show configuration of basic machine tools and state their uses (c) Give examples of machine tools - specification (d) Classify machine tools broadly

**UNIT III. Tool Geometry:** (a) learn geometry of single point turning tools (i) concept of rake and clearance angles (ii) systems of description of tool geometry (b) Study and show tool geometry (i) Machine Reference System (ASA) (ii) Tool Reference System

**UNIT IV. Mechanics of Machining :** (i) State the purposes of conversion of tool angles (ii) Identify the four different methods of conversion of tool angles (iii) Employ the graphical method for conversion of Rake angles, clearance angles, Cutting angles From ASA to ORS and ORS to ASA systems (iv) Convert rake angle and clearance angle from ORS to NRS (v) Demonstrate tool angle’s relationship in some critical conditions.

**UNIT V. Mechanism of chip formation :** (i) describe with illustration the mechanism of chip formation in machining • ductile materials and brittle materials (ii) illustrate and assess geometrical characteristics of ductile chips : •chip reduction coefficient & cutting ratio , shear angle and cutting strain (iii) Identify and state the causes, characteristics and effects of built – up – edge (BUE) formation. (iv) Classify chips and identify the condition for different chip forms.

**Orthogonal and oblique cutting:** (i) define and distinguish, with illustrations, between orthogonal cutting and oblique cutting (ii) identify the causes of oblique cutting and chip flow deviation (iii) determine angle of chip flow deviation. (iv) illustrate and deduce effective rake angle (v) state the effects of oblique cutting

.

**Text Books:**

1. Metal cutting theory and practice - A. Bhattacharyya

**Reference Book:**

1. Manufacturing Science by Amitabha Ghosh and Mallik
2. Modern machining process - PANDEY AND SHAH

**Course Outcome :-**

- Students will be able to understand the various terminologies of the machining tool and its mechanism and also will be able to analyse the mechanism of chip formation under different conditions

<b>L-T-P</b>	<b>MME103B - <u>Industrial Engineering</u></b>	<b>Credits:3</b>
<b>3-0-0</b>		

### **Course Objectives:**

- To take the right decisions to optimize resources utilization by improving productivity of the Lands, Buildings, People, Materials, Machines, Money, Methods and Management effectively

### **UNIT-I:**

**INDUSTRIAL ENGINEERING:** Meaning, Definition, Objective, Need, Scope, Evolution and developments.

**PRODUCTIVITY:** Definition of productivity, individual enterprises, task of management Productivity of materials, land, building, machine and power. Measurement of productivity, factors affecting the productivity, productivity improvement programs, wages and incentives (simple numerical problems).

### **UNIT 2**

**WORK STUDY:** Definition, objective and scope of work study. Human factors in work study. Work study and management, work study and supervision, work study and worker.

**METHOD STUDY:** Definition, objective and scope of method study, activity recording and exam aids. Charts to record moments in shop operation – process charts, flow process charts, travel chart and multiple activity charts. (With simple problems).

### **UNIT 3**

**WORK MEASUREMENT:** Definition, objective and benefit of work measurement. Work measurement techniques. Work sampling: need, confidence levels, sample size determinations, random observation, conducting study with the simple problems.

**TIME STUDY:** Time Study, Definition, time study equipment, selection of job, steps in time study. Breaking jobs into elements, recording information. Rating & standard Rating, standard performance, scale of rating, factors of affecting rate of working, allowances and standard time determination. Predetermined motion time study – Method time measurement (MTM)

### **UNIT 4**

**ERGONOMICS:** Introduction, areas of study under ergonomics, system approach to ergonomics model, man-machine system. Components of man-machine system and their functions – work capabilities of industrial worker, study of development of stress in human body and their consequences. Computer based ergonomics.

DESIGN OF MAN-MACHINE SYSTEM: Fatigue in industrial workers, Quantitative qualitative representation and alphanumeric displays, Controls and their design criteria, control types, relation between controls and displays, layouts of panels and machines. Design of work places, influence of climate on human efficiency. Influence of noise, vibration and light.

## UNIT 5

CURRENT TRENDS: Introduction to Agile manufacturing, Lean and Six Sigma, Value Engineering, Just in time, Total quality management, Enterprise resource planning, Supply chain and logistics management.

### Text Books:

1. “Introduction to work study”ILO, - III Revised Edition, 1981
2. “Engineered work Measurement” - Weldon, ELBS, Marvin E. Mundel- Motion and Time study, PHI, 1<sup>st</sup> edition, 1991.

### Reference Books:

1. “Human Factors in Engineering Design” - S Sanders and E J McCormick, 6th Edition, McGraw Hill
2. “Work Study and Ergonomics “- S Dalela and Sourabh, Chand Publishers, 3rd edition.

### Course Outcomes:

- It encourages students creative thinking and development of a deeper understanding and intuitive feel for the subject.

<b>L-T-P</b>	<b>MME104B- <u>Advanced Engineering Materials</u></b>	<b>Credits:3</b>
<b>3-0-0</b>		

### Course Objective:-

- To introduce students the different types of the composites compositions and their mechanical properties.

**UNIT1. Introduction:** Classifications of Engineering Materials, Concept of composite materials, Matrix materials, Functions of a Matrix, Desired Properties of a Matrix, Polymer Matrix (Thermosets and Thermoplastics), Metal matrix, Ceramic matrix, Carbon Matrix, Glass Matrix etc. Types of Reinforcements/Fibers: Role and Selection of reinforcement materials, Types of fibres, Glass fibers, Carbon fibers, Aramid fibers, Metal fibers, Alumina fibers, Boron Fibers, Silicon carbide fibers, Quartz and Silica fibers, Multiphase fibers, Whiskers, Flakes etc., Mechanical properties of fibres. Material properties that can be improved by forming a composite material and its engineering potential

**UNIT2. Various types of composites:** Classification based on Matrix Material: Organic Matrix composites, Polymer matrix composites (PMC), Carbon matrix Composites or Carbon-Carbon Composites, Metal matrix composites (MMC), Ceramic matrix composites (CMC); Classification based on reinforcements: Fiber Reinforced Composites, Fiber Reinforced Polymer

(FRP) Composites, Laminar Composites, Particulate Composites, Comparison with Metals, Advantages & limitations of Composites

**UNIT3. Fabrication methods:** Processing of Composite Materials: Overall considerations, Autoclave curing, Other Manufacturing Processes, Fiber-only performs, Combined Fiber-Matrix performs, Manufacturing Techniques: Tooling and Specialty materials, Release agents, Peel plies, release films and fabrics, Bleeder and breather plies, bagging films

**UNIT4. Testing of Composites:** Mechanical testing of composites, tensile testing, Compressive testing, Intralaminar shear testing, Inter-laminar shear testing, Fracture testing etc.

**UNIT5. Characterisations techniques:** SEM, TEM, XRD, DSC, DTA, TGA, DMA etc.

**Text book:**

1. Mechanical Metallurgy by G. Dieter Mc-Graw Hill

**Reference book:**

1. Thermal Analysis of Materials by R.F. Speyer, Marcel Decker
2. Engineering Materials: Polymers, Ceramics and Composites A.K Bhargava Prentice Hall of India
3. Materials characterization, Vol. 10, ASM hand book

**Course Outcome :-**

- Students will be able to develop the basic knowledge of different types of engineering materials and how they are being fabricated.
- They will be aware of various mechanical changes when advanced materials are subjected to the mechanical testing.

<b>L-T-P</b>	<b>MME105B- <u>Advanced Manufacturing Process Lab</u></b>	<b>Credits:1</b>
<b>0-0-2</b>		

**List of Experiments**

- Hydraulic Bulge test and Erichsen test
- Mechanical properties of powder compacts
- Experiments on Rolling, Deep Drawing, Extrusion



- Uni-axial compression test to obtain true stress-strain data and to obtain the effects of lubrication
- Plane strain compression test for sheet type of specimen to obtain stress-strain behavior,
- Temperature distribution in arc welding
- Weld quality tests
- Work space analysis of manipulator.
- Experiments on TIG and MIG welding to find out the mechanical properties of metals
- Hydraulic and Pneumatic circuits
- Operation of tool and cutter grinder, twist drill grinder, Centreless grinder
- Determination of cutting forces in turning
- Inspection of parts using tool makers microscope, roughness and form tester
- PLC programming

<b>L-T-P</b>	<b>DMA018A – Research Methodology Lab</b>	<b>Credits: 1</b>
<b>0-0-2</b>		

#### **SPSS Package -**

**An Overview of SPSS :** Mouse and keyboard processing, frequently –used dialog boxes, Editing output, Printing results, Creating and editing a data file

**Managing Data:** Listing cases, replacing missing values, computing new variables, recording variables, exploring data ,selecting cases, sorting cases, merging files

**Graphs:** Creating and editing graphs and charts

**Frequencies:** Frequencies, bar charts, histograms, percentiles

**Descriptive Statistics:** measures of central tendency, variability, deviation from normality, size and stability, Cross Tabulation and chi-square analyses, The means Procedure

**Bivariate Correlation:** Bivariate Correlation, Partial, Correlations and the correlation matrix

**The T-test procedure:** Independent –samples, paired samples, and one sample tests

**The one way ANOVA procedure:** One way analysis of variance

**General Linear model:** three –way analysis of variance and the influence of covariates, Simple Linear Regression, Multiple regression analysis, Multidimensional scaling, Factor analysis, Cluster analysis

<b>L-T-P</b>	<b>MME202B- <u>Computer Aided Manufacturing</u></b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### **Course Objective:-**

- Conceptualization of product, impart the knowledge of the advanced computer aided manufacturing.

## **UNIT I**

### **Introduction**

The meaning and origin of CAM- the changing manufacturing and management scene – External communication - islands of automation and software-dedicated and open systems-manufacturing automation protocol - product related activities of a company- marketing engineering – production planning - plant operations - physical distribution- business and financial management.

## **UNIT II**

### **Components of CAM**

Building blocks of flexible manufacturing system; Manufacturing Machines and their Design

Consideration e.g. CNC Turn, CNC Mill etc., Pallet, CMM, Measuring Probes, Robots, Job Loading & Unloading Arm, Work Transfer stations, Assembly Stations, Automated Storage Retrieved System (ASRS), Material Handling Systems: Automated Guided Vehicles (AGV), Conveyers, Computer Control System. Mechatronics: Sensors, Actuators, Convertors, Modular Automation.

## **UNIT III**

### **Shop Floor Control & Integration of Components**

Shop floor control-phases -factory data collection system -automatic identification methods- Bar code & RFID technology-automated data collection system, Integration of manufacturing & business functions.

### **TEXT BOOK:**

1. Nanua Singh “Systems Approach to Computer Integrated Design and Manufacturing” John Wiley & Sons, Inc
2. Mikell.P.Groover “Automation, Production Systems and computer integrated manufacturing”, Pearson Education 2001.

### **REFERENCE BOOKS:**

1. Nand K. Jha “Hand-book of Flexible Manufacturing Systems” Academic Press, 1991

2. Yoremkoren, “Computer Integrated Manufacturing System”, McGraw-Hill, 1983.
3. Ranky, Paul G., “Computer Integrated Manufacturing”, Prentice Hall International, 1986.
4. David D.Bedworth, Mark R.Hendersan, Phillip M.Wolfe “Computer Integrated Design and Manufacturing”, McGraw-Hill.
5. Roger Hanman “Computer Intergrated Manufacturing”, Addison – Wesley, 1997.
6. Mikell.P.Groover and Emory Zimmers Jr., “CAD/CAM”, Prentice Hall of India Pvt. Ltd., New Delhi-1, 1998.
7. Kant Vajpayee S, “Principles of Computer Integrated Manufacturing”, Prentice Hall India, 2003.

**Course Outcome :-**

- Students will have the knowledge of different manufacturing materials and their applications in real world

<b>L-T-P</b>	<b>MME208B - Computer Aided Analysis &amp; Design</b>	<b>CREDITS: 3</b>
<b>3-0-0</b>		

**COURSE OBJECTIVE:**

The course aim at exposing a higher degree student with advanced concepts in the field of computer-aided-design. One may expect to gain a basic understanding of how CAD has become a need of modern engineering design. Also, emphasis would be given on the mathematical concepts that form the backbone of CAD tools; this is to enable a student to appreciate the subtleties of using CAD as a design tool.

**UNIT-I Introduction-**

Engineering Design, Computer as an Aid to the Design Engineer, Computer Graphics terminology, Graphics Standards and Software, Designer-Computer Interaction, Computer Aided Mechanism and Machine Element Design.

**UNIT-II Transformations and Projections**

Definition, Rigid Body Transformations, Deformation. Generic Transformation in Two-Dimensions, Transformations in Three-Dimensions. Computer Aided Assembly of Rigid Bodies, Projections, Orthographic Projection, Oblique Projections.

**UNIT-III Differential Geometry of Curves**

Curve Interpolation, Curve Fitting Representing Curves, Differential Geometry of Curves

#### **UNIT-IV Design of Curves**

Ferguson's or Hermite Cubic Segments, Composite Ferguson Curves Curve Trimming and Re-parameterization, Blending of Curve Segments, Three-Tangent Theorem, Composite Bézier Curves

#### **UNIT-V Splines**

Definition, Polynomial Splines, B-Splines (Basis-Splines), Newton's Divided Difference Method, Divided Difference Method of Compute B-Spline Basis Functions, Recursion Relation to Compute B-Spline Basis Functions, B-Spline Curves, Interpolation with B-Splines, Non-Uniform Rational B-Splines (NURBS).

#### **TextBooks:**

1. Anupam Saxena & Birendra Sahay; Computer Aided Engineering Design, Springer.

#### **Reference Books:**

1. Chris McMahon and Jimmie Browne - CAD/CAM – Principle Practice and Manufacturing Management, Addison Wesley England, 1998
2. D. F. Rogers and J. A. Adams, Mathematical Elements in Computer Graphics, McGrawHill, 1990

<b>L-T-P</b>	<b>MME209B- Quality Reliability &amp; Maintenance Engineering</b>	<b>CREDITS: 3</b>
<b>3-0-0</b>		

#### **COURSE OBJECTIVE:**

To train students with good scientific and engineering breadth so as to comprehend, analyze, design and create novel products and provide solution for the real life problems.

#### **UNIT-I Introduction-**

Quality function, Dimensions of Quality, Quality Engineering terminology, Brief history of quality methodology, Statistical methods for quality improvement, Quality costs – four categories costs and hidden costs. Brief discussion on sporadic and chronic quality problems. Introduction to quality function deployment.

#### **UNIT-II**

Quality Assurance, Definition and concept of quality assurance, departmental assurance activities. Quality audit concept, audit approach etc. structuring the audit program, planning and performing audit activities, audit reporting, ingredients of a quality program.

#### **UNIT-III**

Definition of SQC, benefits and limitation of SQC, control–chance and assignable cause’s variation. Basic principles of control charts, choice of control limits, sample size and sampling frequency, rational subgroups. Analysis of patterns of control charts.. Process capability

#### UNIT-IV

Control Charts for Variables- Controls charts for X bar and Range, statistical basis of the charts, development and use of X bar and R charts interpretation of charts. Control charts for X bar and standard deviation (S), development and use of X bar and S chart. Brief discussion on – Pre control X bar and S control charts with variable sample size, control charts for individual measurements,

#### UNIT-V

Reliability and Life Testing- Failure models of components, definition of reliability, Mean time to failure (MTTF); Mean time between failure, (MTBF) and mean time to repair (MTTR) Failure rate, bath tub curve types of failure, reliability evaluation in simple cases of exponential failures in series, Maintainability and availability- simple problems, paralleled and series-parallel device configurations, Element Redundancy, Unit redundancy, Standby redundancy, Redundancy and improvement factors evaluations.

#### TextBooks:

1. D C Montgomery; Introduction to statistical Quality Control, John Wiley and Sons.

#### Reference Books:

1. Janet L Novak and Kathleen C Bosheers ;The QS9000 Documentation Toolkit,” Prentice Hall PTR
2. Gupta.R.C, “Statistical Quality Control”, Khanna Publishers, New Delhi.
3. Mahajan M.“Statistical Quality Control”, Dhanpat Publishers, New Delhi.

<b>L-T-P</b>	<b>MME205B– <u>Computer Aided Manufacturing Lab</u></b>	<b>Credits:1</b>
<b>0-0-2</b>		

#### List of Experiments

- AGV planning
- ASRS simulation and performance evaluation
- Machines, AGVs and AS/RS integrated problems
- JIT system
- Kanban flow
- Material handling systems
- M.R.P. Problems
- Shop floor scheduling etc.

- Hydraulic and Pneumatic circuits
- Closed loop control systems
- Study of the chip formation in turning process
- Study of operation of tool and cutter grinder, twist drill grinder, Centreless grinder
- Determination of cutting forces in turning
- Experiments in unconventional manufacturing processes-AJM and study of USM, EDM, Laser Machining and Plasma spraying
- Inspection of parts using tool makers microscope, roughness and form tester
- Study of micro-controllers, programming on various CNC machine tools and also controllers
- Studies on PLC programming
- Study and programming of robots
- Condition monitoring in machining process using acoustic emission.

<b>L-T-P</b>	<b>MME301B- Production and Operation Management</b>	<b>Credits:3</b>
<b>3-1-0</b>		

### **Course Objective:-**

#### **Unit No.1**

##### **Introduction to production & operations systems.**

Definitions of Production Management; Production Process; Production: The Heart of an Organization; Objectives of Production Management; Scope of Production Management.

#### **Unit No.2**

Definition of Operations Management: An Outline of Operations Strategy; Factors Affecting Operations Management; Objectives of Operations Management; Functions and Scope of Operations Management: Planning, Organizing, Controlling.

#### **Unit No.3**

Productivity : Importance, productivity ratio, productivity measurement, productivity index  
Forecasting : Methods —moving average, exponential smoothing, Regression analysis.

Production Planning & Control : Aggregate planning. Sequencing, Line balancing, Flow control, Dispatching, expediting, Gantt chart, line of balance, learning curve

#### **Unit No.4**

Project Management : PERT & CPM Critical path, Most likely time estimate , Resource leveling

## Unit No.5

Inventory Control ,Materials requirement planning. Material Handling and Facility Layout.

### Text Books:

1. Everett E. Adam and Ronald J Ebert, Production and Operation Management: Concepts, Models & Behaviour, PHI New Delhi
2. Chary SN, Production, and Operations Management- Concepts, Methods and Strategy, PHI New Delhi 2005
3. Buffa. ES, Modern Production Management; John Willey, New York 1993
4. Ajay Garg, Production and Operations Management, TMH, Delhi

### Reference Books:

5. Richard B Chase, Ravi Shankar, F.R. Jacobs, N.J. Aquilano, Operations and Supply Management TMH, Delhi
6. R Panneerselvam Book, Production and Operations Management, PHI New Delhi
7. Joseph Martinich, Production and Operations Management, TMH, Delhi
8. K Aswathappa, Production and Operations Management, TMH, Delhi

### Course Outcome :-

- Students will have an knowledge of various techniques of Production and Operation Management methods and their applications and how the simulation techniques can reduce the lead time in manufacturing industries.

<b>L-T-P</b>	<b>MME303B- Total Quality Management</b>	<b>Credits:3</b>
<b>3-0-0</b>		

### Course Objective:-

- To learn the basic concepts of quality and quality from organizational point of view.
- To learn the concept of total quality management from western and Japanese approach.
- To learn the internal politics, quality culture, education and training of the organization.
- To be aware of international/national Quality awards.

## Unit No.1

**Evolution of Quality** -Historical Perspective,Basic Concepts of Quality,Vision, Mission and Objectives of an Organization,Corporate Structure in an Organization and Role of Quality Quality Planning, Quality By Design, Quality Costs and Cost of Failure, Waste Control, How Quality Benefits Business.

## **Unit No.2**

Quality and Competitiveness in Business, Zero Defects and Continuous Improvement, Role of Leadership and Commitment in Quality Deployment, Team Building, Motivation and Rewards, Total Employee Empowerment, Quality Functions -Measurement, Inspection, Testing, Calibration and Assurance

## **Unit No.3**

Design Control and Conformity, Tolerance and Variability, PDCA Cycle, Juran Trilogy, Crosby's 10 points and Deming's 14 Points Customers Requirements, Customer-Supplier and Chain Links, Establishing Customer Focus-Customer, Satisfaction, Measurement and Customer Retention Product Liability, Total Quality Concepts and CWQC, Difference in Western And Japanese Approach of TQM, Basic Philosophy and Fundamental Models of TQM,Total Quality and Ethics

## **Unit No.4**

Internal Politics and Total Quality Management, Quality Culture, Education and Training Implementing Total Quality Management -An Integrated System Approach ,Total Preventive Maintenance

## **Unit No.5**

Self-Assessment, International/National Quality Awards:Malcolm Baldrige Award, Deming Prize,European Award, Rajeev Gandhi Award, CII Exim Award, Jamna Lal Bajaj Award, Golden Peacock Award

### **CourseOutcome:-**

- ☐Students should be able to Quality environment of the organization.
- ☐Student should be able to know the TQM approachfor manufacturing/service organizationin length.
- ☐Student should be able to know various Quality terms like Tolerance and Variability, PDCAcycle,Crosby's 10 points and Deming's 14 Points.
- ☐Student should be able to know international/national Quality awards



**Text Book:**

- 1.Total Quality Management by N.V.R Naidu, G. Rajendra New Age international,,FirstEdition,Jan 2006
- 2.Total Quality Management by R.SNaagarazan ,New Age international,3e, 2015.
- 3.Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India, 2004.

**Reference Books :**

- 1.Total Quality Management by V.SBagad Technical Publications, First Edition,Jan 2008
- 2.Total Quality Management by S. RajaramDreamtechPress,First Edition, Jan 2008

<b>L-T-P</b>	<b>MME302B- <u>Advanced Welding Technology</u></b>	<b>Credits:3</b>
<b>3-1-0</b>		

**Course Objective:-**

- Introducing the concepts of welding and their different types of welding processes for joining two metals.

**UNIT I .Welding Power Sources:**

Types of power sources, External V-I characteristics for constant current and constant voltage power sources, Rectifiers, Solid-state Rectifiers, Inverter systems, Duty cycle.

**Arc welding consumables:**

Types of electrodes, AWS and Indian system of classification and coding of covered electrode for mild steel, Shielding gases and associated mixtures.

**UNIT II. Metal transfer:**

Short circuit/ dip transfer, Free flight, Globular type, Spray type, Forces affecting metal transfer, Weld bead geometry and shape factors, Weld dilution.

**UNIT III. Arc welding processes:**

Electric arc welding principle, MIG: -welding equipment and processes, shielding gas, types of metal transfer. Tungsten inert gas arc welding (GTAW): - welding equipment, electrodes, inert gases and torches. Submerged arc welding (SAW):- principle of processes, applications, fluxes and welding electrodes used. CO2 welding: - difference from MIG welding, Principle of operation, equipment, welding parameters and applications.

**Solid state welding:**

Introduction, main features and applications of Ultrasonic welding, Friction welding and Explosive welding.

**Welding of plastics:**

Difficulties in welding of Plastics, Processes for welding of Plastics.

**UNIT IV. Weldability of specific Materials:**

Stainless Steel, Aluminum and Cast Iron.

**Surfacing and metal spraying:**

Surfacing methods such as SMAW, MIG, TIG, SAW. Thermal spraying: Introduction, Procedures, Applications, Advantages and Disadvantages.

**Thermal cutting of metals:**

introduction, types, principle and operation of flame and plasma cutting.

**Under water Welding:**

Introduction, methods and applications

**UNIT V. Automation in Welding:**

Introduction, Semiautomatic welding, Automatic welding, Welding mechanization, Flexible Automated Welding, Robotic welding, Types of Welding Robots, Robot Selection Mechanics, Joint tracking system.

**Text Book:**

1. Modern welding technology:- carry H. B. (PH).

**Reference Book:**

1. Welding technology :- R. S. Parmar
2. AWS- welding handbook(IV – VI) Edition
3. Welding technology :- A. C. Devis
4. Welding and welding Technology :- Little (TMH)

**Course Outcome :-**

- Students will have the knowledge of different welding processes and their applications in real world

<b>L-T-P</b>	<b>MME304B - <u>Product Design and Development</u></b>	<b>Credits: 3</b>
<b>3-0-0</b>		

### **Course Objective:**

- To train students with good scientific and engineering breadth so as to comprehend, analyze, design and create novel products and provide solution for the real life problems

**Unit I: Introduction:** Significance of product design, product design and development process, sequential engineering design method, the challenges of product development,

**Product Planning and Project Selection:** Identifying opportunities, evaluate and prioritize projects, allocation of resources

**Unit II: Identifying Customer Needs:** Interpret raw data in terms of customers need, organize needs in hierarchy and establish the relative importance of needs.,

**Product Specifications:** Establish target specifications, setting final specifications,

**Concept Generation:** Activities of concept generation, clarifying problem, search both internally and externally, explore the output,

**Unit III: Industrial Design:** Assessing need for industrial design, industrial design process, management, assessing quality of industrial design,

**Unit IV: Concept Selection:** Overview, concept screening and concept scoring, methods of selection.

**Theory of inventive problem solving (TRIZ):** Fundamentals, methods and techniques, General Theory of Innovation and TRIZ, Value engineering Applications in Product development and design, Model based technology for generating innovative ideas

**Unit V: Concept Testing:** Elements of testing: qualitative and quantitative methods including survey, measurement of customers' response,

**Intellectual Property:** Elements and outline, patenting procedures., claim procedure,

**Design for Environment:** Impact, regulations from government, ISO system.,

### **Text books:**

1. Ulrich K. T, and Eppinger S.D, Product Design and Development, Tata McGraw Hill

### **Reference Books:**

1. Inventive thinking through TRIZ: a practical guide, By Michael A. Orloff, Springer.
2. Systematic innovation: an introduction to TRIZ ; (theory of inventive Problem Solving), By John Terninko, AllaZusman, CRC Press.

### Course Outcomes:

At the end of this course students will develop:

CO1: An ability to create ideas for successful and generic product development.

CO2: Ability to identify customer needs for product specification generation

CO 3: Ability to apply all the steps involved in concept generation and concept selection as a part of product development.

CO4: Ability to carry out cost and benefit analysis through various cost models. Students will Be familiar with the design protection and Intellectual Property.

CO5 : Ability to understand and apply all the necessary components of Industrial Design and theory of inventive problem solving.

Course Outcome				Program Outcome										Program Specific Outcome
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1		H	M	M	H	M		H		M	M		M	H
CO2		M		M	M	M	H		M	M			M	M
CO3			H		M		M				H	M	M	H
CO4				M		H	M		H	M	H		M	M
CO5	M	H	M			M		M	M	M	H	M	H	M

H = Highly Related; M = Medium L = Low

<b>BHH001A(TH)</b>	<b>Foundation Course in Food Production-1</b>	<b>CR-2</b>
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**Course Objective:-** The Student will get knowledge about:

1. Know the history of cooking, its modern developments and develop brief idea of various cuisines;
2. Understand the professional requirements of kitchen personnel and the importance and maintenance of hygiene;
3. Have insight of kitchen organization, duties and responsibilities of kitchen staff, workflow, and kitchen equipment's;
4. Have through knowledge raw materials and understanding basic bakery.

<b>Unit No.</b>	<b>Topic</b>
<b>1.</b>	<b>INTRODUCTION TO COOKERY</b> <ul style="list-style-type: none"> <li>• Origin of modern cookery</li> <li>• Classical and modern kitchen brigade, duties and responsibilities of various chefs</li> <li>• Kitchen layout and work flow, co-operation and co-ordination with other departments.</li> <li>• The attributes of a culinary professional, importance of personal hygiene, uniform and protective clothing, food and kitchen safety.</li> </ul>
<b>2</b>	<b>Basic Cookery Fundamentals</b> <ul style="list-style-type: none"> <li>• Identification of tools and Equipments used in kitchen</li> <li>• Identification of commonly used ingredients</li> <li>• Various textures and consistencies</li> <li>• Techniques used in pre-preparation and preparation.</li> <li>• Effect of heat on flour, protein and colour pigments.</li> <li>• Principles of heat transfer- conduction, convection and radiation</li> <li>• Dry, moist and special methods of cooking, principles, advantages and disadvantages of each</li> <li>• Care and precautions to be taken in Kitchen</li> </ul>
<b>3</b>	<b>Stocks and Sauces</b> <ul style="list-style-type: none"> <li>• Stocks- definition, types, recipes, storage, uses, care and precautions</li> <li>• Sauces- introduction, classification of mother sauces, recipes, derivatives, uses, care and precautions.</li> </ul>
<b>4</b>	<b>Basic Bakery Fundamentals</b> <ul style="list-style-type: none"> <li>• Identification of tools and equipments used in bakery</li> <li>• Identification, selection and use of commonly used ingredients- flour, sugar, salt, raising agents, shortening agents, egg etc</li> <li>• Baking food at various temperatures- importance and understanding of temperature.</li> </ul>
<b>5</b>	<b>Bread- I</b> <ul style="list-style-type: none"> <li>• Bread- ingredients used and their role in bread making</li> <li>• Definition</li> <li>• Steps in bread making</li> <li>• Different methods of bread making</li> <li>• Faults in bread and measures to remove/ avoid them</li> <li>• Bread improvers and various other flours used for bread making- ray flour, multi grain flour, potato flour, their characteristic and uses.</li> </ul>

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**Course Outcome (CO):**

At the end of this course students will have to know about:

CO1: History of cooking, its modern developments.

CO2: Kitchen and personal hygiene.

CO3: Kitchen organization.

CO4: 4. Methods of cooking, knowledge of raw materials and Basic Bakery

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		L					
CO2	M						
CO3						L	
CO4	H						

H = Highly Related; M = Medium L = Low

**REFERENCE BOOKS:**

1. The Professional Chef : Le Rol A. Polsin
2. The Books Of Ingredients : Jane Grigson
3. Practical Cookery, Victor Ceserani & Ronald Kinton, ELBS
4. Theory Of Catering, Victor Ceserani & Ronald Kinton, ELBS
5. Theory Of Cookery, Mrs. K.Arora, Frank Brothers

<b>BHH-011A</b>	<b>Foundation Course in Food Production-1 –LAB.</b>	<b>Credits 4</b>
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**Course Objective:-** The Student will get knowledge about:

1. Use knives and kitchen equipment safely to cut meat, vegetables and other ingredients.
2. Define and use cooking terms accurately.
3. Use and convert recipes to produce desired quantities.
4. Weigh and measure ingredients and portions accurately.
5. Season food to achieve desired product outcomes.
6. Prepare a variety of protein, vegetable, starch, and dessert items in a professional kitchen.
7. Apply ethical and sustainability decision making in food production.



Practical No.	Topic
1	Familiarization to working in kitchen
2	Introduction to Equipments and tools, uses cares and precautions
3	Food safety, personal hygiene and work area hygiene
4	Knife handling and basic vegetable cuts
5	Stock making
6	Sauces and their derivatives (2-4 commonly used ones)
7	Cooking methods; actual cooking of various dishes;
8	Basic bread preparations and some varieties of international bread
9	Basic cookies.

### Text Books And Reference Books:

Bali, P. S. (2009). Food Production Operations. New Delhi; Oxford University Press.

Kinton, R., & Ceserani, V. (2005). The Theory of Catering. London: E. Arnold.

Essential Reading / Recommended Reading

Escoffier, A. (1979). The Complete Guide To The Art Of Modern Cookery: The first translation into English in its entirety of Le Guide Culinaire. London: Heinemann.

Larousse, L. (2001). Larousse Gastronomique: The World's Greatest Cookery Encyclopedia. Hamlyn.

### Couse Outcome-

After the completion of the course, students will:

· CO1. Understand the basic operations of a professional kitchen with regard to safety procedures and hygiene and claim an insight into the basic hierarchy in the kitchen and their placement in the brigade with regard to their skills and experiences.

CO2. Identify different types of equipment and their safety operating procedures and also to know the various kinds of modern cooking equipment's and their uses in the kitchen.

· CO3 Familiarize with various cooking methods with regard to taste and texture and to know the utensils and equipment used in various cooking methods.

· CO4 Identify types of vegetables, their selection, storage criteria, pigments and their effects on heat and also to list the cuts of vegetables and their uses in cookery.

· CO5 Comprehend various types of stocks, and sauces; to know their preparation, storage criteria and their uses in the kitchen.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M			L			
CO2	L						
CO3	M						
CO4		L					



CO5						M	
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H = Highly Related; M = Medium L = Low

<b>BHH002A</b>	<b>FOUNDATION COURSE IN FOOD &amp; BEVERAGE SERVICE– I</b>	<b>CR-2 (TH)</b>
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**Course Objective:-** The Student will get knowledge about:

1. Develop an insight into the growth of Catering Industry In the world from medieval period till recent times.
2. Understand the different components of the catering industry) the functions of various departments of a hotel, and their relationship with Food & Beverage service department, in order to acquire professional Competence at basic levels in the principles of Food service and its related activities.
3. Acquire the requisite technical skills for competent service of Food and Beverage
4. Understand different non-alcoholic beverages with their preparation and services.

Unit No.	Topic
01	<b>THE HOTEL &amp; CATERING INDUSTRY</b> <ul style="list-style-type: none"> <li>• Introduction &amp; growth of hotel industry.</li> <li>• Role of catering establisBHHent in tourism industry.</li> <li>• Classification of food &amp; beverage operations.</li> <li>• Commercial: residential/ non residential.</li> <li>• Welfare: industrial/ institutional transport (air, rail, road &amp; sea)</li> </ul>
02	<b>ORGANIZATION OF FOOD &amp; BEVERAGE SERVICE DEPARTMENT</b> <ul style="list-style-type: none"> <li>• Principle staff of various types of food and beverage operations.</li> <li>• Duties and responsibilities of food and beverage service personnel.</li> <li>• Attributes of food and beverage service personnel.</li> <li>• Interdepartmental relationship between food and beverage and other department</li> </ul>
03	<b>FOOD &amp; BEVERAGE SERVICE EQUIPMENT</b> <ul style="list-style-type: none"> <li>• Criteria for selection for equipment.</li> <li>• Usage of various service equipment major and minor(electrical and non</li> </ul>





	electrical) • Tableware (flatware, cutlery, hollowware) • Chinaware, glassware and disposable • Furniture & linen • Specialized service equipment. • Care and cleaning
04	<b>FOOD AND BEVERAGE SERVICE METHODS</b> • Factors dividing the types of service of food. • Categorization of service methods: table service, self service, Assisted service, single point service, specialized service or service In situ, gueridon service
05	<b>Food &amp; beverage terminology related to the inputs of the semester</b>

**Course outcome:-** At the end of course the student should know about:-

CO1. Understand the role of F & B department its functions and staffing

CO2. Identify and use the different types of restaurant equipment.

CO3. Understand the Professional attributes of F& B staff.

CO4. Understand the role of Ancillary department in F&B.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2						L	
CO3							M
CO4		M					

H = Highly Related; M = Medium L = Low

<b>BHH-012A</b>	<b>Foundation Course in Food and Beverage Service-1(LAB.)</b>	<b>Credits 2</b>
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#### **Course Objectives—**

- 1.To understand the development of the food service industry
2. To identify various types of restaurants and understand their features.
3. To comprehend various equipment used in the restaurant
4. To learn and create various napkin folds
5. To learn the various cover setup for food and beverage service.
6. To understand the procedure of taking a guest's order and service of water



S.No	Topic
01	Food Service areas – Induction & Profile of the areas
02	Ancillary F&B Service areas – Induction & Profile of the areas
03	Familiarization of F&B Service equipment
04	Care & Maintenance of F&B Service equipment
05	Cleaning / polishing of EPNS items by: - Plate Powder method - Polivit method - Silver Dip method - Burnishing Machine
06	<b>Basic Technical Skills</b> Task-01: Holding Service Spoon & Fork Task-02: Carrying a Tray / Salver Task-03: Laying a Table Cloth Task-04: Changing a Table Cloth during service Task-05: Placing meal plates & Clearing soiled plates Task-06: Stocking Sideboard Task-07: Service of Water Task-08: Using Service Plate & Crumbing Down Task-09: Napkin Folds Task-10: Changing dirty ashtray Task-11: Cleaning & polishing glassware
07	Tea – Preparation & Service
08	Coffee - Preparation & Service
09	Juices & Soft Drinks - Preparation & Service • Mock tails • Juices, Soft drinks, Mineral water, Tonic water
10	Cocoa & Malted Beverages – Preparation & Service

#### Learning Outcome---

After completing the course, the students will be able to know how to;

CO1 Identify the different equipment used in food and beverage service

CO2. Create napkin folds

CO3 Set a table cover for a la carte and table d’hote

CO4. Identify the various room service management techniques that can be adapted in a hotel

CO5 Take food and beverage orders.

CO6 Serve water according to the order from guests

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1						L	
CO2						M	
CO3						M	
CO4	L						
CO5		M					
CO6	H						



H = Highly Related; M = Medium L = Low

**Text Books And Reference Books:**

Singaravelavan, R. (2014). Food and beverage service. New Delhi, India: Oxford University Press  
Essential Reading / Recommended Reading

Cousins, J., Lillicrap, D., & Weekes, S. (2014). Food and Beverage Service (9th ed.). Hodder Education

Andrews, S. (2013). Textbook of food and beverage management (7th ed.). New Delhi: Tata McGraw-Hill.

Thomas, C., & Hansen, B. (2013). Off-premise catering management (3rd ed.). New Jersey: John Wiley & Sons.

McVety, P., Ware, B., & Ware, C. (2009). Fundamentals of menu planning (3rd ed.). New Jersey: John Wiley & Sons

Davis, B., & Lockwood, A. (1998). Food and beverage management (3rd ed.). Oxford [England: Butterworth-Heinemann.

Dias, P. (1996). The steward. New Delhi: Orient Longman Limited.

Kivela, J. (1994). Menu planning for the hospitality industry. Melbourne: Hospitality Press. Fuller, J. (1992). Modern restaurant service: A manual for students and practitioners. Cheltenham: Stanley Thrones.

<b>BHH003A</b>	<b>FOUNDATION COURSE IN ACCOMMODATION OPERATIONS– I</b>	<b>CR-2</b>
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**Course Objective:-**

The students will get knowledge about:

1. Organization, function of Housekeeping department and its different sections.
2. Different departments Housekeeping co-ordinates with.
3. Procedure of cleaning different status of room.
4. Cleaning equipment and cleaning agent.

<b>S.No.</b>	<b>Topic</b>
01	<b>INTRODUCTION TO HOUSE KEEPING DEPARTMENT</b> <ul style="list-style-type: none"><li>• Meaning and definition</li><li>• Importance of house keeping</li><li>• Responsibilities of the housekeeping department</li><li>• The role of house keeping in hospitality</li></ul>
02	<b>ORGANISATION OF THE HOUSEKEEPING DEPARTMENT</b> <ul style="list-style-type: none"><li>• Layout of the house keeping department</li><li>• Organizational framework of the department (large/medium/small hotel)</li><li>• Role of key personnel in housekeeping</li></ul>



	<ul style="list-style-type: none"> <li>• Job description and job specification of staff in the department</li> <li>• Duties and responsibilities of housekeeping staff</li> <li>• Attributes and qualities of the housekeeping staff –skills of a good housekeeper.</li> </ul>
03	<b>House Keeping Control Desk</b> <ul style="list-style-type: none"> <li>• Role of control desk</li> <li>• Housekeeping control desk</li> <li>• Importance, role, check list, handling lost and found articles</li> <li>• Forms, formats and registers used in the control desk</li> <li>• General operations of control desk, briefing, debriefing, gate pass</li> <li>• Inter departmental relationship, Handling Telephone Calls</li> <li>• Types of keys, Key Control</li> </ul>
04	<b>Cleaning Equipment</b> <ul style="list-style-type: none"> <li>• Types of equipments</li> <li>• Operating principles of equipment</li> <li>• Characteristics of good equipment (mechanical/manual)</li> <li>• Cleaning products (domestic and industrial)</li> </ul> Care and maintenance.
05	<b>Cleaning Of Public Area</b> <ul style="list-style-type: none"> <li>• Cleaning process</li> <li>• Cleaning and upkeep of public area, lobby, cloak room/ restaurant/ bar/ banquet hall/ administration office/ lifts and elevators/ staircase/ back area/ front area/ corridor.</li> </ul>

**Course outcome:-**

By end of this semester students able to know about:

CO1. Understand the structure function, Importance and different section of housekeeping department.

CO2. Co-ordination with other department of hotel.

CO3. Perform different types of cleaning.

CO4. Handling of cleaning equipment & cleaning agents

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2							M
CO3						L	
CO4						M	

H = Highly Related; M = Medium L = Low

<b>BHH013A</b>	<b>FOUNDATION COURSE IN ACCOMMODATION OPERATIONS – I (LAB)</b>	<b>CR.1</b>
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**Course objective---**



Knowledge of cleaning equipment and cleaning agents • Public Area Cleaning Procedures (Cleaning of various surfaces) • Procedures to be followed to Daily Room Cleaning • Chamber Maid trolley setup • Bed Making Procedures

S.no.	Topic
01	Identification of cleaning equipment manual and mechanical;
02	Cleaning of different surfaces (metal, glass, plastic, painted surface, wood, wall and floor covering);
03	Cleaning of public areas (lobby, clock room/ restaurant/ bar/ banquet hall/ administration office/ lifts and elevators/ staircase/ back area/ front area/ corridor);
04	Scrubbing, polishing, wiping, rinsing, swabbing, mopping, sweeping, brushing, buffing

**Text Books And Reference Books:**

O'Fallon, M. and Rutherford, D. (2013). Hotel Management and Operations. Hoboken, New Jersey: John Wiley & Sons, Inc.

Matt, A. (2011). Housekeeping Management. John Wiley & Sons, Inc

Thomas J. A. (2007). Professional Management of Housekeeping Operations. John Wiley & Sons, Inc

**Essential Reading / Recommended Reading**

Raghubalan- G.-&Raghubalan- S. (2011). Hotel housekeeping operations and management. New Delhi: Oxford university press.

**Course Outcome-** After completion of this course student will able to-

CO1. Apply techniques of how to use housekeeping equipment and machines used in different areas of hotel.

CO 2. Do various cleaning activities.

CO3. Track the flow and use of cleaning agents on different surfaces like metal, glass, floor and wood.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	M						
CO3		M					

H = Highly Related; M = Medium L =

<b>BHH004A</b>	<b>FOUNDATION COURSE IN FRONT OFFICE OPERATIONS – I</b>	<b>CR.-2</b>
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**Course Objective:-**

The Student will get knowledge about:

1. Classification and categorization of Hotels and its Evolution.
2. Duties & responsibilities of the staff in the different sections.
3. Types of rooms, food plan, Tariff and room rent.
4. Importance, Modes, Tools of reservation.
5. Basic Terminologies of front office



S.No.	Topic
01	<b>Hospitality Industry</b> <ul style="list-style-type: none"> <li>• Introduction (definition, evolution and development)</li> <li>• Hotels: definition, history, development, growth in India</li> <li>• Hotel chains (domestic/International).</li> </ul>
02	<b>Hotel Organization</b> <ul style="list-style-type: none"> <li>• Importance, mission, goals,</li> <li>• Strategies and tactics</li> <li>• Organization chart,</li> <li>• Classifying functional areas</li> </ul>
03	<b>Hotel Guest</b> <ul style="list-style-type: none"> <li>• Importance of Guest profile</li> <li>• Types of guests(FIT, business travelers, GIT),</li> <li>• Classification of guests</li> <li>• Guest expectations</li> <li>• Guest satisfaction/dissatisfaction</li> <li>• Guest relations</li> </ul>
04	<b>Classification of Hotels</b> <ul style="list-style-type: none"> <li>• Location, size, clientele, length of stay</li> <li>• Ownership and affiliation</li> <li>• Levels of service</li> <li>• Reason of travelling</li> </ul>
05	<b>Front Office Organization</b> <ul style="list-style-type: none"> <li>• Front office department</li> <li>• Organization charts, sub- departments</li> <li>• Front office personnel's</li> <li>• Uniformed Staff</li> <li>• Work shifts</li> </ul>

Reference:

1. Principles of Hotel Front Office Operation by Sue Baker
2. Managing Front Office Operation by Michael L. Kasvana-AH and MA
3. Front Office Manual by Sudhir Andrews
4. Professional Hotel Management Concepts
5. Principles of Dr. Jag Mohan Negi Published by S.Chand
6. Front Office Management by Sushil Bhatnagar

**Course outcome:-** By the end of this course student would be able to:

CO1. Understand the evolution, meaning and classifications of Hotel.

CO2. Understand the various layouts of Front office in the Hotel.

CO3. He would become aware of attributes and hierarchy of front office staff.

CO4. Understand and able to classify Hotel

**.MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	L					M	



CO2							
CO3							M
CO4			H				

H = Highly Related; M = Medium L = Low

<b>BHH014A</b>	<b>FOUNDATION COURSE IN FRONT OFFICE OPERATIONS – I (LAB)</b>	<b>CR 1</b>
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**Course Objective**—Analyzes hotel front office positions and the procedures involved in reservation, registration, accounting for and checking our guests, and principles and practices of night auditing.

Covers the complete guest operation in both traditional and computerized operations

S.No.	Topic
1	Appraisal of front office equipment and furniture
2	Rack, Front desk counter & bell desk
3	Filling up of various preformats
4	Welcoming of guest
5	Telephone handling
6	Role play: • Reservation • Arrivals • Luggage handling • Message and mail handling • Paging

#### Course Outcome

Upon successful completion of the course, the Student will be able to

CO 1. Explain the function and operation of the various systems, forms, equipment, and computer applications found in the front office.

CO2. Construct an efficient reservation system that records crucial information while avoiding problems in processing various types of reservations.

CO 3. Construct a registration system that helps ensure a hotel's profitability while meeting the needs of guests by using effective guestroom sales techniques and efficient credit establishment procedures.

CO 4. Develop an efficient communication system to operate within the front office and between the front office and departments such as housekeeping and maintenance.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	L						
CO3				M			
CO4					H		

H = Highly Related; M = Medium L = Low

<b>DEN001A</b>	<b>COMMUNICATION SKILLS</b>	<b>CR-2(TH)</b>
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**COURSE OBJECTIVE**—The objective of this course is to give basic communication learning to students which will help him to perform better in corporate world.

S.No.	Topic
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1.	<b>Grammar</b> <ul style="list-style-type: none"> <li>Summarize grammar: uses of tenses, sentence building, dictionary skills, anonyms, synonyms,</li> <li>English usage</li> </ul>
2.	<b>Communication</b> <ul style="list-style-type: none"> <li>Nature , objective , importance</li> <li>Process of communication</li> <li>Types of communication verbal / non-verbal ( written communication, body language )</li> <li>Model , feedback : types</li> <li>Importance</li> <li>External / internal communication</li> <li>Channels and network of communication : formal / informal , direction of communication</li> <li>Grapevine / rumor ,</li> <li>Barriers of communication, overcoming of barriers of communication</li> </ul>
3	<b>Written English</b> <ul style="list-style-type: none"> <li>Types of business letters : drafting , editing ,</li> <li>Advertisement , posters ,</li> <li>Bio data ,</li> <li>Application ,</li> <li>Report ,</li> </ul> <b>Complaints</b>
4	<b>Speaking Skills</b> <ul style="list-style-type: none"> <li>Oral presentation,</li> <li>Meeting,</li> <li>Group discussion,</li> <li>Audience analysis,</li> <li>Stress on one to one communication,</li> <li>Restaurant &amp; hotel English,</li> <li>Essential qualities of good speaker &amp; listener,</li> <li>Usage of telephones.</li> </ul>
5	<ul style="list-style-type: none"> <li>Concept of inter personal skills</li> <li>Role, types of interpersonal skills</li> </ul>

**Course outcome-** After completion of this course the student will able to—

CO1. Communicate effectively

CO2. Write in professional manner

CO3.handle situation effectively

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1				M			H
CO2							
CO3		L					



DCH001A	ENVIRONMENTAL STUDIES	CR-4 (TH)
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### Objectives:

Environmental studies deals with every issue that affects an organism. It is essentially a multidisciplinary approach that brings about an appreciation of our natural world and human impacts on its integrity. It is an applied science as it seeks practical answers to making human civilization sustainable on the earth's finite resources. Its components include biology, geology, chemistry, physics, engineering, sociology, health, anthropology, economics, statistics, computers and philosophy. As we look around at the area in which we live, we see that our surroundings were originally a natural landscape such as a forest, a river, a mountain, a desert, or a combination of these elements. Most of us live in landscapes that have been heavily modified by human beings, in villages, towns or cities. But even those of us who live in cities get our food supply from surrounding villages and these in turn are dependent on natural landscapes such as forests, grasslands, rivers, seashores, for resources such as water for agriculture, fuel wood, fodder, and fish.

The basis objective of this course is to provide basic understanding to the students with the nature and the environment.

S.NO.	Topic
<b>UNIT I</b>	The <b>Multidisciplinary</b> nature of environmental studies Definition; Scope and importance, Need for public awareness.
<b>UNIT II</b>	<p>Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.</p> <p>a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.</p> <p>b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.</p> <p>c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.</p> <p>d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.</p> <p>e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.</p> <p>f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.</p> <p>- Role of an individual in conservation of natural resources. - Equitable use of resources for sustainable lifestyles.</p>
<b>UNIT III</b>	<p>Concept of an ecosystem.</p> <p>- Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:</p> <p>a. Forest ecosystem</p> <p>b. Grassland ecosystem</p> <p>c. Desert ecosystem</p> <p>d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).</p>
<b>UNIT IV</b>	<p>Biodiversity and its Conservation</p> <p><input type="checkbox"/> Introduction-Definition: genetic, species and ecosystem diversity.</p>

	<ul style="list-style-type: none"> <li><input type="checkbox"/> Biogeographical classification of India.</li> <li><input type="checkbox"/> Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.</li> <li><input type="checkbox"/> Biodiversity at global, National and local levels.</li> <li><input type="checkbox"/> India as a mega-diversity nation.</li> <li><input type="checkbox"/> Hot-spots of biodiversity.</li> <li><input type="checkbox"/> Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.</li> <li><input type="checkbox"/> Endangered and endemic species of India.</li> <li><input type="checkbox"/> Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.</li> </ul>
<b>UNIT V</b>	<p>Environmental Pollution: Definition, Causes, effects and control measures of: -</p> <ul style="list-style-type: none"> <li>a. Air pollution</li> <li>b. Water pollution</li> <li>c. Soil pollution</li> <li>d. Marine pollution</li> <li>e. Noise pollution</li> <li>f. Thermal pollution</li> <li>g. Nuclear hazards</li> </ul> <p>- Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides</p>
<b>UNIT-VI</b>	<p>Social Issues and the Environment</p> <ul style="list-style-type: none"> <li>- From Unsustainable to Sustainable development.</li> <li>- Urban problems related to energy.</li> <li>- Water conservation, rain water harvesting, watershed management.</li> <li>- Resettlement and rehabilitation of people; its problems and concerns. Case studies.</li> <li>- Environmental ethics: Issues and possible solutions.</li> <li>- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.</li> <li>- Wasteland reclamation.</li> <li>- Consumerism and waste products.</li> <li>- Environment Protection Act.</li> <li>- Air (Prevention and Control of Pollution) Act.</li> <li>- Water (Prevention and Control of Pollution) Act.</li> <li>- Wildlife Protection Act. - Forest Conservation Act.</li> <li>- Issues involved in enforcement of environmental legislation.</li> <li>- Public awareness.</li> </ul>
<b>UNIT-7</b>	<p>: Human Population and the Environment</p> <ul style="list-style-type: none"> <li>- Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare.</li> <li>- Role of information Technology in Environment and human health.</li> <li>- Case Studies.</li> </ul>
<b>UNIT-8</b>	<p>: <b>Field Work (Practical).</b></p> <ul style="list-style-type: none"> <li>- Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain.</li> <li>- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.</li> </ul>

	<ul style="list-style-type: none"> <li>- Study of common plants, insects, birds.</li> <li>- Study of simple ecosystems-pond, river, hill slopes, etc.</li> </ul>
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## Reference Books:

1. Agarwal K.C. 2001 Environmental Biology, Nidi publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Map in Publishing Pvt. Ltd. Ahemdabad-380013, India, E-mail: Mapincenet, net.
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.480p.
4. Clark R.S., Marine pollution, Clanderson Press Oxford.
5. Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T. 2001, Environmental & Encyclopedia, Jaico Publ. House, Mumbai, 1196p
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev.,Environment& Security. Stockholm Env. Institute. Oxford Univ. Press, 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay .
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11. Jadhav, H &Bhosale, V.M.1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p
12. Mckinney, M.L. &Schoeb, R.M. 1996. Environmental Science systems & solutions, Web enhanced edition 639p.
13. Mhaskar A.K. Matter Hazardous. Techno-Science Publications.
14. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co.
15. Odium, E.P. 1971. Fundamentals of Ecology, W.B.Saunders Co. USA. 574p

## Course Outcome-

**CO1. To elucidate the forces underlying an environmental issue.**

**CO 2.How to collect, analyse, and communicate relevant factors of environmental issues and problems persisting in our society.**

**CO3.To fuse the background knowledge and comprehensive ability with leadership and communication skills to successfully devise and implement creative, academically grounded solutions to environmental problems.**

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:



Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							M
CO2						M	
CO3					L		

H = Highly Related; M = Medium L = Low

<b>BHH015A</b>	<b>FOUNDATION COURSE IN FOOD PRODUCTION – II</b>	Cr.-2 (TH)
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**Course Objective:-** The Student will get knowledge about:

1. The various commodities required for food production, their market forms, selection, storage and use.
2. The fundamentals of menu planning & standard recipes
3. The basic culinary skills
4. The bread& cake making process and various pastes
5. Basic preparation soup and Sauce

#### Unit 1 **Vegetable and Fruit Cookery**

- Vegetables- definition
- Classification and uses
- Fruits- definition
- Classification and uses
- Cares and precautions while using these.

#### Unit 2 **Soups and Salad**

- Soups- classification
- Basic recipes
- Definition
- Garnishes and accompaniments
- International soups.
- Salads- definition
- Classification
- Menu examples
- Various dressings.

#### Unit 3 **Meat and Fish Cookery**

- Introduction to meat cookery
- Composition of meat
- Processing
- Preservation and curing.
- Cuts of beef, veal, pork, lamb and poultry- their uses
- Standard purchase specification
- Menu examples.
- Introduction to fish cookery- classification of fish with examples,



- Various cuts of fish
- Standard purchase specification
- Egg cookery – composition of egg, std. purchase specification and various egg preparations

#### Unit 4 **Menu and Recipe**

- Brief introduction to menu
- Menu formulation
- Standard recipes
- Recipe calculation

#### Unit 5 **Sponge, Pastry and Pastry Cream**

- Sponge- definition
- Types
- Role of different ingredients used
- Processes- single stage, double stage etc.
- Faults and measures to remove/ avoid them.
- Pastries- puff pastry, flaky pastry, choux pastry, short crust pastry etc.
- Ingredients used and their role in pastry making
- Definition
- Recipes
- Different methods
- Faults in pastries and measures to remove/ avoid them
- Basic pastry creams, uses in confectionary, Preparation and care in production.

REFERENCE BOOKS: Larousse Gastronomique-Cookery Encyclopedia, Paul Hamlyn Professional Baking-Wayne Glasslen Modern Cookery-Philip E Thangam Baking-Martha Day Classical Food Preparation & Presentation-W K H Bode The Creative Art Of Garnishes-Yvette Stachowiak

**Course outcome:-**At the end of course the student should know about:-

CO1. Various commodities.

CO2. Menu planning and standard recipe.

CO3. Culinary skills.

CO 4. Bakery science.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1						L	
CO2	M						
CO3		H					
CO4						M	

H = Highly Related; M = Medium L = Low

<b>BHH019A</b>	<b>FOUNDATION COURSE IN FOOD PRODUCTION – II LAB</b>	<b>CR-4</b>
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#### **Course Objectives----**

1. To acquire skills in the practical sessions which will guide them in their forth coming semesters
2. To prepare simple Indian and European dishes.
3. To gain knowledge about various classical ingredients of Indian and European dishes, their importance and their taste and texture.

- i. Preparation of basic continental cookery- stews, soups, and basic meat and fish



- preparations;
- ii. Preparation of classical continental dishes (3 course menus);
- iii. Preparation of basic Indian menus;
- iv. Preparation of different types of pastry i.e. choux pastry, puff pastry, short crust pastry;
- v. Preparation of egg custard based dessert (hot and cold) like caramel custard mousse etc;
- vi. Preparation of tarts and pies
- vii. Demonstration of egg preparation – fried, poached, scramble, omelet, etc.

#### Course Outcome

After the completion of the course, students will able to

CO1. To make simple Indian and European dishes

CO2. Acquire knowledge in various European and Indian dishes

CO3. Equipped in their basic presentation skills

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						
CO2		M					
CO3		L					
CO4							

BHH-016A	FOUNDATION COURSE IN FOOD & BEVERAGE SERVICE – II	CR-2 (TH)
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#### Course Objective:-

The Student will get knowledge about:

1. Understand various restaurant services.
2. Understand type of meal and menu.
3. Develop knowledge of the restaurant control system.
4. Understand the processing manufacturing and service of cigar and cigarettes.

#### Unit 1 Types of Meals

- Breakfast- introduction, types service methods.
- A' la carte & table de hote setups.
- Brunch, lunch, high tea, supper, elevenses and others.

#### Unit 2 Menu

- Menu knowledge and accompaniments
- Menu meaning and types. Table de hote and a la carte.
- Menu planning
- Considerations and constraints
- Menu terms, menu design, classical French menu
- Classical hors d' oeuvres
- Cover and service: Indian regional dishes,

#### Unit 3 Control Methods

- Billing methods: duplicate and triplicate methods
- K .O. T & B.O.T
- Computerized K .O. T

#### Unit 4 Room Service

- Introduction

- General principles
- Types: Centralized and de-centralized
- Tray trolley setups for breakfast & others meals.
- Forms and formats, order taking
- Thumb rules, suggestive selling
- Breakfast cards
- Layout and setup of common meals
- Lead time of order taking to clearance.

#### Unit 5 **Non -alcoholic beverages**

- Beverages definition and classification
- Hot beverages types
- Preparation and service
- Cold beverages types
- Preparation and service

#### **F & B terminology Related to the Inputs of the Semester**

##### REFERENCE BOOKS:

Sudhir Andrews: F & B Service Trg. Manual

Denni R. Lillicrap: F & B Service

John Walleg: Professional Restaurant Service

Brian Varghese: Professional F& B Service Management

Brown, Heppner & Deegan: Introduction to F&B Service

##### **Course outcome:-**

**At the end of course the student should know about**

**CO1. Understand the difference among various services eg. American Service, Russian Service, English Service, French Service.**

**CO2. Understand the various types of standard Menus used in star hotels**

**CO3. Understand the Food & Beverages Outlets Operation Control System.**

**CO4. Understand about the non- Alcoholic beverage.**

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2		L					
CO3	L						
CO4		M					

H = Highly Related; M = Medium L = Low

<b>BHH-020A</b>	<b>FOUNDATION COURSE IN FOOD &amp; BEVERAGE SERVICE – II LAB.</b>	<b>CR-2(PR)</b>
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##### **Course Objectives-**

**Food and Beverage Service foundation is a basic course to introduce the various skills required for operating a restaurant. The course will allow students to comprehend the equipment and basic methods followed in the restaurant. Restaurants or food service organizations will find difficult to operate without having personnel who understand the basic food service equipment. This course will deal with the identification of equipment used in the restaurant, basic napkin folding, simple cover set up, cover for a la carte and table d'hote, service of water and skills for handling service spoon and fork. Students will learn these so that they can understand the**



**higher level course in future. This course will enable students to orient and understand the service skills which are necessary for food and beverage personnel.**

1. To understand the development of the food service industry
  2. To identify various types of restaurants and understand their features.
  3. To comprehend various equipment used in the restaurant
  4. To learn and create various napkin folds
  5. To learn the various cover setup for food and beverage service.
  6. To understand the procedure of taking a guest's order and service of water
- To understand the service skills involved using Service Spoon and Fork

- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Breakfast table lay out &amp; room service;</li> <li>2. TDH &amp; a' la Carte covers;</li> <li>3. Restaurant reservation system;</li> <li>4. Receiving the guests;</li> <li>5. Sequence of service;</li> <li>6. Special service (caviar, artichoke etc).</li> </ol> |
|---|

**Course Outcome-**

**After completing the course, the students will be able to know how to;**

**CO1. Identify the different equipment used in food and beverage service**

**CO2 Set a table cover for a la carte and table d'hote**

**CO3 Identify the various room service management techniques that can be adapted in a hotel**

**CO4 Take beverage orders**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	L						
CO2		M					
CO3						M	
CO4	H						

H = Highly Related; M = Medium L = Lo

<b>BHH-017A</b>	<b>FOUNDATION COURSE IN ACCOMMODATION OPERATIONS – II</b>	<b>CR-2(TH)</b>
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**Course Objective:-**

**The students will get knowledge about:**

1. The public area cleaning task.
2. Floors – types of floor finishes, methods of cleaning.
3. Learn about inspection of guest room.
4. Cleaning and care of metals: Brass, silver etc. and their compositions.

**Unit 1 Hotel Guest Room**

- |   |
|---|
| <ul style="list-style-type: none"> <li>• Lay-out of a guest room</li> <li>• Types of guest rooms</li> <li>• Knowledge of rooms – Furniture/ fixtures/ fitting/ soft furnishing/ accessories/amenities in a guest room (to be dealt in brief only)</li> <li>• Daily cleaning of (occupied/ departure/vacant/under repair/VIP rooms) weekly cleaning/ spring cleaning / special cleaning</li> <li>• Evening service / second service</li> </ul> |
|---|





- Contract cleaning
  - Rules on a guest floor.
- Unit 2 House Keeping Supervision**
- Role of Supervisor
  - Importance of inspection
  - Check-list for inspection
  - Typical areas- usually neglected, where special attention is required.

**Unit 3 Cleaning Agents**

- Characteristics of good cleaning agent
- General criteria for selection
- Classification
- Polishes / floor seal
- Use, care & storage of cleaning agents.

**Unit 4 Safety Awareness and First Aid**

- Concept and importance
- Safety : accidents, fires (cause, procedure)
- Security : security of guest/ staff/ public areas/rooms
- First aid: concept and emergency procedures.

**Unit 5 Pest Control**

- Areas of infestation
- Types of pests
- Preventive measures and control measures.
- Waste Disposal

**Glossary of terms (with reference to 3<sup>rd</sup> semester syllabus)**

**Course outcome:-**

**By end of this semester students able to know about:-**

**CO1. The different area of hotel and their cleaning process.**

**CO2. Wall and floor finishes and their use in hotel.**

**CO3. Experience of all housekeeping routines system.**

**CO4. The uses and composition metal, leather glass, wood etc.**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	L						
CO3		L					
CO4		M					

H = Highly Related; M = Medium L = Low

<b>BHH-021A</b>	<b>FOUNDATION COURSE IN ACCOMMODATION</b>	<b>CR-1(PR)</b>
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	<b>OPERATIONS – II LAB.</b>	
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**Course Objective-**The main objectives of the course are to:

- Help to prepare students to meet the challenges associated with the housekeeping department
- Provide an overview of the key issues of housekeeping and maintenance management.
- To understand the theoretical and practical knowledge that constitutes the work of housekeeping
- To illustrate the complexities and demands of working in the industry through the scope of housekeeping.

<ul style="list-style-type: none"> <li>• Room attendant trolley;</li> <li>• Bed making;</li> <li>• Turn down service;</li> <li>• Cleaning of guest rooms (departure, occupied, vacant);</li> <li>• Cleaning of public areas;</li> <li>• Inspection of guest rooms &amp; public areas with the help of checklist;</li> <li>• First aid.</li> </ul>
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**Course Outcomes-**After completion of this course student are able to

CO1 . Address the techniques which include establishing par levels for different types of inventories, CO2. Taking physical inventory, and implementing effective inventory control procedures.

CO3. Generate different type of reports.

CO4. Make checklist for linen, minibar and room.

CO5. To maintain the log book and other registers.

CO6. To maintain the log book and other registers

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1				M			
CO2		H					
CO3	L						
CO4	H						
Co5		H					

H = Highly Related; M = Medium L = Low

<b>BHH-018A</b>	<b>FOUNDATION COURSE IN FRONT OFFICE OPERATIONS – II</b>	<b>CR-2(TH)</b>
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**Course Objective:-** The Student will get knowledge about:

1. Registration, its types, importance and other aspects.
2. Check in procedure for various categories of guest.
3. Meaning and Procedure of Night Auditing.
4. Room Tariff Fixation.

<b>Unit 1</b>	<b>Job profile of Front Office Personnel</b>
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- Job description / job specification.
- Unit 2 Front Office Operation**
- Guest cycle,
  - Front office forms, front desk,
  - Front office equipments, CAS,PMS
  - Functions and importance of front office
- Unit 3 Front Office responsibilities**
- Log book, information directory, mail handling
  - Telephone service, Interdepartmental communication
  - Guest services
- Unit 4 Accommodation Product**
- Brochures/tariff cards, types of guest rooms
  - Types of room rates, basis of charging room rates
  - Meal plan
- Unit 5 Reservation**
- Reservation and sales, types of reservation,
  - Sources and modes of reservation, systems- manual, semi-automated, fully automated, role of new technology in reservation
  - Reservation records, reservation reports.
  - Global Distribution Systems

**Learning outcome:-**

**By the end of this course student would be able to**

**CO1. Understand and handle FIT & GIT guest arrival.**

**CO 2. Understand the procedure of reports prepared**

**CO3. Understand various types of Tariff found in Hotels.**

**CO4. Understand Room Keys Handling**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1			M				
CO2	L						
CO3		L					
CO4		M					

H = Highly Related; M = Medium L = Low

<b>BHH-022A</b>	<b>FOUNDATION COURSE IN FRONT OFFICE OPERATIONS – II LAB.</b>	<b>CR-1(PR)</b>
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**Course Objective---**



The aim is to provide the student with basic skills required at the reception, management of customer service operations and front-office operations from the Opera PMS point of view, and the basics of security and safety in accommodation business.

1. Identification of equipment used in front office
2. Various Forms & Formats used in front office
3. Responding to a reservation query
4. Product knowledge and description
5. Role play of accepting reservation request
6. Filling of reservation form.

**Reference:**

1. Principal Of Hotel Front Office Operation by Sue Baker
2. Managing Front Office Operation by Michael L Kasvana- AH And MA
3. Front Office Manual by Sudhir Andrews
4. Professional Hotel Management Concept, Principals by Dr. Jagmohan Negi.

**Course Outcomes-**

.After completion of the course students will be expected to be able to:

CO1• Describe the basic functions common to property management systems

CO2• Identify, describe and differentiate between both front house and backhouse property management system modules.

CO3• Identify stand-alone technology systems that may interface with PMS

CO4• Describe the basic functions of a point of sale system (POS)

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	L						
CO2		M					
CO3		H					
CO4	M						

H = Highly Related; M = Medium L = Low

<b>BHH023A</b>	<b>APPLICATION OF COMPUTER</b>	<b>CR-1 PR</b>
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### Course Objective---

1. Students will understand the fundamentals of computer architecture and computing theory.
2. Students will be able to design, develop, document, and test software using current techniques.
3. Students will demonstrate the ability to give presentations and write technical reports.

#### Unit 1 **Introduction to Computer**

- What is a computer?
- Characteristics of Computer System
- Block diagram
- Components of a computer system
- Generation of computers
- Programming languages
- Generation of languages
- Storage devices- floppy disks, CD ROMs, HDD
- Input Output Devices

#### Unit 2 **Operating Systems**

- Introduction, Application Software, System Software
- Functions
- Types
- Components case studies- DOS, Windows.

#### Unit 3 **Introduction to DBMS**

- Data
- Data types
- Advantages
- Introduction to FoxPro
- Creating a database
- Searching, sorting, indexing, writing simple programmes
- Overview of MS access.

#### Unit 4 **Word Processing, Spread Sheets and Features of Power Point**

- What is word processing?
- Features of MS Word
- Editing commands and mail merge
- What is spreadsheet?
- Features, formulate and functions
- If-statement, preparing sample, work sheets, different graphs.
- Preparing a presentation and an organization chart.

#### Unit 5 **Introduction to Internet**

- What are the following: internet, network, intranet, extranet, LAN, MAN, WAN, network topologies, www, search engines, e-mail, and websites?
- Introduction to e-commerce.

### Reference:

Fundamentals of Computers, V. Rajaraman, Prentice Hall India

Mastering Microsoft Office, Lonnie E. Moseley & David M. Boodey, BPB Publication.

Computer Fundamentals, P.K.Sinha, BPB Publication

### Course Outcome---

Students will demonstrate the ability to solve problems in the discipline.



1. Students will demonstrate interpretive skills, including the ability to: a) analyze data statistically, b) interpret results of experiments, c) draw reasonable conclusions based on experimental results.
2. Students will learn and demonstrate standards of professional behaviour, including rules of ethics and etiquette.
3. Students will develop and demonstrate the ability to work effectively in a group on a common problem.
4. Students will demonstrate the ability to search the relevant literature of the discipline to find information that addresses a specific problem.
5. Students will demonstrate the ability to produce a technical document.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1				M			
CO2			L				
CO3							H
CO4		H					M
CO5			L				
CO6				L			

### THIRD SEMESTER EXAMINATION

S. No.	Subject Code	Subject Name	Credits	Contact Hrs/Wk.		
				L	T/S	P
		<b>A. Theory</b>				
1	BHH 024A	Food Production Operations-1	2	2	-	-
2	BHH 025A	Food & Beverage Service Operations-1	2	2	-	-
3	BHH 026A	Accommodation Operations -1	2	2	-	-
4	BHH 027A	Front Office Operations -1	2	2	-	-
5	DBA 021A	Basic Accounting	2	2	-	-
6	BHH 028A	Food Science and Nutrition	3	3	-	-
7	DIN003A	Value Education I	1	1	-	-
8	DEN003A	Life Skills I (PD)	2	1	-	2
		<b>B. Practical/LAB</b>				
9	BHH 029A	Food Production Operation-1 LAB.	3	-	-	6
10	BHH 030A	Food & Beverage Service Operations-1 LAB.	1	-	-	2
11	BHH 031A	Accommodation Operations-1 LAB.	1	-	-	2
12	BHH 032A	Front Office Operations-1 LAB.	1	-	-	2
		<b>Total</b>	<b>22</b>	<b>15</b>		<b>14</b>
		<b>Total Teaching Load</b>		<b>29</b>		

  
 Head  
 Department of Hotel Management  
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<b>BHH024A</b>	<b>FOOD PRODUCTION OPERATIONS-I</b>	<b>CR-2(TH)</b>
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**COURSE OBJECTIVE-** The objective of this course is to improve knowledge of students in garnishes, accompaniments, International cuisines , uses of wine in cookery.

<b>S.No.</b>	<b>Topic</b>
01	<b>Appetizers and Garnishes</b> <ul style="list-style-type: none"> <li>• Appetizers: definition,</li> <li>• Classification,</li> <li>• Standard accompaniments,</li> <li>• Uses with menu examples,</li> <li>• Garnishes: definition,</li> <li>• Classical garnishes and historic importance,</li> <li>• Uses with menu examples.</li> </ul>
02	<b>International Cuisine-I</b> <ul style="list-style-type: none"> <li>• Geographic location, historical background, staple food with regional influences, specialties, recipes, in relation to the following cuisines- France, Italy, Spain and Portugal etc</li> </ul>
03	<b>Use of Herbs and Wines in Cookery</b> <ul style="list-style-type: none"> <li>• Difference between cooking wine and table wines</li> <li>• Ideal use of wine in cooking</li> <li>• Herbs and spices- classification</li> <li>• Ideal use of herbs and spices in cooking</li> </ul>
04	<b>Convenience Food and Fast Food</b> <ul style="list-style-type: none"> <li>• Role of convenience food in fast food operations</li> <li>• Advantage and disadvantage of convenience food</li> </ul> Labour and cost saving aspect
05	<b>Bread-II</b> <ul style="list-style-type: none"> <li>• Introduction to international classical bread</li> <li>• Role of key regional ingredients</li> <li>• Bread improvers- uses, types etc.</li> </ul>

#### **Course Outcome**

CO1. Get an insight of quite a vast description on the culture, eating habits, preparation of popular dishes from the cuisines around the world

CO2 Understand the meaning of appetizers and garnishes

CO3 Able to use wine in cookery.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**





<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1						L	
CO2		M					
CO3				L			
CO4							

H = Highly Related; M = Medium L = Low

<b>BHH029A</b>	<b>FOOD PRODUCTION OPERATIONS -1 LAB.</b>	CR-3 (PR)
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Course Objective---The objective of this course to teach students how to prepare three course menu, misc-en-place and garnishing of dishes. Also the students learn about making of appetizers.

- Three course menu of international cuisine
- Classical appetizers and garnishes
- International bread

Reference:

1. The Professional Pastry Chef by Friberg
  2. The Wilton Ways of Cake Decorations by Hamlyn Publishing.
  3. Chocolate by Carolyn Humphries.
  4. International Cook Book, Cavendish House
- Time- Life Series- The Cooking Of Various Countries

**Course Outcome**

CO1. Get an insight of quite a vast preparation of popular dishes from the cuisines around the world

CO2 Able to make appetizers and garnishes

CO3 Able to make international Breads.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1						L	
CO2		M					
CO3				L			
CO4							

H = Highly Related; M = Medium L = Low

<b>BHH025A</b>	<b>FOOD &amp; BEVERAGE SERVICE OPERATIONS-I</b>	CR-2(TH)
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**Course Objectives/Course Description**

To educate students about the exciting world of wines

To recognize various new and old world wines

Food and wine pairing technique



Unit 1	<b>Introduction to Alcoholic Beverages</b>
	<ul style="list-style-type: none"> <li>• Classification &amp; Definition of each Alcoholic Beverage</li> </ul>
Unit 2	<b>Wines</b>
	<ul style="list-style-type: none"> <li>• Introduction of wines</li> <li>• Classification of wines</li> <li>• Wine producing countries</li> <li>• Producing regions of France, Italy, and Spain etc.</li> <li>• Production of wines with description of Principal Grape Varieties</li> <li>• Factors affecting production of wines</li> <li>• Matching wines with food</li> <li>• Reading wine labels</li> <li>• Storage &amp; Service of wines</li> <li>• Glossary of wine trade terms</li> <li>• Production of famous wines – sparkling (Champagne) and fortified (sherry, port &amp; Madeira) in detail.</li> </ul>
Unit 3	<b>Beer</b>
	<ul style="list-style-type: none"> <li>• History &amp; Definition</li> <li>• Classification of Beer</li> <li>• Production of Beer, Top &amp; Bottom Fermentation</li> <li>• Beer producing Countries</li> <li>• Service &amp; storage of beer, faults in beer</li> <li>• Draught beer and its service</li> <li>• Brands ( National &amp; International)</li> </ul>
Unit 4	<b>Aperitifs</b>
	<ul style="list-style-type: none"> <li>• Introduction &amp; Definition</li> <li>• Types of aperitifs</li> <li>• Manufacturing of aperitif ( vermouth)</li> <li>• Brand names</li> </ul>
Unit 5	<b>Other Alcoholic Beverages</b>
	<ul style="list-style-type: none"> <li>• Sake, Cider, Medira, Silvovitz, Arrack, Feni, Grappa, Calvados etc.</li> <li>• Glossary of terms related to alcoholic beverages</li> </ul>

#### Course Outcome---

CO1.Know old world wines and important countries

CO2 Types of Wines and service

CO3 Professional Wine Service, preparation of wine list and proper handling of wine

CO4 Suggestive selling of wine and Food and wine harmony.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2		L					
CO3	M						
CO4							

H = Highly Related; M = Medium L = Low

<b>BHH030A</b>	<b>FOOD&amp; BEVERAGESERVICE OPERATIONS-I LAB.</b>	<b>CR-1 (PR)</b>
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**Course Objective---**This course provides students with practical skills and knowledge for effective management of beverage service operations. The sessions are designed to provide hands on experience on the various aspects of bar operations and management. The core objective of the course is to instill a culture of responsible attitude towards alcoholic beverages and the practice of responsible service.

- Bar introduction
  - Glassware, measurements, bar tools & equipments
  - Taking an order for alcoholic beverages
  - Service of beer and wines
- Red / White / Rosé / Champagne

**Reference:**

1. Food & Beverage Service Training Manual- Sudhir Andrews
2. Food & Beverage Service – Lillicrap & Cousins
3. Professional Guide To Alcoholic Beverages- Lipinski
4. Alcoholic Beverages- Lipinski & Lipinski

**Course Outcome**

At the end of the sessions the participants will be able to:-

1. Display responsible service and legal responsibilities of an F&B Service professional.
2. Identify the various licenses and approvals required to run a beverage establishment.
3. Create a bar operations plan and bar check list.
4. Demonstrate skills to handle various issues and situations associated with running an establishment serving alcoholic beverages.
5. Apply the skills and knowledge of mixology.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	H						
CO3	L						
CO4				M			
CO5				H			

H = Highly Related; M = Medium L = Low

<b>BHH026A</b>	<b>ACCOMMODATION OPERATIONS-1</b>	<b>Cr-2(TH)</b>
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### Course Objective-

1. To understand the planning of facilities and space management.
2. To Practice listening to comments and complaints using positive and negative language and responding appropriately.
3. To detail out the procedures for different departmental processes

#### Unit 1 **Management of Linen**

- Classification of linen and size
- Selection criteria for various linen items
- Activities of the linen room
- Layout and equipment in the linen room
- Purchase of linen
- Linen hire- quality and quantity
- Calculation of linen requirements
- Storage and inspection
- Linen control-procedures and records
- Stock taking-procedures and records
- Recycling of discarded linen
- Par stock
- Inventory control
- Condemned linen- procedure
- Marking and monogramming.

#### Unit 2 **Management of Uniforms**

- Purpose of uniforms, No. of sets issuing
- Producing and exchange of uniform
- Selection and designing of uniforms
- Advantages of providing uniforms to staff
- Stock taking procedures
- Uniform records
- Layout and planning of uniform room.

#### Unit 3 **Sewing Room**

- Activities and areas to be provided,
- Equipments provided.

#### Unit 4 **Laundry**

- Duties and responsibility of laundry staff (laundry manager, dry cleaning supervisor, presser, laundry clerks, valet runner, laundry attendants)
- Types of laundry.

#### Unit 5 **Flow process of Laundry**

- Importance and principles of flow process in laundry
- Stages in wash cycle
- Laundry equipment and machines
- Layout of the laundry
- Role of the laundry agents
- Classification of laundry agents
- Dry cleaning
- Guest laundry /valet services

- Collection and delivering care in the laundry guest articles.

**Glossary of terms (with reference to 4th semester syllabus)**

**Course Outcome- The student will able to**

CO1. Understand laundry operations

CO2. Know about sewing and linen room operations.

CO3. Explain procedure followed in Housekeeping Department

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2		L					
CO3	M						
CO4							

H = Highly Related; M = Medium L = Low

**BHH031A | ACCOMMODATION OPERATIONS-I LAB.**

CR-1(PR)

Course Objective---This course aims to establish the importance of Accommodation operations with in the hospitality Industry .It also prepares the student to acquire basic skills and knowledge necessary to successfully identify the required standards in this area and to consider all aspects of cost control and establishing profitability.

S.No.	Topic	
01	Layoutof LinenandUniformRoom/Laundry	
02	Laundry Machinery andEquipment	
03	StainRemoval	
04	FlowerArrangement	
05	SelectionandDesigning ofUniforms	

**Reference:**

1. Hotel House Keeping, Sudhir Andrews, Tata Mc Graw Hill
2. The Professional House Keeper, Tucker Schneider, VNR
3. Managing House Keeping Operation, Margaret Kappa & Aleta, Hutchinson
4. Professional Management of House Keeping Operations, Martin Jones, Willey
4. Hotel Housekeeping Operations and Management, G. Raghubalan

**Course Outcome---The student will able to-**

- Identifies the technical equipment and materials of laundry room.
- Choose the best amongst the equipment and materials of laundry room.
- Makes Floral Arrangement.
- Select and design the different type of required uniform.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2		M					
CO3	L						
CO4	H						

H = Highly Related; M = Medium L = Low

<b>BHH027A</b>	<b>FRONT OFFICE OPERATIONS-1</b>	<b>Cr.2(TH)</b>
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### Course Objective--

To enable the students to learn the front office cashiering function.

To demonstrate the importance of effective managements of hotel assets.

To explain the Check-out Procedures and guest handling operations.

Unit 1	<b>Registration</b> <ul style="list-style-type: none"> <li>• Pre-registration activity and registration activities</li> <li>• Registration record</li> <li>• Room and rate assignment</li> <li>• Methods of payments</li> <li>• Issuing of room key</li> <li>• Fulfilling special request</li> <li>• Creative option</li> <li>• Selling the guest room</li> <li>• Upgrading of guest room</li> <li>• When guest cannot be accommodated.</li> </ul>
Unit 2	<b>Guest Complaints</b> <ul style="list-style-type: none"> <li>• Different categories,</li> <li>• Identifying complaints,</li> <li>• Handling complaints,</li> <li>• Follow-up procedures.</li> </ul>
Unit 3	<b>Lobby and Bell Desk Operation</b> <ul style="list-style-type: none"> <li>• Role of lobby manager</li> <li>• Role of GRE</li> <li>• Function of bell desk, concierge desk, car valet operation</li> <li>• VIP handling.</li> </ul>
Unit 4	<b>Front Office Security Function</b> <ul style="list-style-type: none"> <li>• Role of front office in hotel security</li> <li>• Electronic locking system</li> <li>• Use of key card</li> <li>• Surveillance &amp; access control</li> </ul>

- Protection of funds and safe deposit boxes.

#### Unit 5                      **Crisis Management in Hotel**

- Definition,
- Emergency situations and handling procedures.
- Importance of crisis management

#### **Text Books And Reference Books:**

Bhatnagar, S. K. (2010). Hotel Front Office. Oxford publications.

Ismail, A. Front Office Operation Management (5 ed.). Thomson and Delmer.

Essential Reading / Recommended Reading

Micheal Kasavanna, R. B. (2012). Managing Front office Operations (8 ed.). Prentice Hall.

#### **Course Outcome---**

After successfully completing this course, students will be able to:

1. Enhance managerial decision making skills
2. To learn to handle conflicting situations that may arise during guest Interactions
3. Impart the knowledge of revenue calculations and other techniques to improve the overall profitability of the hotel.
4. Evaluate hotel performance and analyse strategies for revenue generations.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							H
CO2							M
CO3		M					
CO4	M						

H = Highly Related; M = Medium L = Low

<b>BHH032A</b>	<b>FRONT OFFICE OPERATIONS-I LAB.</b>	<b>CR-1(PR)</b>
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- To appreciate the importance and filling of guest registration card;
- Role play of various guest check-in's: walk-in, fit, VIP, groups;
- Role play of bell captain, bell boys, GRE (real life situations to be enacted);
- Up-selling over the front desk, telephone;
- Message handling (internal / external);
- Handling guest complaints.
- Upgrading of rooms at front desk

#### Reference:

1. Front Office Operations by Colin Dix & Chirs Baird
2. Hotel Front Office Management by James Bardi



3. Managing Front Office Operations by Kasavana & Brooks
4. Front Office Training Manual by Sudhir Andrews

<b>DBA 021A</b>	<b>BASIC ACCOUNTING</b>	<b>CR- 2(TH)</b>
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**Course Objective-** To identify different costing methods and its role in product costing.

- To Analyse and apply costing techniques in practical situations.
- To Explain the costing methods used in hospitality industry.
- To apply the material pricing methods in practical context.
- To Prepare and analyse the cost sheet.

**Unit 1                      Accounting Theory**

- Business transaction and basic terminology
- need to study
- Accounting,,: accounting functions, purpose of accounting records, accounting principles, concepts and conventions

**Unit 2                      Account Records**

- Principle of double entry system
- Journal entries, ledger, and subsidiary books- cash sales & purchase books, bank reconciliation statement

**Unit 3                      Financial Statements**

- Basic financial statements
- Trial balance, preparation of final accounts,
- basic adjustments to final accounts,
- Methods of presenting final accounts -practical problems with adjustments

**Unit 4                      Depreciation Reserves and Provisions**

- Meaning,
- Basic methods with practical problems

**Unit 5                      Computer Application**

- Computerised Accounting System
- Database concepts for Accounting

Reference

1. Comprehensive Accountancy: S.A.Siddiqui
2. A Complete Course In Accounting Volume-I: N.D. Kapoor
3. Double Entry Book Keeping: R.C. Chawala & C. Juneja
4. Introduction To Accountcy: T. S. Grewal

**Course Outcome---**At the completion of the course students will be able to





CO1. Identify different costing methods and its role in product costing.

CO2 Analyse and apply costing techniques in practical situations.

CO3 Explain the costing methods used in hospitality industry.

CO4 Apply the material pricing methods in practical context.

CO5 Prepare and analyse the cost sheet.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2				L			
CO3			M				
CO4				M			
CO5			H				

5. H = Highly Related; M = Medium L = Low

<b>BHH028A</b>	<b>FOOD SCIENCE AND NUTRITION</b>	<b>CR_3 (TH)</b>
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**Course Objective:-**The student will get knowledge about

1. The significance of food in his daily life
2. The terms like food, health, nutrition, malnutrition, and nutritional status.
3. Calculation of recommended dietary allowances, adulteration.
4. Understand the relationship of macro & micro nutrients to health

Unit 1	<b>Fundamentals of Nutrition</b> <ul style="list-style-type: none"><li>• Introduction to nutrition</li><li>• Objectives in the study of nutrition</li><li>• Functions of food</li><li>• Food groups and food habits.</li></ul>
Unit 2	<b>Major Nutrients</b> <ul style="list-style-type: none"><li>• Carbohydrates</li><li>• Lipids, proteins</li><li>• Vitamins</li><li>• Minerals</li><li>• Water</li><li>• Their classification</li><li>• Functions and Food sources</li><li>• Deficiency</li><li>• Calorie</li><li>• BMR, SDA, RDA, energy requirement for various age groups.</li><li>• Pasteurization, sterilization and preservation</li></ul>
Unit 3	<b>Microbes</b> <ul style="list-style-type: none"><li>• Bacteria- Shape, Size, Movement, Growth Phase, Growth requirements</li><li>• Molds- morphology, growth factors, beneficial and harmful effects</li><li>• Yeast- morphology, physiology, and economic importance</li></ul>

Unit 4	<b>Food Adulteration</b>
	<ul style="list-style-type: none"> <li>• Meaning and definition</li> <li>• Types of adulteration and contamination</li> <li>• Laws of prevention.</li> </ul>
Unit 5	<b>Balance Diet and Diet Therapy</b>
	<ul style="list-style-type: none"> <li>• Definition and importance of balance diet</li> <li>• Factors affecting meal planning</li> <li>• Calculation of nutritive value of dishes</li> <li>• Planning special diet (children, adult, old age, and adolescence)</li> <li>• Low calorie diet</li> <li>• Fiber restricted diet</li> <li>• High fiber diet etc.</li> </ul>

**Reference:**

Food science & nutrition, III Ed. Sunitra Roday, Oxford university press

Handbook of Hygiene Control in the Food Industry, II Ed. Huub, John, Domagoj, Elsevier

**Course outcome:-**By the end of this course student would be able to

CO1. Understand the importance of nutrition and good health in his day to day life.

CO2. Know the composition, functions sources of nutrients.

CO3. Understand the effects of excess & deficiency of nutrients.

CO4. Modify attitudes and practices of use existing nutrition

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1						L	
CO2						M	
CO3			M				
CO4			L				

## FOURTH SEMESTER EXAMINATION

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.		
				L	T/S	P
		<b>A. Theory</b>				
1	BHH033A	Food Production operations-II	2	2	-	-
2	BHH034A	Food & Beverage operations-II	2	2	-	-
3	BHH035A	Accommodation Operations-II	2	2	-	-
4	BHH036A	Front Office Operations-II	2	2	-	-
5	BHH037A	Basic Hygiene and HACCP	2	2	-	-
6	DBA026A	Methods and Techniques of Research	2	2	-	-
	DEN004A	Life Skills-II (Aptitude)	2	1	-	2
	DIN004A	Value Education-II	1	1		
		<b>B. Practical /Project</b>				
7	BHH038A	Food Production operations-II LAB.	4	-	-	8
8	BHH039A	Food & Beverage Operations-II LAB.	2	-	-	4
9	BHH040A	Accommodation Operations-II LAB.	1	-	-	2
10	BHH041A	Front Office Operations-II LAB.	1	-	-	2
		<b>Total</b>	<b>22</b>	<b>14</b>		<b>16</b>
		<b>Total Teaching Load</b>		<b>30</b>		

<b>BHH033A</b>	<b>FOOD PRODUCTION OPERATIONS –II</b>	<b>CR-2(TH)</b>
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**Course Objectives-**To provide an in-depth knowledge of purchasing and kitchen management, and also important knowledge of hot and cold desserts.

Unit 1	<b>Sandwiches</b>
	<ul style="list-style-type: none"> <li>Sandwiches- definition</li> <li>Types and parts</li> <li>Types of breads used</li> <li>Different fillings and their classification</li> <li>Spreads and garnishes making</li> <li>Storing of sandwiches.</li> </ul>
Unit 2	<b>International Cuisine-II</b>
	<ul style="list-style-type: none"> <li>Geographic location</li> <li>Historical background</li> <li>Staple food with regional influences</li> <li>Specialties and recipes, in relation to the following cuisines- Germany, Middle Eastern,</li> </ul>



	Mexican, Chinese etc.
Unit 3	<b>Purchase and Storage</b>
	<ul style="list-style-type: none"> <li>• Introduction to purchase</li> <li>• Purchasing system</li> <li>• Purchase specification</li> <li>• Purchasing techniques</li> <li>• Storage</li> </ul>
Unit 4	<b>Icings and Meringues</b>
	<ul style="list-style-type: none"> <li>• Icings- types and uses</li> <li>• Methods of preparation</li> <li>• Recipes and difference between icings and toppings</li> <li>• Meringues- definition and types</li> <li>• Preparation methods</li> <li>• Factors affecting stability</li> <li>• Cooking of meringues.</li> </ul>
Unit 5	<b>Cakes and Gateaux</b>
	<ul style="list-style-type: none"> <li>• Cakes and gateaux- definition</li> <li>• Types</li> <li>• Regional specialties</li> <li>• Role of different ingredients used</li> <li>• Faults and remedies</li> <li>• Care and precautions.</li> </ul>

#### **COURSE OUTCOME**

CO 1) To enable students about the managerial aspects

CO 2) To teach students about quality and Portion control.

CO 3) To master the students in particular area of culinary skill

CO4) To train the students in Cold Kitchen

CO5) To train the students in terms of menu planning

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							M
CO2	L						
CO3		M					
CO4	L						
CO5		M					

H = Highly Related; M = Medium L = Low

**BHH038A | FOOD PRODUCTION OPERATIONS –II LAB.**

**CR-4(PR)**

Course Objective—The objective of the course is to teach students to prepare three course menu from various international cuisines, making sandwiches, cakes and meringues.

- Three course menu of international cuisine.
- Making of different sandwiches.
- Making of cakes and gateaux.
- Different; icings and meringues.

#### Reference:

- The Professional Pastry Chef by Friberg.



2. The Wilton Ways of Cake Decorations by Hamlyn Publishing.
3. Chocolate by Carolyn Humphries.
4. International Cook Book, Cavendish House
5. Time- Life series- The Cooking of Various Countries.

**COURSE OUTCOME- the student will able to—**

**CO1. Prepare and plan three course menu from various international cuisines.**

**CO2. Make different types of sandwiches.**

**CO3. Make cakes and Meringue**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							M
CO2	L						
CO3		M					

H = Highly Related; M = Medium L = Low

<b>BHH034A</b>	<b>FOOD &amp; BEVERAGE OPERATIONS – II</b>	<b>CR.-2 (TH)</b>
<b>Course Objective----</b> The primary objective of this course is: <ul style="list-style-type: none"> <li>• Get to Know the Food and Beverage Division.</li> <li>• Demonstrate Knowledge of Menus and Point-of-Sale Equipment</li> <li>• Get to Know the Job of a Banquet Setup Employee</li> </ul>		
<b>Unit 1     Spirits</b> <ul style="list-style-type: none"> <li>• Introduction and definition</li> <li>• Classification of spirits</li> </ul>		

  
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	<ul style="list-style-type: none"> <li>• Production of spirits (pot / patent)</li> <li>• Whisky – Manufacturing , Whisky's from Scotland , America , Ireland , Canada and India, Brand Names</li> <li>• Rum – Manufacturing , types , brand Names</li> <li>• Gin – Manufacturing , types, brand Names</li> <li>• Vodka - Manufacturing , types, brand Names</li> <li>• Tequila - Manufacturing , types, brand Names</li> <li>• Brandy &amp; Cognac – Manufacturing , types , brand Names</li> <li>• Standards and measuring scales of spirits</li> <li>• IMFL / Heritage Liquor</li> </ul>
Unit 2	<b>Liqueurs &amp; Bitters</b> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Importance of Liqueurs in Alcoholic Drinks</li> <li>• Different types of Liqueurs</li> <li>• Production</li> <li>• Brand names , origin , flavor &amp; service</li> </ul>
Unit 3	<b>Cocktail &amp; Mixology</b> <ul style="list-style-type: none"> <li>• History of Cocktail</li> <li>• Types of Cocktail</li> <li>• Art of Mixology</li> <li>• Methods of making cocktails</li> <li>• Mocktails</li> </ul>
Unit 4	<b>Bar operations- I</b> <ul style="list-style-type: none"> <li>• Introduction to bar</li> <li>• Types &amp; parts of bar ( front / under / back)</li> <li>• Bar equipment &amp; glassware</li> <li>• Layout of bar</li> <li>• Bar hierarchy</li> <li>• Etiquettes &amp; mannerism for handling Bar</li> <li>• Introduction to flaring</li> <li>• Glossary of professional bar terms</li> </ul>
Unit 5	<b>Tobacco</b> <ul style="list-style-type: none"> <li>• History of tobacco</li> <li>• Manufacturing &amp; types</li> <li>• Storage &amp; service</li> <li>• Brand names &amp; their origins</li> <li>• Cigar's</li> </ul>

**Reference Books:**

1. Food & Beverage Service- Lillicrap& Cousins
2. Modern Restaurant Service- John Fuller
3. Beverage Book- Andrew, Dunkin & Cousins
4. Bar & Beverage Book- Mary Porter & Kostagris
5. Alcoholic Beverages- Lipinski & Lipinski

**Course Outcome**—After doing this course the student will able to:

- CO 1 Prepare Banquet Equipment and Setups
- CO2. Take Orders and Serve Drinks in banquets and bar.
- CO 3 Identification of upcoming events and conferences.
- CO 4 Handle the smooth banquet operations.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						
CO2		M					
CO3				H			
CO4	H						

- H = Highly Related; M = Medium L = Low

<b>BHH039A</b>	<b>FOOD &amp; BEVERAGE OPERATIONS – II LAB</b>	<b>CR.-2 (PR)</b>
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Course Objective---The objective of this course to give operational knowledge of restaurant and bar operations like taking of orders, making mock tails etc.

<ul style="list-style-type: none"> <li>• Supervising F&amp; B outlets and service</li> <li>• Taking an order for food and spirits</li> <li>• Preparation of cocktail's &amp; mocktail's</li> <li>• Service of spirits (whisky, rum, brandy, vodka, gin), liqueurs</li> <li>• Flaring Skills</li> </ul>
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**Course Outcome-** The student will able to

CO1. Supervise the F&B outlets.

CO2.Take Orders of Food and Spirits

CO3. Serve alcoholic beverages

CO4. Do flaring

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						
CO2		M					
CO3				H			
CO4	H						

- H = Highly Related; M = Medium L = Low

<b>BHH035A</b>	<b>ACCOMMODATION OPERATIONS–II</b>	<b>CR-2(TH)</b>
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Course Objective----In this course, we look at lodging as a set of products and services that have evolved out of guest needs and preferences. We begin with the evolution of lodging to fit transportation and destination patterns and individual guest preferences. We then delineate different types of lodging properties, discussing the distinguishing characteristics of each. Emphasis is given to ensure the efficient managing and functioning of hotel housekeeping department.

1. To Identify and understand the business of rooms division department in hotels.
2. Figure out the trends in the housekeeping department in various size hotels and design specifications.

Unit 1	<b>Fibers and Fabrics</b>
	<ul style="list-style-type: none"> <li>• Definition of fiber</li> <li>• Classification of fibers, the origin</li> <li>• Characteristics and use of each</li> <li>• Methods of construction (knitting, weaving and braiding) and making of fiber</li> <li>• Weaving</li> <li>• Classification of weaves</li> <li>• Fabrics commonly used in hotels</li> <li>• Identification of yarns</li> <li>• Classification of dyed and printed fabrics</li> <li>• Various finishes of fabrics.</li> </ul>
Unit 2	<b>Stain Removal</b>
	<ul style="list-style-type: none"> <li>• Definition</li> <li>• Classification of stains</li> <li>• General rules of stain removal</li> <li>• Stain removal methods.</li> </ul>
Unit 3	<b>Interior decoration, Colour, Lighting</b>
	<ul style="list-style-type: none"> <li>• Importance</li> <li>• Definition &amp; types</li> <li>• Classification</li> <li>• Principles of design: harmony, rhythm, balance, proportion, emphasis</li> <li>• Element of design: line, form, color, texture.</li> <li>• Colour: Color wheel, importance &amp; characteristics</li> <li>• Classification of colours</li> <li>• Colour scheme</li> <li>• Lighting: Classification</li> <li>• Types &amp; importance</li> <li>• Application</li> </ul>
Unit 4	<b>Floor &amp; Wall Covering</b>
	<ul style="list-style-type: none"> <li>• Types and characteristics</li> <li>• Carpets: selection, types, characteristics</li> <li>• Care and maintenance</li> </ul>
Unit 5	<b>Refurbishment and Redecoration</b>
	<ul style="list-style-type: none"> <li>• Definition</li> <li>• Factors</li> <li>• Procedure and task involved</li> <li>• Snagging list.</li> </ul>



**Course Outcome**---After completion of this course the student will able to:

- CO 1.Plan their work schedule and staff job allocation.
- CO 2Forecast and prepare departmental budget.
- CO 3Track the purchasing and buying methods used in hotels.
- CO4Analyse the different type of contract services.
- CO5 Implement the strain removal procedures.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	H						
CO3				M			
CO4			H				

- H = Highly Related; M = Medium L = Low

<b>BHH040A</b>	<b>ACCOMMODATION OPERATIONS –II LAB.</b>	<b>CR-1(PR)</b>
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Course Objective- The objective of this course is to make students familiar with laundry operations and its handling.

<ul style="list-style-type: none"> <li>• Laundry equipment handling</li> <li>• Laundry operations</li> <li>• Handling different types of fabrics in manual &amp; mechanical laundry</li> <li>• Stain removal</li> </ul>
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Course Outcome---After completion of this course the student will able to:

- CO 1.Plan the laundry linen handling
- CO 2Forecast and make budget for laundry chemicals
- CO3 Implement the strain removal procedures with proper chemical

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	H						
CO3				M			

- H = Highly Related; M = Medium L = Low



<b>BHH036A</b>	<b>FRONT OFFICE OPERATIONS-II</b>	<b>CR.-2</b>
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Course Objective--- This course aims to feminize students with the operational and managerial prospect of the front office department in the hotel industry. Introduction to property management system (PMS), front office accounting; planning and evaluating operations, front office budgeting, visitors tabular ledger (VTL), sales record and control of sale of room and food, settlement of bills, night audit, credit control, occupancy ratios and yield management.

S.NO.	TOPIC
	<b>PLANNING &amp; EVALUATING FRONT OFFICE OPERATIONS</b> A. Setting Room Rates (Details/Calculations thereof) - Hubbart Formula, market condition approach & Thumb Rule - Types of discounted rates – corporate, rack etc. B. Forecasting techniques C. Forecasting Room availability D. Useful forecasting data • % of walking • % of overstay • % of under stay E. Forecast formula F. Types of forecast G. Sample forecast forms H. Factors for evaluating front office operations
2	<b>BUDGETING</b> A. Types of budget & budget cycle B. Making front office budget C. Factors affecting budget planning D. Capital & operations budget for front office E. Refining budgets, budgetary control F. Forecasting room revenue G. Advantages & Disadvantages of budgeting
3	<b>PROPERTY MANAGEMENT SYSTEM</b> A. Fidelio/ IDS/ Shawman B. Amadeus

Course Outcome---After completion of this course student will be able to--

- To explore the tools and technique of management accounting for analysis to understand different business strategies.
- To be able to analyze the affairs of the business through ratios.
- To prepare cash flow statements
- To make budgets both fixed and flexible

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7



CO1			M				
CO2			L				
CO3	M						
CO4	M						

H = Highly Related; M = Medium L = Low Course Outcome----STUDENT WILL ABLE TO-

CO1 .Manage restaurant effectively .

CO2 knowledge about Bar Operations

CO3 knowledge about Mock tails and Cocktails.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M		L				
CO2			L				
CO3		M					
CO4		H					

H = Highly Related; M = Medium L = Low

**BHH041A**

**FRONT OFFICE OPERATIONS-II LAB.**

**CR.-1(PR)**

**COURSE OBJECTIVE-**The objective of this course is to familiarise students with cash and credit handling in front office.

1. To understand the practical aspect of PMS in the computer lab
2. To learn the opening of guest folio, posting of transaction and charges, closing of account
3. Handling credit cards
4. Foreign exchange procedures
5. Calculating occupancy ratios

**COURSE OUTCOME-** The student will able to

CO1. Handling cash transactions.

CO2. Credit transactions.

CO3. Handling foreign currency.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M		L				
CO2			L				
CO3		M					

H = Highly Related; M = Medium L = Low



BHH037A	BASIC HYGIENE AND HACCP	CR-2 (TH)
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**Course Objective-**The subject will provide information regarding Personal Hygiene, Food Hygiene Practices used in Hospitality Industry. It also covers the Importance of HACCP and its principles.

S.No.	Topic
01	<b>Food Hygiene</b> <ul style="list-style-type: none"> <li>• Meaning and definition of hygiene</li> <li>• General principles of food hygiene</li> <li>• Personal hygiene.</li> <li>• Concepts and understanding (HACCP)</li> <li>• Recycling / Quality Audit</li> <li>• Hazard analysis</li> </ul>
02.	<b>Receiving and Storage</b> <ul style="list-style-type: none"> <li>• Food safety in receiving and storage</li> <li>• Food labeling</li> <li>• Operating procedures for receiving and storage.</li> <li>• Food storage condition, Storage of Specific Foods-Meat, Poultry, Egg, Seafood, Dairy Products &amp; Vegetables</li> </ul>
03	<b>Food Safety in Kitchen</b> <ul style="list-style-type: none"> <li>• Food safety in kitchen</li> <li>• Design and facilities</li> <li>• Sources of Food Contamination, Contamination of Water</li> <li>• Kitchen equipments, Dish washing</li> <li>• Garbage Disposal</li> <li>• Food poisoning</li> </ul>
04	<b>Hygiene in Service Department</b> <ul style="list-style-type: none"> <li>• Food safety in service department</li> <li>• Location</li> <li>• Design and facilities</li> <li>• Cleanliness and maintenance of machines</li> <li>• Control of operations</li> <li>• Sanitary Procedures while serving and displaying food –rules to be observed while handling food in mobile food units, Outdoor catering, street side catering units.</li> <li>• Do's and Don't while handling food.</li> </ul>
05.	<b>Hygiene In House Keeping</b> <ul style="list-style-type: none"> <li>• Food safety in house keeping department</li> <li>• Design and facilities</li> </ul> Pest and rodent control

**Course Outcome-** After completion of this course student able to –

CO1. Identify the risks and hazards in food preparation

CO2. Define food poisoning, understand how it occurs and the main causes of food contamination

CO3. Explain the importance of correct storage, preparation, handling and cooking of food

CO4. Explain the purpose of HACC

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**



<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1				M			
CO2							M
CO3		L					
CO4			M				

H = Highly Related; M = Medium L = Low

#### Reference:

1. Sanitation for Food Service workers by Richardson and Nicodemus.
2. Food Hygiene and Sanitation by S. Roday.
3. Food Safety and HACCP Manual for Hotels & Restaurants in India – FHRAI.

<b>DBA026A</b>	<b>Methods and Techniques of Research</b>	<b>CR 2(TH)</b>
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Research methodology will be taught in the theory class of VII semester to prepare students on how to approach the subject of research project in the VIII semester. Topics are allotted to the students in the beginning of VII th semester to prepare the students to peruse the project under guidance of the concerned faculty. Final preparation of the project will be submitted for presentation at the end of VIII semester.

<b>Unit 1</b>	<b>Introduction to Research Methodology</b>
	<ul style="list-style-type: none"> <li>• Meaning and objectives of research, types of research, research approaches, significance of research, research methods vs methodology, research process, criteria of good research, problem faced by researches, techniques involved in defining a problem.</li> </ul>
<b>Unit 2</b>	<b>Research Design</b>
	<ul style="list-style-type: none"> <li>• Meaning and need for research design, features and important concepts relating to research design, different research designs, important experimental designs.</li> </ul>
<b>Unit 3</b>	<b>Sample Design</b>
	<ul style="list-style-type: none"> <li>• Sample survey, implication of sample design, steps in sample design, criteria for selecting a sampling procedure, characteristics of a good sample design, different types of sample design, measurement scales, important scaling techniques.</li> </ul>



Unit 4

**Methods of Data Collection**

- Collection of primary data, collection through questionnaire and schedule collection of secondary data, difference in questionnaire and schedule, different methods to collect secondary data

Unit 5

**Data Analysis Interpretation and Presentation Techniques**

- Hypothesis testing, basic concepts concerning hypothesis testing, procedure and flow diagram for hypothesis testing, test of significance, chi-square analysis, report presentation techniques.

- Calculation of yield management ratios
- Role play: situation handling on various accommodation aspects
- Preparation of sales letter, brochures, promotional letter
- Internet advertising, promotion & sale of accommodation product.
- Travel Agent Voucher
- Itinerary
- **PMS – Rooms Management**

Reference:

1. Managing Computers In Hospitality Industry by Michael casavana and Cahell
2. Front Office Operations by Colin Dix & Chris Baird
3. Hotel Front Office Management by James Bardi
4. Management Front Office Operations by Kasavana & Brooks
5. Front Office Training Manual by Sudhir Andrews
6. Managerial Accounting And Hospitality Accounting by Raymond S ScBHHidgall

### THIRD SEMESTER EXAMINATION

S. No.	Subject Code	Subject Name	Credits	Contact Hrs/Wk.		
				L	T/S	P
		<b>A. Theory</b>				
1	BHM 018A	Food Production Operations-1	2	2	-	-
2	BHM 019A	Food & Beverage Service Operations-1	2	2	-	-
3	BHM 020A	Accommodation Operations -1	2	2	-	-
4	BHM 021A	Front Office Operations -1	2	2	-	-
5	BHM 022A	Basic Accounting	2	2	-	-
6	BHM 023A	Food Science and Nutrition	2	3	-	-
7	BHM 024A	Fundamentals of French	1	1	-	-
8	DIN 003A	Value Education I	1	1	-	-
9	DEN 003A	Life Skills I (PD)	2	1	-	2
		<b>B. Practical/LAB</b>				
10	BHM 025A	Food Production Operation-1 LAB.	3	-	-	6
11	BHM 026A	Food & Beverage Service Operations-1 LAB.	1	-	-	2
12	BHM 027A	Accommodation Operations-1 LAB.	1	-	-	2
13	BHM 028A	Front Office Operations-1 LAB.	1	-	-	2
		<b>Total</b>	<b>22</b>	<b>16</b>		<b>14</b>
		<b>Total Teaching Load</b>		<b>30</b>		

  
 Head  
 Department of Hotel Management  
 JECRC University, Jaipur-303905

<b>BHM 018A</b>	<b>FOOD PRODUCTION OPERATIONS-I</b>	<b>CR-2(TH)</b>
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**COURSE OBJECTIVE-** The objective of this course is to improve knowledge of students in garnishes, accompaniments, International cuisines , uses of wine in cookery.

<b>S.No.</b>	<b>Topic</b>
01	<b>Appetizers and Garnishes</b> <ul style="list-style-type: none"> <li>• Appetizers: definition,</li> <li>• Classification,</li> <li>• Standard accompaniments,</li> <li>• Uses with menu examples,</li> <li>• Garnishes: definition,</li> <li>• Classical garnishes and historic importance,</li> <li>• Uses with menu examples.</li> </ul>
02	<b>International Cuisine-I</b> <ul style="list-style-type: none"> <li>• Geographic location, historical background, staple food with regional influences, specialties, recipes, in relation to the following cuisines- France, Italy, Spain and Portugal etc</li> </ul>
03	<b>Use of Herbs and Wines in Cookery</b> <ul style="list-style-type: none"> <li>• Difference between cooking wine and table wines</li> <li>• Ideal use of wine in cooking</li> <li>• Herbs and spices- classification</li> <li>• Ideal use of herbs and spices in cooking</li> </ul>
04	<b>Convenience Food and Fast Food</b> <ul style="list-style-type: none"> <li>• Role of convenience food in fast food operations</li> <li>• Advantage and disadvantage of convenience food</li> </ul> Labour and cost saving aspect
05	<b>Bread-II</b> <ul style="list-style-type: none"> <li>• Introduction to international classical bread</li> <li>• Role of key regional ingredients</li> <li>• Bread improvers- uses, types etc.</li> </ul>

#### **Course Outcome**

CO1. Get an insight of quite a vast description on the culture, eating habits, preparation of popular dishes from the cuisines around the world

CO2 Understand the meaning of appetizers and garnishes

CO3 Able to use wine in cookery.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**





<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1						L	
CO2		M					
CO3				L			
CO4							

H = Highly Related; M = Medium L = Low

<b>BHM 025A</b>	<b>FOOD PRODUCTION OPERATIONS -1 LAB.</b>	CR-3 (PR)
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Course Objective---The objective of this course to teach students how to prepare three course menu, misc-en-place and garnishing of dishes. Also the students learn about making of appetizers.

- Three course menu of international cuisine
- Classical appetizers and garnishes
- International bread

Reference:

1. The Professional Pastry Chef by Friberg
  2. The Wilton Ways of Cake Decorations by Hamlyn Publishing.
  3. Chocolate by Carolyn Humphries.
  4. International Cook Book, Cavendish House
- Time- Life Series- The Cooking Of Various Countries

**Course Outcome**

CO1. Get an insight of quite a vast preparation of popular dishes from the cuisines around the world

CO2 Able to make appetizers and garnishes

CO3 Able to make international Breads.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1						L	
CO2		M					
CO3				L			
CO4							

H = Highly Related; M = Medium L = Low

<b>BHM019A</b>	<b>FOOD &amp; BEVERAGE SERVICE OPERATIONS-I</b>	CR-2(TH)
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**Course Objectives/Course Description**



To educate students about the exciting world of wines

To recognize various new and old world wines

Food and wine pairing technique

Unit 1	<b>Introduction to Alcoholic Beverages</b> <ul style="list-style-type: none"><li>• Classification &amp; Definition of each Alcoholic Beverage</li></ul>
Unit 2	<b>Wines</b> <ul style="list-style-type: none"><li>• Introduction of wines</li><li>• Classification of wines</li><li>• Wine producing countries</li><li>• Producing regions of France, Italy, and Spain etc.</li><li>• Production of wines with description of Principal Grape Varieties</li><li>• Factors affecting production of wines</li><li>• Matching wines with food</li><li>• Reading wine labels</li><li>• Storage &amp; Service of wines</li><li>• Glossary of wine trade terms</li><li>• Production of famous wines – sparkling (Champagne) and fortified (sherry, port &amp; Madeira) in detail.</li></ul>
Unit 3	<b>Beer</b> <ul style="list-style-type: none"><li>• History &amp; Definition</li><li>• Classification of Beer</li><li>• Production of Beer, Top &amp; Bottom Fermentation</li><li>• Beer producing Countries</li><li>• Service &amp; storage of beer, faults in beer</li><li>• Draught beer and its service</li><li>• Brands ( National &amp; International)</li></ul>
Unit 4	<b>Aperitifs</b> <ul style="list-style-type: none"><li>• Introduction &amp; Definition</li><li>• Types of aperitifs</li><li>• Manufacturing of aperitif ( vermouth)</li><li>• Brand names</li></ul>
Unit 5	<b>Other Alcoholic Beverages</b> <ul style="list-style-type: none"><li>• Sake, Cider, Medira, Silvovitz, Arrack, Feni, Grappa, Calvados etc.</li><li>• Glossary of terms related to alcoholic beverages</li></ul>

**Course Outcome---**

CO1.Know old world wines and important countries

CO2 Types of Wines and service

CO3 Professional Wine Service, preparation of wine list and proper handling of wine

CO4 Suggestive selling of wine and Food and wine harmony.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2		L					
CO3	M						



CO4							
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H = Highly Related; M = Medium L = Low

<b>BHH026A</b>	<b>FOOD &amp; BEVERAGE SERVICE OPERATIONS-I LAB.</b>	<b>CR-1 (PR)</b>
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**Course Objective---** This course provides students with practical skills and knowledge for effective management of beverage service operations. The sessions are designed to provide hands on experience on the various aspects of bar operations and management. The core objective of the course is to instill a culture of responsible attitude towards alcoholic beverages and the practice of responsible service.

<ul style="list-style-type: none"> <li>Bar introduction <ul style="list-style-type: none"> <li>Glassware, measurements, bar tools &amp; equipments</li> <li>Taking an order for alcoholic beverages</li> <li>Service of beer and wines</li> </ul> </li> <li>Red / White / Rosé / Champagne</li> </ul>
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Reference:

1. Food & Beverage Service Training Manual- Sudhir Andrews
2. Food & Beverage Service – Lillicrap & Cousins
3. Professional Guide To Alcoholic Beverages- Lipinski
4. Alcoholic Beverages- Lipinski & Lipinski

### Course Outcome

At the end of the sessions the participants will be able to:-

1. Display responsible service and legal responsibilities of an F&B Service professional.
2. Identify the various licenses and approvals required to run a beverage establishment.
3. Create a bar operations plan and bar check list.
4. Demonstrate skills to handle various issues and situations associated with running an establishment serving alcoholic beverages.
5. Apply the skills and knowledge of mixology.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	H						
CO3	L						
CO4				M			
CO5				H			

H = Highly Related; M = Medium L = Low



<b>BHM020A</b>	<b>ACCOMMODATION OPERATIONS-1</b>	<b>Cr-2(TH)</b>
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**Course Objective-**

1. To understand the planning of facilities and space management.
2. To Practice listening to comments and complaints using positive and negative language and responding appropriately.
3. To detail out the procedures for different departmental processes

**Unit 1 Management of Linen**

- Classification of linen and size
- Selection criteria for various linen items
- Activities of the linen room
- Layout and equipment in the linen room
- Purchase of linen
- Linen hire- quality and quantity
- Calculation of linen requirements
- Storage and inspection
- Linen control-procedures and records
- Stock taking-procedures and records
- Recycling of discarded linen
- Par stock
- Inventory control
- Condemned linen- procedure
- Marking and monogramming.

**Unit 2 Management of Uniforms**

- Purpose of uniforms, No. of sets issuing
- Producing and exchange of uniform
- Selection and designing of uniforms
- Advantages of providing uniforms to staff
- Stock taking procedures
- Uniform records
- Layout and planning of uniform room.

**Unit 3 Sewing Room**

- Activities and areas to be provided,
- Equipments provided.

**Unit 4 Laundry**

- Duties and responsibility of laundry staff (laundry manager, dry cleaning supervisor, presser, laundry clerks, valet runner, laundry attendants)
- Types of laundry.

**Unit 5 Flow process of Laundry**



- Importance and principles of flow process in laundry
- Stages in wash cycle
- Laundry equipment and machines
- Layout of the laundry
- Role of the laundry agents
- Classification of laundry agents
- Dry cleaning
- Guest laundry /valet services
- Collection and delivering care in the laundry guest articles.

**Glossary of terms (with reference to 4th semester syllabus)**

**Course Outcome- The student will able to**

CO1. Understand laundry operations

CO2. Know about sewing and linen room operations.

CO3. Explain procedure followed in Housekeeping Department

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2		L					
CO3	M						
CO4							

H = Highly Related; M = Medium L = Low

**BHM027A | ACCOMMODATION OPERATIONS-I LAB. | CR-1(PR)**

Course Objective----This course aims to establish the importance of Accommodation operations with in the hospitality Industry .It also prepares the student to acquire basic skills and knowledge necessary to successfully identify the required standards in this area and to consider all aspects of cost control and establishing profitability.

S.No.	Topic	
01	Layoutof LinenandUniformRoom/Laundry	
02	Laundry Machinery andEquipment	
03	StainRemoval	
04	FlowerArrangement	
05	SelectionandDesigning ofUniforms	

**Reference:**

1. Hotel House Keeping, Sudhir Andrews, Tata Mc Graw Hill
2. The Professional House Keeper, Tucker Schneider, VNR
3. Managing House Keeping Operation, Margaret Kappa & Aleta, Hutchinson
4. Professional Management of House Keeping Operations, Martin Jones, Willey
4. Hotel Housekeeping Operations and Management, G. Raghubalan

**Course Outcome---The student will able to-**



- Identifies the technical equipment and materials of laundry room.
- Choose the best amongst the equipment and materials of laundry room.
- Makes Floral Arrangement.
- Select and design the different type of required uniform.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2		M					
CO3	L						
CO4	H						

H = Highly Related; M = Medium L = Low

<b>BHM021A</b>	<b>FRONT OFFICE OPERATIONS-1</b>	<b>Cr.2(TH)</b>
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#### Course Objective--

To enable the students to learn the front office cashiering function.

To demonstrate the importance of effective managements of hotel assets.

To explain the Check-out Procedures and guest handling operations.

Unit 1	<b>Registration</b> <ul style="list-style-type: none"> <li>• Pre-registration activity and registration activities</li> <li>• Registration record</li> <li>• Room and rate assignment</li> <li>• Methods of payments</li> <li>• Issuing of room key</li> <li>• Fulfilling special request</li> <li>• Creative option</li> <li>• Selling the guest room</li> <li>• Upgrading of guest room</li> <li>• When guest cannot be accommodated.</li> </ul>
Unit 2	<b>Guest Complaints</b> <ul style="list-style-type: none"> <li>• Different categories,</li> <li>• Identifying complaints,</li> <li>• Handling complaints,</li> <li>• Follow-up procedures.</li> </ul>
Unit 3	<b>Lobby and Bell Desk Operation</b>



- Role of lobby manager
- Role of GRE
- Function of bell desk, concierge desk, car valet operation
- VIP handling.

#### Unit 4            **Front Office Security Function**

- Role of front office in hotel security
- Electronic locking system
- Use of key card
- Surveillance & access control
- Protection of funds and safe deposit boxes.

#### Unit 5            **Crisis Management in Hotel**

- Definition,
- Emergency situations and handling procedures.
- Importance of crisis management

#### **Text Books And Reference Books:**

Bhatnagar, S. K. (2010). Hotel Front Office. Oxford publications.

Ismail, A. Front Office Operation Management (5 ed.). Thomson and Delmer.

Essential Reading / Recommended Reading

Micheal Kasavanna, R. B. (2012). Managing Front office Operations (8 ed.). Prentice Hall.

#### **Course Outcome---**

After successfully completing this course, students will be able to:

1. Enhance managerial decision making skills
2. To learn to handle conflicting situations that may arise during guest Interactions
3. Impart the knowledge of revenue calculations and other techniques to improve the overall profitability of the hotel.
4. Evaluate hotel performance and analyse strategies for revenue generations.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							H
CO2							M
CO3		M					
CO4	M						

H = Highly Related; M = Medium L = Low

<b>BHM028A</b>	<b>FRONT OFFICE OPERATIONS-I LAB.</b>	<b>CR-1(PR)</b>
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<ul style="list-style-type: none"> <li>• To appreciate the importance and filling of guest registration card;</li> </ul>
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- Role play of various guest check-in's: walk-in, fit, VIP, groups;
- Role play of bell captain, bell boys, GRE (real life situations to be enacted);
- Up-selling over the front desk, telephone;
- Message handling (internal / external);
- Handling guest complaints.
- Upgrading of rooms at front desk

Reference:

1. Front Office Operations by Colin Dix & Chirs Baird
2. Hotel Front Office Management by James Bardi
3. Managing Front Office Operations by Kasavana & Brooks
4. Front Office Training Manual by Sudhir Andrews

<b>BHM022A</b>	<b>BASIC ACCOUNTING</b>	<b>CR- 2(TH)</b>
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**Course Objective-**To identify different costing methods and its role in product costing.

- To Analyse and apply costing techniques in practical situations.
- To Explain the costing methods used in hospitality industry.
- To apply the material pricing methods in practical context.
- To Prepare and analyse the cost sheet.

**Unit 1                      Accounting Theory**

- Business transaction and basic terminology
- need to study
- Accounting, : accounting functions, purpose of accounting records, accounting principles, concepts and conventions

**Unit 2                      Account Records**

- Principle of double entry system
- Journal entries, ledger, and subsidiary books- cash sales & purchase books, bank reconciliation statement

**Unit 3                      Financial Statements**

- Basic financial statements
- Trial balance, preparation of final accounts,
- basic adjustments to final accounts,





• Methods of presenting final accounts -practical problems with adjustments
<b>Unit 4 Depreciation Reserves and Provisions</b>
• Meaning,
• Basic methods with practical problems
<b>Unit 5 Computer Application</b>
• Computerised Accounting System
• Database concepts for Accounting

#### Reference

1. Comprehensive Accountancy: S.A.Siddiqui
2. A Complete Course In Accounting Volume-I: N.D. Kapoor
3. Double Entry Book Keeping: R.C. Chawala & C. Juneja
4. Introduction To Accountcy: T. S. Grewal

**Course Outcome---**At the completion of the course students will be able to

CO1. Identify different costing methods and its role in product costing.

CO2 Analyse and apply costing techniques in practical situations.

CO3 Explain the costing methods used in hospitality industry.

CO4 Apply the material pricing methods in practical context.

CO5 Prepare and analyse the cost sheet.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2				L			
CO3			M				
CO4				M			
CO5			H				

5. H = Highly Related; M = Medium L = Low

<b>BHM023A</b>	<b>FOOD SCIENCE AND NUTRITION</b>	<b>CR_3 (TH)</b>
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**Course Objective:-**The student will get knowledge about

1. The significance of food in his daily life
2. The terms like food, health, nutrition, malnutrition, and nutritional status.
3. Calculation of recommended dietary allowances, adulteration.
4. Understand the relationship of macro & micro nutrients to health

<b>Unit 1</b>	<b>Fundamentals of Nutrition</b>
• Introduction to nutrition	
• Objectives in the study of nutrition	
• Functions of food	
• Food groups and food habits.	
<b>Unit 2</b>	<b>Major Nutrients</b>
• Carbohydrates	
• Lipids, proteins	
• Vitamins	



- Minerals
- Water
- Their classification
- Functions and Food sources
- Deficiency
- Calorie
- BMR, SDA, RDA, energy requirement for various age groups.
- Pasteurization, sterilization and preservation

**Unit 3 Microbes**

- Bacteria- Shape, Size, Movement, Growth Phase, Growth requirements
- Molds- morphology, growth factors, beneficial and harmful effects
- Yeast- morphology, physiology, and economic importance

**Unit 4 Food Adulteration**

- Meaning and definition
- Types of adulteration and contamination
- Laws of prevention.

**Unit 5 Balance Diet and Diet Therapy**

- Definition and importance of balance diet
- Factors affecting meal planning
- Calculation of nutritive value of dishes
- Planning special diet (children, adult, old age, and adolescence)
- Low calorie diet
- Fiber restricted diet
- High fiber diet etc.

**Reference:**

Food science & nutrition, III Ed. Sunitra Roday, Oxford university press

Handbook of Hygiene Control in the Food Industry, II Ed. Huub, John, Domagoj, Elsevier

**Course outcome:-**By the end of this course student would be able to

CO1. Understand the importance of nutrition and good health in his day to day life.

CO2. Know the composition, functions sources of nutrients.

CO3. Understand the effects of excess & deficiency of nutrients.

CO4. Modify attitudes and practices of use existing nutrition

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1						L	
CO2						M	
CO3			M				
CO4			L				

**BHM023A**

**Fundamentals of French**

**CR 2(TH)**

**Course Objective** – The course objective is to teach basic French to the students that can be used in hotel industry.

**Unit - 1:**

- Pronunciation - The Alphabet - The Accents; Formules de politesse ;
- The numbers: Cardinal Ordinal;
- Time (only 24 hr clock);



- Weights & Measures;
- The subjective pronouns;
- Auxiliary verbs : etre and avoir

**Unit - 2:**

- Self introduction; presenting and introducing other person;
- Name of vegetables and fruits; Conjugation of first group of verbs;
- Days of the week; Months of the year; Date;
- The definite and indefinite articles

**Unit - 3:**

- Name of the Countries and their Nationalities;
- Conjugation of second group of verbs; Adjectives of place;
- Preposition of place; Describing a place (your city/ tourist place)

**Unit - 4 :**

- Vocabulary describing family;
- Describe your family; Name of dairy products and Cereals;
- Negation; Conjugation of irregular verbs : venir, aller;
- Demonstrative Adjectives Simple translation

**(Oral)**

- Role-playing of different situations
- Understanding questions Conversation
- Picture composition

**FOURTH SEMESTER EXAMINATION**

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.		
				L	T/S	P
		<b>A. Theory</b>				
1	BHM 029A	Food Production operations-II	2	2	-	-
2	BHM 030A	Food & Beverage operations-II	2	2	-	-
3	BHM 031A	Accommodation Operations-II	2	2	-	-
4	BHM 032A	Front Office Operations-II	2	2	-	-
5	BHM 033A	Hotel Maintenance	2	2	-	-
6	BHM 034A	Basic Hygiene and HACCP	2	2	-	-
7	DEN004A	Life Skills-II (Aptitude)	2	1	-	2
8	DIN004A	Value Education-II	1	1		
		<b>B. Practical /Project</b>				
7	BHH 035A	Food Production operations-II LAB.	3	-	-	6
8	BHH 036A	Food & Beverage Operations-II LAB.	1	-	-	2
9	BHH 037A	Accommodation Operations-II LAB.	1	-	-	2
10	BHH 038A	Front Office Operations-II LAB.	1	-	-	2
		<b>Total</b>	<b>21</b>	<b>14</b>		<b>14</b>
		<b>Total Teaching Load</b>		<b>28</b>		

<b>BHM029A</b>	<b>FOOD PRODUCTION OPERATIONS –II</b>
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<b>CR-2(TH)</b>
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**Course Objectives-**To provide an in-depth knowledge of purchasing and kitchen management, and also important knowledge of hot and cold desserts.

**Unit 1 Sandwiches**

- Sandwiches- definition
- Types and parts
- Types of breads used
- Different fillings and their classification
- Spreads and garnishes making
- Storing of sandwiches.

**Unit 2 International Cuisine-II**

- Geographic location
- Historical background
- Staple food with regional influences
- Specialties and recipes, in relation to the following cuisines- Germany, Middle Eastern, Mexican, Chinese etc.

**Unit 3 Purchase and Storage**

- Introduction to purchase

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- Purchasing system
- Purchase specification
- Purchasing techniques
- Storage

**Unit 4 Icings and Meringues**

- Icings- types and uses
- Methods of preparation
- Recipes and difference between icings and toppings
- Meringues- definition and types
- Preparation methods
- Factors affecting stability
- Cooking of meringues.

**Unit 5 Cakes and Gateaux**

- Cakes and gateaux- definition
- Types
- Regional specialties
- Role of different ingredients used
- Faults and remedies
- Care and precautions.

**COURSE OUTCOME**

CO 1) To enable students about the managerial aspects

CO 2) To teach students about quality and Portion control.

CO 3) To master the students in particular area of culinary skill

CO4) To train the students in Cold Kitchen

CO5) To train the students in terms of menu planning

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							M
CO2	L						
CO3		M					
CO4	L						
CO5		M					

H = Highly Related; M = Medium L = Low

**BHM035A FOOD PRODUCTION OPERATIONS –II LAB.**

**CR-4(PR)**

Course Objective—The objective of the course is to teach students to prepare three course menu from various international cuisines, making sandwiches, cakes and meringues.

- Three course menu of international cuisine.
- Making of different sandwiches.
- Making of cakes and gateaux.
- Different; icings and meringues.

**Reference:**

1. The Professional Pastry Chef by Friberg.



2. The Wilton Ways of Cake Decorations by Hamlyn Publishing.
3. Chocolate by Carolyn Humphries.
4. International Cook Book, Cavendish House
5. Time- Life series- The Cooking of Various Countries.

**COURSE OUTCOME- the student will able to—**

**CO1. Prepare and plan three course menu from various international cuisines.**

**CO2. Make different types of sandwiches.**

**CO3. Make cakes and Meringue**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							M
CO2	L						
CO3		M					

H = Highly Related; M = Medium L = Low

<b>BHM030A</b>	<b>FOOD &amp; BEVERAGE OPERATIONS – II</b>	<b>CR.-2 (TH)</b>
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**Course Objective----**The primary objective of this course is:

- Get to Know the Food and Beverage Division.
- Demonstrate Knowledge of Menus and Point-of-Sale Equipment
- Get to Know the Job of a Banquet Setup Employee

Unit 1	<b>Spirits</b> <ul style="list-style-type: none"> <li>• Introduction and definition</li> <li>• Classification of spirits</li> <li>• Production of spirits (pot / patent)</li> <li>• Whisky – Manufacturing , Whisky's from Scotland , America , Ireland , Canada and India, Brand Names</li> <li>• Rum – Manufacturing , types , brand Names</li> <li>• Gin – Manufacturing , types, brand Names</li> <li>• Vodka - Manufacturing , types, brand Names</li> <li>• Tequila - Manufacturing , types, brand Names</li> <li>• Brandy &amp; Cognac – Manufacturing , types , brand Names</li> <li>• Standards and measuring scales of spirits</li> <li>• IMFL / Heritage Liquor</li> </ul>
Unit 2	<b>Liqueurs &amp; Bitters</b> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Importance of Liqueurs in Alcoholic Drinks</li> <li>• Different types of Liqueurs</li> </ul>



	<ul style="list-style-type: none"> <li>• Production</li> <li>• Brand names , origin , flavor &amp; service</li> </ul>
Unit 3	<b>Cocktail &amp; Mixology</b> <ul style="list-style-type: none"> <li>• History of Cocktail</li> <li>• Types of Cocktail</li> <li>• Art of Mixology</li> <li>• Methods of making cocktails</li> <li>• Mocktails</li> </ul>
Unit 4	<b>Bar operations- I</b> <ul style="list-style-type: none"> <li>• Introduction to bar</li> <li>• Types &amp; parts of bar ( front / under / back)</li> <li>• Bar equipment &amp; glassware</li> <li>• Layout of bar</li> <li>• Bar hierarchy</li> <li>• Etiquettes &amp; mannerism for handling Bar</li> <li>• Introduction to flaring</li> <li>• Glossary of professional bar terms</li> </ul>
Unit 5	<b>Tobacco</b> <ul style="list-style-type: none"> <li>• History of tobacco</li> <li>• Manufacturing &amp; types</li> <li>• Storage &amp; service</li> <li>• Brand names &amp; their origins</li> <li>• Cigar's</li> </ul>

Reference Books:

1. Food & Beverage Service- Lillicrap& Cousins
2. Modern Restaurant Service- John Fuller
3. Beverage Book- Andrew, Dunkin & Cousins
4. Bar & Beverage Book- Mary Porter & Kostagris
5. Alcoholic Beverages- Lipinski & Lipinski

**Course Outcome**—After doing this course the student will able to:

CO 1 Prepare Banquet Equipment and Setups

CO2. Take Orders and Serve Drinks in banquets and bar.

CO 3 Identification of upcoming events and conferences.

CO 4 Handle the smooth banquet operations.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						
CO2		M					
CO3				H			
CO4	H						

- H = Highly Related; M = Medium L = Low

<b>BHM036A</b>	<b>FOOD &amp; BEVERAGE OPERATIONS – II LAB</b>	<b>CR.-2 (PR)</b>
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Course Objective---The objective of this course to give operational knowledge of restaurant and bar operations like taking of orders, making mock tails etc.



- Supervising F& B outlets and service
- Taking an order for food and spirits
- Preparation of cocktail's & mocktail's
- Service of spirits (whisky, rum, brandy, vodka, gin), liqueurs
- Flaring Skills

**Course Outcome-** The student will able to

CO1. Supervise the F&B outlets.

CO2. Take Orders of Food and Spirits

CO3. Serve alcoholic beverages

CO4. Do flaring

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						
CO2		M					
CO3				H			
CO4	H						

- H = Highly Related; M = Medium L = Low

<b>BHM031A</b>	<b>ACCOMMODATION OPERATIONS–II</b>	<b>CR-2(TH)</b>
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Course Objective----In this course, we look at lodging as a set of products and services that have evolved out of guest needs and preferences. We begin with the evolution of lodging to fit transportation and destination patterns and individual guest preferences. We then delineate different types of lodging properties, discussing the distinguishing characteristics of each. Emphasis is given to ensure the efficient managing and functioning of hotel housekeeping department.

1. To Identify and understand the business of rooms division department in hotels.
2. Figure out the trends in the housekeeping department in various size hotels and design specifications.

**Unit 1      Fibers and Fabrics**





- Definition of fiber
- Classification of fibers, the origin
- Characteristics and use of each
- Methods of construction (knitting, weaving and braiding) and making of fiber
- Weaving
- Classification of weaves
- Fabrics commonly used in hotels
- Identification of yarns
- Classification of dyed and printed fabrics
- Various finishes of fabrics.

#### Unit 2            **Stain Removal**

- Definition
- Classification of stains
- General rules of stain removal
- Stain removal methods.

#### Unit 3            **Interior decoration, Colour, Lighting**

- Importance
- Definition & types
- Classification
- Principles of design: harmony, rhythm, balance, proportion, emphasis
- Element of design: line, form, color, texture.
- Colour: Color wheel, importance & characteristics
- Classification of colours
- Colour scheme
- Lighting: Classification
- Types & importance
- Application

#### Unit 4            **Floor & Wall Covering**

- Types and characteristics
- Carpets: selection, types, characteristics
- Care and maintenance

#### Unit 5            **Refurbishment and Redecoration**

- Definition
- Factors
- Procedure and task involved
- Snagging list.

**Course Outcome---**After completion of this course the student will able to:

- CO 1. Plan their work schedule and staff job allocation.  
 CO 2. Forecast and prepare departmental budget.  
 CO 3. Track the purchasing and buying methods used in hotels.  
 CO 4. Analyse the different type of contract services.  
 CO 5. Implement the stain removal procedures.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	H						
CO3				M			
CO4			H				

- H = Highly Related; M = Medium L = Low

<b>BHM037A</b>	<b>ACCOMMODATION OPERATIONS –II LAB.</b>	<b>CR-1(PR)</b>
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Course Objective- The objective of this course is to make students familiar with laundry operations and its handling.

- Laundry equipment handling
- Laundry operations
- Handling different types of fabrics in manual & mechanical laundry
- Stain removal

Course Outcome---After completion of this course the student will able to:

CO 1.Plan the laundry linen handling

CO 2Forecast and make budget for laundry chemicals

CO3 Implement the strain removal procedures with proper chemical

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	H						
CO3				M			

- H = Highly Related; M = Medium L = Low

<b>BHM032A</b>	<b>FRONT OFFICE OPERATIONS-II</b>	<b>CR.-2</b>
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Course Objective--- This course aims to feminize students with the operational and managerial prospect of the front office department in the hotel industry. Introduction to property management system (PMS), front office accounting; planning and evaluating operations, front office budgeting, visitors tabular ledger (VTL), sales record and control of sale of room and food, settlement of bills, night audit, credit control, occupancy ratios and yield management.

S.NO.	TOPIC
	<b>PLANNING &amp; EVALUATING FRONT OFFICE OPERATIONS</b> A. Setting Room Rates (Details/Calculations thereof) - Hubbart Formula, market condition approach & Thumb Rule - Types of discounted rates – corporate, rack etc. B. Forecasting techniques C. Forecasting Room availability D. Useful forecasting data • % of walking • % of overstay • % of under stay E. Forecast formula F. Types of forecast G. Sample forecast forms H. Factors for evaluating front office operations
2	<b>BUDGETING</b> A. Types of budget & budget cycle B. Making front office budget C. Factors affecting budget planning D. Capital & operations budget for front office E. Refining budgets, budgetary control F. Forecasting room revenue G. Advantages & Disadvantages of budgeting
3	<b>PROPERTY MANAGEMENT SYSTEM</b> A. Fidelio/ IDS/Shawman B. Amadeus

Course Outcome---After completion of this course student will be able to--

- To explore the tools and technique of management accounting for analysis to understand different business strategies.
- To be able to analyze the affairs of the business through ratios.
- To prepare cash flow statements
- To make budgets both fixed and flexible

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1			M				
CO2			L				
CO3	M						
CO4	M						

H = Highly Related; M = Medium L = Low Course Outcome---STUDENT WILL ABLE TO-



CO1 .Manage restaurant effectively .  
 CO2 knowledge about Bar Operations  
 CO3 knowledge about Mock tails and Cocktails.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M		L				
CO2			L				
CO3		M					
CO4		H					

H = Highly Related; M = Medium L = Low

**BHM038A**

**FRONT OFFICE OPERATIONS-II LAB.**

**CR.-1(PR)**

**COURSE OBJECTIVE-**The objective of this course is to familiarise students with cash and credit handling in front office.

1. To understand the practical aspect of PMS in the computer lab
2. To learn the opening of guest folio, posting of transaction and charges, closing of account
3. Handling credit cards
4. Foreign exchange procedures
5. Calculating occupancy ratios

**COURSE OUTCOME-** The student will able to

CO1. Handling cash transactions.

CO2. Credit transactions.

CO3. Handling foreign currency.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M		L				
CO2			L				
CO3		M					

H = Highly Related; M = Medium L = Low

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<b>BHM033A</b>	<b>Hotel Maintenance</b>	<b>CR 2(TH)</b>
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The subject will provide information regarding the basic services and different types of engineering and maintenance systems in hotel industry. This subject will help students to understand various aspects and importance of engineering department in Hotel. At the end of the semester students will be thorough with various maintenance, refrigeration and air conditioning, fuels, electricity, safety and security, water distribution systems and energy conservation in hotel.

### **Chapter – 1 Maintenance & Replacement Policy**

1.1 Maintenance and Calibration of equipment – Meaning and importance

1.2 Importance of Maintenance department in Hotel Industry

1.3 Organization chart of Maintenance department in 3/4/5 star hotels

1.4 Duties & responsibilities of Chief Engineer of a hotel

1.5 Types of maintenance and their advantages and disadvantages

- Breakdown/ Corrective Maintenance

- Preventive Maintenance

- Predictive Maintenance

1.6 Contract Maintenance

- Need of contract maintenance

- Types: Lump sum, Unit price/ Unit Rate,

Cost plus upper limit contract

1.7 Maintenance charts for -

- Swimming Pool: Daily basis and Quarterly basis

- Kitchen: Daily basis and Quarterly basis

1.8 Replacement of Equipments:

- Reasons for replacement

- Economic replacement of equipments (Graph)

### **Chapter – 2 Refrigeration**

2.1 Definitions: Heat, Temperature, Sensible heat, Latent Heat, Relative Humidity, Zero law of Thermodynamics, 2<sup>nd</sup> Law of Thermodynamics,.

2.2 Methods of Heat Transfer:

- Conduction

- Convection

- Radiation

2.3 Refrigeration:

- Principle of Refrigeration

- Unit of Refrigeration

- Refrigerants: Properties and Types

- Block diagram and working of Vapour

Compression Refrigeration Cycle

- Block diagram and working of Vapour

Absorption Refrigeration Cycle

2.4 Domestic Refrigerator

- Block Diagram and working

- Maintenance



- Defrosting: Need, Methods

## 2.5 Walk in Freezer/ Cold Storage

- Block diagram
- Working

## **Chapter – 3 Air Conditioning**

### 3.1 Types of AC

Unitary AC: Window AC and Split AC

Block Diagram and Working of both

### 3.2 Factors affecting Load on AC

### 3.3 Factors affecting AC Comfort

## **Chapter – 4 Fuels**

### 4.1 Types of Fuels

### 4.2 Comparison of various Fuels: Solid, Liquid and Gaseous

### 4.3 Fuels used in Hotel Industry

## **Chapter – 5 Electricity**

### 5.1 Types of Electricity supply: Single and Three Phase

### 5.2 Types of Fuse: Re-wireable, Cartridge, Miniature Circuit Breakers (MCB)

### 5.3 Importance and method of Earthing System

### 5.4 Calculation of Electricity Bill

## **Chapter – 6 Water Systems**

### 6.1 Sources of water.

### 6.2 Adverse effects of Hard water

### 6.3 Methods of purification& water softening: Ion Exchange, Lime Soda.

### 6.4 Water Distribution System: Up Feed and Down Feed (Hot & Cold)

### 6.5 Traps, Water Closets and Flushing Systems

- Types, diagrams, functions.

### 6.6 Various Plumbing Fixtures

## **Chapter – 7 Energy & Its Conservation**

### 7.1 Various energy sources: Conventional & Non- Conventional: - their examples, advantages and disadvantages

### 7.2 Need of energy conservation

### 7.3 Simple Methods of energy conservation in Kitchen, Guest rooms.

### 7.4 Use of Solar Energy in Hotel

## **Chapter – 8 Safety and Security in Hotel**

### 8.1 Causes of Accidents

### 8.2 Prevention / Control of Accidents

### 8.3 Safety Issues in Hotel:

- Guest Key Control
- Kitchen Safety
- Slip & Fall

## **Reference Books:**

1. Hotel Engineering – Sujit Ghosal – Oxford University Press
2. Hotel Engineering – R.K. Chhatwal
3. Hotel Maintenance – Arora



BHM034A	BASIC HYGIENE AND HACCP	CR-2 (TH)
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**Course Objective-**The subject will provide information regarding Personal Hygiene, Food Hygiene Practices used in Hospitality Industry. It also covers the Importance of HACCP and its principles.

S.No.	Topic
01	<b>Food Hygiene</b> <ul style="list-style-type: none"> <li>• Meaning and definition of hygiene</li> <li>• General principles of food hygiene</li> <li>• Personal hygiene.</li> <li>• Concepts and understanding (HACCP)</li> <li>• Recycling / Quality Audit</li> <li>• Hazard analysis</li> </ul>
02.	<b>Receiving and Storage</b> <ul style="list-style-type: none"> <li>• Food safety in receiving and storage</li> <li>• Food labeling</li> <li>• Operating procedures for receiving and storage.</li> <li>• Food storage condition, Storage of Specific Foods-Meat, Poultry, Egg, Seafood, Dairy Products &amp; Vegetables</li> </ul>
03	<b>Food Safety in Kitchen</b> <ul style="list-style-type: none"> <li>• Food safety in kitchen</li> <li>• Design and facilities</li> <li>• Sources of Food Contamination, Contamination of Water</li> <li>• Kitchen equipments, Dish washing</li> <li>• Garbage Disposal</li> <li>• Food poisoning</li> </ul>
04	<b>Hygiene in Service Department</b> <ul style="list-style-type: none"> <li>• Food safety in service department</li> <li>• Location</li> <li>• Design and facilities</li> <li>• Cleanliness and maintenance of machines</li> <li>• Control of operations</li> <li>• Sanitary Procedures while serving and displaying food –rules to be observed while handling food in mobile food units, Outdoor catering, street side catering units.</li> <li>• Do's and Don't while handling food.</li> </ul>
05.	<b>Hygiene In House Keeping</b> <ul style="list-style-type: none"> <li>• Food safety in house keeping department</li> <li>• Design and facilities</li> </ul> Pest and rodent control

**Course Outcome-** After completion of this course student able to –

CO1. Identify the risks and hazards in food preparation

CO2. Define food poisoning, understand how it occurs and the main causes of food contamination

CO3. Explain the importance of correct storage, preparation, handling and cooking of food

CO4. Explain the purpose of HACC



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1				M			
CO2							M
CO3		L					
CO4			M				

H = Highly Related; M = Medium L = Low

**Reference:**

1. Sanitation for Food Service workers by Richardson and Nicodemus.
2. Food Hygiene and Sanitation by S. Roday.
3. Food Safety and HACCP Manual for Hotels & Restaurants in India – FHRAI.



## FIFTH SEMESTER EXAMINATION

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.		
				L	T/S	P
		<b>A. Theory</b>				
1	BHH501D	Food Production operations-II	2	2	-	-
2	BHH502D	Food & Beverage operations-II	2	2	-	-
3	BHH503D	Accommodation Operations-II	2	2	-	-
4	BHH504D	Front Office Operations-II	2	2	-	-
5	BHH505D	Professional Skills Development	2	2	-	-
6	BHH506D	Methods and Techniques of Research	2	2	-	-
		<b>B. Practical /Project</b>				
7	BHH511D	Food Production operations-II LAB.	4	-	-	8
8	BHH512D	Food & Beverage Operations-II LAB.	2	-	-	4
9	BHH513D	Accommodation Operations-II LAB.	1	-	-	2
10	BHH514D	Front Office Operations-II LAB.	1	-	-	2
		<b>Total</b>	<b>20</b>	<b>12</b>		<b>16</b>
		<b>Total Teaching Load</b>		<b>28</b>		

**BHH501D | FOOD PRODUCTION OPERATIONS –II**

**CR-2(TH)**

**Course Objectives-**To provide an in-depth knowledge of purchasing and kitchen management, and also important knowledge of hot and cold desserts.

### Unit 1 **Sandwiches**

- Sandwiches- definition
- Types and parts
- Types of breads used
- Different fillings and their classification
- Spreads and garnishes making
- Storing of sandwiches.

### Unit 2 **International Cuisine-II**

- Geographic location
- Historical background
- Staple food with regional influences
- Specialties and recipes, in relation to the following cuisines- Germany, Middle Eastern, Mexican, Chinese etc.

### Unit 3 **Purchase and Storage**

- Introduction to purchase
- Purchasing system
- Purchase specification
- Purchasing techniques
- Storage

### Unit 4 **Icings and Meringues**

- Icings- types and uses
- Methods of preparation
- Recipes and difference between icings and toppings
- Meringues- definition and types
- Preparation methods

- Factors affecting stability
  - Cooking of meringues.
- Unit 5 Cakes and Gateaux**
- Cakes and gateaux- definition
  - Types
  - Regional specialties
  - Role of different ingredients used
  - Faults and remedies
  - Care and precautions.

#### **COURSE OUTCOME**

CO 1) To enable students about the managerial aspects

CO 2) To teach students about quality and Portion control.

CO 3) To master the students in particular area of culinary skill

CO4) Cold Kitchen

CO5) To train the students in terms of menu planning

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							M
CO2	L						
CO3		M					
CO4	L						
CO5		M					

H = Highly Related; M = Medium L = Low

#### **BHH511D FOOD PRODUCTION OPERATIONS –II LAB.**

**CR-4(PR)**

Course Objective—The objective of the course is to teach students to prepare three course menu from various international cuisines, making sandwiches, cakes and meringues.

- Three course menu of international cuisine.
- Making of different sandwiches.
- Making of cakes and gateaux.
- Different; icings and meringues.

#### Reference:

1. The Professional Pastry Chef by Friberg.
2. The Wilton Ways of Cake Decorations by Hamlyn Publishing.
3. Chocolate by Carolyn Humphries.
4. International Cook Book, Cavendish House
5. Time- Life series- The Cooking of Various Countries.

**COURSE OUTCOME- the student will able to—**

**CO1. Prepare and plan three course menu from various international cuisines.**

**CO2. Make different types of sandwiches.**

**CO3. Make cakes and Meringue**

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							M
CO2	L						
CO3		M					

H = Highly Related; M = Medium L = Low

**BHH502D FOOD & BEVERAGE OPERATIONS – II**

**CR.-2 (TH)**

Course Objective----The primary objective of this course is:

Get to Know the Food and Beverage Division.

Demonstrate Knowledge of Menus and Point-of-Sale Equipment

Get to Know the Job of a Banquet Setup Employee Reference Books:

1. Food & Beverage Service- Lillicrap & Cousins
2. Modern Restaurant Service- John Fuller
3. Beverage Book- Andrew, Dunkin & Cousins
4. Bar & Beverage Book- Mary Porter & Kostagris
5. Alcoholic Beverages- Lipinski & Lipinski

**Unit 1 Spirits**

- Introduction and definition
- Classification of spirits
- Production of spirits (pot / patent)
- Whisky – Manufacturing , Whisky's from Scotland , America , Ireland , Canada and India, Brand Names
- Rum – Manufacturing , types , brand Names
- Gin – Manufacturing , types, brand Names
- Vodka - Manufacturing , types, brand Names
- Tequila - Manufacturing , types, brand Names
- Brandy & Cognac – Manufacturing , types , brand Names
- Standards and measuring scales of spirits
- IMFL / Heritage Liquor

**Unit 2 Liqueurs & Bitters**

- Definition
- Importance of Liqueurs in Alcoholic Drinks

	<ul style="list-style-type: none"> <li>• Different types of Liqueurs</li> <li>• Production</li> <li>• Brand names , origin , flavor &amp; service</li> </ul>
Unit 3	<b>Cocktail &amp; Mixology</b> <ul style="list-style-type: none"> <li>• History of Cocktail</li> <li>• Types of Cocktail</li> <li>• Art of Mixology</li> <li>• Methods of making cocktails</li> <li>• Mocktails</li> </ul>
Unit 4	<b>Bar operations- I</b> <ul style="list-style-type: none"> <li>• Introduction to bar</li> <li>• Types &amp; parts of bar ( front / under / back)</li> <li>• Bar equipment &amp; glassware</li> <li>• Layout of bar</li> <li>• Bar hierarchy</li> <li>• Etiquettes &amp; mannerism for handling Bar</li> <li>• Introduction to flaring</li> <li>• Glossary of professional bar terms</li> </ul>
Unit 5	<b>Tobacco</b> <ul style="list-style-type: none"> <li>• History of tobacco</li> <li>• Manufacturing &amp; types</li> <li>• Storage &amp; service</li> <li>• Brand names &amp; their origins</li> <li>• Cigar's</li> </ul>

**Course Outcome**—After doing this course the student will able to:

CO 1Prepare Banquet Equipment and Setups

CO2. Take Orders and Serve Drinks in banquets and bar.

CO 3Identification of upcoming events and conferences.

CO 4 Handle the smooth banquet operations.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						
CO2		M					
CO3				H			
CO4	H						

- H = Highly Related; M = Medium L = Low

<b>BHH512D</b>	<b>FOOD &amp; BEVERAGE OPERATIONS – II LAB</b>	<b>CR.-2 (PR)</b>
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Course Objective---The objective of this course to give operational knowledge of restaurant and bar operations like taking of orders, making mock tails etc.

<ul style="list-style-type: none"> <li>• Supervising F&amp; B outlets and service</li> </ul>
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- Taking an order for food and spirits
- Preparation of cocktail's & mocktail's
- Service of spirits (whisky, rum, brandy, vodka, gin), liqueurs
- Flaring Skills

**Course Outcome-** The student will able to

CO1. Supervise the F&B outlets.

CO2. Take Orders of Food and Spirits

CO3. Serve alcoholic beverages

CO4. Do flaring

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						
CO2		M					
CO3				H			
CO4	H						

- H = Highly Related; M = Medium L = Low

<b>BHH503D</b>	<b>ACCOMMODATION OPERATIONS–II</b>	<b>CR-2(TH)</b>
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Course Objective----In this course, we look at lodging as a set of products and services that have evolved out of guest needs and preferences. We begin with the evolution of lodging to fit transportation and destination patterns and individual guest preferences. We then delineate different types of lodging properties, discussing the distinguishing characteristics of each. Emphasis is given to ensure the efficient managing and functioning of hotel housekeeping department.

1. To Identify and understand the business of rooms division department in hotels.
2. Figure out the trends in the housekeeping department in various size hotels and design specifications.

**Unit 1                      Fibers and Fabrics**

- Definition of fiber
- Classification of fibers, the origin
- Characteristics and use of each
- Methods of construction (knitting, weaving and braiding) and making of fiber
- Weaving
- Classification of weaves
- Fabrics commonly used in hotels
- Identification of yarns
- Classification of dyed and printed fabrics

	<ul style="list-style-type: none"> <li>• Various finishes of fabrics.</li> </ul>
<b>Unit 2</b>	<b>Stain Removal</b>
	<ul style="list-style-type: none"> <li>• Definition</li> <li>• Classification of stains</li> <li>• General rules of stain removal</li> <li>• Stain removal methods.</li> </ul>
<b>Unit 3</b>	<b>Interior decoration, Colour, Lighting</b>
	<ul style="list-style-type: none"> <li>• Importance</li> <li>• Definition &amp; types</li> <li>• Classification</li> <li>• Principles of design: harmony, rhythm, balance, proportion, emphasis</li> <li>• Element of design: line, form, color, texture.</li> <li>• Colour: Color wheel, importance &amp; characteristics</li> <li>• Classification of colours</li> <li>• Colour scheme</li> <li>• Lighting: Classification</li> <li>• Types &amp; importance</li> <li>• Application</li> </ul>
<b>Unit 4</b>	<b>Floor &amp; Wall Covering</b>
	<ul style="list-style-type: none"> <li>• Types and characteristics</li> <li>• Carpets: selection, types, characteristics</li> <li>• Care and maintenance</li> </ul>
<b>Unit 5</b>	<b>Refurbishment and Redecoration</b>
	<ul style="list-style-type: none"> <li>• Definition</li> <li>• Factors</li> <li>• Procedure and task involved</li> <li>• Snagging list.</li> </ul>
	<b>Glossary of terms</b>

**Course Outcome**---After completion of this course the student will able to:

- CO 1. Plan their work schedule and staff job allocation.  
CO 2. Forecast and prepare departmental budget.  
CO 3. Track the purchasing and buying methods used in hotels.  
CO 4. Analyse the different type of contract services.  
CO 5. Implement the stain removal procedures.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	H						
CO3				M			

CO4			H				
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- H = Highly Related; M = Medium L = Low

<b>BHH513D</b>	<b>ACCOMMODATION OPERATIONS –II LAB.</b>	<b>CR-1(PR)</b>
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Course Objective- The objective of this course is to make students familiar with laundry operations and its handling.

<ul style="list-style-type: none"> <li>• Laundry equipment handling</li> <li>• Laundry operations</li> <li>• Handling different types of fabrics in manual &amp; mechanical laundry</li> <li>• Stain removal</li> </ul>
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Course Outcome---After completion of this course the student will able to:

CO 1.Plan the laundry linen handling

CO 2Forecast and make budget for laundry chemicals

CO3 Implement the strain removal procedures with proper chemical

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	H						
CO3				M			

- H = Highly Related; M = Medium L = Low

<b>BHH504D</b>	<b>FRONT OFFICE OPERATIONS-II</b>	<b>CR.-2</b>
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Course Objective--- This course aims to feminize students with the operational and managerial prospect of the front office department in the hotel industry.Introduction to property management system (PMS), front office accounting; planning and evaluating operations, front office budgeting, visitors tabular ledger (VTL), sales record and control of sale of room and food, settlement of bills, night audit, credit control, occupancy ratios and yield management.

S.NO.	TOPIC
	<b>PLANNING &amp; EVALUATING FRONT OFFICE OPERATIONS</b> A. Setting Room Rates (Details/Calculations thereof) - Hubbart Formula, market condition approach & Thumb Rule - Types of discounted rates – corporate, rack etc. B. Forecasting techniques C. Forecasting Room availability D. Useful forecasting data • % of walking

	<ul style="list-style-type: none"> <li>• % of overstaying</li> <li>• % of under stay</li> </ul> E. Forecast formula F. Types of forecast G. Sample forecast forms H. Factors for evaluating front office operations
2	<b>BUDGETING</b> A. Types of budget & budget cycle B. Making front office budget C. Factors affecting budget planning D. Capital & operations budget for front office E. Refining budgets, budgetary control F. Forecasting room revenue G. Advantages & Disadvantages of budgeting
3	<b>PROPERTY MANAGEMENT SYSTEM</b> A. Fidelio/ IDS/Shawman B. Amadeus

Course Outcome---After completion of this course student will be able to--

- To explore the tools and technique of management accounting for analysis to understand different business strategies.
- To be able to analyze the affairs of the business through ratios.
- To prepare cash flow statements
- To make budgets both fixed and flexible

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1			M				
CO2			L				
CO3	M						
CO4	M						

H = Highly Related; M = Medium L = Low Course Outcome---STUDENT WILL BE ABLE TO-

CO1 .Manage restaurant effectively .

CO2 knowledge about Bar Operations

CO3 knowledge about Mock tails and Cocktails.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:



<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M		L				
CO2			L				
CO3		M					
CO4		H					

H = Highly Related; M = Medium L = Low

**BHH514D**

**FRONT OFFICE OPERATIONS-II LAB.**

**CR.-1(PR)**

**COURSE OBJECTIVE-**The objective of this course is to familiarise students with cash and credit handling in front office.

1. To understand the practical aspect of PMS in the computer lab
2. To learn the opening of guest folio, posting of transaction and charges, closing of account
3. Handling credit cards
4. Foreign exchange procedures
5. Calculating occupancy ratios

**COURSE OUTCOME-** The student will able to

CO1. Handling cash transactions.

CO2. Credit transactions.

CO3. Handling foreign currency.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M		L				
CO2			L				
CO3		M					

H = Highly Related; M = Medium L = Low

**BHH505D**

**Professional Skills Development**

**Cr.2 TH.**

**Course Objectives/Course Description—**

To prepare the students towards successful campus placement

To inculcate the need and importance of acquiring employability skills

## **Unit-1**

### **Attitude Building**

Introduction and icebreaker, meaning and need for building positive attitude, Concept of attitude, positive attitude, benefits of having positive attitude, ways to acquire positive attitude

## **Unit-2**

### **Group Discussion**

Introduction and icebreaker, myths about group discussion, types of GD, do's and don'ts of group discussion, role of body language and communication in GD

## **Unit-3**

### **Personality Development**

Introduction/ Activity, meaning of Personality, Determinants of Personality, Know your Personality - Kersey's Temperament Sorter Test, Positive Thinking, How to Build Positive Self-esteem, SWOT analysis, How to handle Adversities.

## **Unit-4**

### **Interview Skills**

Introduction/icebreakers, meaning and importance, professional dress code and body language

## **Unit-5**

### **Resume Writing**

Introduction and activities need for resume writing, formats, types, and tips for creating impressive resumes, internet resume and video resume.

## **Unit-6**

### **Time Management**

Introduction and icebreaker, myths about time management, time interrupters, techniques of time management, time management matrix, importance of time management.

## **Unit-7**

### **Leadership Skills**

Icebreakers/ Activities, concept and need, types of leaders, techniques of acquiring leadership skills

## **Unit-8**

Icebreakers and activities, meaning and styles and decision making, Exercise/case study.

### **Text Books And Reference Books:**

- Khera, S, You can win.
- Covey, S, The Seven Habits of Highly Effective People,
- Covey, S, The 8th Habit: From Effectiveness to Greatness,
- Covey, S, First Things First,
- Covey, S, The Leader in Me,
- Covey, S, The SPEED of Trust

<b>BHH506D</b>	<b>Methods and Techniques of Research</b>	<b>CR 2(TH)</b>
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Research methodology will be taught in the theory class of VII semester to prepare students on how to approach the subject of research project in the VIII semester. Topics are allotted to the students in the beginning of vii th semester to prepare the students to peruse the project under guidance of the concerned faculty. Final preparation of the project will be submitted for presentation at the end of VIII semester.

<b>Unit 1</b>	<b>Introduction to Research Methodology</b>
<ul style="list-style-type: none"><li>• Meaning and objectives of research, types of research, research approaches,</li></ul>	



significance of research, research methods vs methodology, research process, criteria of good research, problem faced by researches, techniques involved in defining a problem.

## Unit 2      **Research Design**

- Meaning and need for research design, features and important concepts relating to research design, different research designs, important experimental designs.

## Unit 3      **Sample Design**

- Sample survey, implication of sample design, steps in sample design, criteria for selecting a sampling procedure, characteristics of a good sample design, different types of sample design, measurement scales, important scaling techniques.

## Unit 4      **Methods of Data Collection**

- Collection of primary data, collection through questionnaire and schedule collection of secondary data, difference in questionnaire and schedule, different methods to collect secondary data

## Unit 5      **Data Analysis Interpretation and Presentation Techniques**

- Hypothesis testing, basic concepts concerning hypothesis testing, procedure and flow diagram for hypothesis testing, test of significance, chi-square analysis, report presentation techniques.

### SIXTH SEMESTER EXAMINATION

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.		
				L	T/S	P
		<b>A. Theory</b>				
1	BHH601D	Food Production operations-III	2	2	-	-
2	BHH602D	Food & Beverage operations-III	2	2	-	-
3	BHH603D	Accommodation Management	2	2	-	-
4	BHH604D	Front Office Management	2	2	-	-
5	BHH606D	Hospitality Law and Risk Management	2	2		

		<b>B. Practical /Project</b>				
6	BHH611D	Food Production operations-III LAB.	4	-	-	8
7	BHH612D	Food & Beverage Operations-III LAB.	2	-	-	4
8	BHH613D	Accommodation Management LAB.	1	-	-	2
9	BHH614D	Front Office Management LAB.	1	-	-	2
10	BHH615D	Research Project ( Submission)	2			4
		<b>Total</b>	<b>20</b>	<b>10</b>		<b>20</b>
		<b>Total Teaching Load</b>		<b>30</b>		

L\* = Lecture      T\*=Tutorial      P\* = Practical

<b>BHH601D</b>	<b>Food Production operations-III</b>	<b>CR—2(TH)</b>
Unit 1 <b>Basic Masala</b> <ul style="list-style-type: none"> <li>• Introduction to spices</li> <li>• Role of spices in Indian cookery</li> <li>• Blending of spices</li> <li>• Different masala used in Indian cookery</li> <li>• Dry and wet masala.</li> </ul>		

**Unit 2 Introduction to Volume Cookery**

- Quantity food production
- Introduction to volume feeding
- Industrial and institutional catering
- Staff organization
- Kitchen layout
- Kitchen equipment and utensils
- Volume forecasting.

**Unit 3 Regional Indian Cuisine**

- Detail study regional cuisine
- Staple food
- Indian spices
- Main dishes of the region
- Traditional preparation methods
- Utensils and accompaniments
- Indian bread and sweetmeats.

**Unit 4 Indian Gravies**

- Composition of basic gravies
- Different types of gravies.

**Unit 5 Banquet Menus**

- Planning
- Indenting
- Costing
- Forecasting
- Pre-preparation
- Cooking techniques.

**Course Outcome**

CO1. Get an insight of quite a vast description on the culture, eating habits, preparation of popular dishes from the cuisines of India.

CO2 Understand the meaning of volume catering and the nuances of it.

CO3 Design and visit to a large scale food production kitchen.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1						L	
CO2		M					
CO3				L			
CO4							

H = Highly Related; M = Medium L = Low

**BHH611D Food Production operations-III LAB.**

**CR—4(PR)**

**Course Objectives-**

The course is designed for all students of III Semester which will surface around Indian spices, masalas, cooking methods, cooking techniques and menus. It will give a practical experience for

students to analyze and taste the flavors of certain Indian Regional cuisine with an emphasis to house flavors. It will provide students hands on compilation of menus to experiment on. This course introduces students to current culinary trends which include a variety of preparation methods. Topics include current and developing trends such as adaptation of native/regional ingredients and preparation methods into conventional cuisines. Upon completion, students should be able to demonstrate knowledge of a variety of contemporary cuisines. It also gives an insight of the various cooking methods of regional India. It distinguishes between flavours and textures.

- Preparation of gravies and commonly used Indian masala
- Regional cookery with accompaniments like chutney, Indian bread, rice and dessert preparations
- Tandoori cooking with accompaniments
- Planning elaborate Indian menus up to 100 portion according to quantity food production
- Planning Indian fast food menus according to different region (East, West, North, South)

### Course Outcome

- Learn from this course will be on fine tuning the cooking methods applied in the basic category.
- Understand flavours, textures and Course about the practical use of certain ingredients will be the main focus of this course.
- Help in understanding the pre preparation and experimenting of Indian Cuisine with various spices.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2		M					
CO3							
CO4							

H = Highly Related; M = Medium L = Low

### Reference:

1. A Taste Of India, Madhur Jaffery, Pavillion
2. Dastarkhwan-E- Awadh, Sangeeta Bhatnagar & R.K.Saxena, Harper Collins
3. Prashad, Cooking With Masters, J.Inder Singh Kalra, Allied
4. Zaika, Sonya Atal Sapru, Harper Collins
5. Punjabi Cuisine, Premjit Gills

**BHH602D**

**FOOD & BEVERAGE SERVICE OPERATIONS-III**

**CR-2(TH)**



**Unit 1                    Banquets and Buffets**

- History and types of banquets
- Formal banquets, Informal banquets
- Hierarchy of banquet department, duties & responsibilities
- Banquet sales, menus,
- Booking procedure
- Banquet formats – FP / BPO
- Banquet booking diary
- Space area requirement,
- Mise-en-place
- Duty allocation, service, table and sitting plans, toasting
- Types of buffet – breakfast, cold buffet, sit down, fork and finger
- Planning and organizing, sequence of food display
- Service, buffet check list, supplies.

**Unit 2                    Guéridon Service**

- History of guéridon
- Definition
- Advantages and disadvantages
- Types of trolleys used
- Equipment
- Types of alcohol used and their role
- Points to be considered while operations
- Factors to create impulse buying.

**Unit 3                    Planning & Operations Of Various F&B Outlets**

- Restaurants & bar - Layouts of functional area and ancillary areas
- Factors and steps in planning
- Space requirement
- Planning staff requirement
- Selecting and planning restaurant furniture & fixture
- Selection of heavy and light equipment, approximate cost.

**Unit 4                    Managing F&B Outlet**

- Supervisory skills
- Standard operating procedure
- Handling guest complaints
- Guest satisfaction
- Duty roasters for F & B outlets
- Trash management system (segregation and disposal)
- Breakage control and cost awareness of inventory items.

**Unit 5                    Bar Operations –II**

- Bar planning and designing
- Bar menus, bar formats and cards
- Bar control methods, bar licenses & bar stock
- Bar staffing, bar thefts and frauds
- Bar equipment, glassware and their measurements and uses.

- Planning and organizing lunch service and function catering
- Preparing dishes on gueridon trolley
  - Crepe suzette
  - Banane au rhum
  - Omelette au rhum
  - Steak Diane
  - Pineapple flambé

Reference:

1. Food & Beverage Service Training Manual- Sudhir Andrews
2. Food & Beverage Service – Lillicrap & Cousins
3. Professional Guide To Alcoholic Beverages- Lipinski
4. Alcoholic Beverages- Lipinski & Lipinski
5. Menu Planning – John Kivela
6. Modern Restaurant Service – John Fuller
7. Profitable Menu Planning – John Drysale



Course Objective----In this course, we look at lodging as a set of products and services that have evolved out of guest needs and preferences. We begin with the evolution of lodging to fit transportation and destination patterns and individual guest preferences. We then delineate different types of lodging properties, discussing the distinguishing characteristics of each. Emphasis is given to ensure the efficient managing and functioning of hotel housekeeping department.

1.To Identify and understand the business of rooms division department in hotels.

2.Figure out the trends in the housekeeping department in various size hotels and design specifications.

**Unit 1 Planning and Organizing**

- Area inventory list
- Frequency schedules
- Performance and Productivity standards
- Time and Motion study
- Standard operating manuals – job procedures
- Job allocation and work schedules
- Calculating staff strength and Planning duty roasters
- Budgeting- The role of executive Housekeeper, types, Importance,
- Purchasing system, controlling expenses
- Performance appraisal

**Unit 2 Flower Arrangement**

- Flower arrangements in hotels
- Equipment and material required for flower arrangement
- Conditioning of Plant material
- Styles of flower arrangements
- Principles of design as applied to flower arrangement

**Unit 3 Soft Furnishing, Windows**

- Curtains and its types
- Care and cleaning of curtains, Blinds
- Loose covers and cushions
- Care and cleaning
- Different types of windows
- Use and care of window.

**Unit 4 Energy and Water conservation in house-keeping operations, Green Environment, Air Purifier**

**Unit 5 Housekeeping Services & Facilities in institutions other than Hotels,**

**Course Outcome**---After completion of this course the student will able to:

CO 1.Plan their work schedule and staff job allocation.

CO 2Forecast and prepare departmental budget.

CO 3Track the purchasing and buying methods used in hotels.

CO4Analyse the different type of contract services.

CO5 Implement the energy and water conservation procedures.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		M					
CO2	H						
CO3				M			
CO4			H				

- H = Highly Related; M = Medium L = Low

<b>BHH613D</b>	<b>ACCOMMODATION MANAGEMENT LAB.</b>	<b>CR-1(PR)</b>
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<ul style="list-style-type: none"> <li>• Maintaining various house keeping formats</li> <li>• Flower arrangement</li> </ul>
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<b>BHH604D</b>	<b>FRONT OFFICEMANAGEMENT</b>	<b>CR.-2(TH)</b>
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Course Objective--- This course aims to feminize students with the operational and managerial prospect of the front office department in the hotel industry.

Introduction to property management system (PMS), front office accounting; planning and evaluating operations, front office budgeting, visitors tabular ledger (VTL), sales record and control of sale of room and food, settlement of bills, night audit, credit control, occupancy ratios and yield management.

**Unit 1 Yield Management**

- Introduction and concept, hotel industry application,
- Differential rates,
- Booking horizons,
- Yield management software system
- Measuring yield

**Unit 2 Accommodation Management Aspect**

- Tariff decision,
- Various approaches to room pricing,
- Special room rates,
- Forecasting room availability: forecasting data, forecast formula,
- Budgeting for operation,
- Evaluating front office operation
- Occupancy ratios

**Unit 3 Hotel Sales**

- Selling concept,
- Purpose,
- Reading customer,
- Direct sales: travel agents, tour operators, hotel booking agencies
- Reaching customers
- E Commerce

**Unit 4 Tourism**

- Introduction, Types of tourism
- Importance
- Function: transport, travel agents, tour operators, travel formalities,
- Economic impact
- Threats and obstacles to tourism – modes of travel

**Unit 5 Six Sigma**

- Inception of six sigma in hospitality
- Various tools:
  - 5-why's
  - Kaizen
  - Fish bone
  - Single point lesson
  - Visual control
  - Poka-yoke
- Concepts of:
  - Area effective teams (AETS)
  - Process effectiveness teams (PETS)

- Total quality management (TQM)

Course Outcome---After completion of this course student will be able to--

- To explore the tools and technique of management accounting for analysis to understand different business strategies.
- To be able to analyze the affairs of the business through ratios.
- To prepare cash flow statements
- To make budgets both fixed and flexible

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1			M				
CO2			L				
CO3	M						
CO4	M						

H = Highly Related; M = Medium L = Low

<b>BHH614D</b>	<b>FRONT OFFICEMANAGEMENT LAB.</b>	<b>CR.-1(PR)</b>
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- Calculation of yield management ratios
- Role play: situation handling on various accommodation aspects
- Preparation of sales letter, brochures, promotional letter
- Internet advertising, promotion & sale of accommodation product.
- Travel Agent Voucher
- Itinerary
- **PMS – Rooms Management**

#### Reference:

1. Managing Computers In Hospitality Industry by Michael casavana and Cahell
2. Front Office Operations by Colin Dix & Chris Baird
3. Hotel Front Office Management by James Bardi
4. Management Front Office Operations by Kasavana & Brooks
5. Front Office Training Manual by Sudhir Andrews
6. Managerial Accounting And Hospitality Accounting by Raymond S ScBHHidgall

<b>BHH606D</b>	<b>Hospitality Law and Risk Management</b>	<b>CR 2(TH)</b>
<b>Unit 1</b>	<b>Law Relating to Hotel-Guest Relationship</b>	

- Definition – hotel and lodging house
- Manager of a hotel
- Owner of a lodging house
- Paying guest, Premises, tenant etc.
- Refusal of accommodation
- Eviction of a guest from hotel room
- Duties, rights and responsibilities of innkeeper towards guest
- Hotel lien

#### Unit 2            **Licenses and Permits**

- Licenses and permits for hotel and catering establishments
- Procedure for obtaining, renewing licenses, suspension and termination of licenses
- Liquor licenses- Types,
- Drinking in the licensed premises
- Different types of permits

#### Unit 3            **Food Legislation**

- Definition- adulterant
- Adulterated food
- Public analyst
- Central food laboratory
- Food inspectors and their power and duties
- Procedure to be followed by food inspectors
- Report of public analyst
- Notification of food poisoning

#### Unit 4            **Industrial Employment Standing Order Act 1946**

- Industrial Employment Standing Order Act 1946- Model standing order, show cause notice, charge sheet, domestic enquiry, discharge and dismissal of employee

#### Unit 5            **Employees Organizations and Welfare**

- Factories Act- Definition – factory, manufacturing process, adult, adolescent, child, young person calendar year, week, provision regarding health, safety and welfare
- Payment of Wages Act - Definitions industrial establishments, wages, deductions allowed under the act.
- Trade Union Act- Scope, eligibility, fund, registration, rights on the part of the employer and employee

**BHH615D**

**Research Report (Submission)**

**CR 2**

### **Purpose of Project**

The project is intended to serve the student develop ability to apply multidisciplinary concepts, tools and techniques to deal with any subject related to hospitality industry. Emphasis should be placed on industry sponsored projects.



**Types of Project**

The project may be one of the following type:

- a. Comprehensive case study
- b. Inter Organizational study
- c. Field study

**Project Supervision**

Each project shall be guided by supervisor duly appointed by the department/ coordinator.

**Project Proposal (Synopsis)**

Synopsis of the Project should be prepared in consultation with the guide and submitted in the department. The synopsis should clearly state the objectives and research methodology of the proposed project to be undertaken. It should have full detail of the rationale, description of universe sampling, research instruments to be used, limitations if any and future directions for further research etc.

**Project Documentation**

Project report should be properly documented and will include Executive summary, Research design & Methodology, Literature review and analysis, conclusion and recommendations and bibliography.

**Project Submission**

Final draft of the project should be submitted in the department duly certified by the concerned guide.

**Project Presentation & Evaluation**

Formal presentation and evaluation of the project before internal and external panel constituted by the department/coordinator together with selected target audience.

**Reference:**

1. Mercantile Law- N.D. Kapoor
2. Mercantile Law- S.P. Lyengar
3. Business Law – M.C. Kuchal
4. Hotel Law – Dr. Jag Mohan Negi
5. Shops and Establishments Act.

## SEVENTH SEMESTER EXAMINATION

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.		
				L	T/S	P
		<b>A. Theory</b>				
1	BHM701B	*Professional Specialisation –I	2	2	-	-
2	BHM702B	**Professional Specialisation -II			-	-
3	BHM703B	Facility Design & Management	4	4	-	-
4	BHM706B	Methods and Techniques of Research	2	2		
5	BHM707B	Entrepreneurship Management	2	2		
6	BHM708B	Skill Development	4	2	2	
		<b>B. Practical /Project</b>				
7	BHM711B	*Professional Specialisation -1(LAB)	4	-	-	8
8	BHM712B	**Professional Specialisation -1I(LAB)				
		<b>Total</b>	<b>18</b>	<b>12</b>	<b>2</b>	<b>12</b>
		<b>Total Teaching Load</b>		<b>24</b>		

L\* = Lecture      T\*=Tutorial      P\* = Practical

\*Professional Specialisation -1(LAB) -- Food production and Food Beverage Service

\*\*Professional Specialisation -1I(LAB)- Room Division

<b>BHM701B</b>	<b>Advance Food Production (Professional Specialisation-I)</b>	<b>CR2(TH)</b>
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**Course Objectives-**To provide an in-depth knowledge of purchasing and kitchen management, and also important knowledge of hot and cold desserts

**Unit 1 Larder**

- Introduction to larder
- Definition
- Equipment used
- Layout
- Common terms used in larder
- Larder control
- Functions of larder.

**Unit 2 Charcutière**

- Introduction to charcutière
- Sausages- definition
- Types
- Types of casings
- Types of fillings
- Additives
- Binding agents and preservatives
- Forcemeat- types, Preparation and uses
- Cured Meats : Ham, Bacon, Gammon
- Galantines and ballotines- definition, preparation, uses with menu, examples and differences.
- Pates- definition, preparation, uses with menu, examples and differences.
- Mousses and mousselines- definition, preparation, uses with menu, examples and differences.

**Unit 3 Cold Sauces and Marinades**

- Chaud froid- definition
- Types and uses
- Preparation and precautions
- Aspic and Gelee- definition and uses
- Difference and preparation
- Truffle- sources, cultivation, uses and types of truffles
- Brines, cures and marinades- types, methods, preparation, uses and differences.
- Quenelles, parfaits, roulades,

**Unit 4 Frozen Desserts and Chocolates**

- Frozen desserts- types and classification
- Ice-creams- definition
- Method of preparation
- Role of stabilizers



- Over run
- Additives and preservatives used
- Chocolates- definition
- History, types, manufacturing and processing
- Tempering
- Cocoa butter
- White chocolate and its applications.

#### Unit 5              **Non- Edible Displays**

- Ice carvings
- Gum pastes
- Tallow sculptures
- Fruit and vegetable display
- Salt dough
- Pastillage
- Chocolate work.

#### **COURSE OUTCOME**

CO 1) To enable students about the managerial aspects

CO 2) To teach students about quality and Portion control.

CO 3) To master the students in particular area of culinary skill

CO4) Cold Kitchen

COe5To train the students in terms of menu planning

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1							M
CO2	L						
CO3		M					
CO4	L						
CO5		M					

H = Highly Related; M = Medium L = Low

<b>BHM711B</b>	<b>ADVANCE FOOD PRODUCTION LAB</b>	<b>CR 4(PR)</b>
i. Demonstration of basic charcutière items like pates, terriens, mousses, galantines and ballotine ii. Making of sizzlers iii. Pickles, chutneys and murrabas iv. Charcoal cooking v. Decorated cakes, sorbets, parfaits, hot and cold desserts vi. Chocolate handling and moulding vii. Demonstration of non edible displays		

#### Reference

1. The larder Chef, M.J. Leto

2. Modern cookery for teaching & trade by Philip E. Thangam
3. Professional baking by Wayne Glasslen
4. A taste of India by Madhur Jaffrey
5. Garnishes by Lyn Rutherford

<b>BHM701B</b>	<b>ADVANCE FOOD &amp; BEVERAGE (Professional Specialisation-I)</b>	<b>CR.-2 (TH)</b>
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Course Objective----The primary objective of this course is:

Get to Know the Food and Beverage Division.

Demonstrate Knowledge of Menus and Point-of-Sale Equipment

Get to Know the Job of a Banquet Setup Employee

01	<b>PLANNING &amp; OPERATING VARIOUS F&amp;B OUTLET</b> A. Physical layout of functional and ancillary areas B. Objective of a good layout C. Steps in planning D. Factors to be considered while planning E. Calculating space requirement F. Various set ups for seating G. Planning staff requirement H. Menu planning I. Constraints of menu planning J. Selecting and planning of heavy duty and light equipment K. Requirement of quantities of equipment required like crockery, Glassware, Cutlery - steel or silver etc. L. Suppliers & manufacturers M. Approximate cost N. Planning Décor, furnishing fixture etc.
02	<b>FUNCTION CATERING</b> <b>BANQUETS</b> A. History B. Types C. Organisation of Banquet department D. Duties & responsibilities E. Sales F. Booking procedure G. Banquet menus <b>BANQUET PROTOCOL</b> <ul style="list-style-type: none"> <li>• Space Area requirement</li> <li>• Table plans/arrangement</li> <li>• Misc-en-place</li> <li>• Service</li> <li>• Toast &amp; Toast procedures</li> </ul> <b>INFORMAL BANQUET</b> <ul style="list-style-type: none"> <li>• Reception</li> <li>• Cocktail parties</li> <li>• Convention</li> <li>• Seminar</li> <li>• Exhibition</li> <li>• Fashion shows</li> <li>• Trade Fair</li> <li>• Wedding</li> </ul>

	<ul style="list-style-type: none"> <li>Outdoor catering</li> </ul>
3	<b>FUNCTION CATERING      BUFFETS</b> A. Introduction B. Factors to plan buffets C. Area requirement D. Planning and organisation E. Sequence of food F. Menu planning G. Types of Buffet H. Display I. Sit down J. Fork, Finger, Cold Buffet K. Breakfast Buffets L. Equipment M. Supplies N. Check list
4	<b>GUERIDON SERVICE</b> A. History of gueridon B. Definition C. General consideration of operations D. Advantages & Dis-advantages E. Types of trolleys F. Factor to create impulse, Buying – Trolley, open kitchen G. Gueridon equipment H. Gueridon ingredients
5	<b>KITCHEN STEWARDING</b> A. Importance B. Opportunities in kitchen stewarding C. Record maintaining D. Machine used for cleaning and polishing E. Inventory

Reference Books:

- Food & Beverage Service- Lillicrap & Cousins
- Modern Restaurant Service- John Fuller
- Beverage Book- Andrew, Dunkin & Cousins
- Bar & Beverage Book- Mary Porter & Kostagris
- Alcoholic Beverages- Lipinski & Lipinski

**Course Outcome**—After doing this course the student will be able to:

CO 1 Prepare Banquet Equipment and Setups

CO 2. Take Orders and Serve Drinks in banquets and bar.

CO 3 Identification of upcoming events and conferences.

CO 4 Handle the smooth banquet operations.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M						
CO2		M					
CO3				H			
CO4	H						

- H = Highly Related; M = Medium L = Low

<b>BHM702B</b>	<b>Room Division Management (Professional Specialisation-II)</b>	<b>CR 2 TH.</b>
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### **UNIT 1 PLANNINGV HOUSEKEEPING EXPENDITURE**

- ☐ Cleaning Agents, Cleaning Equipments
- ☐ Standard Sizes of Linen, Bed and Rooms
- ☐ Staffing
- ☐ Laundry Equipments
- ☐ Types of flooring and Wall Covering

### **UNIT 2 MATERIAL PLANNING**

- ☐ Material Budget – capital Expenditure Budget, Operating Budget and Pre Operating Budget
- ☐ Inventory Control material Classification – Basic application to principles of accounting, ongoing operations.
- ☐ Pre-operating operations – Temporary storage, moving on the property, Disposition of spares.
- ☐ Material Planning – Supplies and equipments
- ☐ Housekeeping Chemicals
- ☐ Cleaning Supplies and Equipment
- ☐ Guest Supplies

### **UNIT 3 YEILD MANAGEMENT**

- ☐ Concepts and Importance
- ☐ Applicability to rooms divisions
- ☐ Capacity Management
- ☐ Discount Allocation
- ☐ Measurement of Yield
- ☐ Numerical Pertaining to Yield Management

### **UNIT 4 – ACCOMODATION STATISTICS AND YIELD MANAGEMENT**

- ☐ Occupancy Ratios
- ☐ Break Even pricing influence
- ☐ Productivity Activity
- ☐ Market Share Index
- ☐ Rev par
- ☐ Statistics

- ☐ Computing Room Availability

#### **UNIT 5 LEGAL CONCERNS FOR FRONT OFFICE OPERATIONS**

- ☐ Guest Safety
- ☐ Guest Privacy
- ☐ Guest Removal
- ☐ Guest property
- ☐ Guest Non payment
- ☐ Illness and death of a guest

<b>BHM712B</b>	<b>Room Division Management LAB. (Professional Specialisation-II)</b>	<b>CR 2 (PR)</b>
1 Identification of colour schemes 2 Study the layout and model preparation for – a. Single b. Double c. Handicap room,etc 3 Planning and designing of a Lobby (Assignment) 4 Project on floor furnishing, wall coverings, curtains. (Samples to be collected) 5 Designing a Brochure for a. A heritage Hotel b. Business Hotel c. Resort 6 Collection five different examples of Hotel Advertisement 7 Comparative study of any two MICE destinations 8 Assignments – Workout a model-marketing plan for a Five Star Hot		

<b>BHM703B</b>	<b>Facility Design&amp; Management</b>	<b>CR 4(TH)</b>
<p>Course Objective---Course will enable students to understand the role of the facility manager in working with the organization and the users of space to identify facility related needs and present them to design professionals. Students will so learn the facility managers' role in strategic planning, facilitating the organization's business plan. The course examines the scope of facility manager's position in various practice situations. The Facility manager role to an organizations strategic plan is also stressed upon. This course is designed for professionals to acquire the requisite skills for effective facilities management which provides coordinated, comprehensive, preventive maintenance and repair services for qualitative service delivery for all departmental facilities within an organization.</p>		

<b>Unit 1</b>	<b>Hotel design</b>
	<ul style="list-style-type: none"> <li>• Design consideration</li> <li>• Efficient plan</li> <li>• Good location</li> <li>• Suitable material</li> <li>• Good workmanship</li> <li>• Sound financing</li> </ul>

Unit 2	<ul style="list-style-type: none"> <li>Competent management.</li> </ul> <p><b>Facility planning</b></p> <ul style="list-style-type: none"> <li>The systematic layout planning pattern (SLP)</li> <li>Planning consideration- flow process &amp; flow diagram</li> <li>Procedure for determining space considering the guiding factors for the guest rooms / public facilities, support facilities &amp; services, hotel administration, internal roads / budget hotels / 5 stars hotels.</li> <li>Architectural consideration- difference between carpet area, plinth area and super built area, their relationships</li> <li>Reading of blue print (plumbing, electrical, ac, ventilation, FSI, public area)</li> <li>Approximate cost of construction estimate</li> <li>Approximate operating areas in budget type / 5 star type hotel</li> <li>Approximate other operating areas as per guest room</li> <li>Approximate requirement and estimation of water / electrical load / gas / ventilation.</li> </ul>
Unit 3	<p><b>Star classification of hotel</b></p> <ul style="list-style-type: none"> <li>Criteria for star classification of hotel</li> <li>Category of Hotel : Five, four, three, two, one, Heritage &amp; Apartment</li> <li>Guidelines for approval of Hotel Projects</li> <li>Format / Fees for classification</li> <li><b><i>Facilities for differently abled Guests- Introduction, Govt. rules &amp; Guidelines</i></b></li> </ul>
Unit 4	<p><b>Kitchen</b></p> <ul style="list-style-type: none"> <li>Equipment required for commercial kitchen</li> <li>Heating, gas / electrical, cooling (for various catering establishments)</li> <li>Developing specification for various kitchen Equipment,</li> <li>Planning of various supporting services, (pot wash, wet grinding, chef room, larder, store and other staff facilities).</li> </ul>
Unit 5	<p><b>Kitchen Lay Out &amp; Design</b></p> <ul style="list-style-type: none"> <li>Principles of kitchen layout &amp; design,</li> <li>areas of the various kitchens with recommended dimension</li> <li>factors that affect kitchen design, placement of Equipment, flow of work, space allocation, kitchen equipment, manufacture and selection,</li> <li>Layout of commercial kitchen (types, drawing a layout of a commercial kitchen), budgeting for kitchen equipment.</li> </ul>

Reference:

- Hospitality facilities management and design by David M. Stipanuk
- How things work- The universal encyclopedia of machines.
- The management of maintenance and engineering systems in hospitality industry by Frank D. Borsenik & Alan T. Stutts
- Hotel Facility Planning – Tarun Bansal

**Course Outcome---**

- To analyse the totality of facility management as a consolidation of exercises of different function in faulty maintenance and how these affect the quality of life in a building.
- To identify key factors that contribute to effective and efficient property maintenance practices.
- To learn about the impact on the natural resources of a community by a hotel/resort property and how 'green' management practices can contribute to the overall sustainability of the area.
- Able to identify the necessary steps required to measure the carbon footprint of hotel/resort facility and discuss how the lodging industry impacts the sustainability.

- To understand the importance of successful people management in helping to achieve the aims of built environment organizations.
- To demonstrate understanding in the historical setting of Facilities Management, and how it has grown since its creation.
- To discuss the definition, origins, nature and requirements of sustainability

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<i>Course Outcome</i>	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1			L				
CO2			M				
CO3							H
CO4	L						M
CO5						L	
CO6						M	

H = Highly Related; M = Medium L = Low

<b>BHM704B</b>	<b>Entrepreneurship Management</b>	<b>CR 2 (TH)</b>
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**Course Objective** ---This course enables the student to develop entrepreneurship abilities and understand the culture of entrepreneurship development.

**Chapter 1**

Introduction to Entrepreneurship 0 / Concept of Entrepreneurship

**Chapter 2**

Qualities & Attributes required for Entrepreneurship

**Chapter 3**

The Entrepreneurial Process 1

**Chapter 4**

Identifying the Opportunity (SWOT Analysis)

**Chapter 5**

Assessing the Market

- Information gathering techniques
- Principles of market survey
- Analysis of survey data

**Chapter 6**

Resource Mobilization

**Chapter 7**

Budgeting, Accounting & Control

- Principles of evaluation of quality control

**Chapter 8**

Preparation of a Project report

XXVII. Note : Glossary of Terms Students should be familiar with the glossary of terms

pertaining to above mentioned topics

**Reference Books**

Entrepreneurship Development - MSBTE.

Innovation & Entrepreneurship – Peter Drucker

The culture of Entrepreneurship – Berger

BHM705B

Professional Skills Development

Cr. 2 (Th.)

**Course Objectives/Course Description—**

To prepare the students towards successful campus placement

To inculcate the need and importance of acquiring employability skills

**Unit-1**

**Attitude Building**

Introduction and icebreaker, meaning and need for building positive attitude, Concept of attitude, positive attitude, benefits of having positive attitude, ways to acquire positive attitude

**Unit-2**

**Group Discussion**

Introduction and icebreaker, myths about group discussion, types of GD, do's and don'ts of group discussion, role of body language and communication in GD

**Unit-3**

**Personality Development**

Introduction/ Activity, meaning of Personality, Determinants of Personality, Know your Personality - Kersey's Temperament Sorter Test, Positive Thinking, How to Build Positive Self-esteem, SWOT analysis, How to handle Adversities.

**Unit-4**

**Interview Skills**

Introduction/icebreakers, meaning and importance, professional dress code and body language

**Unit-5**

**Resume Writing**

Introduction and activities need for resume writing, formats, types, and tips for creating impressive resumes, internet resume and video resume.

**Unit-6**

**Time Management**

Introduction and icebreaker, myths about time management, time interrupters, techniques of time management, time management matrix, importance of time management.

**Unit-7**

**Leadership Skills**

Icebreakers/ Activities, concept and need, types of leaders, techniques of acquiring leadership skills

**Unit-8**

Icebreakers and activities, meaning and styles and decision making, Exercise/case study.

**Text Books And Reference Books:**

➤ Khera, S, You can win.





- Covey, S, The Seven Habits of Highly Effective People,
- Covey, S, The 8th Habit: From Effectiveness to Greatness,
- Covey, S, First Things First,
- Covey, S, The Leader in Me,
- Covey, S, The SPEED of Trust

<b>BHM706B</b>	<b>Methods and Techniques of Research</b>	<b>CR 2(TH)</b>
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Research methodology will be taught in the theory class of VII semester to prepare students on how to approach the subject of research project in the VIII semester. Topics are allotted to the students in the beginning of VII th semester to prepare the students to peruse the project under guidance of the concerned faculty. Final preparation of the project will be submitted for presentation at the end of VIII semester.

<b>Unit 1</b>	<b>Introduction to Research Methodology</b>
	<ul style="list-style-type: none"> <li>Meaning and objectives of research, types of research, research approaches, significance of research, research methods vs methodology, research process, criteria of good research, problem faced by researches, techniques involved in defining a problem.</li> </ul>
<b>Unit 2</b>	<b>Research Design</b>
	<ul style="list-style-type: none"> <li>Meaning and need for research design, features and important concepts relating to research design, different research designs, important experimental designs.</li> </ul>
<b>Unit 3</b>	<b>Sample Design</b>
	<ul style="list-style-type: none"> <li>Sample survey, implication of sample design, steps in sample design, criteria for selecting a sampling procedure, characteristics of a good sample design, different types of sample design, measurement scales, important scaling techniques.</li> </ul>
<b>Unit 4</b>	<b>Methods of Data Collection</b>
	<ul style="list-style-type: none"> <li>Collection of primary data, collection through questionnaire and schedule collection of secondary data, difference in questionnaire and schedule, different methods to collect secondary data</li> </ul>
<b>Unit 5</b>	<b>Data Analysis Interpretation and Presentation Techniques</b>
	<ul style="list-style-type: none"> <li>Hypothesis testing, basic concepts concerning hypothesis testing, procedure and flow diagram for hypothesis testing, test of significance, chi-square analysis, report presentation techniques.</li> </ul> <p style="text-align: center;">-----*</p>

### EIGHT SEMESTER EXAMINATION

S. No.	Course Code	Course Name	Credits	Contact Hrs/Wk.		
				L	T/S	P
		<b>A. Theory</b>				
1	BHM801B	Job Training Appraisals	4		-	20 weeks
2	BHM802B	Log Book	4		-	
3	BHM803B	Job Training Report and Presentation	4		-	
4	BHM804B	Research Report (Submission)	6			
		<b>Total</b>	<b>18</b>			
		<b>Total weeks</b>				<b>20 weeks</b>

L\* = Lecture      T\*=Tutorial      P\* = Practical

<b>BHM805B</b>	<b>Research Report (Submission)</b>	<b>CR 4</b>
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### **Purpose of Project**

The project is intended to serve the student develop ability to apply multidisciplinary concepts, tools and techniques to deal with any subject related to hospitality industry. Emphasis should be placed on industry sponsored projects.

### **Types of Project**

The project may be one of the following type:

- a. Comprehensive case study
- b. Inter Organizational study
- c. Field study

### **Project Supervision**

Each project shall be guided by supervisor duly appointed by the department/ coordinator.

### **Project Proposal (Synopsis)**

Synopsis of the Project should be prepared in consultation with the guide and submitted in

the department. The synopsis should clearly state the objectives and research methodology of the proposed project to be undertaken. It should have full detail of the rationale, description of universe sampling, research instruments to be used, limitations if any and future directions for further research etc.

**Project Documentation**

Project report should be properly documented and will include Executive summary, Research design & Methodology, Literature review and analysis, conclusion and recommendations and bibliography.

**Project Submission**

Final draft of the project should be submitted in the department duly certified by the concerned guide.

**Project Presentation & Evaluation**

Formal presentation and evaluation of the project before internal and external panel constituted by the department/coordinator together with selected target audience.



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SCHOOL OF HUMANITIES AND SOCIAL SCIENCES  
DEPARTMENT OF ENGLISH

BOARD OF STUDIES : BA (HONORS) ENGLISH

ACADEMIC SESSION: 2021-22

*Ruchika Basuman*  
Head  
Department of English  
JECRC University, JAIPUR

## **Program Description**

Bachelor of Arts in English is a three-year undergraduate programme designed to prepare students to understand the use of the English language effectively by building vocabulary and introduce them to current ideas and issues. The programme offers deep insights into the world of literature and enables the students to critically appreciate major literary works. It strengthens the linguistic capabilities of the student through theoretical and practical sessions. The students are introduced to the political, social, cultural, economic and intellectual backgrounds of various periods in literary history. This opens up student vision and capability to acquire an understanding of life. After successful completion of the course, students can opt for careers like media & advertising, writing & publishing, journalism, public relations, content writing & blogging, creative writing, teaching and academia, etc.

## **Vision**

Our vision prevails in providing a perfect gateway to the new students who enter the core levels of learning, the freedom of enquiry, the pursuit of truth and care for others through teaching, scholarship and service of the highest calibre.

## **Mission**

Our mission is:

- To familiarize students with literary and aesthetic concepts.
- To inculcate Communication skills and Life skills for the holistic development of the students.
- To instill research and investigative aptitude in learners.
- To promote integrative research approach towards learning.
- To future ready our students by identifying their caliber and inclination and place them in a professional and competitive space.

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### **Programme Outcomes (POs):**

**PO1 Domain knowledge:** Apply the knowledge of domain subjects, science, computer fundamentals, and humanities & social science specialization to the solution of complex individual & social problems.

**PO2 Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

**PO3 Problem Analysis:** Stimulate into adopting an enquiring attitude towards the problems encountered, developing solutions & appreciation of the different contexts

**PO4 Design/development of solutions:** Design solutions for complex psychological, economical, political & social problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO5 Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO6 Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex activities with an understanding of the limitations.

**PO7 Environment and sustainability:** Understand the impact of the professional solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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**PO8 Ethics:** Recognize the diversity and complexity of ethical dilemmas in the real world, and educate oneself to base one's actions on responsibility, and respect for human rights

**PO9 Multidisciplinary approach:** To develop multidisciplinary perspective in reference to historical, social, psychological, economic, political & cultural context.

**PO10 Effective Communication:** Articulate ideas and perspectives, by developing and enhancing the communicative skills of listening, speaking, reading, and writing in interpersonal and interactive contexts, in print and in electronic media, for various audiences and purposes.

**PO11 Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO12 Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological change.

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## **PROGRAMME SPECIFIC OUTCOMES FOR B.A. (HONS) ENGLISH**

**PSO-1:** Demonstrate & understand: knowledge of literary traditions, British Literature, Literatures in English and translations, genres, literary movements, and authors, in classroom discussions and debates.

**PSO-2:** Critically analyze and interpret texts/characters/themes through close reading, by drawing on relevant linguistic, cultural, and historical information, scholarship, and theories.

**PSO-3:** Write focused and convincingly argued essays, in grammatically correct and appropriate English, giving evidence of students' understanding of the prescribed texts and their contexts.

**PSO-4:** Develop four Language Skills LSRW, through practice in the controlled technological environment of the Advanced Language Lab, the skills of effective listening, and clear and impactful spoken communication, for various roles, interactions and audiences.

**PSO-5:** Scope of employability and entrepreneurship in the field of Media and Journalism, Teaching, Public Relations, Human Resource, Civil Service, Creative Writing etc.

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**JECRC University**  
**School of Humanities and Social Sciences**  
**Department of English**  
**Course Structure of BA (Hons.) English**

**Course Structure**

<b>First Semester</b>								
		<b>Contact Hours</b>			<b>Credits</b>			
<b>Course Code</b>	<b>Course Name</b>	<b>L (Hrs)</b>	<b>T (Hrs)</b>	<b>P (Hrs)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core Courses</b>								
BEN001C	Modern Language and Applied Linguistics	4	1	0	4	1	0	5
BEN002C	Classical European Literature	4	1	0	4	1	0	5
BEN003C	Indian Classical Literature in Translation	4	1	0	4	1	0	5
<b>Fundamental Courses</b>								
DCA001A	Web Development	2	0	0	2	0	0	2
DCA002A	Web Development Lab	0	0	2	0	0	1	1
DCH001A	Environmental Studies	3	0	2	3	0	1	4
<b>Foundation Courses</b>								
DEN001A	Communication Skills	2	0	2	2	0	1	3
DIN001A	Culture Education - I	2	0	0	2	0	0	2
	<b>Total</b>	<b>21</b>	<b>3</b>	<b>6</b>	<b>21</b>	<b>3</b>	<b>3</b>	<b>27</b>

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Second Semester								
		Contact Hours			Credits			
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L	T	P	C
<b>Core Courses</b>								
BEN004C	British Poetry and Drama: Medieval to Renaissance	4	1	0	4	1	0	5
BEN005C	Indian Literature in English	4	1	0	4	1	0	5
BEN006C	British Poetry and Drama: Commonwealth to Enlightenment	4	1	0	4	1	0	5
<b>Discipline Specific Elective - I</b>								
BEN015C	World Literature- African Literature <b>OR</b>	4	1	0	4	1	0	5
BEN021C	Indian Literature in English Translation <b>OR</b>	4	1	0	4	1	0	5
BEN027C	Basic Concepts of Linguistics ELT and Multilingualism <b>OR</b>	4	1	0	4	1	0	5
BEN033C	Miscellaneous - Literature and Cinema	4	1	0	4	1	0	5
<b>Fundamental Courses</b>								
DCA003A	Project Management Lab	0	0	2	0	0	1	1
<b>Foundation Courses</b>								
DEN002A	Professional Skills	2	0	2	2	0	1	3
DIN002A	Culture Education - II	2	0	0	2	0	0	2
	<b>Total</b>	<b>20</b>	<b>4</b>	<b>4</b>	<b>20</b>	<b>4</b>	<b>2</b>	<b>26</b>

  
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Third Semester								
		Contact Hours			Credits			
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L	T	P	C
<b>Core Courses</b>								
BEN007C	British Poetry and Drama: Romanticism	4	1	0	4	1	0	5
BEN008C	Literature of America	4	1	0	4	1	0	5
<b>Discipline Specific Elective - II</b>								
BEN016C	World Literature- French and German Literature <b>OR</b>	4	1	0	4	1	0	5
BEN022C	Indian Literature - Literature of Migration and Diaspora <b>OR</b>	4	1	0	4	1	0	5
BEN028C	Introduction to Phonetics and Phonology <b>OR</b>	4	1	0	4	1	0	5
BEN034C	Miscellaneous - Literature of Graphics and Illustrations	4	1	0	4	1	0	5
<b>Fundamental Courses</b>								
DCA004A	Advanced Spreadsheet Lab	0	0	2	0	0	1	1
<b>Foundation Courses</b>								
DEN003A	Life Skills –I (Personality Development)	1	0	2	1	0	1	2
DIN003A	Value Education - I	1	0	0	1	0	0	1
<b>Open Electives</b>								
DEN005A	Modes of Creative Writing: Poetry, Fiction and Drama	3	0	0	3	0	0	3
DEN006A	Reading Shakespeare	3	0	0	3	0	0	3
	<b>Total</b>	<b>20</b>	<b>3</b>	<b>4</b>	<b>20</b>	<b>3</b>	<b>2</b>	<b>25</b>

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Fourth Semester								
		Contact Hours			Credits			
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L	T	P	C
<b>Core Courses</b>								
BEN009C	British Prose and Fiction - I	4	1	0	4	1	0	5
BEN0010C	British Poetry and Drama – Victorian Era	4	1	0	4	1	0	5
<b>Discipline Specific Elective - III</b>								
BEN017C	World Literature- Australian Literature <b>OR</b>	4	1	0	4	1	0	5
BEN023C	Indian Literature – Indian Women Writings <b>OR</b>	4	1	0	4	1	0	5
BEN029C	Introduction to Semantics and Pragmatics <b>OR</b>	4	1	0	4	1	0	5
BEN035C	Miscellaneous – Women Literature and Studies	4	1	0	4	1	0	5
<b>Fundamental Courses</b>								
DCA005A	Python Programming	2	0	0	2	0	0	2
DCA006A	Python Programming Lab	0	0	2	0	0	1	1
<b>Foundation Courses</b>								
DMA011A	Life Skills –II (Aptitude)	1	0	2	1	0	1	2
DIN004A	Value Education - II	1	0	0	1	0	0	1
	Research Methodology	2	1	0	2	1	0	3
	<b>Total</b>	<b>18</b>	<b>4</b>	<b>4</b>	<b>18</b>	<b>4</b>	<b>2</b>	<b>24</b>

  
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Fifth Semester								
		Contact Hours			Credits			
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L	T	P	C
<b>Core Courses</b>								
BEN0011C	British Poetry and Drama – Modern to Post Modern	4	1	0	4	1	0	5
BEN0012C	British Prose and Fiction - II	4	1	0	4	1	0	5
<b>Discipline Specific Elective - IV</b>								
BEN018C	World Literature- Asian Literature <b>OR</b>	4	1	0	4	1	0	5
BEN024C	Indian Literature – War and Partition Literature <b>OR</b>	4	1	0	4	1	0	5
BEN030C	Introduction to Morphosyntactics <b>OR</b>	4	1	0	4	1	0	5
BEN036C	Miscellaneous – Children Literature	4	1	0	4	1	0	5
<b>Discipline Specific Elective - V</b>								
BEN019C	World Literature- Canadian Literature <b>OR</b>	4	1	0	4	1	0	5
BEN025C	Indian Literature – Literature of Peripherals <b>OR</b>	4	1	0	4	1	0	5
BEN031C	Introduction to Stylistics <b>OR</b>	4	1	0	4	1	0	5
BEN037C	Miscellaneous – Life Narratives	4	1	0	4	1	0	5
<b>Open Electives</b>								
DEN007A	Reading Poetry	3	0	0	3	0	0	3
	<b>Total</b>	<b>19</b>	<b>4</b>	<b>0</b>	<b>19</b>	<b>4</b>	<b>0</b>	<b>23</b>

  
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Sixth Semester								
		Contact Hours			Credits			
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L	T	P	C
<b>Core Courses</b>								
BEN0013C	Literature of Post Colonial Era	4	1	0	4	1	0	5
BEN0014C	Dissertation - I	0	0	0	0	0	0	10
<b>Discipline Specific Elective- VI</b>								
BEN020C	World Literature- Caribbean Literature <b>OR</b>	4	1	0	4	1	0	5
BEN026C	Indian Literature – Contemporary Literature in English <b>OR</b>	4	1	0	4	1	0	5
BEN032C	Introduction to New Concepts of Linguistics <b>OR</b>	4	1	0	4	1	0	5
BEN038C	Miscellaneous – Travel and Travelogues	4	1	0	4	1	0	5
<b>Open Electives</b>								
DEN008A	Popular Literature	3	0	0	3	0	0	3
	<b>Total</b>	<b>11</b>	<b>2</b>	<b>0</b>	<b>11</b>	<b>2</b>	<b>0</b>	<b>23</b>

L = Number of Lectures hours/week  
 T = Number of Tutorial hours/week  
 P = Number of practical hours/week  
 C = Credit per paper

S No.	Course Type	No. of Papers	Color Code
1	Core Course	13+1= 14	

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2	<b>Discipline Specific Elective</b> (Out of <i>twenty four</i> papers offered students have to opt any <i>six</i> papers)	<b>24</b>	
3	<b>Foundation Courses</b>	<b>08</b>	
4	<b>Fundamental Courses</b>	<b>06</b>	
5	<b>Open Elective</b> (Students have to opt any <i>four</i> Courses out of different courses offered by different departments/schools)	<b>04</b>	
<b>Total</b>		<b>56</b>	

#### CREDIT SUMMARY

Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI	Total Credits
27	26	25	24	23	23	148

**Faculty of Humanities and Social Science**  
**Department of English**  
**BA (Hons.) English**  
**Detailed Syllabi**

#### SEMESTER I

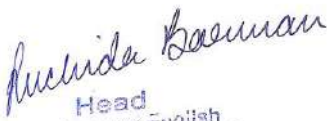
##### Core Course 1: Modern Language Usage and Applied Linguistics (BEN001C)

##### Course Objectives:

- To develop among students an insight in the process of word formation and transformation.
- To develop among students an insight into the structure of English language and develop their skills of grammatical analysis and description.
- To introduce rhetorical structures for effective writing.
- To give basic information about English sounds and phonemic transcriptions in British English (Received Pronunciation) and American English.
- To sensitize the learner about the nuances of English speech sounds, word accent, intonation and rhythm.
- To introduce core components of linguistics like phonology, morphology, syntax, semantics, discourse and pragmatics through this course.

##### Course Content

Unit 1	<b>Grammar and Usage</b>
	Basic Sentence Types
	Sentence Elements and Pattern
	Phrase Structure
Unit 2	<b>Theme Writing</b>

  
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	<b>Vocabulary</b> One Word Substitution Idioms and Phrases Synonyms and Antonyms
Unit 3	<b>Literary Appreciation</b> <b>Focus, Theme and Emphasis</b>
Unit 4	<b>Aspects of Pronunciation</b> Knowledge of Phonemic Symbols for Sounds of English Transcription of Words and Word Stress Word Structure (Elementary Morphology) Intonation

### Suggested Readings:

- A S Hornby: A Guide to Patterns and Usage
- CIEFL: Material on Morphology and Phonology from the Distance Education Dept.
- George Yule: The Study of Language, CUP
- Geoffrey Leech: English Grammar for Today (Longman)
- Praveen K Thaker: Appreciating English Poetry, A Practical Course and Anthology, Orient Longman
- Krishna Mohan and Meenakshi Rama: Effective English Communication, Tata MacGraw Hill
- V Sasikumar and PV Dhamija: Spoken English, Tata MacGraw Hill L G Alexander: Poetry and Prose Appreciation for Overseas Students, Longman.

### Course Outcomes -

**CO1** – Student will be able to analyze specific sounds & understand systematic properties of sound system of English.

**CO2** - Student will be able to identify the symbols of all the 44 English sounds, and try to produce Received Pronunciation and transcription of the sounds.

**CO3** – Student will be able to recognize and analyze the grammatical system of English and other languages.

**CO4** – Student will be able to understand the cognitive and social dimensions of first and second language acquisition.

**CO5** – Student will be able to compare and contrast languages in terms of systematic differences in phonetics, phonology, morphology, syntax, semantics, and pragmatics.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

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Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3		2	1		3				3	2	2	3		2	3	2
CO2	3	2				3				2	2	2	3		2	3	2
CO3	3	2	2			3				2	2	2	2	2	2	3	
CO4	2	3	2	2	2	3	2		1	2	3	2	2	3	2	3	2
CO5	3	2	2	2		3				3	3	2	3	2	3	3	2

### Core Course 2: Classical European Literature (BEN002C)

#### Course Objectives

- explore the historical, cultural, and philosophical origins of tragedy, comedy and Epics; engage with these genres in their distinctive form, style, and characterization, including their representation of human aspirations, foibles, grandeur, and vulnerability;
- examine representations of disability in mythology
- examine the debate over tragic fate and human suffering, and to locate its enduring influence over subsequent humanist writings;
- study the history of ideas pertaining to the human-social-divine interface in theorizations on form, narrative, social organization, and aesthetics
- study gendered explorations of human relations in classical literature in multiple genres, and to examine a woman writer's standpoint on love, war and the primacy of the gendered self.

#### Course Content

Unit 1	<b>Homer</b> The Iliad tr. E V Rieu (Harmondsworth : Penguin, 1975)
Unit 2	<b>Sophocles</b> Oedipus: The King tr. Robert Fagles in Sophocles: The Three Theban Plays (Harmondsworth: Penguin, 1984)
Unit 3	<b>Plautus</b> The Pot of Gold tr. E F Watling (Harmondsworth : Penguin, 1965) <b>Ovid</b> Selection from Metamorphoses 'Bacchus (Book III), Pyramus and Thisbe (BookIV), Philomela (Book VI) tr. Mary M Innes (Harmondsworth : Penguin, 1975)

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Unit 4	<p><b>Plato</b> 'Theory of Art'; in Republic, Book 10 (Penguin Classics, 2007) pp. 240- 48; 335-53.</p> <p><b>Aristotle</b> Poetics, translated with an introduction and notes by Malcolm Heath, (London: Penguin, 1996) chaps. 6–17, 23, 24, and 26.</p>
Unit 5	<p><b>Sappho</b> (i) 'On the Throne of Many Hues, Immortal Aphrodite'; (ii) 'Some Say an Army of Horsemen', from Lyrics 1, trans. Diane J. Rayor and Andre Lardinois, in A New Translation of Complete Works, (2014).</p> <p><b>Horace</b> 'Ars Poetica', trans. H. Rushton Fairclough (Harvard University Press, 1929). Pp 451-73</p>

### Suggested Topics and Background Prose Readings for Class Presentations Topics

The Epic  
Comedy and Tragedy in Classical  
Drama  
The Athenian City State  
Catharsis and Mimesis  
Satire  
Literary Culture in August  
Rome

### Suggested Readings:

- Aristotle, Poetics translated by Malcolm Heath (London: Penguin 1996). Chapters 6 – 17, 23, 24 and 26.
- Plato, The Republic, Book X, tr. Desmond Lee (London: Penguin 2007).
- Horace, Ars Poetica tr. H Rushton Fairclough, Horace: Satires, Epistles and Ars Poetica (Cambridge Mass: Harvard University Press 2005) pp. 451 - 73.
- Bowra, C.M. Heroic Poetry (1954).
- Ford, Andrew. The Poetry of the Past (1992).
- Lawrence, W.W. Beowulf and Epic Tradition (1928).
- Pollock, Sheldon. The Language of Gods in the World of Men (University of California Press, 2006).

### Course Outcomes:

**CO1:** The student will have a perception on the wider concepts of European history.

**CO2:** The students would be able to relate to the historical past of the literary text and connect it to the present to trace the development of forms and ideas over time.

**CO3:** The student will be able to understand how reason and emotion interact in the various situations of grandeur and suffering.

**CO4:** The student will be able to apply the humanist perspective in interactive debates on explorations of human relations in different situations.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

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Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3				2	2			3	3		3	3	3	2	
CO2	3	2				2	1		3	1			3	2	1	2	
CO3	3	2	1			2	1		3				3	2			
CO4	3	2					1	2	3	3	2	3	3	2	3	3	

### Core Course 3: Indian Classical Literature in Translation (BEN003C)

#### Course Objectives

- To determine conceptualization and representation of class, caste, gender, and disability in the context of the epic battle over rights and righteousness;
- To understand the interplay of Tamil poetics and the lifestyle of communities, negotiating ideas related to love, justice, war, governance, and conduct in private and public domains;
- study Sanskrit drama, a Nataka, and a Prakarna, to appreciate its debts to Natyashastra in their formal aspects;
- explore the central concerns of Sanskrit drama in relation to notions of the ideal ruler, lover, friend, and spouse; the presence of Buddhist edicts, the voices of the poor and the marginalised, the position of women in different social strata, the subversive use of humour, and the performative aspects of Sanskrit theatre;
- Appreciate the inter-connections between theory and practice in theatre.

#### Course Content:

Unit 1	<b>Kalidasa</b> Abhijnana Shakuntalam, tr. Chandra Rajan, in <i>Kalidasa: The Loom of Time</i> (New Delhi: Penguin, 1989)
Unit 2	<b>Vyasa</b> <ul style="list-style-type: none"> <li>• 'The Dicing' and 'Sequel to Dicing', Book 2, Sabha Parva Section XLVI-LXXII</li> <li>• 'The Temptation of Karna', Book 5, Udyog Parva, Section CXL-CXLVI.</li> <li>• 'Dhritrashtra and Gandhari's Wrath', Book 11, Section XI-XV.</li> </ul>
Unit 3	<b>Sudraka</b> <i>Mrcchakatika</i> tr. M M Ramchandra Kale (New Delhi: Motilal Banarsidass, 1962)

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Unit 4	<b>Ilango Adigal</b> <i>The Cilappatikaram</i> , Cantos 1, 2, 7, 18, 19, 20, 21, 22, 24, 26, 30, trans. R. Parthasarathy (Columbia University Press, 1993; Penguin Books India, 2004).
Unit 5	<ul style="list-style-type: none"> <li>• <b>Selections from Natyasastra</b>, (i) Chapter 6, 'The Sentiments'; (ii) Chapter 20, 'Ten Kinds of Play'; (iii) Chapter 35, 'Characteristics of the Jester', trans. Manomohan Ghosh (Calcutta: Asiatic Society of Bengal, 1951) pp.105-17; 355-74; 548-50.</li> <li>• <b>Iravati Karve</b>, 'Draupadi', in <i>Yuganta: The End of an Epoch</i> (Hyderabad: Disha, 1991) pp. 79–105.</li> <li>• <b>R. Venkatachalapathy</b>, 'Introduction', in <i>Love Stands Alone: Selections from Tamil Sangam Poetry</i> (Delhi: Penguin Classics, 2013) pp. XIII-XLI, 25, 45, 70, 186.</li> </ul>

### Suggested Topics and Background Prose Readings for Class Presentations Topics

The Indian Epic Tradition

Classical Indian Drama: Theory and Practice

Alankara and Rasa

Dharma and Heroic

### Suggested Readings:

- Bowra, C.M. *Heroic Poetry* (1954).
- Ford, Andrew. *The Poetry of the Past* (1992).
- Lawrence, W.W. *Beowulf and Epic Tradition* (1928).
- Pollock, Sheldon. *The Language of Gods in the World of Men* (University of California Press, 2006).
- Pollock, Sheldon, ed. *Literary Cultures in History: Reconstructions from South Asia* (New Delhi: OUP, 2003).
- Choudhary, Satya Dev. *Glimpses of Indian Poetics: A Survey of Sanskrit Poetics* (New Delhi: Sahitya Akademi, 2002).
- Devy, G.N., ed. *Indian Literary Criticism: Theory and Interpretation* (Hyderabad: Orient Longman, 2002).
- Gupt, Bharat. *Dramatic Concepts: Greek and Indian. A study of the Poetics and the Natyasastra* (New Delhi: D. K. Printworld, 1994).
- Jafri, S.N.H., ed. *Critical Theory: Perspectives from Asia* (Creative Books, Delhi, 2004).

### Course Outcomes:

**CO1:** Identify the ways Indian texts speak about and are influenced by history, language, caste, economics, religion, gender, regional differences, sexuality and culture.

**CO2:** The students will understand the formal structures and multiple aspects of Sanskrit drama in the tradition of Bharata's Natyashastra.

**CO3:** The students will be able to appreciate the styles and thoughts of individual poets focusing on the poetical, artistic, cultural and historical aspects of their works.

**CO4:** The student will be able to identify the socio-cultural conditions of the Indian society in the ancient times.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

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Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3				2	2	3	3	2	2		3	3	2	2	
CO2	3	3				1		3		2			3	3	2		
CO3	3	3				1	2	2	3	2	1		3	3	2	1	
CO4	3	3				1	2	2	3	1		2	3	3	1		

### **Foundation Course: Communication Skills (DEN001A)**

#### **Course Objectives**

- To enhance English language competence in reading, writing, listening and speaking.
- Switch the approach from teacher-centred to student-centred one.
- Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
- Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
- To link communication skills with the organizational behaviour.
- To inculcate skills that are very much required for employability and adjust in the professional Environment.

#### **Course Content**

UNIT 1	<b>Basics of Organizational Communication:</b> Communication: Meaning, Elements, Process, Types, Flows of Communication and Barriers to communication, basics of professional communication and professional ethics including Time-management, Respect for deadlines and corporate culture
UNIT 2	<b>Basic Writing Skills:</b> Parts of Speech, Elements of Sentences, Sentence types based on meaning and structure, Tenses, Voice, Narration
UNIT 3	<b>Composition:</b> , Basics of Letter Writing, Email Writing, Précis Writing, Essay Writing,
UNIT 4	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms
UNIT 5	<b>Professional and Technical Communication :</b> Basics of Drafting a CV/Resume, Basics of Telephonic Interview and Online Interview, Basics of PPT presentation

#### **Syllabus: Lab**

UNIT 1	<b>Basics of Organizational Communication:</b> Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time-management, Following Deadlines etc
UNIT 2	<b>Write Dialogue from the different contexts of corporate culture:</b> Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc

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UNIT 3	<b>Composition:</b> , Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting- Redrafting, Proof Reading, Editing etc
UNIT 4	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
UNIT 5	<b>Professional and Technical Communication :</b> Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making,

#### **Suggested Reading:**

- Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
- Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
- More Games Teams Play, by Leslie Bendaly, McGraw-Hill Ryerson.
- On Writing Well. William Zinsser. Harper Resource Book. 2001
- Practical English Usage. Michael Swan. OUP. 1995
- Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
- Remedial English Grammar. F.T. Wood. Macmillan. 2007
- Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
- Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006
- The BBC and British Council online resources

#### **Course Outcomes (CO):**

##### **At the end of this course students will have:**

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in different contexts.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels knowing the type of different standards of English

#### **Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	3	2	1	2	3	1	2	3	3	2	3	3	2	3	3	2
CO2	3	3	1				1		2	3	3	3	3	3	3	3	3
CO3	3	3				3		1	2	3	2	3	3	3	3	2	
CO4	3	2						2	2		3	3	3	3	2	2	3

## **SEMESTER II**

### **Core Course 4: British Poetry and Drama- Medieval to Renaissance (BEN004C)**

#### **Course Objectives-**

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- To introduce tradition of English Literature from beginning
- To cover the medieval to Renaissance literary age, within the historical, social, political and intellectual context
- To comprehend the trends and development of British poetry and drama
- To understand the theme, structure and style of British poetry and drama

### Course Content

Unit 1	<b>Geoffrey Chaucer</b> <i>The Wife of Bath's Prologue</i>
Unit 2	<b>Edmund Spenser</b> Selections from Amoretti Sonnet LXVII 'Like as huntsman...' Sonnet LXXV 'One day I wrote her name...' <b>Philip Sidney</b> Loving and Truth Not the First Sight
Unit 3	<b>John Donne</b> The Sunne Rising Batter My Heart <b>Andrew Marvel</b> To His Coy Mistress
Unit 4	<b>Christopher Marlowe</b> The Jew of Malta
Unit 5	<b>William Shakespeare</b> Macbeth

### Suggested Topics and Background Prose Readings for Class Presentations

#### Topics

Renaissance Humanism  
The Stage, Court and City  
Religious and Political Thought Ideas of Love and Marriage  
The Writer in Society

#### Readings

- Baldassare Castiglione, 'Longing for Beauty' and 'Invocation of Love', in Book 4 of The Courtier, 'Love and Beauty', tr. George Bull (Harmondsworth: Penguin, rpt. 1983) pp. 324–8, 330–5.
- John Calvin, 'Predestination and Free Will', in The Portable Renaissance Reader, ed. James Bruce Ross and Mary Martin McLaughlin (New York: Penguin Books, 1953) pp. 704–11.
- Philip Sidney, An Apology for Poetry, ed. Forrest G. Robinson (Indianapolis: Bobbs- Merrill, 1970) pp. 13–18.
- Pico Della Mirandola, excerpts from the Oration on the Dignity of Man, in The Portable Renaissance Reader, ed. James Bruce Ross and Mary Martin McLaughlin (New York: Penguin Books, 1953) pp. 476–9.

### Course Outcomes -

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**CO1** – Students will understand the history and evolution of English literature and language of medieval age through the work of writers like Chaucer

**CO2** – Students will learn the salient features of Shakespearean and other Elizabethan dramas like Marlowe

**CO3** - Students will appreciate the different forms and structure of British poetry like Shakespearean and Petrarchan sonnets

**CO4** – Students will get an insight into the socio-political and cultural environment of 14<sup>th</sup> to 18<sup>th</sup> century

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3					1	2		2	2	2	2	3		2	1	
CO2	3					1	1	2		2		1	3		2	2	
CO3	3	2	1			1		1		2	2	1	3	2	2	1	
CO4	3	3	2			1	2	1	3	2	2	3	3	3	2	2	

### **Core Course 5: Indian Literature in English (BEN005C)**

#### **Course Objectives:**

- To understand the development of Indian writing, its major movements and figures through texts across different genres
- To examine various features of Indian Literature from the perspectives of various Indian subjectivities
- To critique the regional influence on the writings in English
- To explain the socio-political and cultural shifts in the writings of different time
- To inculcate the spiritual values and self-realization through different traditions and beliefs

#### **Course Content**

<b>Unit 1</b>	<b>Mulk Raj Anand</b> <i>Coolie</i> <b>Anita Desai</b> <i>The Village by the Sea</i>
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<b>Unit 2</b>	<b>H.L.V. Derozio</b> <i>Freedom to the Slave</i> <b>Robin S. Ngangom</b> <i>The Strange Affair of Robin S. Ngangom</i> <b>Kamala Das</b> <i>Introduction</i> <b>Nissim Ezekiel</b> <i>Enterprise</i> <b>Toru Dutt</b> <i>The Lotus</i> <i>Our Casuarina Tree</i>
<b>Unit 3</b>	<b>Girish Karnad</b> <i>Naga Mandala</i> <b>Mahesh Dattani</b> <i>Tara</i>
<b>Unit 4</b>	<b>Raja Rao</b> <i>The Cow of the Barricades</i> <b>R.K. Narayan</b> <i>The Missing Mail</i>
<b>Unit 5</b>	<b>Shashi Deshpande</b> <i>Why I am a Feminist</i> <b>Mahatma Gandhi</b> <i>Autobiography or the Story of My Experiments with Truth</i> , Part I Chapters II to IX, pp. 5-26 (Ahmedabad: Navajivan Trust, 1993)

### Suggested Topics and Background Prose Readings for Class Presentations Topics

Indian English

Indian English Literature and its Readership Themes  
and Contexts of the Indian English Novel

The Aesthetics of Indian English Poetry Modernism  
in Indian English Literature

### Readings

- Bruce King, 'Introduction', in *Modern Indian Poetry in English* (New Delhi: OUP, 2nd Edn, 2005) pp. 1–10.
- Meenakshi Mukherjee, 'Divided by a Common Language', in *The Perishable Empire* (New Delhi: OUP, 2000) pp.187–203.
- Raja Rao, Foreword to *Kanthapura* (New Delhi: OUP, 1989) pp. v–vi.
- Salman Rushdie, 'Commonwealth Literature does not exist', in *Imaginary Homelands* (London: Granta Books, 1991) pp. 61–70.

### Course Outcomes –

**CO1** – Students will understand the change in theme, language and structure through the works of R K Narayan, Raja Rao, Karnad, Dattani.

**CO2** - Students will be able to relate the regional influence in the content and language of the text through the works of Karnad, Derozio, Ngangom.

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**CO3** – Students will be able to interpret the various socio-political scenarios through the texts of Raja Rao, Rushdie, Narayan, Kamala Das

**CO4** – Students will understand Indian culture and its values through the lens of colonialism, post colonialism, nationalism and globalization.

**CO5** – Students will be able to implement the holistic approach and spiritual refinement in human life.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	1		2	2	2	2	2	2	1	3	3	2	2	
CO2	3	2				2	2	2	3	2	2	2	3	2	2	2	
CO3	3	3	2			2	2	2	2	2	2	2	3	3	2	2	
CO4	3	3	1			2	1	2	3	2	2	3	3	3	2	2	2
CO5	3	3	1	1		2	2	3	3	2	2	3	3	3	2	2	

**Core Course 6: British Poetry and Drama – Commonwealth to Enlightenment (BEN006C)**

**Course Objectives:**

- To acquaint students with the Jacobean and the 18th century British poetry and drama.
- To acculturate students with new form and structure of poetry, mock epic
- To classify different kinds of poetry i.e. metaphysical poetry, cavalier poetry and heroic poetry.
- To understand features of Neoclassicism and its influence on English society.
- To apprise students with features of Restoration Comedy.

**Course Content**

Unit 1	<b>John Milton</b> Paradise Lost: Book 1
Unit 2	<b>John Webster</b> The Duchess of Malfi
Unit 3	<b>Alexander Pope</b> The Rape of the Lock

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Unit 4	<b>John Dryden</b> Mac Flecknoe
Unit 5	<b>Aphra Behn</b> The Rover

### Suggested Topics and Background Prose Readings for Class Presentations Topics

Religious and Secular Thought in the 17th Century

The Stage, the State and the Market

The Mock-epic and Satire Women in the  
17th Century

The Comedy of Manners

### Readings

- John Dryden, 'A Discourse Concerning the Origin and Progress of Satire', in The Norton Anthology of English Literature, vol. 1, 9th edn, ed. Stephen Greenblatt (New York: Norton 2012) pp. 1767–8.
- Niccolo Machiavelli, The Prince, ed. and tr. Robert M. Adams (New York: Norton, 1992) chaps. 15, 16, 18, and 25.
- The Holy Bible, Genesis, chaps. 1–4, The Gospel according to St. Luke, chaps. 1–7 and 22–4.
- Thomas Hobbes, selections from The Leviathan, pt. I (New York: Norton, 2006) chaps. 8, 11, and 13.
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### Course Outcomes

**CO1** – Student will learn about social and political nuances of the age through different literary texts.

**CO2** – Student will be able to understand the major theme of satire and its elements, irony and humour.

**CO3** – Students will be able to locate the texts within the neo-classic literary environment.

**CO4** – Student will be able to comprehend the difference between comedy and humour.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2				2	1	2	3	2	2	1	3	2	2	2	
CO2	3	2				1		1		2	2	2	3	2	2	2	
CO3	3	1				2	1			1	2	1	3	1	1	2	
CO4	3	2				1				2	2	2	3	2	2	2	

### Discipline Specific Elective - 1

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## World Literature - African Literature (BEN015C)

### Course Objectives

- To introduce students with Africa's Oral Literature, Socio-economic and Political Condition of Different Parts of Africa, Slavery, Colonization, and Apartheid.
- To enable students to understand African poetic tradition
- To understand the theme, structure and style of African drama
- Do enable students to put African novels into context and develop critical thinking.

### Course Content

<b>UNIT 1</b>	<b>Introduction:</b> Introduction to the Oral Literature of Africa, Socio-economic and Political Condition of Different Parts of Africa, Slavery, Colonization, Apartheid, <b>Mary E. Modupe Kolawole:</b> <i>"Women's Oral Genres"</i>
<b>UNIT 2</b>	<b>Wole Soyinka:</b> "Abiku" (Poem), "Telephone Conversation" (Poem) <b>Ben Okri</b> An African Elegy On Edge of Time Future
<b>UNIT 3</b>	<b>Nadine Gordimer:</b> <i>My Son's Story</i> (Drama)
<b>UNIT 4</b>	<b>Chinua Achebe:</b> <i>Things Fall Apart</i> (Novel) <b><u>Ngũgĩ wa Thiong'o</u></b> <i>Petals of Love</i>
<b>UNIT 5</b>	<b>Bessie Head</b> "The Prisoner Who Wore Glasses" (Short Story), <b>Anonymous:</b> "The Origin of Death" (Story)

### Suggested Topics:

Africa's Oral Literature  
Slavery  
Colonization  
Apartheid  
Decolonization.

### Suggested Reading:

- Achebe, Chinua. *Things Fall Apart*. William Heinemann, 1958.
- Ben Okri. "An African Elegy", "On Edge of Time Future". Poetry Foundation
- Clark, Nancy L., and William H. Worger. *South Africa: The Rise and Fall of Apartheid*. Longman, 2004.
- Gikandi, Simone. *Encyclopedia of African Literature*. London: Routledge, 2003.
- Head, Bessie. "The Prisoner Who Wore Glasses." 1973. *Hungry Flames and other Black South African Short Stories* edited by Mbulelo Vizikhungo Mzamane. Longman, 1986.
- Irele, Abiola and Simone Gikandi (eds). *The Cambridge History of African and Caribbean Literature*, 2 Vols. Cambridge: Cambridge University Press, 2004. Print.

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- Nadine Gordimer. *My Son's Story*. Picador, 1990.
- [Ngũgĩ wa Thiong'o](#). *Petals of Love*. Penguin Classics, 1977.
- Parker, John, Richard Rathbone. *African History: A Very Short Introduction*. United States: Oxford University Press, 2007.
- Wole Soyinka. "Abiku". "Telephone Conversation". Poetry Foundation

### Course Outcomes (CO):

**CO1** – Students will understand the history and evolution Africa's Oral Literature, Socio-economic and Political Condition of Different Parts of Africa, Slavery, Colonization, and Apartheid.

**CO2** – Students will learn the salient features of African poetic tradition

**CO3** - Students will appreciate the different forms, theme, structure and style of African drama

**CO4** – Students will get an insight into the socio-political and cultural environment of African region and develop critical thinking

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2			2	2	1	2	2	3	2	3	3	2	2	
CO2	3	3	2			2	3	2	3	2	3	2	3	3	2	2	
CO3	3	3	2			3	2	2	3	2	3	2	3	3	2	2	
CO4	3	3	3			2	1	1	2	3	3	3	3	3	2	2	

### Indian Writing – Indian Literature in English Translation (BEN021C)

#### Course Objectives:

- To give students a glimpse of the vast diversity of modern Indian writing in bhasha traditions.
- To show students the polyphonic tumultuous richness of the 19th and 20th centuries from peasant life in colonial India, to the mythical reality to real reality through the myriad life-worlds of the poems and stories.
- To encourage students in a deeper engagement with and a nuanced discussion of issues of history, memory, caste, gender and resistance through poems, stories and prose selections.
- To acquaint students with the concept of 'twice born' form of writing. In the process it partakes of both the native and alien perspectives and has an inherent inclination to be postcolonial

#### Course Content

Unit 1	<b>Premchand</b> 'The Shroud', in <i>Penguin Book of Classic Urdu Stories</i> , ed. M. Assaduddin <b>Ismat Chughtai</b> 'The Quilt', in <i>Lifting the Veil: Selected Writings of Ismat Chughtai</i> , tr.M. Assaduddin <b>Gurdial Singh</b> 'A Season of No Return', in <i>Earthy Tones</i> , tr. Rana
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Unit 2	<p><b>Fakir Mohan</b> Senapati 'Rebati', in <i>Oriya Stories</i>, ed. Vidya Das, tr. Kishori Charan Das (Delhi: Srishti Publishers, 2000).</p> <p><b>Rabindra Nath Tagore</b> 'Light, Oh Where is the Light?' 'When My Play was with thee', <i>Gitanjali: A New Translation with an Introduction</i> by William Radice (New Delhi: Penguin India, 2011).</p> <p><b>G.M. Muktibodh</b> 'The Void', (tr. Vinay Dharwadker) 'So Very Far', (tr. Tr. Vishnu Khare and Adil Jussawala), in <i>The Oxford Anthology of Modern Indian Poetry</i>, ed. Vinay Dharwadker and A.K. Ramanujam</p>
Unit 3	<p><b>Amrita Pritam</b> 'I Say Unto Waris Shah', (tr. N.S. Tasneem) in <i>Modern Indian Literature: An Anthology, Plays and Prose, Surveys and Poems</i>, ed. K.M. George, vol. 3</p> <p><b>Thangjam Ibopishak Singh</b> 'Dali, Hussain, or Odour of Dream, Colour of Wind' 'The Land of the Half-Humans', tr. Robin S. Ngangom, in <i>The Anthology of Contemporary Poetry from the Northeast</i>.</p>
Unit 4	<p><b>Dharamveer Bharati</b> Andha Yug, tr. Alok Bhalla.</p>
Unit 5	<p><b>Habib Tanvir</b> <i>Charandas Chor</i></p>

### Suggested Topics and Background Prose Readings for Class Presentations Topics

The Aesthetics of Translation  
Linguistic Regions and  
Languages Modernity in Indian  
Literature Caste, Gender and  
Resistance  
Questions of Forms in 20th Century Indian Literature.

### Readings

- B.R. Ambedkar, *Annihilation of Caste* in *Dr. Babasaheb Ambedkar: Writings and Speeches*, vol. 1 (Maharashtra: Education Department, Government of Maharashtra, 1979) chaps. 4, 6, and 14.
- G.N. Devy, 'Introduction', from *After Amnesia* in *The G.N. Devy Reader* (New Delhi: Orient BlackSwan, 2009) pp. 1–5.
- Namwar Singh, 'Decolonising the Indian Mind', tr. Harish Trivedi, *Indian*

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*Literature*, no. 151 (Sept./Oct. 1992).

- Sujit Mukherjee, 'A Link Literature for India', in *Translation as Discovery* (Hyderabad: Orient Longman, 1994) pp. 34–45.

### Course Outcomes

**CO1** – The student will be able to understand the polyphony of modern Indian writing in translation.

**CO2** – The student will understand the multifaceted nature of cultural identities in various Indian literature, through indigenous literary tradition.

**CO3** – The student will be able to compare literary texts produced across Indian regional landscapes to seek similarities and differences in thematic and cultural perspectives.

**CO4** – The student will be able to explore and comprehend the images in literary productions that express the sense of their society.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2		1	2	2	2	1	3	2	2	3	2	3	2	1
CO2	3	3	1			2	2	2	3	2	2	3	3	3	2	2	
CO3	3	3	1		1	2	2	1	2	2	2	2	3	3	2	2	
CO4	3	3	1			2	3	2	3	2	2	3	3	3	2	2	

### Language and Linguistics – Basic Concepts of Linguistics, ELT and Multilingualism (BEN027C)

#### Course Objectives

- To introduce the students to the scientific study of language to kindle their interest in it, if they want to take it up for further study and research at higher levels of their academic pursuit.
- To introduce the students to the different branches of Linguistics so that they can groom the concerned skills.
- To introduce the students to the concept of language change over time and space.
- To introduce students to the terms, methods and techniques of English language teaching in India.
- To introduce the students to the development that has taken place in the history of English language teaching.

#### Course Content

<b>UNIT 1</b>	<b>Unit-1</b> Introduction to Linguistics: Brief history; definition; major concepts and branches Language: Definition, nature, properties and functions of language, sub-systems of language Language and linguistic theory; traditional prescriptive grammar and descriptive Linguistics, structural linguistics and transformational-generative grammar; parametric setting and SLA; sociolinguistic analysis; history and growth of applied linguistics as a discipline
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<b>UNIT 2</b>	Branches of Linguistics: Phonetics, Phonology, Semantics, Syntax, Morphology, Pragmatics, Stylistics
<b>UNIT 3</b>	Language Change and Varieties: Language changes over time, Language changes over space, Language changes over mode of transmission, Standards in English, Varieties of English National, Regional, Social and Temporal Dialect Variation
<b>UNIT 4</b>	ELT: Concepts of ELT, CLT, ESL, EFL, ESP, Teaching Methods: Direct Method, Grammar translation Method, Audiovisual Method, Situational Method, Concepts of Bilingualism, Multilingualism, Second Language Acquisition and Second Language Learning, Mother-tongue Interference, Diglossia, Lingua Franca
<b>UNIT 5</b>	Language Acquisition/ Learning theories: B.F.Skinner, Noam Chomsky, Vygotsky, Krashen, Jean Piaget ( in detail) Acculturation Model- Schumann, Accomodation theory- Giles & Byrne, Discourse theory- Hatch, Variable Competence Model- Ellis, Universal Hypothesis- Wode, Neuro-functional Thoery- Lamendella.

#### **Suggested Reading:**

- Akmajian, A., R.A. Demers, A.K. Farmer, & R.M. Harnish 2001. Linguistics: An Introduction to Language and Communication. Cambridge, Massachusetts: The MIT Press.
- Asher, R. (ed.). 1994. Encyclopedia of Language and Linguistics. Elsevier Pargamon.
- Bauer, L. 2007. The linguistics student's handbook. Edinburgh: Edinburgh University Press.
- Bloomfield. L. 1933. Language, New York, Henry Holt. (Indian Edition, Delhi: Motilal Banarsidas).
- Bright, W. (ed.) 1992. International Encyclopedia of Linguistics. New York: Oxford University Press.
- Brown, H. D. (2000). Principles of Language Learning and Teaching (Fourth Edition). Essex: Longman.
- Bynon, T. 1977. Historical Linguistics. Cambridge, Cambridge University Press.
- Ellis, Rod (1994). The Study of Second Language Acquisition. Oxford Oxfordshire: Oxford University Press.
- Lyons, John (2003) Language and Linguistics. Cambridge University Press
- Tomasello, M. (2003). Constructing language: A usage-based theory of language acquisition. Cambridge, MA: Harvard University Press.
- Van Riemsdijk, Hank and E. Williams 1986. Introduction to the theory of grammar. Cambridge. Mass. MIT Press.

#### **Course Outcomes (CO):**

##### **At the end of this course students will have:**

**CO1:** ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

**CO2:** An ability to analyze the usage of English in different contexts.

**CO3:** An understanding of the different varieties and sociolinguistics concept related to it.

**CO4:** An ability to adapt the latest technique, method for English language learning and teaching.

#### **Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

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Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	3	2	3	3		1	3		1			3	3	2
CO2	3	3	3	2	2	3	3		1	3		2			3	3	2
CO3	3	3	3	2	2	3	3		1	3		1			3	3	3
CO4	3	2	2	3	2	3	3		1	3		1			3	3	3

### Miscellaneous – Literature and Cinematic Adaptations (BEN033C)

#### Course Objectives:

- To examine the close relationship between literature and cinema by studying the points of contact of literary and cinematic praxis
- To enable students to study cinema as a composite medium since the texts under discussion will open space for examining cinema as audio-visual articulation as adaptation/translation and as a form of (popular) culture with its own parameters of reception and its own history (movements/frameworks of study).
- To equip students in a practical sense for understanding the cinematic medium.
- To examine cinema as an art employing different time frames situations literary cultures and other media/forms to compose itself as a text.
- To stress the interdisciplinary nature of academic work by imparting skills of reading and understanding literary texts and cinematic expressions through the development of relevant critical vocabulary and perspective among students and.
- To provide a theoretical framework to strengthen the awareness about intertextuality and the convergence between the modes of literature and cinema.

#### Course Content

Unit 1	<b>James Monaco</b> 'The Language of Film: Signs and Syntax', in <i>How To Read a Film: The World of Movies, Media &amp; Multimedia</i> (New York: OUP, 2009) chap. 3, pp. 170– 249.
Unit 2	<b>William Shakespeare</b> <i>Romeo and Juliet</i> , and its adaptations: <i>Romeo &amp; Juliet</i> (1968; dir. Franco Zeffirelli, Paramount); and <i>Romeo + Juliet</i> (1996; dir. Baz Luhrmann, 20th Century Fox)

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Unit 3	<b>Bapsi Sidhwa</b> <i>Ice Candy Man</i> and its adaptation <i>Earth</i> (1998; dir. Deepa Mehta, Cracking the Earth Films Incorp.) <b>Amrita Pritam</b> <i>Pinjar: The Skeleton and Other Stories</i> , tr. Khushwant Singh (New Delhi: Tara Press, 2009) and its adaptation: <i>Pinjar</i> (2003; dir. C.P. Dwivedi, Lucky Star Entertainment)
Unit 4	<b>Ian Fleming</b> <i>From Russia with Love</i> , and its adaptation: <i>From Russia with Love</i> (1963; dir. Terence Young, Eon Productions).
Unit 5	<b>Jane Austen</b> <i>Pride and Prejudice</i> and its adaptations: BBC TV mini-series (1995), Joe Wright (2005) and Gurinder Chadha's <i>Bride and Prejudice</i> (2004)

#### Other films that may be used for class presentations:

1. William Shakespeare, *Comedy of Errors*, *Macbeth*, and *Othello* and their adaptations: *Angeer* (dir. Gulzar, 1982), *Maqbool* (dir. Vishal Bhardwaj, 2003), *Omkara* (dir. Vishal Bhardwaj, 2006) respectively.
2. *Rudaali* (dir. Kalpana Lajmi, 1993) and *Gangor* or 'Behind the Bodice' (dir. Italo Spinelli, 2010).
3. Ruskin Bond, *Juno* (dir. Shyam Benegal, 1979), *The Blue Umbrella* (dir. Vishal Bhardwaj, 2005), and *Saat Khoon Maaf* (dir. Vishal Bhardwaj, 2011).
4. E.M. Forster, *Passage to India* and its adaptation dir. David Lean (1984)

#### Suggested Topics and Background Prose Readings for Class Presentations Topics

Theories of Adaptation  
Transformation and Transposition  
Hollywood and 'Bollywood'  
The 'Two Ways of Seeing'  
Adaptation as Interpretation

#### Readings

- Linda Hutcheon, 'On the Art of Adaptation', *Daedalus*, vol. 133, (2004).
- Poonam Trivedi, 'Filmi Shakespeare', *Litfilm Quarterly*, vol. 35, issue 2, 2007.
- Thomas Leitch, 'Adaptation Studies at Crossroads', *Adaptation*, 2008, vol. 1, no. 1, pp. 63–77.
- Tony Bennett and Janet Woollacott, 'Figures of Bond', in *Popular Fiction: Technology, Ideology, Production, Reading*, ed. Tony Bennet (London and New York: Routledge, 1990).

#### Course Outcomes -

**CO1** – Student will display a working knowledge of film techniques, offering descriptive examples from films

**CO2** – Student will be able to identify and describe distinct cinematic elements pertaining to genres and directors

**CO3** – Student will be able to analyze films for their structure and meaning, using appropriate terminology

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**CO4** – Student will be able to write analytically about films using MLA guidelines.

**CO5** – Student will be able to effectively communicate ideas and critique related to the films during class and group activities.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2				3	2		2	2	3	2	3	2	2	3	
CO2	3	3	1			2	2			2	3	3	3	3	2	3	
CO3	3	3	2			2	3		2	2	2	2	3	3	2	2	
CO4	3	3		2		1		3	1	3	3	3	3	3	3	3	
CO5	3	2				1	2	3		3	3	3	3	2	3	3	

## **Foundation Course 2: Professional Skills (DEN002A)**

### **Course Objectives**

- To enhance Professional competence in reading, writing, listening and speaking.
- Switch the approach from providing information about the language to use the language.
- Minimize the Grammar Translation Method of ELT while trying to replace it with Direct Method.
- Introduce Communicative Method of ELT and focusing the teaching pedagogy on the student-centred learning rather than on the teacher-centred learning.
- Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
- Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

### **Course Content**

UNIT 1	<b>Professional Grooming and Professional Culture:</b> Basics of corporate culture, Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management
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UNIT 2	<b>Advanced Grammar:</b> Common errors related to prepositions, articles, models , Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents
UNIT 3	<b>Composition:</b> , Memo, Notice, Circular, Book Review, Research Article, Reports
UNIT 4	<b>Vocabulary Building:</b> Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms
UNIT 5	<b>Reading Comprehension:</b> Reading different types of documents including Passages, Reports, Technical Essays, Speeches, Research Articles, Newspaper articles, Interviews etc-Skimming and Scanning-Inference and Deduction,

#### Syllabus: Lab

UNIT 1	<b>Professional Grooming and Professional Culture:</b> Role plays and Activities on Dressing sense-personal hygiene, Cultural adaptability, Body language components: undesirable and desirable body language, Team-ship, Leadership, Stress and Conflict management
UNIT 2	<b>Advanced Grammar:</b> Exercise Sessions for Common errors related to prepositions, articles, models , Conditionals, Determiners etc, Punctuation, Proof-reading and Editing of Documents
UNIT 3	<b>Composition:</b> , Memo, Notice, Circular, Book Review, Research Article, Reports – Giving Assignments based on practical applications, Practice sessions on different topics
UNIT 4	<b>Vocabulary Building:</b> Words often misspelt, One Word Substitution, Phrasal Verbs, Idioms- Activities related to the appropriate use of words
UNIT 5	<b>Reading Comprehension:</b> Practice Reading Unseen Paragraphs- Finding Suitable title, Summarizing, Analyzing, Finding new words etc

#### Suggested Readings:

- Anderson, Paul. Technical Communication: A Reader Centered Approach, V Edition, Hercourt, 2003.
- Felixa Eskey. Tech Talk, University of Michigan. 2005
- Kenneth, Anderson, Tony Lynch, Joan Mac Lean. Study Speaking. New Delhi: CUP, 2008.
- Lynch, Tony. Study Listening. New Delhi: CUP, 2008.
- Marks, Jonathan. English Pronunciation in Use. New Delhi: CUP, 2007.
- Michael Swan. Practical English Usage, Oxford University Press. 2005
- Syamala, V. Effective English Communication For You (Functional Grammar, Oral and Written Communication): Emerald, 2002.
- Thampi, G. Balamohan. Meeting the World: Writings on Contemporary Issues. Pearson, 2013.

#### Course Outcomes (CO):

##### At the end of this course students will have:

CO1: Ability to design a language component or process to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

CO2: Ability to analyze the usage of English words in professional scenario.

CO3: An understanding of technical and academic articles' comprehension.

CO4: The ability to present oneself at multinational levels as per the demand of the corporate culture

#### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

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Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	2	1	2	3	1	2	3	3	2	3	3	2	3	3	2
CO2	3	3	1				1		2	3	3	3	3	3	3	3	3
CO3	3	3				3		1	2	3	2	3	3	3	3	2	
CO4	3	2						2	2		3	3	3	3	2	2	3

### SEMESTER III

#### Core Course 7: British Poetry and Drama - Romanticism (BEN007C)

##### Course Objectives:

- To acquaint students with the salient features of Romanticism and its writings.
- To provide the students with the broad idea of the social and historical contexts of British Romantic Literature.
- To understand the concept of function of poetry and simplicity and lucidity of expression of poets in romantic poetry.
- To assimilate the concept of nature and beauty in romantic poetry.
- To explore the gothic and super-natural element in romantic poetry.

##### Course Content

Unit 1	<p><b>Thomas Gray</b> Elegy Written in a Country Churchyard</p> <p><b>William Blake</b> Introduction to The Songs of Innocence The Chimney Sweeper The Tyger</p> <p><b>Robert Burns</b> Bard's Epitaph Scots Wha Hae</p>
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Unit 2	<b>William Wordsworth</b> Tintern Abbey Ode: Intimations to Immortality  <b>Samuel Taylor Coleridge</b> Kubla Khan
Unit 3	<b>Lord George Gordon</b> She Walks in Beauty The Destruction of Sennacherib Prometheus  <b>Percy Bysshe Shelley</b> Ode to the West Wind Ozymandias  <b>John Keats</b> Ode to a Nightingale To Autumn' On First Looking into Chapman's Homer
Unit 4	<b>Samuel Taylor Coleridge</b> Remorse
Unit 5	<b>Percy Bysshe Shelley</b> Cenci

### Suggested Topics and Background Prose Readings for Class Presentations Topics

Reason and Imagination

Conceptions of Nature

Literature and

Revolution

The Gothic

The Romantic Lyric

### Suggested Readings

- Jean-Jacques Rousseau, 'Preface' to *Emile or Education*, tr. Allan Bloom (Harmondsworth: Penguin, 1991).
- John Keats, 'Letter to George and Thomas Keats, 21 December 1817', and 'Letter to Richard Woodhouse, 27 October, 1818', in *Romantic Prose and Poetry*, ed. Harold Bloom and Lionel Trilling (New York: OUP, 1973) pp. 766–68, 777–8.
- Samuel Taylor Coleridge, *Biographia Literaria*, ed. George Watson (London: Everyman, 1993) chap. XIII, pp. 161–66.
- William Wordsworth, 'Preface to Lyrical Ballads', in *Romantic Prose and Poetry*, ed. Harold Bloom and Lionel Trilling (New York: OUP, 1973) pp. 594–611.

### Course Outcomes

**CO1** - Students will be able to perceive the concept of beauty and spiritual interpretation of nature in Romantic poetry.

**CO2** - Students will be able to appreciate the simplicity of theme and expression and lyric quality of romantic poetry.

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**CO3** - Students will be able to understand the coinages like willing suspension of disbelief and negative capability in the ambit of imagination in romantic literature.

**CO4** - Students would get glimpse of the presence of Gothic element in romantic literature.

**CO5** - Students will be able to separate sensuousness from sensuality from the texts of Coleridge, Keats.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1			1	2	2		2	2	1	3	3	2	2	
CO2	3	2	1			1	2	2		2	2	1	3	3	2	2	
CO3	3	3				2	1			2	2	2	3	3	2	2	
CO4	3	1				1	1			2	2		3	1	2	2	
CO5	3	3				1	2	1		2	2	2	3	3	2	2	

**Core Course 8: Literature of America (BEN008C)**

**Course Objectives:**

- To acquaint students with the wide and varied literatures of America: literature written by writers of European particularly English descent reflecting the complex nature of the society that emerged after the whites settled in America in the 17th century
- To include Utopian narrative transcendentalism and the pre- and post- Civil War literature of the 19th century
- To introduce students to the African American experience both ante-bellum and post-bellum reflected in the diversity of literary texts
- To familiarize students with native American literature which voices the angst of a people who were almost entirely wiped out by forced European settlements and
- To include modern and contemporary American literature of the 20th century.

**Course Content**

Unit 1	<b>James Fenimore Cooper</b> The Pioneers <b>Tennessee Williams</b> A Streetcar Named Desire
Unit 2	<b>Toni Morrison</b> Beloved
Unit 3	<b>F. Scott Fitzgerald</b> The Great Gatsby

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Unit 4	<b>Edgar Allan Poe</b> The Purloined Letter  <b>William Faulkner</b> Dry September  <b>Nathaniel Hawthorne</b> Rappaccini's Daughter
Unit 5	<b>Anne Bradstreet</b> The Prologue <b>Robert Frost</b> The Road Not Taken  <b>Walt Whitman</b> O Captain, My Captain <b>Emily Dickinson</b> A Bird Came Down the Walk  <b>Alexie Sherman Alexie</b> Crow Testament Evolution

### Suggested Topics and Background Prose Readings for Class Presentations Topics

The American Dream

Social Realism and the American Novel

Folklore and the American Novel

### Suggested Readings:

- Matthiessen, F.O. *American Renaissance: Art and Expression in the Age of Emerson and Whitman* (New York: Oxford University Press, 1941).
- McNeill, Helen. *Emily Dickinson* (New York: Virago/ Pantheon Pioneers, 1986).
- Parrington, Vernon L. *Main Currents in American Thought*. Vol.2 (New York; Harcourt Brace, 1927).
- Rans, Geoffrey. "Inaudible Man: The Indian in the Theory and Practice of White Fiction." *Canadian Review of American Studies VII* (1977): 104-15.
- Sundquist, Eric J. *To Wake the Nations: Race in the Making of American Literature* (Cambridge, Mass.: The Belknap Press of Harvard University, 1993).
- Tompkins, Jane. "Indians: Textualism, Morality, and the Problem of History." *Critical Inquiry 13* (1986): 101-19.

### Course Outcomes

- CO1** - Students will be able to understand the American themes of self-reliance individualism, sin and redemption were shaped through its rich and varied literature.
- CO2** – Students will gain knowledge about how multiculturalism was shaped through its rich literature.
- CO3** - Students will learn some aspects of American English usage and diction.
- CO4** - Students will gain an understanding of how society, culture and politics affect literature

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

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Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1			2	2	3	2	2	2	3	3	3	2	2	
CO2	3	2				2	2	1	2	2	2	1	3	2	2	2	
CO3	3					2	1			3	2	3	3		3	3	
CO4	3	3	2			2	2	2	3	2	2	2	3	2	2	2	

## Discipline Specific Elective- 2

### World Literature – French and German Literature (BEN016C)

#### Course Objectives

- To introduce students with Michel de Montaigne's philosophy.
- To enable students to understand French and German poetic tradition
- To develop critical thinking among students by way of reading French and German novels and short-stories.
- To provide in-depth knowledge of contemporary French and German societies.

#### Course Content

UNIT 1	<b>Michel de Montaigne</b> That to study Philosophy is to learn to die Of Fear
UNIT 2	<b>Johann Wolfgang von Goethe:</b> "Wanderer's Nightsong I", <b>Berthold Brecht:</b> "Send Me a leaf", <b>Friedrich Schiller:</b> "Archimedes and the Student"
UNIT 3	<b>Bertolt Brecht:</b> <i>Mother Courage and Her Children</i>
UNIT 4	<b>Thomas Mann:</b> <i>Death in Venice</i> <b>Victor Hugo:</b> <i>The Hunchback of Notre-Dame</i>

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UNIT 5	<b>Guy de Maupassant:</b> “The Necklace”, “Boule de Suif” (Ball of Fat) <b>Franz Kafka</b> <i>The Metamorphosis</i>
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### Suggested Topics

World War  
 Epic theatre  
 V-effect  
 Alienation  
 Existential philosophy

### Suggested Reading:

- Brecht, Bertolt. Mother Courage and Her Children. The Macmillan Anthology of Australian Literature – Ken Goodwin and Allan Lawson, Macmillan – 1990
- Guy de Maupassant. *The Complete Short Stories* (Only edition with all 226 stories). Projapoti, 2015.
- Kafka, Franz. *The Metamorphosis*. Penguin Classic, 1915.
- Mann, Thomas. *Death in Venice*. S. Fischer Verlag, 1912.
- Project Gutenberg's Berthold Brecht: “Send me a leaf”,
- Project Gutenberg's Friedrich Schiller: “Archimedes and the Student”
- Project Gutenberg's Johann Wolfgang von Goethe: “Wanderer's Nightsong I”,
- Project Gutenberg's The Essays of Montaigne, Complete, by Michel de Montaigne

### Course Outcomes (CO):

**At the end of this course students will have:**

**CO1** – In-depth understanding of Michel de Montaigne’s philosophy

**CO2** – a broader understanding of French and German poetic tradition

**CO3** - Students have in-depth understanding of socio-political and cultural environment of German society during world war.

**CO4:** varied understanding of Guy de Maupassant and Franz Kafka and their delineation with contemporary social reality.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2					1	2	3	2	2	3	3	2	2	
CO2	3	3	2			1	3	2	2	3	2	2	3	3	2	2	

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CO3	3	3	2			1	3	3	3	2	3	3	3	3	2	2	
CO4	3	3	3			2	3	3	2	3	2	3	3	3	2	2	

### **Indian Writing – Literature of Migration and Diaspora (BEN022C)**

#### **Course Objectives:**

- To provide students with preliminary knowledge on the intrinsic connection between literature and Diaspora.
- To study the concepts of Diaspora, alienation, migration, and nostalgia.
- To study narrative techniques used by Diaspora writers to express their mindscape
- To help students acquire a set of basic skills in literary communication narration and explication of diasporic practices and processes
- To enable an appreciation of the global inter-sectionalities stemming out of increased migration and cross cultural living culminating into diasporic practices
- To analyse the writings of diverse authors representing world's major diasporic communities.

#### **Course Content**

Unit 1	<b>Rohinton Mistry</b> A Fine Balance
Unit 2	<b>Chitra Banerjee Divkaruni</b> Mistress of Spices
Unit 3	<b>Easterine Kire</b> Sky is My Father: A Naga Village Remembered
Unit 4	<b>Jhumpa Lahiri</b> The Namesake
Unit 5	<b>Vikram Seth</b> Three Chinese Poets

#### **Suggested Topics and Background Prose Readings for Class Presentations**

##### **Topics**

The Diaspora  
Nostalgia New  
Medium  
Alienation

##### **Reading**

- “Cultural Configurations of Diaspora,” in Kalra, V. Kaur, R. and Hutynuk, J. (2005).
- “Introduction: The diasporic imaginary” in Mishra, V. (2008). *Literature of the Indian diaspora*. London: Routledge
- “The New Empire within Britain,” in Rushdie, S. (1991). *Imaginary Homelands*. London: Granta Books
- *Diaspora & hybridity*. London: Sage Publications.

#### **Course Outcomes**

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**CO1** – Student will have an understanding of issues of diaspora, location, history and geography in literature.

**CO2** – Student will be aware of relationship between literary texts and historical, political and cultural contexts.

**CO3** – Student will gain insight into the complex traumatic and fragmented history of South Asia which led to modern cultural imaginaries of home identity and belonging.

**CO4** – Student will be able to understand double ‘alienation’ and ‘marginalization’ in context of women diasporic writer and character.

**CO5** – Student will be able to comprehend the role and significance of memory and sense of nostalgia

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1			2	2	1	3	2	2	3	3	3	2	2	
CO2	3	3	1			2	2	1	3	2	2	3	3	3	2	2	1
CO3	3	3	3		1	2	3	2	3	2	2	3	3	3	2	2	
CO4	3	3	3		2	2	3	3	3	2	2	3	3	3	2	2	
CO5	3	3				2	1		2	2	2	2	3	3	2	2	

### **Language and Linguistics – Introduction to Phonetics and Phonology (BEN028C)**

#### **Course Objectives**

- To introduce the students to the different branches of Phonetics.
- To introduce the students to the mechanism of producing various speech-sounds.
- To introduce the students to the vowel and consonant sounds and their application in words.
- To introduce students to the paralinguistic features of stress, tone and rhythm.
- To introduce to syllables and the concepts related to phonology.

#### **Course Content**

<b>UNIT 1</b>	Introduction to Phonetics: Definition and branches. Brief sketch of articulatory, acoustic and auditory phonetics
<b>UNIT 2</b>	Speech and Sounds: Formation of speech sounds; Organs of Speech: Air stream mechanisms  Sounds formed using non-pulmonic air stream: Ejectives, implosives and clicks

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<b>UNIT 3</b>	Classification of speech sounds: Segmentals  Vowels and Consonants  Classification of consonants: Place and manner of articulation, voiceless and voiced consonants  Classification of vowels: Concept of cardinal vowels Semivowels and diphthongs Phonetic Transcription
<b>UNIT 4</b>	Formation and Classification of speech sounds: Suprasegmentals: Stress, Rhythm, and Intonation
<b>UNIT 5</b>	Phonology: Definitions of phoneme and allophones. Syllable: Types and structure of Syllable

### Suggested Reading:

- Abercrombie, D. 1967. Elements of General Phonetics. Edinburgh: Edinburgh University Press.
- Baltaxe, C.V. 1978. Foundations of Distinctive Feature Theory. Baltimore: University Park Press.
- Bloch, B. and G.L. Trager, 1950. Outline of Linguistic Analysis. Baltimore: Linguistic Society of America (2nd ed).
- Clark, J. and C. Yallop 1990. An Introduction to phonetics and phonology. Oxford: Basil Blackwell.
- Fisher-Jorgensen, G. 1975. Trends in phonological analysis. Copenhagen: Akademisk Forlag.
- Fudge, E.C. (ed.) 1973. Phonology. Harmondsworth: Penguin.
- Hyman, Larry M. 1975. Phonology: Theory and analysis. N.Y.: Holt Rinehart and
- Jensen, John T. 2004. Principles of generative phonology: An introduction. Amsterdam: John Benjamins Publishing Company.
- Joos, M. (ed.) 1968. Reading in Linguistics. Vol. 1. New York: American Council of Learned Societies.
- Ladefoged, P. 1975. A Course in Phonetics. New York: Harcourt Brace Jovanovich.
- Odden, David. 2005. Introducing phonology. Cambridge: Cambridge University Press.
- Pike, K.L. 1947. Phonemics. Ann Arbor: The University of Michigan Press.
- Rocca, Iggy and Wyn Johnson. 1999. A course in phonology. Oxford: Blackwell publishers.
- Schane, S.A. 1973. B Generative Phonology. Englewood-cliffs. N.J.: Prentice Hall.
- Trubetzkoy, N.S. 1979. Principles of phonology. Baltaxe, CAM (Trans) 1969. Berkeley: University of California Press.

### Course Outcomes (CO):

**At the end of this course students will have:**

**CO1:** An ability to pronounce better to meet desired need within realistic, Constraints such as economic, environmental, social, political, ethical, scenario

**CO2:** An ability to produce the sounds correctly.

**CO3:** An ability to discriminate between right and wrong pronunciation and their applications in the words.

**CO4:** The ability to present oneself as a good orator and good public speaker with the application of fine pronunciation skills.

**CO5:** The ability to adapt to the changing scenario wherein the standard pronunciation is very much required.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

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Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	1	2	3		1	1		1			3	3	2
CO2	3	3	3	1	1	2	3		1	1		2			3	3	3
CO3	3	3	3	2	1	1	3		1	2		2			3	3	3
CO4	3	2	2	2	1	1	3		1	1		2			3	3	3
CO5	3	2	2	1	1	1	2		2	2		2			3	3	3

### Miscellaneous – Literature of Graphics and Illustrations (BEN034C)

#### Course Objectives:

- The graphic narrative in long form is today a prominent and popular mode in visual cultures its accessibility making it often the first entry point to the world of literature for many young people.
- As a form it has been omnivorous in providing representation to both dominant hegemonic values as well as subversive ones.
- The best examples of the form work through the interconnection of art and text the intersection of drawing coloured and blank spaces proportion and pithy dialogue

#### Course Content

Unit 1	<b>McCloud Scott</b> Making Comics: Storytelling secrets of Comics, Manga and Graphic Novels (Selected Sections) <b>Ryoichi Ikegami</b> Spiderman: The Manga (Gekiga)
Unit 2	<b>Nora Kurg</b> Belonging

  
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Unit 3	<b>Amruta Patil</b> Kari (Delhi: Harper Collins, 2008)
Unit 4	<b>Srividya Natarajan and Aparajita Ninan,</b> A Gardener in the Wasteland (Delhi: Navayana, 2016)
Unit 5	<b>Saranath Banarjee</b> Corridor

### Keywords

Visual literacy  
Popular public cultures  
Visual arts  
Narrative  
Interpretation and reading

### Course Outcomes

- CO1** - provide a toolkit for them to acquire visual literacy and thus to equip them to better understand popular public cultures
- CO2** - examine how major graphic narrative comment on contemporary culture, history and mythology.
- CO3** - provide visual literacy tools through examining visual arts as extending translating and providing a new textual vocabulary to narrative including fictional and non-fictional narrative
- CO4** - provide exposure to major genres within the field such as that of the mass-circulation 'comic' book, the fictionalized autobiography/memoir biographical texts and that of fiction and provide tools for the exploration of form and genre that are sensitive to nuances of race gender caste ethnicity ableism and sexuality
- CO5** - enable students from backgrounds in subjects other than English literary studies to broaden their skill-sets in textual interpretation reading and writing about texts

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1			1	2	1		2	2		3	3	2	2	
CO2	3	3	2			1	3	2	3	2	2	2	3	3	2	2	
CO3	3	3		2		2	2		3	2	2	2	3	3	2	2	
CO4	3	3	3	1		2	3	2	2	2	2	3	3	3	2	2	
CO5	3	3	2			3	3	3	3	2	2	3	3	3	2	2	

### Foundation Course 3: Life Skills – I (DEN003A)

#### Course Objectives

- To prepare the students as per the industry demands.
- Switching to Activity and Task based Teaching modules.
- To focus on the linguistic aspects in relation to life situations.
- Facilitating the aspects of behavioral skills in language.

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- Ability to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
- Providing a deep insight into the techniques for delivering effective presentations, winning job interviews, and actively participating in various forms of group communication.

#### Course Content

UNIT 1	<ul style="list-style-type: none"> <li>• Basics of Debates / Speeches / Addressing the public / Extempore/Group Discussion</li> <li>• Basics of Narrating and describing things</li> </ul>
UNIT 2	<ul style="list-style-type: none"> <li>• Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview</li> <li>• CV/Resume Drafting and HR Interview advance theory</li> <li>• Basics of Video Interviews and Video Profiles for Job</li> </ul>
UNIT 3	<ul style="list-style-type: none"> <li>• Types of listening, advantages and disadvantages</li> </ul>
UNIT 4	<ul style="list-style-type: none"> <li>• Basics of Group Discussion, Presenting New Idea/Concept/Proposal/ Project/ Report</li> </ul>
UNIT 5	Types of personalities, Perspective towards things, ideas, views, codes, Life skills related to Multicultural environment and emotional intelligence like- Self-confidence, Self-esteem, Self-motivation, Decision making, Resourcefulness, Risk Taking, Conflict management, Stress management, Team Building etc

#### Syllabus: Lab

UNIT 1	<ul style="list-style-type: none"> <li>• Debates / Speeches / Addressing the public / Extempore/Group Discussion</li> <li>• Describing a hypothetical situation / theme / surroundings / appearance/personality traits/company/ a professional Concept/New Idea, / New Project through PPT and video aids</li> </ul>
UNIT 2	<ul style="list-style-type: none"> <li>• Telephonic Etiquette: Casual and formal Telephonic Communication, Telephonic Interview</li> <li>• CV/Resume Drafting and HR Interview practice sessions elaborating the points as per the CV and industry demand</li> <li>• Video Interviews and Video Profiles for Job-Practice session for Online Interviews</li> </ul>

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UNIT 3	<ul style="list-style-type: none"> <li>Listening to variety of audio/video conversations including interviews, news, reports, reports, GDs, dialogues from body language, logic, wit and vocabulary perspectives</li> </ul>
UNIT 4	<ul style="list-style-type: none"> <li>Group Discussion-Practice sessions, Presenting New Idea/Concept/Proposal/ Project/ Report</li> </ul>
UNIT 5	Activities on how to be a strong Personality, Motivation, Case studies for Resourcefulness and out of the box thinking, Role plays and Case studies on Risk taking, Self confidence and Self-esteem, Decision Making, Emotion Management, Cultural Adaptability, Multicultural Perspective towards things, ideas, views, codes etc

### Suggested Readings:

- A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.
- Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
- Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co.
- 101 Great Answers to the Toughest Interview Questions. Ron Fry. High Bridge Company. 1996.
- Michael Swan. Practical English Usage, Oxford University Press.
- A Communicative Grammar of English: Geoffrey Leech and Jan Svartvik. Longman, London.
- Adair J (1986) - "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
- Gulati S (2006) - "Corporate Soft Skills", New Delhi, India: Rupa& Co. The Hard Truth about Soft Skills, by Amazon Publication.

### Course Outcomes (CO):

#### At the end of this course students will have:

CO1: Ability to use appropriate language while communicating with the people ranging from personal to professional settings in order to meet the desired needs of economic, environmental, social, political, ethical fields.

CO2: Ability to learn by doing it practically in the classroom.

CO3: Ability to learn by creating an environment and adapting to the environment.

CO4: The ability to prepare the students as per the need of the Multi-cultural scenario around.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	2	1	2	3	1	2	3	3	2	3	3	2	3	3	2
CO2	3	3	1				1		2	3	3	3	3	3	3	3	3
CO3	3	3				3		1	2	3	2	3	3	3	3	2	
CO4	3	2						2	2		3	3	3	3	2	2	3

### Open Elective 1: Modes of Creative Writing -- Poetry Fiction and Drama (DEN005A)

#### Course Objectives:

- This course introduces students to Creative Writing in the three fundamental modes – poetry, fiction (short story and novel) and drama (including scripts and screen plays).
- The students will be introduced to the main tropes and figures of speech that distinguish the creative from other forms of writing.

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- The students will be able to see language as not just a means of communication but as something that can be played with and used for the expression of the whole range of human emotion and experiences.
- Within each literary mode the students will study conventional as well as contemporary expressions. This course will interest those who wish to engage with the discipline of creative writing in its varied manifestations.

### Course Content

Unit 1	<b>The Art and Craft of Writing</b> <ol style="list-style-type: none"> <li>Tropes and Figures of Speech (examples of figures of speech based on similarity/obliqueness/difference/extension/utterance and word building should be discussed and practiced in class)</li> </ol>
Unit 2	<b>Modes of Creative Writing -- Poetry and Fiction</b> <ol style="list-style-type: none"> <li>Writing to Communicate</li> <li>Writing Poetry-Definitions of Poetry/Difference between Poetry and Prose</li> <li>Form and Technique Shapes</li> <li>Dominant Forms and Modes of Poetry</li> <li>Writing Verse for children</li> <li>Writing Fiction-Differences between Fiction and Non-Fiction</li> <li>Literary and Popular Fiction</li> <li>Creating Character Plot Setting and POV</li> <li>Writing for Children</li> </ol>
Unit 3	<b>Modes of Creative Writing-Drama and Screenplay</b> <ol style="list-style-type: none"> <li>What is a Drama Concept</li> <li>Plot and Character in Drama</li> <li>Verbal and Non-verbal elements in Drama</li> <li>Contemporary Theatre in India – a brief overview</li> <li>Writing for Films --Screenplay conventions</li> <li>Scripting for Children --Theatre and Films</li> </ol>

  
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Unit 4	<b>Editing and Preparing for Publication</b> a) Editing and proof reading your manuscript b) Preparing a manuscript for Publication
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### Prescribed Text

*Creative Writing: A Beginners' Manual* by Anjana Neira Dev et al. for The Department of English University of Delhi New Delhi Pearson 2008.

### Recommended Additional Resources

*Cambridge Companion to Creative Writing* edited by David Morley and Philip Nielsen. Cambridge University Press: Cambridge 2012.

### Suggested Methods of Internal Evaluation

It is recommended that students be asked to prepare a portfolio of original writings which will include any 4 from:

- Illustrated examples using tropes and figures of speech in writing
- A Poem
- A Short Story
- A Dramatic Sequence
- Writing for Children -- a poem/short story/dramatic sequence
- A Dummy Manuscript

A poem/short story/dramatic sequence in a different form from the one used in a)/b)/c)

### Course Outcomes

**CO1** - This course will introduce students to a variety of tropes and figures of speech and sensitize them to the texture of literary language.

**CO2** - This will help them to understand the importance of reading with a view to unlocking the writers' craft.

**CO3** - The students will be introduced to the various forms of poetry fiction and drama and the wide range of possible genres within them.

**CO4** - The students will be made aware of the range of career opportunities that exist within the field of creative writing as well as within the realm of theatre and performance.

**CO5** - This course will encourage students to revise their work critically and inculcate the skills of editing and preparing their work for publication.

### Open Elective 2: Reading Shakespeare

#### Course Objectives:

- This Course intends to familiarize students with the writings of Shakespeare.
- The student will be familiarized with the tradition of Elizabethan Theatre and English (Shakespearean) Sonnets.
- The aim of this course familiarizes the student with the society of the 16<sup>th</sup> century England and its depiction in dramas of Shakespeare.

#### Course Content:

Unit 1	<b>Sonnets:</b> Sonnet 30: When to the sessions of sweet silent thought Sonnet 55: Not Marble, nor the gilded monuments
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	Sonnet 104: To me, fair friend, you never can be old
<b>Unit 2</b>	Merchant of Venice OR As You Like It
<b>Unit 3</b>	Julius Caesar
<b>Unit 4</b>	Othello

#### **Suggested Readings:**

- Stephen Greenblatt: *Will in the World: How Shakespeare became Shakespeare* (2004)
- Harold Bloom: *Shakespeare: The World as a Stage*
- A.C. Bradley: *Shakespearean Tragedy*
- Patrick Cheney ed. *The Cambridge Companion to Shakespeare's Poetry*
- Michael Dobson ed. *The Oxford Companion to Shakespeare*
- John Julius Norwich, *Shakespeare's Kings: The Great Plays and the History of England in the Middle Ages: 1337-1485*
- Samuel Taylor Coleridge, *Coleridge on Shakespeare: The text of the Lectures of 1811-12*
- Stanley Wells ed. *William Shakespeare: A Textual Companion*

#### **Course Outcomes:**

**At the end of this course the student will be able to:**

CO1: The Student will have an understanding of the Sonnet form of Poetry.

CO2: The student will gain an insight of the society of 16<sup>th</sup> century England.

CO3: The student will gain knowledge of the traditional dramatic structure of Elizabethan Age.

CO4: The students will be able to analyse different types and forms of drama.

CO5: This course will encourage the students to indulge in reading more dramas and understand the history and society of the time in which the drama is set.

## **SEMESTER IV**

### **Core Course 9: British Prose and Fiction I (BEN009C)**

#### **Course Objectives:**

- To introduce the students with the beginnings of prose writing culture in English Literature.
- To acquaint students with the growth and development of the English novel through the eighteenth and a major part of the nineteenth century,
- To introduce the students to the social and cultural contexts, and the major trends in fiction writing.
- To develop an understanding of structure and style of prose writing as being different from poetry and drama.

#### **Course Content:**

<b>Unit 1</b>	<b>Francis Bacon</b> Of Studies Of Simulation and Dissimulation
<b>Unit 2</b>	<b>Daniel Defoe</b> Robinson Crusoe
<b>Unit 3</b>	<b>Hannah More</b> Village Politics: Addressed to all the Mechanics, Journeymen and Day-Laborers in Great Britain

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<b>Unit 4</b>	<b>George Eliot</b> Silas Mariner
<b>Unit 5</b>	<b>Jonathan Swift</b> Gulliver's Travels (Book III & IV)

### **Suggested Topics and Readings for Class Presentations**

Rise of English Prose (Essays, Political Discourses)  
The English Novel  
Print Culture and Readership  
The Picaresque Novel  
Travel Fiction  
English Society and Novels

### **Suggested Readings:**

- Allen, Walter, *The English Novel*.
- Eagleton, Terry. *The English Novel: An Introduction*
- Forster, E.M. *Aspects of the Novel*.
- Leavis, F.R. *The Great Tradition*
- Watt, Ian. *The Rise of the Novel*.

### **Course Outcomes:**

**CO1:** The student will understand the capacity of prose and fiction to bring about social and cultural change.

**CO2:** The student will be able to apply the methods of textual analysis to identify the different issues depicted in any prose writing.

**CO3:** The student will acquire a broad perspective of the essays, commentaries and novel as literary genres and the relevant historical, geographical, and cultural identity-based backgrounds.

**CO4:** The student will be able to identify and understand the significance of literary forms and techniques used in shaping a text's meaning.

### **Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3	2	1			2	2	1	3	2	2	2	3	2	2	2	
<b>CO2</b>	3	3	1			1	1	1	1	2	2	2	3	3	2	2	
<b>CO3</b>	3	3	2			2	2	2	3	3	3	3	3	3	2	2	
<b>CO4</b>	3	1				2				2	2	3	3	1	2	2	

### **Core Course 10: British Poetry and Drama - Victorians (BEN010C)**

### **Course Objectives:**

- To expose the students to the literature produced in Britain in the 19th century.
- To familiarize students with the characteristics of Victorian and late Victorian period.

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- To enable students to understand the concept of marriage and sexuality, the concept of utilitarianism and its role in human life.
- To reflect on the aspects of instruction, entertainment, society, class and gender as perceived in the nineteenth century England.
- To enable students to understand the existing conflict between faith and doubt in Victorian society.

### Course Content

Unit 1	<b>Oscar Wilde</b> The Importance of Being Earnest
Unit 2	<b>George Bernard Shaw</b> The Dark Lady of the Sonnets
Unit 3	<b>Gerard Manley Hopkins</b> Pied Beauty  <b>Elizabeth Barrett Browning</b> Sonnet 43 – How do I Love Thee? Let me Count the Ways from Sonnets from the Portuguese
Unit 4	<b>Alfred Tennyson</b> The Lady of Shallot Ulysses <b>Robert Browning</b> My Last Duchess The Last Ride Together
Unit 5	<b>Matthew Arnold</b> Dover Beach <b>Christina Rossetti</b> The Goblin Market

### Suggested Topics and Background Prose Readings for Class Presentations Topics

Renaissance Humanism

The Stage, Court and

City

Religious and Political Thought

Ideas of Love and Marriage

*The Writer in Society*

### Readings

- Baldassare Castiglione, 'Longing for Beauty' and 'Invocation of Love', in Book 4 of The Courtier, 'Love and Beauty', tr. George Bull (Harmondsworth: Penguin, rpt. 1983) pp. 324–8, 330–5.
- John Calvin, 'Predestination and Free Will', in The Portable Renaissance Reader, ed. James Bruce Ross and Mary Martin McLaughlin (New York: Penguin Books, 1953) pp. 704–11.
- Philip Sidney, An Apology for Poetry, ed. Forrest G. Robinson (Indianapolis: Bobbs- Merrill, 1970) pp. 13–18.

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- Pico Della Mirandola, excerpts from the Oration on the Dignity of Man, in The Portable Renaissance Reader, ed. James Bruce Ross and Mary Martin McLaughlin (New York: Penguin Books, 1953) pp. 476–9.

### Course Outcomes

**CO1** – Students will understand the development of fiction in England from the close of the eighteenth century.

**CO2** – Students will be able to acknowledge the relationship between fiction and popular taste especially Victorian sentimentality.

**CO3** – Students will apprehend the relevant social and political contexts.

**CO4** – Students will be able to evaluate various constructions of identity, such as age, sexuality, class, and region.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
<b>CO1</b>	3					1	1			2	2	1	3		2	2	
<b>CO2</b>	3	3				1	2	2	3	2	2		3	3	2	2	
<b>CO3</b>	3	3	2			1	2	3	3	2	2	1	3	3	2	2	
<b>CO4</b>	3	3	2			2	3	2	3	2	2	2	3	3	2	2	

### Discipline Specific Elective- 3

#### World Literature – Australian Literature (BEN017C)

### Course Objectives

- To introduce students with Australian Oral and Aboriginal Literature.
- To enable students to understand Australian poetic tradition
- To make students understand the theme, structure and style of Australian drama
- Do enable students to put African novels and short-stories into context to be able to develop critical thinking.

### Course Content

UNIT 1	<b>Myths and Legends</b> The Aboriginal Song Cycle - The Djanggawul Song Cycle The Wild Colonial Boy
UNIT 2	<b>Jack Davis:</b> “Aboriginal Australia” <b>Judith Wright:</b> “Bora Ring” <b>Oodgeroo Noonuccal</b>

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	<b>We are Going</b> <b>Dorothy Hewett</b> Unanswered Love Letters
UNIT 3	<b>Ned Kelly:</b> Douglas Stuart
UNIT 4	<b>Marcus Clark:</b> For the Turn of his Natural Life <b>Ethel Turner:</b> Seven Little Australians
UNIT 5	<b>Kate Grenville:</b> "Mate" <b>Thomas Keneally:</b> "One Sunday in February 1942"

### Suggested Topics

Aboriginal literature  
 identity crisis  
 socio-cultural climes and  
 political space.

### Suggested Reading:

- Clarke, Marcus For the Term of His Natural Life Adelaide : Rigby, Seal books edition, 1970.
- Douglas Stuart. *Ned Kelly*. Angus & Robertson, 1964.
- Ethel Turner. Seven Little Australians, Ward, Lock and Bowden, 1894.
- Grenville, Kate (Summer 2000). "Mate". *Granta*. 70: 293–304.
- The Cambridge Companion to Australian Literature – Elizabeth Webby – Cambridge University Press – 2000
- The Macmillan Anthology of Australian Literature – Ken Goodwin and Allan Lawson, Macmillan – 1990

### Course Outcomes (CO):

**At the end of this course students will have:**

**CO1** – In-depth understanding of Africa's Oral and Aboriginal Literature

**CO2** – Students learn the salient features of Australian poetic tradition

**CO3** - Students have in-depth understanding of socio-political and cultural environment of Australian society.

**CO4:** An understanding of Australia's multiple identities.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

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Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3			1	1		2	2	2	2	3	3	2	2	
CO2	3	3	3			1	1	1	2	2	3	2	3	3	2	2	
CO3	3	3	3			1	1		3	2	3	3	3	3	2	2	
CO4	3	3				2	2	2	3	2	3	3	3	3	2	2	

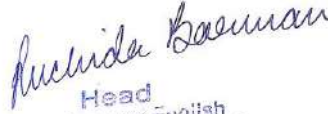
### Indian Writing – Indian Women Writing (BEN023C)

#### Course Objectives

- The aim of this course is to introduce the students to the Women writers of India and to present to them the Culture of India which they depicted in their writings.
- To understand women's literary history, women's studies and feminist criticism.
- To understand and examine closely narratives that seek to represent women femininities and by extension gendering itself
- To understand how gender norms intersect with other norms such as those of caste race religious and community to create further specific forms of privilege and oppression
- Identify how gendered practices influence and shape knowledge production and circulation of such knowledges including legal sociological and scientific discourses.

#### Course Content

UNIT 1	<b>Mahasweta Devi</b> Hazar Chaurasi Ki Ma  <b>Rama Mehta</b> Inside the Haveli
UNIT 2	<b>Shashi Deshpande</b> That Long Silence
UNIT 3	<b>Kamala Das</b> <i>My Story</i>  <b>Polie Sengupta</b> Thus Spake Shoornpankha, So Said Shakuni from <i>Women Centre Stage: The Dramatist And The Play</i>

  
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UNIT 4	<b>Anuja Chauhan</b> The Zoya Factor
UNIT 5	Selected Poems of Amrita Pritam, Sarojini Naidu, Mira Bai, Balamani Amma, Kamla Bhasin

### Suggested Topics and Readings for Class Presentations

Gender and Sex  
The Confessional Mode in Women's Writing  
Sexual Politics  
Race, Caste and Gender  
Social Reform and Women's Rights  
Culture and Tradition and Women of India

### Suggested Reading:

- Amrita Pritam. *Selected Poems of Amrita Pritam*. Dialogue Calcutta Publications
- Anuja Chauhan. *The Zoya Factor*. Westland:2016.
- Butler, Judith. *Gender Trouble* (1990).
- de Beauvoir, Simone. *The Second Sex* (1949).
- Freidan, Betty. *The Feminine Mystique* (1963).
- Kamala Das. *My Story*. Harper Collins:2009.
- Manjula Padmanabhan. *Laughter and Blood: Performance Pieces*. Hachette India:2020
- Polie Sengupta. *Women Centre Stage: The Dramatist And The Play*. Routledge:2010
- Sudhir Madhpati. *The Theme of Quest for Identity in Rama Mehta's Inside the Haveli*. Two Day National Seminar on Postcolonial Indian English Literature, August 2020.
- Tharu, Susie and K.S. Lalita, eds. "Introduction" *Women Writing in India (New Delhi: O.U.P., 1993)*

### Course Outcomes

**CO1** - Students will be able to understand gender equality and women's rights.

**CO2** - Students will learn about the revolutionary changes that occurred due to women empowerment.

**CO3** - Students will be acquainted with the suppression and oppression a woman faces in a society.

**CO4** - Students will learn about problems women face within different cultures and political boundaries.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3			2	3	2	2	2	2	3	3	2	2	2	
CO2	3	3				2	3	2	2	2	2	3	3	3	2	2	

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CO3	3	3	3			2	3	3	2	2	2	3	3	3	2	2	
CO4	3	3	3		2	2	3	3	2	2	2	3	3	3	2	2	

### **Language and Linguistics – Introduction to Semantics and Pragmatics (BEN029C)**

#### **Course Objectives**

- To introduce the students to the basic concepts of semantics.
- To introduce the students to the analysis of word formation.
- To introduce the concept of the change of meaning in semantics.
- To introduce students to the concept of language use in different situations.
- To introduce the students to the concept of language change as per different genders, regions, nationalities etc.

#### **Course Content**

UNIT 1	Basic distinctions: Propositions. Lexical semantics vs. function words. Notations for coding meaning contrasts Kinds of semantic entities: predicates, arguments, quantifiers, connectives. Valence, Thematic roles.
UNIT 2	Basic tools for lexical analysis: Anomaly, contradiction, synonymy, antonymy, Fields. Hierarchies: hypernyms and hyponyms, meronyms (parts and wholes), Scales and gradability, Ambiguity and vagueness, Kinds of nouns, Kinds of verbs: acts – events – states, Polysemy and homonymy, Etymology.
UNIT 3	Semantic change: Dictionaries and Etymology, Grammaticalization, Markedness, Center / periphery (a.k.a. unmarked / marked), Iconicity, Immediacy. Paths. Conceptual spaces, Squishes and non-discrete linguistics, Freezes. Sounding, metaphoring and unmetaphoring
UNIT 4	Pragmatics– How we use language: Speech acts, The performative hypothesis, Derived force rules, Pragmantax, Information flow, Functional sentence perspective., Topic continuity, Pragmatic presupposition, The architecture of emphasis, Cleft and pseudo cleft sentences, Left and right dislocation
UNIT 5	Interpersonal relations: Politeness, Gender, Robin Lakoff on Women's language, Labov on African-American English

#### **Suggested Reading:**

- Aitchison, J. 1987. Words in the Mind. Oxford: Basil Blackwell.
- Akmajian, A ; Demers, R.A.; Farmer, A.K. and Harnish, R.M. (2001):Linguistics: An Introduction to Language and Communication. MIT, Cambridge, USA
- Blake, Barry J. 2008. All About Language. Oxford University Press, Oxford.
- Fromkin V. and R. Rodman. 1974. An Introduction (Language. New York: Holt, Rinehart and Winston.
- Hockett, C.F. 1958. A Course in Modern Linguistics. New York: Macmillan.
- Leech G N. (1983) . Principles of Pragmatics. London: Longman.
- Levinson S. (1983) . Pragmatics. Cambridge, CUP.
- Lyons, John (2003) Language and Linguistics. Cambridge University Press
- O'Grady, W; Dobrovolsky, M. and Aronoff, M. 2004. Contemporary Linguistics: An Introduction.5th Edition. New York: St. Martin's Press.

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- Palmer, F. R. (1976) . Semantics : A New Outline Cambridge, CUP.
- Prakasam, V. & Abbi Anvita. (1985) . A Semantic Theories and Language Teaching. New Delhi, Allied Publishers.
- Radford , A.; Atkinson, M.; Britain, D.; Clashen, H. and Spencer, A. 2002. Linguistics: An Introduction. Cambridge University Press, Cambridge
- Yule, G. 1996. The Study of Language(2nd edition) Cambridge: Cambridge University Press.
- Thomas, G. (1998). Meaning in Interaction, London: Longman.

### Course Outcomes (CO):

**At the end of this course students will have:**

**CO1:** An ability to understand the concept of meaning formation and change process.

**CO2:** An ability to analyze the usage of English words and the change of meaning.

**CO3:** An understanding of how the meaning changes over time.

**CO4:** The ability to use language in different realistic, Constraints such as economic, environmental, social, political, ethical, scenario.

**CO5:** An ability to understand meaning variations in terms of different genders, nationalities, regions etc

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	1	2	3		2	1		2			3	3	3
CO2	3	3	3	1	1	2	3		1	1		2			3	3	3
CO3	3	3	3	2	1	1	3		2	2		2			3	3	3
CO4	3	3	3	2	2	2	3		3	2		2			3	3	3
CO5	3	3	3	2	2	1	2		2	2		2			3	3	3

### Miscellaneous – Women Literature and Studies (BEN035C)

#### Course Objectives:

- To understand different forms of literature: poetry, fiction, short fiction and critical writings
- To understand women's literary history, women's studies and feminist criticism.
- To understand and examine closely narratives that seek to represent women femininities and by extension gendering itself
- To understand how gender norms intersect with other norms such as those of caste race religious and community to create further specific forms of privilege and oppression
- Identify how gendered practices influence and shape knowledge production and circulation of such knowledges including legal sociological and scientific discourses.

#### Course Content

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Unit 1	<b>Emily Dickinson</b> I cannot live with you I'm wife; I've finished that  <b>Sylvia Plath</b> Daddy Lady Lazarus  <b>Eunice De Souza</b> Advice to Women Bequest
Unit 2	<b>Alice Walker</b> The Color Purple
Unit 3	<b>Charlotte Perkins Gilman</b> The Yellow Wallpaper <b>Katherine Mansfield</b> Bliss
Unit 4	<b>Mahashweta Devi</b> Draupadi, tr. Gayatri Chakravorty Spivak (Calcutta: Seagull, 2002)  <b>Mary Wollstonecraft</b> A Vindication of the Rights of Woman (New York: Norton, 1988) chap. 1, pp. 11–19; chap. 2, pp. 19–38.
Unit 5	<b>Kamala Markandya</b> Nectar in Sieve  <b>Rassundari Debi</b> Excerpts from Amar Jiban in Susie Tharu and K. Lalita, eds. Women's Writing in India, vol. 1 (New Delhi: OUP, 1989)

### Suggested Topics and Background Prose Readings for Class Presentations Topics

The Confessional Mode in Women's Writing

Sexual Politics

Race, Caste and Gender

Social Reform and Women's Rights

### Readings

- Hector St John Crevecoeur, 'What is an American', (Letter III) in Letters from an American Farmer (Harmondsworth: Penguin, 1982) pp. 66–105.
- Frederick Douglass, A Narrative of the life of Frederick Douglass (Harmondsworth: Penguin, 1982) chaps. 1–7, pp. 47–87.
- Henry David Thoreau, 'Battle of the Ants' excerpt from 'Brute Neighbours', in Walden (Oxford: OUP, 1997) chap. 12.
- Ralph Waldo Emerson, 'Self Reliance', in The Selected Writings of Ralph Waldo Emerson, ed. with a biographical introduction by Brooks Atkinson (New York: The Modern Library, 1964).

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- Toni Morrison, 'Romancing the Shadow', in *Playing in the Dark: Whiteness and Literary Imagination* (London: Picador, 1993) pp. 29–39.

### Course Outcomes

**CO1** - Students will be able to understand gender equality and women's rights.

**CO2** - Students will learn about the revolutionary changes that occurred due to women empowerment.

**CO3** - Students will be acquainted with the suppression and oppression a woman faces in a society.

**CO4** - Students will learn about problems women faces within different cultures and political boundaries.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3			2	3	2	2	2	2	3	3	2	2	2	
CO2	3	3				2	3	2	2	2	2	3	3	3	2	2	
CO3	3	3	3			2	3	3	2	2	2	3	3	3	2	2	
CO4	3	3	3		2	2	3	3	2	2	2	3	3	3	2	2	

## SEMESTER V

### Core Course 11: British Poetry and Drama – Modern to Post Modern (BEN011C)

#### Course Objectives:

- To familiarize the students with the new literature of Britain in the early decades of 20th century.
- To analyze how issues such as politics, history, ethnicity, geography, religion, class and gender have been explored in the 20th century British Literature.
- To understand the literary criticism and innovative techniques introduced by the writers of 20th century.
- To analyse the inter-relationships of form, content and style in the 20th century.
- To consider a number of theoretical models which have been applied to contemporary poetry.

#### Course Content

Unit 1	<b>Samuel Beckett</b> Waiting for Godot
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Unit 2	<b>Harold Pinter</b> The Birthday Party
Unit 3	<b>Arnold Wesker</b> The Kitchen
Unit 4	<b>W B Yeats</b> Leda and the Swan No Second Troy
Unit 5	<b>T S Eliot</b> The Love Song of J Alfred Prufrock Sweeney among The Nightingales The Hollow Men  <b>Philip Larkin</b> The Grass  <b>Ted Hughes</b> The Casualty  <b>W H Auden</b> Musee Dex Beux Arts The Unknown Citizen

### **Suggested Topics and Background Prose Readings for Class Presentations Topics**

Modernism, Post-modernism and non-European Cultures

The Women's Movement in the Early 20th Century

Psychoanalysis and the Stream of Consciousness

The Uses of Myth

The Avant Garde

### **Suggested Readings:**

- Ashcroft, Bill et al. *The Empire Writes Back*.
- Bigsby, C.W.E., *Contemporary English Drama*.
- Bradbury, Malcolm. *Modernism*.
- Esslin, Martin, *The Theatre of the Absurd*.
- Hamilton, Ian. *The Oxford Companion to Twentieth-Century Poetry in English*.
- Sigmund Freud, 'Theory of Dreams', 'Oedipus Complex', and 'The Structure of the Unconscious', in *The Modern Tradition*, ed. Richard Ellman et. al. (Oxford: OUP, 1965) pp. 571, 578–80, 559–63.
- Styan, J.L., *Modern Drama in Theory and Practice* (Cambridge University Press, 1983).
- T.S. Eliot, 'Tradition and the Individual Talent', in *Norton Anthology of English Literature*, 8th edn, vol. 2, ed. Stephen Greenblatt (New York: Norton, 2006) pp. 2319–25.
- Welch, Robert, *The Abbey Theatre 1899-1999*.
- Williams, Raymond. *Drama from Ibsen to Brecht*.
- Worth, Katharine J. *Revolutions in Modern English Drama*.

### **Course Outcomes**

**CO1** - To recognize the significance of the cultural, religious, social and historical contexts in which texts are produced and comment on the linguistic diversity they contain.

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**CO2** – Students will be able to understand the new techniques i.e. Psycho analysis and stream of consciousness.

**CO3** - Students will be acquainted with the various aspects of women's movement along with the different causes contributed to the rise of such movement.

**CO4** - To identify and use a number of theoretical models that has been applied to contemporary poetic texts

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2			2	2	2	3	2	2	3	3	3	2	2	
CO2	3	2				2	1	1	2	2	2	1	3	2	2	2	
CO3	3	3	3			2	3	2	2	2	2	3	3	3	2	2	
CO4	3	2				2		1		2	2	1	3	2	2	2	

### **Core Course 12: British Prose and Fiction II (BEN012C)**

#### **Course Objectives:**

- To understand how fiction records and alters social and cultural realities.
- To understand the strategies of narrative, theme and image that fiction uses to take forward this task.
- Get a wide exposure of eminent writers like Jane Austen, Emily Bronte, Charles Lamb, William Hazlitt and Charles Dickens and Virginia Woolf's famous description of Shakespeare's sister. Their unique styles of writing and imagination help to enhance their creative writing skills.
- Conceptualize the Genre of Novel and its types viz. Allegorical, Gothic, Historical, Epistolary, Picaresque, and Psychological.
- Become well acquainted with the literary genre of Novel, Non-Fiction, Essays and Short Story and literary devices of allegory and metaphor, satire, and stream of consciousness technique

#### **Course Content**

Unit 1	<b>Jane Austen</b> Pride and Prejudice
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Unit 2	<b>Emily Bronte</b> Wuthering Heights
Unit 3	<b>Charles Lamb</b> Essays of Elia [Any two]  <b>William Hazlitt</b> On Posthumous Fame – Whether Shakespeare was in love of it. On the Literary Character
Unit 4	<b>D H Lawrence</b> Love Among the Haystacks  <b>Thomas Hardy</b> Life's Little Ironies [Any Two Stories]
Unit 5	<b>Virginia Woolf</b> A Room of One's Own <b>Charles Dickens</b> Great Expectations

#### **Suggested Topics and Readings for Class Presentations:**

Women in English Society in the Nineteenth Century

Psychoanalysis

Industrialization

Memory and Present

Matrimony in English Culture

#### **Suggested Readings:**

- Booth, Wayne C. *The Rhetoric of Fiction*.
- Chakrabarty, Dipesh, *Provincialising Europe*.
- Ford, Boris, General Editor. *From Dickens to Hardy, Pelican History of English Literature*, Vol. VI.
- Frazer, G.S. *The Modern Writer and His World* (Pelican, 1964).
- James, Henry. "The Art of Fiction".
- M. Kirkham, *Jane Austen, Feminism and Fiction* (Brighton, 1983)
- Raymond Williams, 'Introduction', in *The English Novel from Dickens to Lawrence* (London: Hogarth Press, 1984) pp. 9–27.
- Rich, Adrienne. *A Human Eye: Essays on Art in Society*, 1997-2008.
- *The Cambridge Companion to Modernism*. Ed. Michael Levenson (Cambridge: CUP, 1999).
- Trotter, David. "The Modernist Novel."
- Weston, Jessie. *From Ritual to Romance*.
- Wollstonecraft, Mary. *A Vindication of the Rights of Woman* (1792).
- Woolf, Virginia. "Modern Fiction" in *The Common Reader*.

#### **Course Outcomes:**

**CO1:** The student will understand the social, historical and political backgrounds of the world of the novelists and short story writers through the elaborate and allegorical descriptions.

**CO2:** The student will recognize the didactic issues underlying the author's work -- his or her insights into the principles that govern human behavior.

**CO3:** The student will be able to identify a variety of literary devices such as (though not limited to) plot, characterization, exposition, point of view,

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themes, motifs, symbols, style, tone, atmosphere, climax, dialogue, imagery, irony, motivation, narration, pacing, realism, naturalism, voice, satire, and etc.

**CO4:** The student will acquire a broad perspective of the essays, commentaries and novel as literary genres and the relevant historical, geographical, and cultural identity-based backgrounds.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2			2	2	2	3	2	2	2	3	3	2	2	
CO2	3	2	1				1	3		2	2	3	3	3	2	2	
CO3	3	3	1			1	1			2	2	2	3	3	2	2	
CO4	3	3	2			1	3	2	3	2	2	3	3	3	2	2	

### **Discipline Specific Elective - 4**

#### **World Literature – Asian Literature (BEN018C)**

#### **Course Objectives**

- To develop skills in formal description, textual analysis, and interpretation through close reading of primary texts, and to refine skills of analytical writing and scholarly argumentation using literary sources.
- Do enable students to put select novels and short-stories into context to be able to understand socio-cultural space of Asia.

#### **Course Content**

UNIT 1	<b>Elif Shafak</b> The Architect's Apprentice
UNIT 2	<b>Jasmine Darznik</b> Song of a Captive Bird
UNIT 3	<b>Haruki Murakami</b> A Wild Sheep Chase
UNIT 4	<b>Khaled Hosseini</b> <i>A Thousand Splendid Suns</i>

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UNIT 5	<b>Romesh Guneseakra</b> Reef  <b>Kamila Shamsie</b> Kartography
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### Suggested Readings

- Elif Shafak. *The Architect's Apprentice*. Penguin, 2015.
- Haruki Murakami. *A Wild Sheep Chase*. Vintge, 1982.
- Jasmine Darznik. *Song of a Captive Bird*. Random House, 2018.
- Kamila Shamsie. *Kartography*. Mariner Books, 2001.
- Khaled Hosseini. *A Thousand Splendid Suns*. Riverheads, 2007.
- Romesh Guneseakra. *Reef*. Granta Books. 1994, 1994.

### Course Outcomes (CO):

**At the end of this course students will have:**

**CO1:** textual analysis, and interpretation through close reading of primary texts, and to refine skills of analytical writing and scholarly argumentation using literary sources.

**CO2:** select novels and short-stories into context to be able to understand socio-cultural space of Asia. **CO3:** understanding of Asian cultures and global interactions through historical traditions in diverse Asian cultures

**CO4:** challenge issues, confronts the reader with political debates and moral uncertainties

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2			2	2	1	3	2	3	2	3	3	2	2	
CO2	3	3	2			2	2		3	3	2	3	3	3	2	2	
CO3	3	3	3			3	2		3	2	3	2	3	3	2	2	
CO4	3	3	3			3	2	1	2	2	2	2	3	3	2	2	

### Indian Writing – War and Partition Literature (BEN024C)

#### Course Objectives:

- To enable an understanding of the affective dimensions of the Partition in varied geopolitical spaces.
- To aid the student in comprehending the country's postcolonial realities.
- To introduce students to the following topics through the study of literary texts: colonialism nationalisms and the Partition of India in 1947 communalism violence and the British Rule in India homelessness exile and migration women and children in the Partition refugees rehabilitation and resettlement borders and borderlands.

#### Course Content

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Unit 1	<b>Intizar Husain</b> Basti, tr. Frances W. Pritchett
Unit 2	<b>Amitav Ghosh</b> The Shadow Lines. <b>Bhishm Sahani</b> Tamas
Unit 3	<b>Bapsi Sidhwa</b> Cracking India/Ice Candy Man
Unit 4	<b>Sa'adat Hasan Manto</b> Toba Tek Singh <b>Navtej Singh</b> An Evening in Lahore
Unit 5	<b>Jibbananda Das</b> I Shall Return to This Bengal <b>Gulzar</b> Toba Tek Singh (Poem)

#### Films

*Garam Hawa* (dir. M.S. Sathyu, 1974).

*Khamosh Paani: Silent Waters* (dir. Sabiha Sumar, 2003).

*Subarnarekha* (dir. Ritwik Ghatak, 1965)

#### Suggested Topics and Readings for Class Presentation Topics

Colonialism, Nationalism, and the Partition

Communalism and Violence

Homelessness and Exile

Women in the Partition

#### Background Readings and Screenings

- Ritu Menon and Kamla Bhasin, 'Introduction', in *Borders and Boundaries* (New Delhi: Kali for Women, 1998).
- Sigmund Freud, 'Mourning and Melancholia', in *The Complete Psychological Works of Sigmund Freud*, tr. James Strachey (London: Hogarth Press, 1953) pp. 3041–53.
- Sukrita P. Kumar, *Narrating Partition* (Delhi: Indialog, 2004).
- Urvashi Butalia, *The Other Side of Silence: Voices from the Partition of India* (Delhi: Kali for Women, 2000).

#### Course Outcomes

**CO1** – Student will develop a strong understanding of the complex politics that led to the partition of the Indian subcontinent into the two states of India and Pakistan.

**CO2** – Student will have an insight to human and social costs of geo-political power struggles.

**CO3** – Student will have an understanding of how “History” informs literature.

**CO4** – Student will be able to comprehend the sense of alienation and exile in the context of partition.

**CO5** – Student will be able to understand the role and position of women during partition.

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**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3		1	2	3	2	3	2	2	2	3	3	2	2	3
CO2	3	3	3		1	2	3	2	3	2	2	2	3	3	2	2	3
CO3	3	3				2	1	2	3	2	2	3	3	3	2	2	3
CO4	3	3				2	2	2	2	2	2	3	3	3	2	2	3
CO5	3	3	1			2	2	2	3	2	2	2	3	3	2	2	3

**Language and Linguistics – Introduction to Morphosyntactics (BEN030C)**

**Course Objectives**

- To introduce the students to the different branches of Morphology.
- To introduce the different types of morphemes that helps in word formation.
- To introduce the students to the process of word formation.
- To introduce students to the basic concepts of syntax.
- To introduce the students to the basic syntactic concepts that helps in sentence formation.

**Course Content**

UNIT 1	Introduction to Morphology: Morphemes, Morphs, Allomorphs, Branches of Morphology: Inflectional & Derivational Morphology
UNIT 2	Types of Morphemes: Free & Bound Morphemes, Roots / Stems / Bases / Affixes, Inflectional / Derivational Morphemes, Paradigms & Zero Allomorphs, Superfixes Classification of Words: Structure & Classification A.Simple / Complex / Compound / Compound-Complex Words
UNIT 3	Processes of Word Formation: Affixation / (Multiple Affixation), Inflection, Derivation, Back Formation, Compounding, Combining Forms, Reduplication, Clipping, Blending, Echoism / Onomatopoeia, Coinage / Invention, Borrowing, Conversion
UNIT 4	Parts of Speech / Word Classes A.Content Words / Open Classes of Words 1.Nouns / Verbs / Adjectives / Adverbs B.Function Words / Closed Classes of Words 1.Syntactic Devices 2.Noun Determiners 3.Auxiliaries 4.Intensifiers

  
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UNIT 5	Phrase structure, Clause structure, Sentence structure
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### Suggested Reading:

- Aronoff, M. 1976. Word formation in generative grammar. Cambridge. Mass: MIT Press.
- Aronoff, M. and K. Fudeman (2005). What is Morphology? Oxford: Blackwell.
- Bauer, L. 1988. Introducing Linguistic Morphology. Edinburgh: Edinburgh University Press.
- Burton-Roberts, N. (1986) Analysing Sentences: An Introduction to English Syntax. Cambridge: CUP.
- Cowper, Elizabeth A. 1992. A Concise introduction to syntactic theory: The Government and binding approach. Chicago: The University of Chicago Press.
- Disciullo, A.M. and Williams E. 1987. On the definition of word. Cambridge, Mass.: MIT Press.
- Freidin, R. 1992. Foundations of Generative Syntax. Cambridge. Mass: MIT Press
- Haegeman, L. 2009. Theory and Description in Generative Syntax. Cambridge: Cambridge University Press.
- Haspelmath, M. (2002) Understanding Morphology. London: Arnold.
- Katamba, F. and John Stonham 2006. Morphology 2nd ed. London: Palgrave.
- Mathews, P.H. 1972. Inflectional Morphology. Cambridge, Cambridge University Press.
- Radford Andrew, (1997), "Syntax: A Minimalist Approach, Cambridge, CUP.
- Radford, A. (1988) Transformational Grammar: A First Course. CUP, 1988.

### Course Outcomes (CO):

#### At the end of this course students will have:

CO1: An ability to understand the function of Morphology and its application in real life.

CO2: An ability to analyze the word formation theory.

CO3: An understanding of the process of word formation.

CO4: An ability to understand the importance of syntactic study in English language.

CO5: An ability to form correct sentences in real life in different fields of life.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	1	2	3		1	1		1			3	3	3
CO2	3	3	3	2	1	2	3		1	1		2			3	3	3

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<b>C03</b>	3	3	3	2	1	2	3		1	2		2			3	3	3
<b>C04</b>	3	3	3	2	1	2	3		1	2		2			3	3	3
<b>C05</b>	3	3	3	1	1	1	2		2	2		2			3	3	3

### Miscellaneous – Children Literature and Studies (BEN036C)

#### **Course Objectives:**

- To appreciate the value of multicultural and international children's literature in developing an understanding of and appreciation for other cultures through literary genres
- To understand how authors use literary devices to get their message through
- To understand how children's books support children's development (cognitive, social, emotional, language and aesthetic development)
- To appreciate how adults scaffold children's thinking through dialogic reading and read aloud activities
- Knowledge and understanding of the interrelatedness of local, global, international and intercultural issues, trends and systems through the use of children's literature that addresses global issues

#### **Course Content**

Unit 1	<b>Lewis Carroll</b> Looking Through the Glass
Unit 2	<b>Jane Wang</b> The Prince and the Dressmaker <b>E B White</b> Charlotte's Web
Unit 3	<b>Fairytales</b> Cindrella, Sleeping Beauty, Red Riding Hood <b>Vishnu Sharma</b> Panchtantra (any two stories) <b>Satyajit Ray</b> Feluda Series (Any two Stories)

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Unit 4	<b>Ruskin Bond</b> Room on the Roof and The Flight of Pigeons <b>Ogden Nash</b> Children Party
Unit 5	<b>Roald Dahl</b> Snow White and the Seven Dwarf <b>R L Stevenson</b> My Shadow  <b>Shel Silverstein</b> Falling Up The Wild Cherote Snowball

### Readings

- “Children’s Books: History and Trends”
- “Organising Children’s Literature by Genre” (these are Chapter 5 and Chapter 6 from Tunnell, Michael O, James S. Jacobs, Terrel A Young and Gregory Bryan. *Children’s Litertaure: Briefly*. Pearson: Boston, 2012. Print)
- Charles Sarland: “Ideology”
- Karín Lesnik-Oberstein: “Essentials: What is Children’s Literature? What is Childhood?”
- Peter Hunt: “Introduction: The World of Children’s Literature Studies”

### Course Outcomes

**CO1** – Student will understand how children’s books support children’s multiple perspectives and empathy while promoting their cognitive, social, emotional, language and aesthetic development.

**CO2** - Understand developmentally appropriate practices in which literature can and does support the goals of early childhood education.

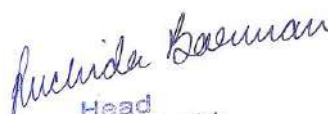
**CO3** - Student will be able to apply technology to organize and integrate assessment information.

**CO4** – Student will be able to recognize the importance of ELLs’ home languages and language varieties, and build on these skills as a foundation for learning English.

**CO5** – Student will be able to recognize how to cognitively engage children with and without disabilities.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	2			2	2			2	2	2	3	3	2	2	
<b>CO2</b>	3	2		1		3	2		2	2	2	3	3	2	2	2	
<b>CO3</b>	3	3		2		3	3		2	2	2	3	3	3	2	2	1

  
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CO4	3	2				1			1	3	3	3	3	2	3	3	
CO5	3	3	3	2		2	3	2		3	3	2	3	3	3	3	

### Discipline Specific Elective - 5

#### World Literature – Canadian Literature (BEN019C)

#### Course Objectives

- To introduce the students to Canadian literature through the close reading of the selected texts.
- To make them approach selected texts for their literary value and cross cultural importance

#### Course Content

UNIT 1	Michael Ondaatje: <i>The English Patient</i>
UNIT 2	Wilfred Campbell : “The Winter Lake” A. J. M. Smith : “Live as Old Proud King in Parable”
UNIT 3	George Ryga : <i>Ecstasy of Rita Joe</i>
UNIT 4	Margaret Atwood : <i>The Handmaid’s Tale</i>
UNIT 5	Alice Munro : “Red Dress” Alistair MacLeod : “As Birds Bring Forth the Sun”

#### Suggested Readings

- Alice Munro. “Red Dress”. Project Gutenberg.
- Alistair MacLeod. “As Birds Bring Forth the Sun”
- George Ryga. *Ecstasy of Rita Joe*. Talonbooks, 1970.
- Margaret Atwood. *The Handmaid’s Tale*. Picador, 1985.
- Michael Ondaatje. *The English Patient*. McClelland & Stewart, 1992.
- Mosaics: An Anthology of Canadian Literature. Mainspring Publishers. Chennai-600042.

#### Course Outcome:

**At the end of this course students will have:**

**CO1:** Identify and explain key literary terms, in relation to Canadian style

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**CO2:** Explain Canadian historical and geographical content, with reference to the individual literary pieces

**CO3:** Interpret readings through written submissions, including proper vocabulary analysis

**CO4:** Indicate what type of audience each Canadian author is addressing

**CO5:** Explain why each author's style is unique to the individual piece

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1			1	2	2	2	2	2	2	3	3	2	2	
CO2	3	3	1			1	2	2	3	3	3	2	3	3	2	2	
CO3	3	3	3			3	2	2	2	3	2	3	3	3	2	2	
CO4	3	3	3			1	1	1	2	2	3	3	3	3	2	2	
CO5	3	3	2			1	1	2	3	3	2	2	3	3	3	3	

### **Indian Writing – Literature of Peripherals (BEN025C)**

#### **Course Objectives:**

- Since the twentieth century, literary texts from varied contexts in India have opened up new discursive spaces from within which the idea of the normative is problematized. Positions of marginality, whether geographical, caste, gender, disability, or tribal, offer the need to interrogate the idea of the normative as well as constitutions of the canon. Though this engagement has been part of literary academic analysis, it has just begun making its foray into the syllabus of English Departments of Indian universities
- This paper hopes to introduce undergraduate students to perspectives within Indian writing that acquaint them with both experiences of marginalization, alongside with examining modes of literary stylistics that offer a variation from conventional practice

#### **Course Content**

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Unit 1	<p><b>Caste</b>  <b>BR Ambedkar</b>  <i>Annihilation of Caste: The Annotated Critical Edition</i>, Chaps 4 (233-236) 6 (241-244) and 14 (259-263) (New Delhi: Navayana Publications, 2015).</p> <p><b>Bama</b>  <i>Sangati</i> Chapter 1, trans. Lakshmi Holmstrom (New Delhi: Oxford University Press 2005) pp. 3 -14.</p> <p><b>Aruna Gogulamanda</b>  A Dalit Woman in the Land of Goddesses, in <i>First Post</i>, 13 August 2017.</p>
Unit 2	<p><b>Disability</b>  <b>Rabindranath Tagore</b>  Subha, <i>Rabindranath Tagore: The Ruined Nest and Other Stories</i>, trans. Mohammad A Quayum (Kuala Lumpur: Silverfish, 2014) pp. 43-50.</p> <p><b>Malini Chib</b>  Why Do You Want to Do BA, <i>One Little Finger</i> (New Delhi: Sage, 2011) pp. 49-82.</p> <p><b>Raghuvir Sahay</b>  The Handicapped Caught in a Camera, trans. Harish Trivedi, <i>Chicago Review</i> 38: 1/2 (1992) pp. 146-7.</p> <p><b>Girish Karnad</b>  <i>Broken Images Collected Plays: Volume II</i> (New Delhi: Oxford University Press, 2005) pp. 261-84.</p>

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Unit 3	<p><b>Tribe</b>  <b>Waharu Sonawane</b>  Literature and Adivasi Culture ,<i>Lokayana Bulletin</i>, Special Issue on Tribal Identity, 10: 5/6 (March-June 1994): 11-20</p> <p><b>Janil Kumar Brahma</b>  Orge, <i>Modern Bodo Short Stories</i>, trans. Joykanta Sarma (Delhi: Sahitya Akademi,2003) pp. 1-9.</p> <p><b>D. K.Sangma</b>  Song on Inauguration of a House ,trans. Caroline Marak, <i>Garo Literature</i>(Delhi: Sahitya Akademi, 2002) pp. 72-73.</p> <p><b>Randhir Khare</b>  Raja Pantha,<i>The Singing Bow: Poems of the Bhil</i>(Delhi: Harper Collins, 2001) pp. 1-2.</p>
Unit 4	<p><b>Gender</b>  <b>Living Smile Vidya</b>  ‘Accept me!’ in <i>I Am Vidya: A Transgender's Journey</i> (New Delhi: Rupa, 2013)pp. 69-79.</p> <p><b>Rashid Jahan</b>  ‘Woh’, trans. M. T. Kahn, in <i>Women Writing in India 600 BC to the Present Vol 2</i> Susie Tharu and K Lalita.eds(New York: The Feminist Press, 1993) pp. 119-22.</p> <p><b>Ismat Chughtai</b>  ‘Lihaf’, trans. M. Assadudin,<i>Manushi</i>, Vol. 110, pp. 36-40.</p> <p><b>Hoshang Merchant</b>  Poems for Vivan, in <i>Same Sex Love in India: Readings from Literature and History</i>, Ruth Vanita and Saleem Kidwai,eds(New York: Palgrave, 2001) pp. 349-51.</p>

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Unit 5	<p><b>North East Mamang Dai</b> Myths of Creation ,<i>Arunachal: A Hidden Land</i>(New Delhi: Penguin, 2009) pp. 37-50.</p> <p><b>Cherrie L Chhangte</b> What Does an Indian Look Like, Tilottoma Misra, ed., <i>The Oxford Anthology of Writings from North-East India: Poetry and Essays</i>(New Delhi: Oxford UP, 2011) p. 49.</p> <p><b>K. S.Nongkynrih</b> Ren ,<i>Anthology of Contemporary Poetry from the Northeast</i>,K. S. Nongkynrih and R. S.Ngangom, eds(Shillong, India: NEHU Publications, 2003)pp.158-59.</p> <p><b>IndiraGoswami</b> The Offspring, trans. Indira Goswami,<i>Inner Line: The Zubaan Book of Stories by Indian Women</i>,Urvashi Butalia, ed. (New Delhi: Zubaan, 2006)pp. 104-20.</p>
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### Suggested Topics and Readings for Class Presentations

Community, Marginalization  
Dalit Literature, Caste in Literature  
Images and representation in Literature  
Gender,  
Marginalization of Gender, Caste, Disability and Location  
North Eastern Literature

### Suggested Readings:

- Anwesha Ghosh, *Identity and Marginality in India: Settlement Experience of Afghan Migrants*
- Asmita Bhattacharyya and Sudeep Basu ed. *Marginalities in India: Themes and Perspectives*
- Bala Ramulu Chinnala, *Marginalized Communities and Decentralized Institutions in India: An Exclusion and Inclusion Perspective*
- Barua, Manjeet. "Political Literature from the North East".
- Baruah, Sanjeev. *India Against Itself*.
- Chandra, N.D.R. and Nigamananda Das. *Ecology, Myth and Mystery: Contemporary Poetry in English from North East India*.
- Daruwalla, Keki N. "Poetry and the North East".
- Hazarika, Sanjoy. *Strangers of the Mist: Tales of War and Peace from India's Northeast*.
- Horam, M. *North East India: A Profile*.
- Karmawphang, Desmond Lee and Robin Ngangom, eds. *Anthology of Contemporary Poetry*.
- Kashyap, Aruni. "Some Thoughts on Literature from India's North East".
- Nadeem Hasnain, *Sociology of Marginalized Communities and Weaker Sections in India*
- Rajakishor Mahana, *Negotiating Marginality: Conflicts over Tribal Development in India*
- Samrat Choudhary, *Insider Outsider - Dhkars, Chinkies & Role Reversals: Writings from the Northeast of India*
- Santosh Gupta and Bandana Chakrabarty ed. *Dalit Writing: Emerging Perspectives*
- Supriya Agarwal, Neha Arora and Ved Prakash ed. *Understanding Marginality: Cultural and Literary Perspectives*
- Yasmin Saikia and Amit R. Baishya ed. *Northeast India: A Place of Relations*
- Yatindra Singh Sisodia and Tapas Kumar Dalapati ed. *Social Inclusion of Marginalised in India: State policies and Challenges*

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### Course Outcomes

**CO1** - Students will approach to literature through the lens of varied identity positions and evolve in them a fresh critical perspective for reading literary representations

**CO2** – Student will be able to explore various forms of literary representations of marginalization as well as writing from outside what is the generally familiar terrain of Indian writing in schools

**CO3** – Student will be aware of the different ways in which literary narratives are shaped, especially since some of the texts draw on traditions of the oral mythic folk and the form of life-narrative as stylistics

**CO4** – Student will understand how literature is used also to negotiate and interrogate this hegemony

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3				2			2	2	2	3	3	3	2	2	
<b>CO2</b>	3	3				2	2	2		2	2	2	3	3	2	2	
<b>CO3</b>	3	3				3	3	2	2	2	2	3	3	3	2	2	
<b>CO4</b>	3	3				3	3	2	2	2	2	3	3	3	2	2	

### **Language and Linguistics – Introduction to Stylistics (BEN031C)**

#### **Course Objectives**

- To introduce the students to the basics of stylistics and its importance.
- To introduce with the connection between language and literature.
- To offer hands on experience to students for literary appreciation.
- To develop the analytical mind for literary interpretation by learning it through the syntactic concepts.
- To apply the stylistic devices to literary texts

#### **Course Content**

<b>UNIT 1</b>	Basic Concepts in Linguistics and Stylistics, What is linguistics?, Synchronic and diachronic, Syntagmatic and paradigmatic relations, Langue and parole, competence and performance
<b>UNIT 2</b>	What is Style?, What is Stylistics?, Brief history of stylistics, Types of stylistics, Stylistics and Linguistics, Stylistics and Literature, Discourse Analysis

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UNIT 3	Phonology and Literature, Vowels and consonants in English, Rhyme schemes and sound patterns, Types of meter, Types of feet
UNIT 4	Syntactic aspect of literature, Sentence structure Types of sentences – declarative, interrogative, imperative, simple, compound, Complex, Direct and indirect sentences, Active and passive sentences
UNIT 5	Stylistics and Literature, Stylistics and Poetry – poetic diction and license, foregrounding, figures of speech, Stylistics and Drama – speech act theory, cooperative and politeness principles, Stylistics and Novel – Narrative Strategy, Point of view

### Suggested Reading:

- Austin, J. L. (1962), How to do things with words, Oxford: Clarendon Press Black, Elizabeth (2006), Pragmatic Stylistics, (Edinburgh)
- Crystal, David – A Dictionary of Applied Linguistics and Stylistics
- Cummings, M. and R. Simmons (1983), The Language of Literature: A Stylistic Introduction to the Study of Literature, London: Pergamon
- Elam, K. (1980), The Semiotics of Theatre and Drama, London : Methuen
- Fowler, Roger (1971), The Language of Literature, London: Routledge and Kegan
- Freeman, D. C. (1970), Linguistics and Literary Style, New York : Holt Rinehart and Winston
- Halliday and Hasan, (1976), Cohesion in English, Longman.
- Leech Geoffrey and Short M. (1981), Style in Fiction, Harlow: Longman.
- Lesley Jeffries and Dan McIntyre, (2010), Stylistics, Cambridge (UK) : CUP. 24 Lyons, J. (1981), Language and Linguistics, Cambridge: CUP.
- Prakasam, V. (1996), Stylistics of Poetry: A Functional Perspective, Hyderabad: Omkar Publishers
- Paul Simpson, (2004), Stylistics; A Resource Book for Students, Routledge, London and New York.
- Tragott and Pratt, (1980), Linguistics for the Students of Literature, Harcourt Brace Jovanovich Inc.

### Course Outcomes (CO):

**At the end of this course students will be able :**

CO1: To understand the importance of stylistics for the study of language and literature both.

CO2: To understand the basic concepts of linguistics and stylistics.

CO3: To understand the relation between linguistics and stylistics.

CO4: To be able to understand the syntax in terms of context.

CO5: CO5: To apply the linguistic concepts to analyze the literary texts

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

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Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	1	2	3		2	1		1	2	3	3	3	3
CO2	3	3	3	2	1	2	3		2	1		2	2	3	3	3	3
CO3	3	3	3	2	1	2	3		2	2		2	2	3	3	3	3
CO4	3	3	3	2	1	2	3		2	2		2	2	3	3	3	3
CO5	3	3	3	1	1	3	2		3	2		2	3	3	3	3	3

### Miscellaneous – Life Narratives (BEN037C)

#### Course Objectives:

- To learn the elements of biography and autobiography
- To determine what information is included in biographies and autobiographies.
- To identify the text structure used in biographies and autobiographies and explain why it is used.
- To compare/contrast the use of point of view and text structure in biographies and autobiographies

#### Course Content

Unit 1	<b>Binodini Dasi</b> <i>My Story and Life as an Actress</i> , pp. 61-83 (New Delhi: Kali for Women, 1998). <b>A.Revathi</b> <i>Truth About Me: A Hijra Life Story</i> , Chapters One to Four, pp. 1-37 (New Delhi: Penguin Books, 2010.)
Unit 2	<b>Mark Twain</b> Own Autobiography (excerpts) <b>Dalai Lama</b> Freedom and Exile (excerpts)
Unit 3	<b>Sylvia Nasar</b> <i>A Beautiful Mind</i>

  
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Unit 4	<b>Laura Hillenbrand</b> Unknown: A World War II Story of survival, resilience and redemption
Unit 5	<b>J. Drew Lanham</b> The Home Place: Memoirs of a Colored Man's Love Affairs with Nature

### **Suggested Topics and Background Prose Readings for class Presentations:**

Self and society

Role of memory in writing Autobiography as resistance

Autobiography as rewriting history

### **Readings:**

- James Olney, 'A Theory of Autobiography' in *Metaphors of Self: the meaning of autobiography* (Princeton: Princeton University Press, 1972) pp. 3-50.
- Laura Marcus, 'The Law of Genre' in *Auto/biographical Discourses* (Manchester: Manchester University Press, 1994) pp. 229-72.
- Linda Anderson, 'Introduction' in *Autobiography* (London: Routledge, 2001) pp.1- 17.
- Mary G. Mason, 'The Other Voice: Autobiographies of women Writers' in *Life/Lines: Theorizing Women's Autobiography*, Edited by Bella Brodzki and Celeste Schenck (Ithaca: Cornell University Press, 1988) pp. 19-44.

### **Course Outcomes**

**CO1** – Student will learn about the form and elements of biography and autobiography.

**CO2** – Student will be able to plan a personal narrative using pre writing technique.

**CO3** – Student will be able to identify key language, structure, organization and presentational features in life writing.

**CO4** – Student will learn to interpret biography and autobiography as rewriting of history.

**CO5** – Student will be able to read the text in context of self and society.

### **Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	2			3	4	1		2	2	3	3	3	2	2	
<b>CO2</b>	3	2		2		1	3	2		2	2	2	3	2	2	2	2
<b>CO3</b>	3	3	2			2	3	2		2	2	3	3	3	2	2	
<b>CO4</b>	3	3	2			2	3	2	3	2	2	2	3	3	2	2	
<b>CO5</b>	3	3	3	2		2	3	2		3	3	2	3	3	3	3	

### **Open Elective 3: Reading Poetry (DEN005A)**

#### **Course Objectives:**

- To familiarize the student with different poetic forms of expression.
- To introduce the students to different poetic appreciation techniques and structures of criticism.
- To make the student read and understand poetry of different poets belonging to different ages, societies and cultures.
- To make the student familiar with different societal issues presented by the poets through the poems.

#### **Course Content:**

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<b>Unit 1</b>	Types of Poetry (Sonnet, Lyric, Ballad, Elegy, Ode, Epic, Mock-Epic, etc.) Appreciation of Poetry (Plot, Language, Rhyme, Tone, Figures of Speech & Thought, etc.)
<b>Unit 2</b>	<b>Rudyard Kipling</b> If <b>Kabir Das</b> Are You Looking for Me? What is seen is not Truth
<b>Unit 3</b>	<b>Samuel Taylor Coleridge</b> The Rime of The Ancient Mariner <b>Kamala Das</b> The Looking Glass A Hot Noon in Malabar
<b>Unit 4</b>	<b>Maya Angelou</b> Still, I Rise / Caged Bird <b>Jayant Mahapatra</b> Hunger A Summer Poem

### Suggested Readings

Rene Wellek, *Genre Theory, The Lyric and Erlebnis*  
Susan Stewart, from *Poetry and the Fate of Senses* (Introduction and Chapter I)  
Aamir Mufti, *Towards A Lyric History of India*  
Loius Martz, *The Poetry of Meditation*  
Martin Heidegger, *Poetically, Man Dwells*  
Plato, *Ion*  
David Buchan, from *Ballad and the Folk*  
Susan Manning, *Antiquarianism, Balladry, and the Rehabilitation of Romance*  
Brian McHale, —*Beginning to Think about Narrative in Poetry*, *Journal of Narrative* 17 (2009): 11–30.  
Peter Hühn and Jörg Schöner, —Introduction: *The Theory and Methodology of the Narratological Analysis of Lyric Poetry*. In *The Narratological Analysis of Lyric Poetry: Studies in English Poetry from the 16th to the 20th Century*, edited by Peter Hühn and Jens Kiefer, 1–14. Berlin: de Gruyter, 2005  
Bruce Heiden, *Narrative in Poetry: A Problem of Narrative Theory*  
Gilles Deleuze, *The Logic of Sense —Introduction: Is There a There There?* from *Sean Latham and Gayle Rogers, Modernism: Evolution of an Idea* (London: Bloomsbury, 2015), pp. 1-16.

### Course Outcomes:

CO1: The student will be able to identify and understand the different types of poetry and appreciate it critically.  
CO2: The student will be able to address the different societal issues presented in different poetries.  
CO3: The student will be able to compare the poetry of Indian descent with that of other western countries and point out the similarities and dissimilarities in them.  
CO4: They will get a sense that poetry is not only written text but also the spoken word and has oral as well as aural possibilities.

### SEMESTER VI

#### Core Course 13: Postcolonial Literature (BEN013C)

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**Course Objectives:**

- To introduce the students to post-colonial literature that includes the theory and concepts of post-colonial studies.
- To familiarize students with development and practice of post-colonial theory.
- To enable students to make a critical analysis of a work of art within the frames of post-colonial studies.
- To facilitate students to gain knowledge about the terms and concepts exclusives of post-colonial literature

**Course Content**

Unit 1	<b>Chinua Achebe</b> Man of The People
Unit 2	<b>Gabriel Garcia Marquez</b> Chronicle of a Death Foretold
Unit 3	<b>Jean Rhys</b> Wide Sargasso Sea
Unit 4	<b>Bessie Head</b> The Collector of Treasures <b>Ama Ata Aidoo</b> The Girl who can <b>Grace Ogot</b> The Green Leaves  <b>Pablo Neruda</b> Tonight I can write The Way Spain Was
Unit 5	<b>Derek Walcott</b> A Far Cry from Africa Names <b>David Malouf</b> Revolving Days Wild Lemons <b>Mamang Dai</b> Small Towns and the River The Voice of the Mountain

**Suggested Topics and Background Prose Readings for Class Presentations Topics**

De-colonization, Globalization and Literature

Literature and Identity Politics

Writing for the New World Audience

Region, Race, and Gender

Postcolonial Literatures and Questions of Form

**Readings**

- Franz Fanon, 'The Negro and Language', in Black Skin, White Masks, tr. Charles Lam Markmann (London: Pluto Press, 2008) pp. 8–27.
- Gabriel Garcia Marquez, the Nobel Prize Acceptance Speech, in Gabriel Garcia Marquez: New Readings, ed. Bernard McGuirk and Richard Cardwell (Cambridge: Cambridge University Press, 1987)
- Ngugi wa Thiong'o, 'The Language of African Literature', in Decolonising the Mind (London: James Curry, 1986) chap. 1, sections 4–6.

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### Course Outcomes

**CO1** - Students will gain knowledge about the terms and concepts exclusive to the post-colonial literature.

**CO2** - Students will be familiarized with the development of post-colonial literature

**CO3** - Students will be acquainted with the major theories and reputed writers who practice those theories.

**CO4** - Students will understand that how the colonial power has provoked from the nation in their search for a literature of their own.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2			2	2		2	2	2	2	3	3	2	2	
CO2	3	2				2	2	1	2	2	2	2	3	3	2	2	
CO3	3	3				2	3	2	2	2	2	3	3	3	2	2	
CO4	3	3				2	3	3	3	2	2	2	3	3	2	2	

### Core Course 14: Dissertation I (BEN014C)

#### Course Objectives:

- To develop research aptitude in students so that they can design and conduct an original and ethical research.
- To make students write a dissertation in the MLA format.
- To learn researches like empirical/data based (quantitative, qualitative, or mixed-methods)
- To do critical review of research and theory.
- To gain insights about the domain researched and critically reflecting on the steps of the research process.

#### Course Content

Unit 1	Abstract & Introduction: Understanding the area of research, ethical guidelines of research, and finalization of Topic; Theoretical underpinnings
Unit 2	Review of Literature: Understanding and exploration of related research in the discipline
Unit 3	Methodology: Designing the Study, Methods of Data Collection as per the requirements of the topic and design

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Unit 4	Data Analysis & Discussion: Qualitative and/or Quantitative Analysis as per the design and aims of the research
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### Course Outcomes

CO 1: Students will be able to design and conduct an original and ethical research.

CO 2: Students will be able to write a dissertation in the MLA format.

CO 3: Students will learn researches like empirical/data based (quantitative, qualitative, or mixed-methods)

CO 4: Students will be able to do critical review of research and theory.

CO 5: They will gain insights about the domain researched and critically reflecting on the steps of the research process.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	3	3	3	3	3	3		3	3	3	2	3	3	3	3	3	
CO2	3	3				3	2	3		3	3	3	3	3	3	3	2
CO3	3	3				3	2	3		3	3	3	3	3	3	3	2
CO4	3	3	3	3	3	2	3	3	3	2	2	2	3	3	2	2	1
CO5	3	3		2	1	3		3	2	3	3	3	3	3	3	3	

### Discipline Specific Elective 6

#### World Literature – Caribbean Literature (BEN020C)

#### Course Objectives

- To introduce the students to Caribbean literature through the close reading of the selected texts.
- To make them approach selected texts for their literary value and cross cultural importance

#### Course Content

UNIT 1	<b>Derek Walcott:</b> “A Far Cry from Africa” <b>Nancy Morejon:</b> “Black Woman”
UNIT 2	<b>V. S. Naipaul:</b> Half a Life

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UNIT 3	<b>Olive Senior:</b> “Summer Lightning” <b>Jamaica Kincaid:</b> “In the Night”
UNIT 4	<b>Aimé Césaire:</b> <i>The Tragedy of King Christophe</i>
UNIT 5	<b>John Agard:</b> “Half-Caste” <b>Edward Baugh:</b> “The Carpenter’s Complaint”

### Suggested Readings:

- Selections from Caribbean Literature. Mahaam Publishers, Chennai – 78.
- V. S. Naipaul. *Half a Life*. Pan Macmillan, 2012.
- Derek Walcott: “A Far Cry from Africa”. Poets.org.
- Nancy Morejon: “Black Woman”. Poets.org.
- Aimé Césaire: *The Tragedy of King Christophe*. Grove Press, 1970.
- John Agard: “Half-Caste”. Amnesty.org.
- Edward Baugh: “The Carpenter’s Complaint”. Amnesty.org.
- Olive Senior: “Summer Lightning” Project Gutenberg.
- Jamaica Kincaid. Collected Poems.

### Course Outcomes

**At the end of this course students will have:**

**CO1:** the understanding of the background of Caribbean Literature.

**CO2:** Explain Caribbean historical and geographical content, with reference to the individual literary pieces

**CO3:** associate the context of Caribbean literature in English with the socio cultural contexts of other streams in New Literatures in English.

**CO4:** Indicate what type of audience each Caribbean author is addressing

**CO5:** Explain why each author’s style is unique to the individual piece

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3			1		2	2	2	3	3	3	3	2	2	
CO2	3	3	2			2	2	2	2	3	3	2	3	3	2	2	
CO3	3	3	3			2	2	2	2	3	2	3	3	3	2	2	2
CO4	3	3	3			2	2	2	2	3	3	3	3	3	2	2	
CO5	3	3	3			1	2	2	2	3	3	3	3	3	2	2	

### Indian Writing – Contemporary Literature in English (BEN026C)

### Course Objectives

- This paper seeks to introduce the students to genres such as romance, modern Indian fiction, fantasy/mythology, which have a —mass appeal, and can help us gain a better understanding of the popular roots of Indian literature.
- To enable students to trace the rise of popular modern culture in India, and the emergence of genre fiction and bestsellers
- To familiarize students with debates about culture, traditions, myths, superstitions etc.

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- To help them engage with debates about the canonical and non-canonical, and hence investigate the category of literary and non-literary writing.

### Course Content

UNIT 1	<b>Agha Shahid Ali</b> “The Country Without a Post Office”  <b>Basharat Peer</b> Curfewed Night
UNIT 2	<b>Ashwin Sanghi</b> Chanakya Chants
UNIT 3	<b>Manjula Padmanabhan</b> <i>Harvest</i>
UNIT 4	<b>Vikram Seth</b> “Round and Round”, “At Evening” <b>Meena Alexander</b> “Without Place”
UNIT 5	<b>Meena Kandaswamy, Arundhati Subramaniam, Sohini Basak, Aditi Rao, Akhil Katyal</b> Selected Poems  <b>Aravind Adiga</b> <i>The White Tiger</i>

### Suggested Topics and Readings for Class Presentations

Culture and Tradition in India  
Modernization in India  
Indian Myth and Folklore  
Emerging Sensibilities of Indian People

### Suggested Reading:

- Ashley, B., ed. *The Study of Popular Fiction* (London: Pinter, 1989).
- Bennett, T., ed. *Popular Fiction: Technology, Ideology, Production, Reading* (London & New York: Routledge, 1990).
- Cawelti, J.G. *Adventure, Mystery and Romance* (Chicago: University of Chicago Press, 1976).
- Gelder, Ken. *Popular Fiction: The Logics and Practices of a Literary Field* (London & New York: Routledge, 2004).
- Harrex, S. C. *The Fire and the Offering: The Modern Indian Novel in English*.
- King, Bruce. *New Literatures in English*.
- Nandan, Satendra, ed. *Language and Literature in Multicultural Contexts*.
- Palmer, J. *Potboilers: Methods, Concepts and Case Studies in Popular Fiction* (London & New York: Routledge, 1991).
- Pawling, C., ed. *Popular Fiction and Social Change* (London: Macmillan 1984).

### Course Outcomes

**CO1** - Students will be able to differentiate between canonical and the popular literature.

**CO2** - Students will be able to understand the effectiveness of the modern fiction, fantasy/mythology and romance which have a mass appeal.

**CO3** - Students will have better understanding of the popular roots of literature.

**CO 4** - Students will be able to identify Indian Traditions which guide the life of Indian People in such contemporary literature.

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**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2				2	2	1	2	2	2	2	3	2	2	2	
CO2	3	3				2	2	1	2	2	2	2	3	3	2	2	
CO3	3	3				2	3	3	3	2	2	3	3	3	2	2	1
CO4	3	2				2	3	2	2	2	2	3	3	2	2	2	

**Language and Linguistics – New Concepts of Linguistics (BEN032C)**

**Course Objectives**

- To introduce the students to the latest and new branches of linguistics like Sociolinguistics wherein the society and language change is studied.
- To introduce the students to the latest and new branches of linguistics like Psycholinguistics wherein the language change is studied in terms of language.
- To introduce the students to the latest and new branches of linguistics like Neuro-linguistics wherein the neurological concepts in language change is studied.
- To introduce the students to the latest and new branches of linguistics like Cognitive Linguistics wherein the cognitive factors and language change is studied.
- To introduce the students to the latest and new branches of linguistics like Computational Linguistics wherein the modern age technology especially artificial intelligence is studied in terms of language change.

**Course Content**

UNIT 1	Sociolinguistics: Introduction, Speech Communities, High prestige and Low prestige varieties, Social network, Class aspirations in language, Sociolinguistic codes and factors, Language Change, language varieties, Bilingualism, Multilingualism, Code- switching, Code-mixing, Pidgins and Creoles.
UNIT 2	Psycholinguistics: Introduction, language and speech, language acquisition, language production, language comprehension, accommodation, behavioral tasks, eye-movements, production errors, Psycholinguistics and Neuro-imaging, Competence and Performance, Language acquisition in children, Innateness Hypothesis.

  
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UNIT 3	Neuro-linguistics: Introduction, language and the brain, Cerebral dominance, Localization and Lateralization, Equipotentiality Hypothesis and Critical Period Aphasia, Dyslexia and stuttering, Schizophrenia, Autism, Dysarthria, Mother's depression, Developmental Language Disorders
UNIT 4	Cognitive Linguistics: Introduction, Conceptual metaphor theory, Cognitive and construction grammar, Cognitive perspective on Natural language processing
UNIT 5	Computational Linguistics: Introduction, Artificial Intelligence and Language, Different approaches of development, structural and production.

### Suggested Reading:

- Caplan, David, Gloria Waters, David Kennedy, Nathaniel Alpert, Nikos Makris, Gayle DeDe, Jennifer Michaud, & Amanda Reddy. 2007. A study of syntactic processing in aphasia II: Neurological aspects. *Brain and Language* 101, 151-177.
- Caplan, David, Gloria Waters, Gayle DeDe, Jennifer Michaud, & Amanda Reddy 2007. A study of syntactic processing in aphasia I: Behavioral (psycholinguistic) aspects. *Brain and Language* 101, 103-150.
- Chambers, J.K. 2003 (2nd ed.). *Sociolinguistic Theory*. Oxford: Blackwell.
- Chomsky, Noam 2006. *Language and Mind*, Cambridge University Press.
- Dabrowska, Ewa. 2004 *Language, Mind and Brain*, Edinburgh University Press,
- Edinburgh University Press, Edinburgh.
- Edinburgh.
- Evans, Vyvyan and Melanie Green 2006. *Cognitive Linguistics: An Introduction*.
- Fasold, R. 1984. *The Sociolinguistics of society*. Oxford: Blackwell.
- Furth, H. 1970. *Piaget and Knowledge: Theoretical Foundations*. London: Prentice Hall.
- Gaskell, G. et al 2007 *The Oxford Handbook of Psycholinguistics*, Oxford University
- Hudson, R.A. 1980. *Sociolinguistics*. Cambridge, Cambridge University Press.
- Hymes, D. 1971 ed. *Pidginization and creolization of language* Cambridge: Cambridge University Press.
- Krishnaswamy, N, & Verma S K. (2005) . *Modern Linguistics: An Introduction*. New Delhi: OUP.
- MacWhinney, Brian (2015). "Introduction – language emergence". In MacWhinney, Brian; O'Grady, William (eds.). *Handbook of Language Emergence*. Wiley. pp. 1–31. [ISBN 978-1-118-34613-6](#).
- Meyerhoff, Miriam 2006. *Introducing Sociolinguistics*. London and New York:
- Novick, J.M., Trueswell, J.C., & Thompson-Schill, S.L. (2010). *Broca's Area and Language Processing: Evidence for the Cognitive Control Connection*. *Language and Linguistics Compass*.
- Press, London
- Robinson, Peter (2008). *Handbook of Cognitive Linguistics and Second Language Acquisition*. Routledge. pp. 3–8. [ISBN 978-0-805-85352-0](#).
- Steinberg, Dany D. 1982. *Psycholinguistics: Language, Mind and the World*. London: Longman

### Course Outcomes (CO):

#### At the end of this course students will have:

CO1: Ability to understand the social factors that affect language learning.

CO2: Ability to understand the psychology behind learning language.

CO3: An understanding of neurological factors in language learning.

CO4: The ability to understand the cognitive factors of learning a language.

CO5: An ability to use artificial intelligence in linguistic set up.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

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Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	3	2	3		3	2		2			3	3	3
CO2	3	3	3	3	3	2	3		3	2		2			3	3	3
CO3	3	3	3	3	3	2	3		3	2		2			3	3	3
CO4	3	3	3	3	3	2	3		3	2		2			3	3	3
CO5	3	3	3	3	3	3	3		3	2		2			3	3	3

### Miscellaneous – Travels and Travelogues (BEN037C)

#### Course Objectives:

- Exploring contemporary travel writing and the genre it represents, literary and non fiction.
- To acquire knowledge about the studied texts and about an important and popular literary genre.
- To develop the student's ability to analyse and discuss travel narratives in the light of, and aided by, relevant theory.

#### Course Content

Unit 1	<b>Khuswant Singh's</b> <i>City Improbable: Writings on Delhi</i> , Penguin Publisher <b>Al Biruni:</b> Chapter LXIII, LXIV, LXV, LXVI, in <i>India by Al Biruni</i> , edited by Qeyamuddin Ahmad, National Book Trust of India
Unit 2	<b>Ernesto Che Guevara:</b> <i>The Motorcycle Diaries: A Journey around South America</i> (the Expert, Home land for victor, The city of viceroys), Harper Perennial
Unit 3	<b>William Dalrymple:</b> <i>City of Dijn</i> (Prologue, Chapters I and II) Penguin Books <b>Rahul Sankrityayan:</b> <i>From Volga to Ganga</i> (Translation by Victor Kierman) (Section I to Section II) Pilgrims Publishing
Unit 4	<b>Nighat M. Gandhi:</b> <i>Alternative Realities: Love in the Lives of Muslim Women</i> , Chapter 'Love, War and Widow', Westland, 2013 <b>Elisabeth Bumiller:</b> <i>May You be the Mother of a Hundred Sons: a Journey among the Women of India</i> , Chapters 2 and 3, pp.24-74 (New York: Penguin Books, 1991)

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Unit 5	<b>Daniel Defoe:</b> Robinson Crusoe <b>Paul Theroux:</b> <i>The Great Railway Bazaar</i> (Chapters 8 to 16)
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### Suggested Topics and Background Prose Readings for Class Presentations

Travel Writing and Ethnography  
Gender and Travel  
Globalization and Travel  
Travel and Religion  
Orientalism and Travel

### Readings

- Casey Balton, 'Narrating Self and Other: A Historical View', in *Travel Writing: The Self and The Other* (Routledge, 2012), pp.1-29
- Sachidananda Mohanty, 'Introduction: Beyond the Imperial Eyes' in *Travel Writing and Empire* (New Delhi: Katha, 2004) pp. ix –xx.
- Susan Bassnett, 'Travel Writing and Gender', in *Cambridge Companion to Travel Writing*, ed. Peter Hulme and Tim Young (Cambridge: CUP,2002) pp, 225-241
- Tabish Khair, 'An Interview with William Dalrymple and Pankaj Mishra' in *Postcolonial Travel Writings: Critical Explorations*, ed. Justin D Edwards and Rune Graulund (New York: Palgrave Macmillan, 2011), 173-184

### Course Outcomes

- CO1** – Student will acquire knowledge of the forms, techniques, and uses of the "fourth genre" of creative nonfiction.
- CO2** – Student will be familiarized with the forms and purposes of contemporary nonfiction travel writing.
- CO3** – Student will gain knowledge of the many themes of travel writing, which explores subjects that are personal, political, scientific, cultural, historical, and more.
- CO4** – A student will have a passport to "virtual travel" and thus a better understanding of the world and an improved sense of global geography.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes												Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2				1	3			2	2	1	3	2	2	2	
CO2	3					2	3	2		2	2	3	3		2	2	
CO3	3	3	1			2	3	2		2	2	3	3	3	2	2	
CO4	3		2			3	3	2		3	3	3	3		3	3	

### Open Elective 4: Popular Literature in English (DEN007A)

#### Course Objectives:

- This paper seeks to introduce the students to genres such as romance, detective fiction, fantasy/mythology, which have a —mass appeal, and can help us gain a better understanding of the popular roots of literature.
- To enable students to trace the rise of print culture in England, and the

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emergence of genre fiction and bestsellers

- To familiarize students with debates about culture, and the delineation of high and low culture
- To help them engage with debates about the canonical and non-canonical, and hence investigate the category of literary and non-literary fiction.

#### Course Content

<b>Unit 1</b>	<b>George Orwell</b> Animal Farm
<b>Unit 2</b>	<b>Paulo Coelho</b> The Alchemist
<b>Unit 3</b>	<b>Nicholas Sparks</b> The Notebook
<b>Unit 4</b>	<b>Chitra Banerjee Divakaruni</b> The Palace of Illusions

#### Readings

- Chelva Kanaganayakam, 'Dancing in the Rarefied Air: Reading Contemporary Sri Lankan Literature' (*ARIEL*, Jan. 1998) rpt, Malashri Lal, Alamgir Hashmi, and Victor J. Ramraj, eds., *Post Independence Voices in South Asian Writings* (Delhi: Doaba Publications, 2001) pp. 51–65.
- Felicity Hughes, 'Children's Literature: Theory and Practice', *English Literary History*, vol. 45, 1978, pp. 542–61.
- Leslie Fiedler, 'Towards a Definition of Popular Literature', in *Super Culture: American Popular Culture and Europe*, ed. C.W.E. Bigsby (Ohio: Bowling Green University Press, 1975) pp. 29–38.
- Sumathi Ramaswamy, 'Introduction', in *Beyond Appearances?: Visual Practices and Ideologies in Modern India* (Sage: Delhi, 2003) pp. xiii–xxix.

#### Course Outcomes

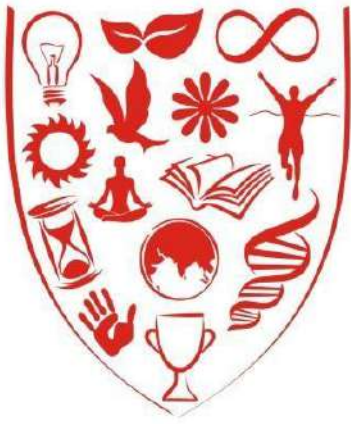
**CO1** - Students will be able to differentiate between canonical and the popular literature.

**CO2** - Students will be able to understand the effectiveness of the modern fiction, fantasy/mythology and romance which have a mass appeal.

**CO3** - Students will have better understanding of the popular roots of literature.

**CO 4** - Students will be able to differentiate between 'sense' and 'nonsense' in literature.

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**BOARD OF STUDIES : M.A. ENGLISH**  
**FOR ACADEMIC SESSION 2021-22**

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## **Program Description**

Master of Arts in English is a two year post-graduate program designed to prepare students to understand the use of the English language effectively by building vocabulary and introduce them to current ideas and issues. The course on English engages with literatures in English and the cultures with historical connections with English or translated into English and interprets and formulates cultural theories. In its concerns with literature, the subject engages with (a) processes of creativity and of appreciation i.e., poetics and aesthetics; (b) comparative literature across languages and cultures; (c) the act of literary representation and of methodologies, traditions and schools of interpretation; (d) the connection between visual representation, verbal image building and the nature of the mimetic act; and (e) with the politics of language. Language is multi-functional and is used in multiple contexts – communication, diplomacy, power, art and ideas amongst many others. The program offers deep insights into the world of literature and enables the students to critically appreciate major literary works. It strengthens the linguistic capabilities of the student through theoretical and practical sessions. The students are introduced to the political, social, cultural, economic and intellectual backgrounds of various periods in literary history. This opens up student vision and capability to acquire an understanding of life. After successful completion of the course, students can opt for careers like media & advertising, writing & publishing, journalism, public relations, content writing & blogging, creative writing, teaching and academia, etc.

Eligibility criterion is 55% in any discipline from a recognized higher institution.

## **Vision**

Our vision prevails in providing a perfect gateway to the new students who enter the core levels of learning, the freedom of enquiry, the pursuit of truth and care for others through teaching, scholarship and service of the highest calibre.

## **Mission**

Our mission is:

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- To familiarize students with literary and aesthetic concepts.
- To inculcate Communication skills and Life skills for the holistic development of the students.
- To instill research and investigative aptitude in learners.
- To promote integrative research approach towards learning.
- To future ready our students by identifying their caliber and inclination and place them in a professional and competitive space.

### **Masters in English**

#### **Programme Outcomes (POs):**

**PO1 Critical Thinking:** The students acquire in depth knowledge in the field of social sciences, Literature and Humanities. The critical analytical perspective will make them sensitive and sensible to solve the issues related with the man and mankind.

**PO2 Inter-disciplinary Approach:** Learners will integrate the various theories and methodologies in their chosen focus area(s), including interconnections between them as well as their connections with larger social and environmental contexts.

**PO3 Research Aptitude:** The students will know about research in their respective subjects. Students get knowledge of various research methods and can realize the importance of research to find solutions of a specific issue.

**PO4 Effective Communication:** Engage in inter and intra personal communications, behavioural change communication and proficiency in information Communication Technology.

**PO5 Environment and Sustainability:** The students will be sensitized towards the environment and work towards sustainable development and also on the issues of women empowerment, gender equality and sustainable practices in order to enable them to apply them in day to day life.

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**PO6 Ethics:** Students will cultivate a better understanding of the values of equality, ethics and morality that support in reasoned judgment at all stages of life and use ethical practices in research.

**PO7 Effective Citizenship:** Inculcate values of patriotism and of unity, and transfer these values to real-life through selfless volunteering and activism, for promoting community welfare.

#### **PROGRAMME SPECIFIC OUTCOMES FOR MA ENGLISH**

**PSO1:** To familiarise with the writers of English literature across different ages and continents, their theories, perspectives, models and methods.

**PSO2:** To be able to demonstrate competence in analysis and critically analyse scholarly work in the areas of English language teaching, literary research and translation.

**PSO3:** To develop the technical skills and ethical decisions appropriate for the holistic professional development in the field.

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**JECRC University**  
**School of Humanities and Social Sciences**  
**Department of English**  
**Course Structure of MA English**

**Course Structure**

<b>First Semester</b>								
		<b>Contact Hours</b>			<b>Credits</b>			
<b>Course Code</b>	<b>Course Name</b>	<b>L (Hrs)</b>	<b>T (Hrs)</b>	<b>P (Hrs)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core Courses</b>								
MEN001A	Literary Criticism	4	1	0	4	1	0	5
MEN002A	Research Methodology	4	1	0	4	1	0	5
MEN003A	Literature from Renaissance to Restoration	4	1	0	4	1	0	5
<b>Discipline Specific Elective</b>								
MEN013A	Introduction to Cultural Studies	4	1	0	4	1	0	5

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MEN017A	Introduction to Gender Studies	4	1	0	4	1	0	5
MEN021A	Language, Brain and Mind	4	1	0	4	1	0	5
MEN025A	Film Studies	4	1	0	4	1	0	5
<b>AECC (Ability Enhancement Compulsory Course)</b>								
DEN010A	Gender Studies	3	1	0	3	1	0	4
	<b>Total</b>	<b>19</b>	<b>5</b>	<b>0</b>	<b>19</b>	<b>5</b>	<b>0</b>	<b>24</b>

Second Semester								
		Contact Hours			Credits			
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L	T	P	C
Core Courses								
MEN004A	Indian Aesthetics	4	1	0	4	1	0	5
MEN005A	Indian Writing in English and Translation	4	1	0	4	1	0	5
MEN006A	Literature of Neo Classics to Romantics	4	1	0	4	1	0	5
Discipline Specific Elective - II								

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MEN014A	Memory, History and Mythologies	4	1	0	4	1	0	5
MEN018A	Gender Studies and Theories	4	1	0	4	1	0	5
MEN022A	Language, Society and Language Change	4	1	0	4	1	0	5
MEN026A	Adaptation and Reworking Studies	4	1	0	4	1	0	5
	Open Elective 1	3	0	0	3	0	0	3
	<b>Total</b>	<b>19</b>	<b>4</b>	<b>0</b>	<b>20</b>	<b>4</b>	<b>0</b>	<b>23</b>

Third Semester								
		Contact Hours			Credits			
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L	T	P	C
Core Courses								

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MEN007A	Critical Theory	4	1	0	4	1	0	5
MEN008A	Literature from Victorian to Modern Age	4	1	0	4	1	0	5
MEN009A	American Literature	4	1	0	4	1	0	5
<b>Discipline Specific Elective – III</b>								
MEN015A	Nation, Boundaries and Identities	4	1	0	4	1	0	5
MEN019A	Gender and Identity	4	1	0	4	1	0	5
MEN023A	Issues in Applied Linguistics	4	1	0	4	1	0	5
MEN027A	Violence, Memory and Resistance Literature	4	1	0	4	1	0	5
<b>Skill Enhancement Course</b>								
DEN009A	Introduction to Theatre and Performance	3	1	0	3	1	0	4
	Open Elective 2	3	0	0	3	0	0	3
	<b>Total</b>	<b>22</b>	<b>5</b>	<b>0</b>	<b>22</b>	<b>5</b>	<b>0</b>	<b>27</b>

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Fourth Semester								
		Contact Hours			Credits			
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L	T	P	C
<b>Core Courses</b>								
MEN010A	Post Colonial Literature	4	1	0	4	1	0	5
MEN011A	Worldwide Literature	4	1	0	4	1	0	5
MEN012A	Dissertation – II							10
<b>Discipline Specific Elective - IV</b>								
MEN016A	Popular Culture	4	1	0	4	1	0	5
MEN020A	Gender and Intersectionality	4	1	0	4	1	0	5
MEN024A	Translation: Concept and Challenges	4	1	0	4	1	0	5
MEN028A	Green Literature	4	1	0	4	1	0	5
<b>AECC (Ability Enhancement Compulsory Course)</b>								
DEN011A	Introduction to Creative Writing in Media	3	1	0	3	1	0	4
	<b>Total</b>	<b>15</b>	<b>4</b>	<b>4</b>	<b>15</b>	<b>4</b>	<b>0</b>	<b>29</b>

L = Number of Lectures hours/week  
 T = Number of Tutorial hours/week  
 P = Number of practical hours/week  
 C = Credit per paper

S No.	Course Type	No. of Papers	Color Code
1	Core Course	13+1=12	
2	Discipline Specific Elective (Out of sixteen papers offered students have to opt any six papers)	04	
3	AECC	02	
4	Open Elective	02	
5	SEC	01	
	<b>Total</b>	<b>21</b>	

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**CREDIT SUMMARY**

Semester I	Semester II	Semester III	Semester IV	Total Credits
24	23	27	29	103

**SEMESTER – 1****Core Course 1: Literary Criticism (MEN001A)****Course Objectives:**

- To develop students' understanding about the principles of Western European philosophy and aesthetic theory.
- To trace the evolution of these principals from the Classical to the Romantic and Modern periods.
- To prepare the student for more critical writings of contemporary nature.

**Course Content**

Unit 1	<b>Classic Literary Criticism</b> <b>Aristotle:</b> Poetics (Extracts) <b>Longinus:</b> On the Sublime (Extracts)
Unit2	<b>Early English Literary Criticism</b> <b>Philip Sidney:</b> An Apology for Poetry (Excerpts) <b>Alexander Pope:</b> Essay on Criticism
Unit 3	<b>Late Eighteenth Century English Criticism</b> <b>Samuel Johnson:</b> Preface to Shakespeare <b>Coleridge:</b> Biographia Literaria (Chapter IV/ the ones on Imagination)

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Unit 4	<b>Nineteenth Century English Criticism</b> <b>P.B. Shelley:</b> A Defence of Poetry (Extracts) <b>Mathew Arnold:</b> The Function of Criticism at the Present Time
Unit 5	<b>Modern English Literary Criticism</b> <b>T.S. Eliot:</b> Tradition and Individual Talent <b>I.A. Richards:</b> Practical Criticism (Four Kinds of Meaning/ Two Uses of Language)

### Suggested Readings

- Blamires, Harry. *A History of Literary Criticism*.
- Brooks, Cleanth and W.K. Wimsatt. *A Short History of Literary Criticism*.
- Elam, Kier. *Semiotics of Drama*.
- Ford, Andrew. *The Origins of Criticism*.
- Murray, Penelope and T.S. Dorsch. *Classical Literary Criticism*. (Penguin Classics)
- Prasad, B. *An Introduction to Classic Criticism*.
- Styan, J.L. *Modern Drama in Theory and Practice*.
- Watson, George. *English Criticism*
- Wellek, Rene. *A History of Literary Criticism* (6 Vols.)

### Course Outcomes:

The student will be able to –

**CO1:** Familiarized with origin of critical ideas in literature from Plato to present

**CO2:** Understand function of criticism, idea of tradition with a deep historical sense in the field of Literature.

**CO3:** Explore The World, the Text, and the Critic in Modern Criticism and Theory.

**CO4:** Acquire critical skills in the handling of theoretical issues related to the study of literature and culture.

**CO5:** Read and understand new articles on current research, theories, and analyses theories and discipline-specific skills to teach, edit and other professional areas.

*Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>CO1</b>	3	2	3	3	3	2	2	3	3	2
<b>CO2</b>	3	2	2	2	2	2	2	3	3	2
<b>CO3</b>	3	3	3	3	3	2	2	3	3	2

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CO4	3	3	3	3	3	2	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3

### **Core Course 2: Research Methodology (MEN002A)**

#### **Course Objectives**

- To familiarize students with the basic concepts of research on the post-graduate level before heading towards higher dimensions of research.
- To enable students to understand various paradigms of research, its tools, ethics and challenges related to English studies and related fields and develop creative and academic skills in them.

#### **Course Content**

<b>Unit 1</b>	<b>Introduction to Research Methodology:</b> Aims and principles of Research, Selection of a topic, Sources, Evaluation of Sources, Research aids, Literature Review, Research Plan, Research Hypothesis, Data collection- Primary and Secondary Sources
<b>Unit2</b>	<b>The Mechanics of Research:</b> Documentation, Format of a research paper, Preparation of thesis and dissertations, Proofreading
<b>Unit 3</b>	<b>Principles of Citation:</b> Schools of Citation, Why we Cite? ; In-text Citation, Quotations, APA Citation and References, MLA Citation and Work-cited, Chicago Manual Style: Citation and Bibliography, Footnotes
<b>Unit 4</b>	<b>What is literary research? (This unit incorporates following essays from <i>Research Methods in English Studies: Gabriele Griffin</i>)</b> o Textual Analysis as a Research Method (Catherine Belsey) o Archival Methods (Carolyn Steedman) o Discourse Analysis (Gabriele Griffin), o Creative Writing as a Research Method (Jon Cook)
<b>Unit 5</b>	<b>Ethics in Research and Plagiarism</b>

#### **Suggested Readings:**

- Academic Writing 1: Paragraph: Alice Savage and Mausod Shafiei
- Academic Writing: A Handbook for International Students: Stephen Bailey
- MLA handbook for Writers of Research Papers: Latest edition
- Peter Winch's "Can we understand ourselves?" (From Philosophical Investigations 20: 3 July, 1997)
- Quentin Skinner's "Motives, Intentions and Interpretation" (From —Visions of PoliticsI,
- Research Methodology: Methods and Techniques: C. R. Kothari
- Research Methods in English Studies: Gabriele Griffin
- Research Methods in English: M.P. Sinha

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**Course Outcomes:****By the end of this course, the students will be able to:****CO1:** Understand the basic concepts of research and Research Methodology**CO2:** Formulate their own research and write research papers, Articles, Thesis and Dissertations.**CO3:** Cite the sources used in his/her research properly in different styles according to the requirements.**CO4:** Apply proper research methods pertinent to English Studies and Related Fields**CO5:** To undertake ethical research by following the various guidelines set for the best practice in Research.***Course Articulation Matrix: (Mapping of COs with POs and PSOs)***

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>CO1</b>	3	3	3	3	2	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3	3	3	3	3	3
<b>CO3</b>	1	3	3	3	2	3	2	3	3	3
<b>CO4</b>	3	3	3	3	2	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3	3	3	3	3	3

**Core Course 3: Literature from Renaissance to Restoration (MEN003A)****Course Objectives:**

- To introduce the student to the tradition of Renaissance in 16<sup>th</sup> and 17<sup>th</sup> century England
- To provide basic insights about the Elizabethan Drama (both Tragedy and Comedy)
- To introduce the New English poetic forms of Spenserian stanza, Shakespearean sonnet, Metaphysical Poetry and Epics.
- To introduce Restoration Age and Comedy of Manner

**Course Content**

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<b>Unit 1</b>	<b>Ben Johnson</b> Every Man in His Humor
<b>Unit2</b>	<b>Edmund Spenser</b> The Shepherds Calendar (April Eclogue) <b>William Shakespeare</b> Shall I Compare thee to a Summers day?
<b>Unit 3</b>	<b>Christopher Marlowe</b> Dr. Faustus <b>William Shakespeare</b> Tempest / Othello
<b>Unit 4</b>	<b>John Donne</b> A Valediction: Forbidding Mourning Flea <b>John Milton</b> Lycidas <b>Herbert Spenser</b> The Collar
<b>Unit 5</b>	<b>William Congreve</b> The Way of the World

**Suggested Readings:**

- Age of Shakespeare, Vol. 2.
- Bradley, A C. Shakespearean Tragedy.
- Eighteenth Century Background. Augustan Age
- Ford, Boris. General Editor. Pelican History of Literature.
- From Donne to Marvell. Vol. 3.
- From Dryden to Johnson. Vol. 4.
- Wiley, Basil. Seventeenth Century Background

**Course Outcomes:**

**The student will be able to-**

**CO1:** Understand the concept of Renaissance and its emergence in 16<sup>th</sup> and 17<sup>th</sup> century England.

**CO2:** Understand the basics of comedy and difference between humor and manner

**CO3:** Reflect at the rise of Puritanism and development of scientific enquiry

**CO4:** Understand and differentiate the reflective prose and literary criticism – in both its theoretical and evaluative form

**CO5:** Apply the theories and criticism across all major texts, works and movements and write critical essays on it.

*Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

Course Outcomes	Program Outcomes	Program Specific Outcomes
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	2	2	2	2	2	3	2	2
CO2	2	1	2	2	1	1	1	3	2	1
CO3	3	3	3	3	2	2	2	3	3	2
CO4	3	3	3	3	2	2	2	3	3	2
CO5	3	3	3	3	1	2	2	3	3	2

### Discipline Specific Elective – 1

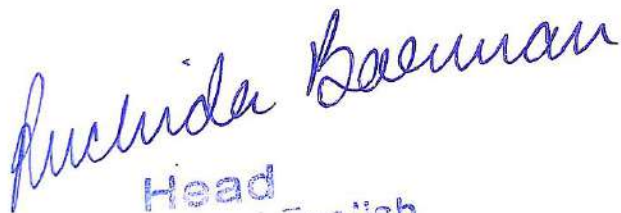
#### DSE 1: Introduction to Cultural Studies (MEN013A)

##### Course Objectives

- Introduce students to significant debates and theories within Cultural Studies
- Enable students to engage with these debates from their own immediate vantage points
- Familiarize students to core methodologies of narrativizing the past and the present through a Cultural Studies approach

##### Course Content

<b>UNIT 1</b>	<b>Introduction: Culture as Concept</b> Various words and meanings associated with word ‘culture’. Civilization, anthropology, traditions, nationalism, acculturation, subculture, cultural relativism, aesthetics, iconography, symbols, globalization, colonization, indigenous, language, ethnicity, identity, self. Explore ways of understanding the relationship between culture and society.
<b>UNIT 2</b>	<b>Cultural Studies</b> Emergence of Cultural Studies in India in reference to its development in UK and North America. M Madhava Prasad: <i>Cultural Studies in India. Reason and History.</i> Vinay Lal. <i>Introduction. South Asian Cultural Studies: A Bibliography</i> Rashmi Swahney. <i>Decolonizing Cultural Studies, Artha</i>

  
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<b>UNIT 3</b>	<b>Nation as Representation</b> Idea of nation, nationalism and contested nature of nation and nationalism. A S Rathore and Ashis Nandy: Introduction. Vision for a Nation: Paths and Perspectives. Ernst Renan: <i>What is a Nation?</i> Romila Thapar: <i>From on Nationalism</i> .
<b>UNIT 4</b>	<b>Subaltern Studies</b> Reworking of the Western Idea of the 'class' into reworking of subaltern studies. Gayatri Spivak: <i>Can Subaltern Speak?</i> Dipesh Chakrabarty: <i>In Retrospect: Subaltern Studies and the Future Past</i> .
<b>UNIT 5</b>	<b>Politics of Identity: Caste, Race, Gender and Language</b> Identity as an important factor in shaping idea of cultural production and consumption with focus on notion of caste, race (in global and societal context), gender and language. Ambedkar, BR: <i>Annihilation of Caste</i> . Devy, GN. <i>The Being of Bhasha: a General Introduction</i> . Leggon: <i>Race and Ethnicity: A Global Perspective</i> .

#### **Suggested Reading:**

- A S Rathore and Ashis Nandy: 'Introduction', Vision for a Nation: Paths and Perspectives
- Aloysius G: From *Nationalism Without a Nation*.
- Ambedkar, BR: Extracts from *Annihilation of Caste*.
- Dipesh Chakrabarty: 'In Retrospect: Subaltern Studies and the Future Past'
- Gayatri Chakravorty Spivak: "Can the Subaltern Speak?"
- Grossberg, Lawrence. 'Cultural Studies in the Future Tense'.
- Guru, Gopal: 'Liberal Democracy in India and the Dalit Critique'.
- Gilroy, Paul (1992) Short Extract from *The Black Atlantic*
- Leggon: 'Race and Ethnicity: A Global Perspective'
- Niranjana, Tejaswini, P. Sudhir, and Vivek Dhareshwar: 'Introduction', *Interrogating Modernity: Culture and Colonialism in India*.
- Partha Chatterjee: 'Whose Imagined Community?'
- Rashmi Sawhney: 'Decolonising Cultural Studies', *Artha*.
- Romila Thapar: From *On Nationalism*.
- Vinay Lal: 'Introduction', *South Asian Cultural Studies: A Bibliography*. Madhava Prasad: 'Cultural Studies in India: Reasons and a History'.
- Vivek Chibber: 'Revisiting Subaltern Studies', *EPW*

#### **Course Outcomes (CO):**

##### **Students will be able to:**

**CO1** – Understand and analyze the culture, its various tropes and cultural studies.

**CO2** – Understand and interpret the multifarious dimension of culture studies in terms of history, anthropology, politics, literature, society and individual and collective identities.

**CO3** - Use Cultural Studies approaches to reflect upon their own immediate contexts through assignments and class exercises.

**CO4** - Develop habits of independent learning through research projects and critical analysis.

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**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO 2	PSO3
CO1	2	2	3	1	2	2	3	3	2	2
CO2	3	3	3	3	3	2	3	3	3	2
CO3	3	3	3	3	3	2	2	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3

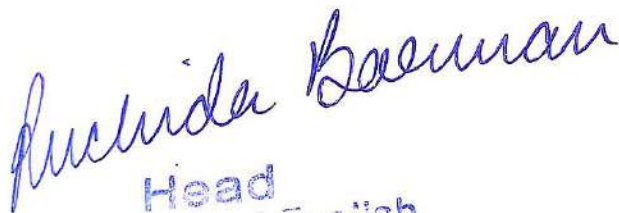
**DSE 1: Introduction to Gender Studies (MEN017A)**

**Course Objectives:**

- To understand how gender and sexuality operate in institutions, systems, organizations and the public sphere;
- To develop an understanding of genders and sexualities that emphasizes the histories, theorizing, and experiences of multiple communities, identities, and perspectives;
- To recognize the intersection of race, class, sexuality, gender, and the structural sources of privilege in the full range of human endeavors;
- To understand the diversity of women's and sexual minority's lives in the past and present, in local, national and global contexts.

**Course Content**

UNIT 1	<b>Conceptualizing Gender</b>
	<ul style="list-style-type: none"> <li>• Sex and Gender; Types of Gender</li> <li>• Gender Roles and Gender Division of Labour</li> <li>• Gender Stereotyping and Gender Discrimination</li> <li>• Construction of Sexuality</li> <li>• Masculine, Feminine, LGBTQ</li> <li>• The Other and Objectification</li> <li>• Male Gaze and Objectivity</li> </ul>

  
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UNIT 2	<b>Gender Perspectives of Body</b> <ul style="list-style-type: none"> <li>• Biological, Phenomenological and Socio-Cultural Perspectives of body</li> <li>• Body as a Site and Articulation of Power Relations</li> <li>• Cultural Meaning of Female Body and Women's Lived Experiences</li> <li>• Gender and Sexual Culture –Richard Freiherr von Krafft-Ebing , Henry Havelock Ellis, and Sigmund Freud</li> </ul>
UNIT 3	<b>Gender and Society</b> <ul style="list-style-type: none"> <li>• Gender and Family</li> <li>• Gender and Marriage and Kinship</li> <li>• Gender and Education</li> <li>• Social Dynamics of Gender – Patriarchy, Capitalism, Caste, Class and Gender</li> </ul>
UNIT 4	<b>Social Construction of Femininity</b> <ul style="list-style-type: none"> <li>• Bio-Social Perspective of Gender</li> <li>• Gender as Attributional Fact.</li> <li>• Essentialism in the Construction of Femininity</li> <li>• Challenging Cultural Notions of Femininity</li> <li>• Images of Women in Sports, Arts, Entertainment and Fashion Industry</li> <li>• Media and Feminine Identities</li> </ul>
UNIT 5	<b>Social Construction of Masculinity</b> <ul style="list-style-type: none"> <li>• Definition and Understanding of Masculinities</li> <li>• Sociology of Masculinity</li> <li>• Social Organization of Masculinity and Privileged Position of Masculinity</li> <li>• Politics of Masculinity and Power</li> <li>• Media and Masculine Identities</li> </ul>

#### Suggested Reading:

- Butler, Judith and Joan Scott, eds., 1992. Feminists Theorize the Political, New York: Routledge
- Butler, Judith, 1990, Gender Trouble, Routledge, New York
- Cherry Smith, 1997, 'Queer Notions', in Sandra Kemp and Judith Squires (eds), Feminisms, Oxford University Press: New York
- Connell, R W, 1987, Gender and Power, Cambridge, Polity Press
- Di Leonardo, Micaela. Ed. 1991. Gender at Crossroads of Knowledge: Feminist Anthropology in the Postmodern Era, University of California Press. California
- Gerda Lerner, 1985 Creation of Patriarchy, Oxford University Press
- Grew, Sneha, 1991, A Reader in Feminist Knowledge, Routledge, New York
- Jackson, Steve, 1999, 'Heterosexuality in Question', Sage Publications.
- Jaggar, A, 1983. Feminist Politics and Human Nature, Brighton: The Harvester

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Press.

- Kathy Rudy, 2000, 'Queer Theory and Feminism', Women's Studies, vol.29, 195-216.
- Menon, Nivedita. ed. 2007. Sexualities. Women Unlimited. New Delhi.
- Millett, Kate, 1970, Sexual Politics, Avon Books, New York
- Mohanty, Chandra Talpade. 1991. Third World Women and the Politics of Feminism, ed. Indianapolis: Indiana University Press
- Scott, Joan 1988 Gender and the politics of history, New York: Columbia University Press
- Seidman, Steven 1996, (ed), 'Queer Theory/Sociology', Blackwell
- V. Geetha, 2007, Patriarchy, Stree Publications, Calcutta

### Course Outcomes (CO):

Students will be able to:

**CO1:** Define and Evaluate gender as a social construct.

**CO2:** Identify the ways gender, power, privilege, and oppression play out across a range of cultures and human experiences.

**CO3:** Demonstrate an understanding of gender as it intersects with sexuality, race, ethnicity, religion, class and other critical variables.

**CO4:** Analyze human interactions and social/political systems using a "gender lens".

**CO5:** Conduct scholarly research on key gender issues and/or debates.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	3	3	3	2
CO2	3	3	3	3	2	2	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	2	2	2	3	3	3	3
CO5	3	2	3	3	2	2	3	3	3	3

### DSE 1: Language Brain and Mind (MEN021A)

#### Course Objectives

- Understand the historical development of ideas in Linguistics in relation to ideas in Philosophy, Psychology and Neurology.
- Analyze the connection between linguistic and cognitive concepts
- Comprehend the basic components of language processing

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- Understand the neurobiological underpinnings of language organization in the brain
- Understand how the brain processes Sign Language of the Deaf

### Course Content

UNIT 1	Introduction to Language, Brain and Mind <ul style="list-style-type: none"> <li>• Behaviorism: Proponents and Critics</li> <li>• Cognitive Revolution: Computational Theory of Mind, Modularity of Mind, Functionalism, Connectionism</li> </ul>
UNIT 2	Language and Cognitive Concepts <ul style="list-style-type: none"> <li>• Sapir-Whorf Hypothesis</li> <li>• Colour terms</li> <li>• Mass and Count Terms</li> <li>• Numerical cognition</li> </ul>
UNIT 3	Cognitive basis of Language <ul style="list-style-type: none"> <li>• Competence and Performance</li> <li>• Mental Representations and the Psychological reality of linguistic structure: Language and Memory; the sentence superiority effect</li> <li>• Language Processing: planning, production, comprehension, reading</li> </ul>
UNIT 4	Neurobiological basis of Language <ul style="list-style-type: none"> <li>• Acquisition of Language: First Language Acquisition, Critical Period Hypothesis, Second Language Acquisition, Multilingualism</li> <li>• Aphasia and other language disorders</li> <li>• Experimental evidence for brain organization</li> </ul>
UNIT 5	Sign Language in the Brain <ul style="list-style-type: none"> <li>• Language in the visual-gestural modality</li> <li>• Sign Language Acquisition: Critical Period and effects of late language acquisition</li> <li>• Similarities and Differences between Sign Language and Spoken Language Processing in the Brain</li> <li>• Lateralisation</li> <li>• Brain Lesions in Signers</li> </ul>

### Suggested Reading:

- Aitchison, J. (2007). The articulate mammal: An introduction to psycholinguistics. Routledge.
- Barner, D., & Snedeker, J. (2005). Quantity judgments and individuation: Evidence that mass nouns count. *Cognition*, 97(1), 41-66.
- Campbell, Ruth; MacSweeney, Mairéad; Waters, Dafydd. Sign language and the brain: a review. *Journal of Deaf Studies and Deaf Education*. 2008; 13(1):3–20.

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- Chomsky, N. (1959). "A review of BF Skinner's Verbal Behavior". Language, 35(1), 26-58.
- Emmorey, K., (2002) Language, cognition and the brain: Insights from Sign Language Research. Lawrence Erlbaum Associates Publishers.
- Friederici, A. D. (2017). Language in Our Brain: The Origins of a Uniquely Human Capacity. United States: MIT Press.
- MacSweeney, Mairéad; Capek, Cheryl M.; Campbell, Ruth; Woll, Bencie. The signing brain: the neurobiology of sign language. Trends in Cognitive Sciences. 2008a; 12(11):432–440.
- Pinker, S. (2003). The language instinct: How the mind creates language. Penguin UK.
- Rescorla, M. (2020). "The Computational Theory of Mind" in Edward N. Zalta (ed.), The Stanford Encyclopedia of Philosophy. <https://plato.stanford.edu/archives/fall2020/entries/computational-mind/>

### Course Outcomes (CO):

By the end of this course the students will be able to-

CO1: Critically analyze broad hypotheses regarding the language-brain-mind interface

CO2: Devise and test novel hypotheses about the specific contribution of different languages to our understanding of the language-brain-mind interface

CO3: Understand and analyze language learning keeping the mind working in mind.

CO4: Understand the

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	3	2	2				3	2
CO2	2	3	3	2	2				3	2
CO3	2	3	3	2	2				3	2
CO4	2	3	3	2	2				3	2

### DSE 1: Film Studies (DSE025A)

#### Course Objective:

- Develop and display an understanding of critical analysis of film through careful examination of cinematic adaptations of literary texts, focusing on character development, dramatic structure, and performance among other narrative devices.
- Utilize the terminology of film analysis, both those terms shared with literary discussion and those specific to cinema
- Evaluate and display an understanding of the possibilities and problems involved in the transposition of literature to film, applying terminology and critical skills.
- Understanding the semiotics of visual representation;

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- Critical analysis and appreciation of cinematic techniques; and
- Transference of text to image.

### Course Content

Unit 1	<b>Herbert Read:</b> "Towards a Film Aesthetics" <b>Maya Deren:</b> "Cinematography: The Creative Use of Reality" 216-227.
Unit 2	<b>Richard Maltby &amp; Ian Craven:</b> Introduction from Hollywood Cinema. Blackwell. Oxford, 1995. <b>Satyajit Ray:</b> "An Indian New Wave." Our Films, Their Films.
Unit 3	<b>Laura Mulvey:</b> Visual Pleasure & Narrative Cinema" (from Film Theory and Criticism). <b>Ritwik Kumar Ghatak:</b> „Sound in Film“, in Rows and Rows of Fences, 2000
Unit 4	<b>Akira Kurosawa:</b> Rashomon/ Ran with reference to text. <b>Satyajit Ray:</b> Shatranj Ke Khiladi with reference to texts.
Unit 5	<b>Forms of Cinema: Melodrama and Spectacular with special reference to one of the following.</b> Mughal-e-Azam / The Ten Commandments / Troy. Meghe Dhaka Tara / Mother India / Rebecca

### Suggested Readings

- Bazin, Andre. The Evolution of the Language of Cinema, and The Virtues and Limitations of Montage, in What is Cinema? Vol. 1, 2005.
- Bordwell & Thompson: Film Art and Film History Ideology of Indian Films
- Boyum, Joy Gould. Double Exposure: Fiction & Film: Calcutta: Seagull, 1989.
- Braudy, Leo and Marshall Cohen. Film Theory & Criticism: Introductory Readings. Oxford University Press: 2004.
- Kolker, Robert. Film, Form and Culture.
- Monaco, James: How to read a Film: The World of Movies, Media, Multimedia: Language, History, and Theory. Oxford University Press: 2000.
- Nandy, Ashis and Viney Lal. Fingerprinting Popular Culture, Delhi: OUP (2006) 2010
- Nandy, Ashis. The Secret Politics of Our Desires. 1998
- Ray, Satyajit. Our Films, Their Films. Orient Black Swan (1976), 2009.
- Stam, Robert & Toby Miller: Eds. A Companion to Film Theory. London: Blackwell Publishers, 1999.

### Course Outcome:

**At the end of the course, the student will be able to-**

**CO1:** Gain perspective on literature's relationship with cinema

**CO2:** Understand film form as language

**CO3:** Learn politics and processes of adaptation

**CO4:** Explain terminology used in the analysis of literature and film, and ways it can be used

**CO5:** Identify and describe a variety of critical approaches that may be employed in the study of literature and film

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***Course Articulation Matrix: (Mapping of COs with POs and PSOs)***

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	3	3	1	2	1	3	3	3
CO2	2	3	2	3	2	3	2	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	1	3	2	3	2			3	1	2
CO5	3	3	3	3	2	1		3	3	3

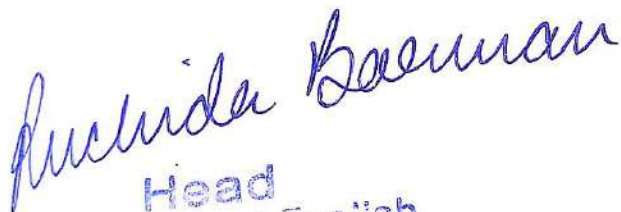
**Ability Enhancement Course- Gender Studies (DEN010A)**

**Course Objective:**

- To enable the student to understand gender as a category of social analysis and gender bias in contemporary society.
- To provide insight on gender disparities within the family, economy, education, political and legal systems.
- To enable the students to explore gendered lives, analyze oppressive structures and discriminatory practices, question gender power relations, articulate gender strategy to undo gender discrimination and develop gender schema for women empowerment.
- To understand the linkages between environment and livelihoods of women.
- To sensitize the students on the presentation of gender in different media and develop a critical thinking.
- To enrich the students with critical enquiry, analytical understanding and conceptual reasoning.

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Unit 1	<b><u>Conceptualizing Gender</u></b> <ul style="list-style-type: none"> <li>• Sex and Gender</li> <li>• Types of Gender</li> <li>• Gender Roles and Gender Division of Labour</li> <li>• Gender Stereotyping and Discrimination</li> <li>• Construction of Sexuality</li> <li>• Masculine, Feminine and LGBTQ</li> <li>• Need for Gender Sensitization</li> </ul>
Unit 2	<b><u>Gender and Society</u></b> <ul style="list-style-type: none"> <li>• <b>Gender and Family-</b> Gender division of labour, Gender Role and Psychoanalysis and Social Construction</li> <li>• <b>Gender in Political and Legal System-</b> Gender representation in Polity, Gender perspective of personal Law, Social Legislations and Empowerment</li> <li>• <b>Gender and Education</b> – Gender disparity in Education, Gender bias in School curriculum, Education goals from Gender Perspective</li> <li>• <b>Social Dynamics of Gender</b> – Patriarchy, Capitalism, Caste, Class and Gender</li> </ul>
Unit 3	<b><u>Gender and Economy</u></b> <ul style="list-style-type: none"> <li>• <b>Contribution of Gender in Country's Economy</b></li> <li>• <b>Gender Inequality in Labor Market</b> - Segmented Labor Market and Occupational Segregation, Gendered jobs and Social Inequality, Sex Segregation at Work Place, Gender Stereotyping at workplace.</li> <li>• <b>Organized Sector-</b> Definition and categories of organized economy, Women's participation in organized sector, Gender Discrimination, Marginalization and Glass Ceiling, Gender issues at the work place.</li> <li>• <b>Unorganized Sector</b> Globalization and its impact on gender Concentration of women in informal sector and gendered occupations ,Issues of wage discrimination and exploitation</li> </ul>

  
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Unit 4	<p><b><u>Gender, Environment and Livelihood</u></b></p> <ul style="list-style-type: none"> <li>• Gender roles in Rural and Tribal Societies</li> <li>• Environment and Livelihood Resources</li> <li>• Gendered impact of globalization and loss of livelihoods</li> <li>• <b>Environmental Degradation and Livelihoods of Women-</b> Environmental Degradation : Deforestation, Climate Change, Depletion of Water</li> <li>• <b>Resources</b> Gender specific consequences of environmental degradation, Development, displacement and loss of livelihood</li> <li>• <b>Livelihood Resources</b>, Rights and Entitlements</li> <li>• <b>Role of Women in Sustainable Environment</b> Women in Natural Resources Management, Women, Public-Private Partnership and natural resource management, Women, Participatory Management and natural resources management, Role of women in Sustainable Development</li> </ul>
Unit 5	<p><b><u>Gender and Media</u></b></p> <ul style="list-style-type: none"> <li>• Evolution: Traditional, folk media, Mass media.</li> <li>• Fundamentals of Mass Communication Types of Mass media and their Characteristics: theatre, print, electronic, audio, video and New Media.</li> <li>• Gender Stereotyping in Media- Portrayal of Gender in Print Media, Audio Visual Media, Radio Programmes</li> <li>• Gender and Electronic Media- Television- Gender Presentation in Serials / Reality Shows / Talk Shows / Game Shows /</li> <li>• Advertisements / Comedy / News – TV Culture.</li> <li>• Films - Gender construct through the history of cinema - Hero Vs Heroine Centric Representation and Gender Stereotyping</li> <li>• Commercialization and Objectification</li> <li>• Gender and Alternative Media</li> </ul>

### Readings:

- Basu Aparna(1999) Women's Education in India in Ray and Basu (edt): From
- Bhandari, M. (2004) Quality of Life of Urban Working Women. New Delhi: Abhijeet Publications.
- Bhasin Kamala (2000): Understanding Gender, kali for women, N. Delhi.
- Bonnie J. Bow, Julia T. Wood,(2006) The Sage Hand book of Gender and Communication, New Delhi: Sage Publication (RGNIYD – 7089)
- Chakravarty Uma (2003), Gendering caste through a feminist Lense, Stree, Calcutta.

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- Foucault, Michel. "17 March 1976." Society Must Be Defended: Lectures at the College de France 1975-1976. Trans. David Macey. New York: Picador, 1976.
- Freedman Jane: Feminism, Viva Books, New Delhi, 2002.
- Ganesamurthy (ed.) (2008) Women in the Indian Economy. New Delhi: New Century Publications.
- Geetha V.: Gender, Stree, Calcutta, 2002.
- Geetha V.: Patriarchy, Stree, Calcutta, 2007.
- Ghadiyally Rehana (Edt): Urban Women in Contemporary India, Sage Publications, 2007.
- John D.H. Downing, (2004) The Sage Handbook of Media Studies New Delhi: Sage Publication, (RGNIYD -6781)
- Kaplan Karen, An Introduction to Women's Studies: Gender in a Transnational World. 2nd ed. Eds. Inderpal Grewal and New York: McGraw Hill, 2006.
- Khullar Mala(ed.): Writing the Women's Movement- A Reader, Zubaan, New Delhi, 2005.
- Kimmel Michael: The Gendered Society, Oxford, NY, 2008.
- Krishna S(ed) Women's Livelihood Rights, recasting citizenship for development (2007) New Delhi: Sage.
- Pamela J. Creedon & Judith Cramer, (2007) Women in Mass Communication (Third Edition), New Delhi: Sage Publication. (RGNIYD- 6301)

### **Course Outcomes:**

CO1- Student will be sensitized to the concept of sexuality and gender as a social identity.

CO2- Student will be able to understand disparities and discriminations prevalent in society, economy, political and legal system, education etc on the basis of the gender.

CO3- Student will be able to understand the role of genders and its impact on environment and sustainable development.

CO4- Student will be able to understand the role of media in creation and projection of gender representations.

## **SEMESTER II**

### **Core Course 4: Indian Aesthetics (MEN004A)**

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### Course Objectives

- To initiate students in the study of Indian aesthetics and Literary Criticism
- To enable them to appreciate its theoretical dimensions and interpret texts

### Course Content

<b>UNIT 1</b>	<b>Rasa Theory</b> Bharatamuni: <i>On Natya and Rasa: Aesthetics of Dramatic Experience</i> (translated by G.K. Bhatt) <b>Introduction</b>
<b>UNIT 2</b>	<b>Dhvani Theory</b> Anandavardhan: <i>Dhvani: Structure of Poetic Meaning</i> (translated by K.Krishnamoorthy) <i>Meghdootam</i> by Kalidasa
<b>UNIT 3</b>	<b>Vakrokti</b> Kuntaka: <i>Language of Poetry and Metaphor</i> (translated by George G.O. Hass)
<b>UNIT 4</b>	<b>Rabindranath Tagore:</b> “What is Art?” <b>A.K. Ramanujan:</b> “Is there an Indian Way of Thinking? An Informal Essay”
<b>UNIT 5</b>	<b>Indian Poetic Traditions</b> Amir Khusrau: “Multilingual Literary Culture” (translated by R. Nath and Faiyaz ‘Gwaliari’) A.K. Ramanujan: “On Ancient Tamil Poetics”

### Suggested Reading:

- Auchitya in Sanskrit Poetics, 245-261. By V. Raghavan.
- Bhartrihari: Vakyapadiya, Trans. By K. A. Subramania Iyer. New Delhi: MLBD, 1971.
- Bhartrihari’s Discussions of the Nature of the Sphota. 272-286. By K. Raja
- Devy, G. N.: Indian Literary Criticism: Theory and Interpretation (2002). Hyderabad: Orient Blackswan, 2010.
- From Dhavanyaloka: Anandavardhana. Pp 78-88.
- From Locana: Abhinavgupta. Pp 108-135.
- From Vakrokti Jivita: Kuntaka. Pp 143-150.
- Kapoor, Kapil: Literary theory: Indian Conceptual Framework. Delhi: Affiliated East-West Press Pvt. Ltd, 2012.
- Kuntaka’s Theory of Poetry: Vakrokti. 206-218. By SK De
- Padia, Chandrakala: “Feminism, Tradition and Modernity: An Essay in Relation to Manusmriti.” (pp 231-39). Shimla: IAS, 2002 & 2015.
- Sethuraman, V.S.: Indian Aesthetics: An Introduction. Bangalore: Trinity Press, 2014.
- Theory of Dhvani. 287-309. By K. Raja

### Course Outcomes

**At the end of this course students will be able to:**

**CO1:** Understand the basic concepts of aesthetics according to Indian scholars and philosophers against the

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historical background of the aspect of "beauty" in Fine Arts

**CO2:** Understand the four facets of Aesthetics, and the various aspects of Aesthetics, such as Aesthetic Attitude, Expression, Experience, Feeling and Emotion.

**CO3:** Analyze the contextual relevance of aesthetic theories.

**CO4:** To develop a culture of critical and analytical thinking

*Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	3	3	3
CO2	3	2	3	2	1	2	1	3	3	1
CO3	3	3	3	2	1	1	1	3	3	2
CO4	3	1	3	2	1	2	2	3	3	2

### **Core Course 5: Indian Writing in English and Translation (MEN005A)**

#### **Course Objectives:**

- Familiarize the students with the importance of translation as a tool bridging the gap among various linguistic regions.
- Explain how Literature becomes wide reaching, from local confines to universal readership.
- Initiate to analyze the impact of social, political, economic, and political factors on the translation

#### **Course Content**

<b>Unit 1</b>	<b>Henry Derozio</b> The Harp of India <b>Sri Aurobindo</b> Savitri: a Legend and a Symbol <b>Bankim Chandra Chattopadhyay</b> Rajmohan's Wife
<b>Unit2</b>	<b>Raja Rao</b> Preface to <i>Kanthapura</i> <b>Krishna Sobti</b> Zindaginama

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<b>Unit 3</b>	<b>Rabindranath Tagore</b> Home and The World <b>Jhumpa Lahiri</b> Interpreter of Maladies
<b>Unit 4</b>	<b>Vijay Tendulkar</b> Silence! Court is in Session
<b>Unit 5</b>	<b>R. Parthasarthy</b> Exile, Trial and Homecoming from <i>The Rough Passage in Ten Twentieth Century Poets</i> ed. R. Parthasarthy <b>Sarojini Naidu</b> The Bird of Time: Songs of Life, Death and the Spring (any two poems) <b>Nissim Ezekiel</b> Poet, Lover, Birdwatcher

#### Suggested Readings:

- K.R.S. Iyengar, Indian Writing in English, New Delhi: Sterling Publishers, 1985.
- Mehrotra, Arvind K. A Concise History of Indian Literature in English, Macmillan, 2009.
- Mukherjee, Sujit. "Indo-English Literature: An Essay in Definition", Critical Essays on Indian
- Mukherjee, Sujit. "Towards a Literary History of India", The Idea of Indian Literature. Ed. Sujit
- Mukherjee. Mysore: Central Institute of Indian Language, 1981.
- Naik, M.K. and Shyamala Narayan. A History of Indian Writing in English. New Delhi : Sahitya Akademi
- Ramanan, Mohan. "Introduction" to Nineteenth Century Indian English Prose. Ed. Mohan
- Ramanan. New Delhi : Sahitya Akademi.
- Talwar, Urmil and Bandana Chakravarty. Contemporary Indian Drama. Rawat.
- Walsh, William. Indian Literature in English. London and New York: Longman, 1990.
- Writing: Presented to Armando Menezes. Eds. M.K. Naik et al., Dharwar: 1968.

#### Course Outcomes:

**At the end of this course students will be able to:**

**CO1:** Understand the importance of translation and translation theories.

**CO2:** Attain accessibility to regional and international literary forms.

**CO3:** Critically evaluate the text under different domains of society, politics, economics and culture.

**CO4:** Contextualize the text and develop a comparative perspective to study the texts.

#### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes	Program Specific Outcomes
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s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	3	2	3	3	3
CO2	1	3	2	2	3	1	2	3	1	2
CO3	3	3	3	2	2	2	3	3	3	2
CO4	3	3	3	3	2	3	2	3	3	3

### Core Course 6: Literature of Neo-Classics to Romanticism (MEN006A)

#### Course Objectives:

- Acquaint the students with three remarkable forms of literature: Essay, poetry and drama.
- Understand gradual changes from reason to emotion in British literature
- Highlight on the major features of neo-classicism and Enlightenment.
- Provide the students with the broad idea of the social and historical contexts of British Romantic Literature.
- Understand the concept of nature as stated by the romantic poets in literature.
- Appreciate the simplicity and lucidity of expression of poets in romantic literature

#### Course Content

<b>Unit 1</b>	<b>Alexander Pope</b> Elegy to the Memory of an Unfortunate Lady <b>Jonathan Swift</b> A Modest Proposal
<b>Unit2</b>	<b>John Dryden</b> All for Love <b>Oliver Goldsmith</b> She Stoops to Conquer
<b>Unit 3</b>	<b>Henry Fielding</b> Tom Jones <b>Lady Mary Wortley Montagu</b> Hymn to Moon The Lady's Resolve

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<b>Unit 4</b>	<b>Thomas Gray</b> The Bard – A Pindaric Ode <b>Robert Burns</b> A Red Red Rose <b>Walter Scott</b> The lady of the Last Minstrel <b>William Wordsworth</b> Lucy Poems <b>Samuel Taylor Coleridge</b> The Rime of the Ancient Mariner
<b>Unit 5</b>	<b>Percy Bysshe Shelley</b> To a Skylark <b>Lord Byron</b> Don Juan <b>John Keats</b> Ode on a Grecian Urn <b>Mary Shelley</b> Frankenstein

#### Suggested Readings

- Abrams, M.H. The Mirror and the Lamp.
- Ford, Boris. General Editor. From Blake to Byron. Pelican History of Literature. Vol. 5.
- M Butler, Romantics, Rebels and Reactionaries: English Literature and its Background
- M. Kirkham, Jane Austen, Feminism and Fiction (Brighton, 1983)

#### Course Outcomes:

**At the end of the course the student will be able to-**

**CO1:** Read, understand and learn to interpret Neoclassical Literature

**CO2:** Differentiate between the various literary forms and devices such as the Epic, Mock Epic, Satire, Elegy Comedy of Manners, the Picaresque novel etc.

**CO3:** Follow the concept and significance of nature in Romantic poetry and understand the spiritual interpretation of nature and its educative power as depicted by the romantic poets

**CO4:** Understand the difference between reason and imagination, literature and revolution and get the glimpse of the presence of Gothic element in romantic literature.

**CO5:** Critically analyze and understand formal, societal, cultural, and human issues discussed and described in the poems, prose and the novel of that eras.

*Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3

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CO1	3	1	2	3	1	1	2	3	3	1
CO2	3	2	2	2	2	1	2	3	3	2
CO3	3	2	3	2	3	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	2	3	3	3	3	3	3

## Discipline Specific Elective - 2

### DSE 2: Memory, History and Mythologies (MEN014A)

#### Course Objectives

- Understand genres of historical narratives, including historiography, ethnology and anthropology.
- Identify social and cultural factors that help shape our identities by analyzing firsthand reflections and creating their own personal identity charts.
- To make students understand that identity is not only valuable for their own social, moral, and intellectual development, it also serves as a foundation for examining the choices made by individuals and groups in the past as well as in the present.
- Understand the cultural and historical significance of myths
- Identify universal mythic patterns
- Develop a cross-cultural perspective on myths
- Understand the fundamentals of Mnemoculture
- Recognize the role of performative art within mythology

#### Course Content

<b>UNIT 1</b>	<b>Memory, History and Identity</b> <ul style="list-style-type: none"> <li>- Performance of the Past: Theories of History, Memory and Identity, and Cultural Histories</li> <li>- Framing and Reframing Identity: Mapping the Terrain of Memory - Individual to Collective</li> <li>- Unstuck in Time: The Sudden Presence of the Past - The Politics of Subversion</li> <li>- Tracing the Ghost and Geography of Violence-</li> <li>- The Contested Place of Memory</li> <li>- The Ubiquitous Past-Present and Lost</li> <li>- Making History: Narratives and Counter-narratives</li> </ul>
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UNIT 2	<p><b>Performative Identities: Indelible Memories</b></p> <p>Memory and discordant Images: Political Lives of Dead Bodies; Burials, Mass Graves, Exhumations, Bodies of Great People. Identity and the Politics of Remembrance: Engendered Memories; Culinary Discourses and Politics of Food; Folktales and Folklore The Economy of Memory: Consumption of/and Heritage, Heritage Tourism, Cultural Property and Identity Ethics and Limits of Representation: Can Culture <i>Belong</i> to any One Group? Can Culture be Copyrighted?</p> <p>William Golding: <i>Lords of Flies</i>  Joanna Harris: <i>Chocolat</i>  Lisa See: <i>Snow Flower and A Secret Fan</i>  Arthur Golden: <i>Memoir of Geisha</i></p>
UNIT 3	<p><b>Myths, Symbols and Meaning Making</b></p> <p>The unit seeks to familiarize students with the anthropology of myths and establish the connect between myths, rituals, symbols. The attempt is to elucidate the cross-cultural overlaps that myths bring to the fore.</p> <p>Sir James George Frazer: <i>The Golden Bough: A Study in Magic and Religion</i>  Amar Chitra Katha  Hesiod: "Theogony"  Aesop's Fables  Geoffrey Chaucer: <i>The Canterbury Tales</i></p>
UNIT 4	<p><b>Mythical Imagination and Re-interpretation</b></p> <p>The focus of this unit is on contemporary Indian mythical narratives. The texts under this unit will help locate the manner in which myths have been reinterpreted and retold according to contemporary ambiances and offer alternate and multiple readings of such narratives. The unit will also bring to the fore the difference between 'myth' and 'history', decoding of myths under the ambit of popular imagination and culture.</p> <p>Chitra Devakaruni: <i>The Forest of Enchantment</i> Devdutt Patnaik: <i>Shikhandi</i>  Carole, Satyamurti. <i>Mahabharata - a Modern Retelling.</i></p>

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<b>UNIT 5</b>	<p><b>Mnemoculture, Cultural Inheritance and Performativity</b></p> <p>-Introduction of the concept of 'mnemo cultures' or the cultures of memory          -Transmission of mythologies, traditions, and cultural beliefs through the enactment or performance of memories          -Role of performative art forms in the dissemination of myths. The focus will also be on the manner in which myths pervade contemporary living through popular cultural mediums or digital platforms.</p> <p><b>D. Venkat Rao: Cultures of Memory in South Asia: Orality, Literacy and the Problem of Inheritance</b>          Donald H. Mills: <i>The Hero and the Sea: Patterns of Chaos in Ancient Myth</i></p> <p>Performative Art forms be considered includes:          Kavadi          Thiruvathira          Villu Pattu          Sarpam Thullal          Mata Ni Pachedi          Chhau Dance          Yakshagana          Gondha          Puppetry Show          Ramleela Performance          Baul</p>
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### Suggested Reading:

- Alam, Muzaffar. 2014. The Languages of Political Islam in India c. 1200-1800.
- Apollonius, and William H. Race. Argonautica. Harvard University Press, 2009.
- Bakhtin, Michail Michajlovic. Rabelais and His World. Indiana University Press, 2009.
- Ballinger, Pamela. 2002. History in Exile: Memory and Identity at the Borders of the Balkans, Princeton: Princeton University Press.
- Banerjee, Sumanta, 2003. Ayodhya: A Future Bound by the Past, Economic and Political Weekly, Vol. 38, No. 27, pp. 2795-2796.
- Brodbeck, Simon, and Brian Black. Gender and Narrative in the Mahabharata.
- Chassot, Joanne. 2018. Ghosts of the African Diaspora: Re-Visioning History, Memory, and Identity, Re-Mapping the Transnational - A Dartmouth Series in American Studies Dartmouth: Dartmouth College Press.
- Chatterjee, Partha. 1993. The Nation and its Fragments: Colonial and Postcolonial Histories. Princeton, New Jersey: Princeton University Press.
- Chatterjee, Partha. 2012. The Black Hole of Empire: History of a Global Practice of Power, Princeton and Oxford: Princeton University Press.
- Counihan, Carole, and Steven L. Kaplan. 1998. Food and Gender: Identity and Power, Food and Nutrition in History and Culture Series, Amsterdam: Harwood

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Academic Publishers.

- Dom, Sherman, Barbara J. Shircliffe, Deirdre Cobb-Roberts (eds). 2006. Schools as Imagined Communities: The Creation of Identity, Meaning, and Conflict in US. History, New York: Palgrave Macmillan.
- Eliade, Mircea. The Sacred and the Profane the Nature of Religion. HarcourtBrace, 1959.
- Friedman, Kajsa Ekholm. 1994. Consumption and Identity, Studies in Anthropology & History Series, Amsterdam: Harwood Academic Publishers.
- Generations, and the Dynamics of National Identity in Poland, Bremen:Springer.
- Ramanujan, AK. Folktales from India. Penguin, 1994.
- Sikes, Alan. Representation and Identity from Versailles to the Present: The Performing Subject, Palgrave Studies in Theatre and Performance History Series, New York: Palgrave Macmillan.
- Thapar, Romila, Harbans Mukhia, Bipan Chandra. 1969. Communalism and the Writing of Indian History, New Delhi: People's Publishing House.
- Tharu,Susie. Ed. Subject to Change. Sahitya Akademi, 1994.
- Wangler, Alexandra. 2012. Rethinking History, Reframing Identity: Memory,
- Webster, Wendy. 1998. Imagining Home: Gender, Race and National Identity, 1945-1964, Women's History Series, London: University College London Press.

### Course Outcomes (CO):

Students will be able to:

**CO1** - Critically engage with representations of the past in the present and use the evidence in interrogating historical accounts and memory.

**CO2** - Critically reflect and engage with the interface between the past and the present, fostering a healthy appreciation for history and its imprint on our present world.

**CO3** - Define the cultural and historical significance of myths

**CO4** - Explain the politics of 'myth' creation through oral presentation and writing

**CO5** - Analyze the role and politics of performative art and mythology

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	3	3	3	2
CO2	3	3	3	3	3	2	3	3	3	2
CO3	3	3	3	3	3	2	3	3	3	2
CO4	2	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	2	3	3	3	2

### DSE 2: Gender Studies and Theories (MEN018A)

#### Course Objectives:

- Demonstrate knowledge of the history of women's studies as an academic discipline, with an understanding of its growth and relation to the fields of gender and sexuality studies.

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- Articulate and understand the history of feminism and the ways in which feminism has enhanced the lives of women and men.
- Demonstrate fluency in feminist theories and methodologies and their applications to a number of different academic fields.
- Recognize shifting definitions of “man” and “woman” in relation to evolving notions of “masculinity” and “femininity.”
- Appreciate women’s contributions to society historically, culturally, and politically.
- Appreciate variations in women’s experiences across time, nations, and cultures.
- Analyze the ways in which the media has a role in the shaping of identity, particularly along intersections of gender, race, and class.

#### Course Content

<b>UNIT 1</b>	<b>Liberal Feminism</b> <ul style="list-style-type: none"> <li>• Historical Development of Liberal Feminist Thought.</li> <li>• Issues of Equal opportunity and Structural Impediments</li> <li>• Welfare Orientation</li> <li>• Critique of Liberal Feminism</li> </ul>
<b>UNIT 2</b>	<b>Marxist and Socialist Feminism</b> <ul style="list-style-type: none"> <li>• <b>Marxist Feminism</b> <ul style="list-style-type: none"> <li>– Origin of Family, private property and state</li> <li>– Sexual Division of Labour</li> <li>– Contemporary Marxist Feminism</li> <li>– Critique of Marxist Feminism</li> </ul> </li> <li>• <b>Socialist Feminism</b> <ul style="list-style-type: none"> <li>– Dual Systems Theory : Patriarchy and Capitalism</li> <li>– Critique of Dual System Theory</li> <li>– Towards Unified- Systems Theory: Gender Division of Labour and alienation</li> <li>– Critique of Unified Systems Theory</li> </ul> </li> </ul>

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<b>UNIT 3</b>	<b>Radical Feminism</b> <ul style="list-style-type: none"> <li>• Biological Sex and Patriarchal Gender</li> <li>• Politics of Reproduction and Motherhood</li> <li>• Sexual Politics &amp; Roots of oppression</li> <li>• Feminist Sexuality</li> <li>• Lesbian Politics and Rights</li> <li>• Critique of Radical Feminism</li> </ul>
<b>UNIT 4</b>	<b>Psychoanalytic and Existential Feminism</b> <ul style="list-style-type: none"> <li>• <b>Psychoanalytical Feminism</b> <ul style="list-style-type: none"> <li>– Roots of Psychoanalytical Feminism</li> <li>– Rejection of Freud's Biological Determinism</li> <li>– Women's Morality</li> </ul> </li> <li>• <b>Existential Feminism</b> <ul style="list-style-type: none"> <li>– Being a Nothingness</li> <li>– Existentialism for women</li> <li>– Critique of Existential Feminism</li> </ul> </li> </ul>
<b>UNIT 5</b>	<b>Other Feminist Thought</b> <ul style="list-style-type: none"> <li>• Post Modern Feminist thought</li> <li>• Queer Studies</li> <li>• Black Feminism</li> <li>• Dalit Feminism</li> <li>• Eco Feminism</li> <li>• Global Feminism</li> </ul>

### Prescribed Readings

- Bell Hooks.(2000) Feminist Theory: From Margin to Center. London: Pluto Press.
- Cavallaro, Dani (2003) Feminist Theory. London: Continuum Books.
- Chaudri, M. (2003) Feminisms in India. New Delhi: Kali for Women.
- Donovan, Josephine (2006) Feminist Theory: The Intellectual Traditions. New York: FredrickUngar Publishing Co. Inc.
- Friedan, B. (1974) The Feminine Mystique. New York: Dell, 1974, pp. 95-116.
- Jackson, Steve (1998) Contemporary Feminist Theories. Edinburg: Edinburg University Press.
- Jagger Alison M. (1983) Feminist Politics and Human Nature. Maryland: Rowman and Littlefield
- Kerber K. L. (2011) Psycho – Feminism (Vol. I & II). New Delhi: Global Vision Publishing House.
- Mies, M. & Shiva, V. (1993) Eco-Feminism. Halifax: Fernwood.
- Mitchell, J. (1974) Psychoanalysis and Feminism. New York: Vintage Books.Publishers.

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- Tong, Rosemarie (2009) *Feminist Thought: A Comprehensive Introduction*. Colorado: Westview Press.
- Wollstonecraft M. (1796) *A Vindication of the Rights of Women: With Structure on Political and Moral Subject*. London: Johnson Publications.

### **Suggested reading**

- Barrett, M. (1980) *Women's Oppression Today: Problems in Marxist Feminist Analysis*. London: Verso.
- Bebel, A. (1971) *Woman Under Socialism*. New York: Schocken Books.
- Boserup, E. (1970) *Women's Role in Economic Development*. London: George Allen and Unwin.
- Cocks, J. (1984) "Wordless Emotion: Some Critical Reflections on Radical Feminism," *Politics and*
- De Beauvoir, Simone. (1974) *The Second Sex*, trans. and ed. H. M. Parshley. New York: Vintage Books,
- Ehrenreich, B. (1976) "What is Socialist Feminism?" *Win*, June 3, 1976, pp.4-7.
- Eisenstein, H. (1983) *Contemporary Feminist Thought*. Boston: G. K.
- Hall, Firestone, S. (1970) *The Dialectic of Sex*. New York: Bantam Books.
- Eisentein, Z. (Ed.) (1979) *Capitalist Patriarchy and the Case for Socialist Feminism*. New York: Monthly Review Press.
- Frye, M. (1983) *The Politics of Reality: Essays in Feminist Theory*. Reumansburg, N.Y: Crossing Press.
- Koedt, A., Levine, E., and Rapone, P. (Eds) (1973) *Radical Feminism*. New York: Quauadrangle Books.
- Lakoff, S. A. (1964) *Equality in Political Philosophy*. Cambridge, Mass.: Harvard University Press. pp.129-143.
- Malos, E. (Ed.) (1980) *The Politics of Housework*. London: Allison & Busby.
- Martin, G. (1978) *Socialist Feminism: The First Decade, 1966-1976*. Seattle: Freedom Socialist Publications.
- Mill, J. S. (1970) "The Subjection of Women." In John Stuart Mill and Harrier Taylor Mill, *Essay on Sex Equality*, ed. Alice S. Rossi, pp.123-242. Chicago: University of Chicago Press.
- Millett, K. (1970) *Sexual Politics*. Garden City, N.Y: Doubleday.

### **Course Outcomes (CO):**

#### **Students will be able to:**

**CO1:** Describe major theories and theorists in Women's and Gender Studies.

**CO2:** Identify, categorize, and distinguish elements of the main theories associated with Women's and Gender Studies in order to engage in classroom discussion, papers, and projects appropriate for the discipline.

**CO3:** Understand the field of Women's and Gender Studies in relation to contemporary and/or recurring problems in society.

**CO4:** Engage in theoretically informed civic engagement in the context and concerns of gender, race, sexuality, and social justice.

**CO5:** Conduct scholarly research on key gender issues and/or debates.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

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Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	3		3	3	2
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	2	2	1	2	3	3	1
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	2	3	3	3	3	3

## **DSE 2 - Language, Society and Language Change (DEN022A)**

### **Course Objectives**

- Providing extensive knowledge of theoretical postulates that govern the representation of language in society
- Providing updated literature on the interface between language and society along with different social variables
- Providing functional theories that address the issues of language change and language convergence.
- Providing the skills to analyze the concept of language change in terms of society.
- Providing the research aptitude to analyze the sociolinguistics factors in ELT.

### **Course Content**

UNIT 1	Unit-1: Structural, cognitive and functional perspectives to study the human language <ul style="list-style-type: none"> <li>• Saussure and Structuralism</li> <li>• Chomsky and Cognitive paradigm</li> <li>• Dell Hymes and Functional paradigm</li> </ul>
UNIT 2	Social decorum and different social thinkers <ul style="list-style-type: none"> <li>• Functional perspective on Society: Max Weber, Emile Durkheim, Talcott Parsons, R.K. Merton,</li> <li>• Conflict perspective on Society: Karl Marx, Engels</li> <li>• Interaction perspective: G.H. Mead</li> <li>• Indian society: M.N.Srinivas, Andre Beteille</li> </ul>

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UNIT 3	Linguistics and its interface with Anthropology <ul style="list-style-type: none"> <li>● Kinship terms, Usage of Pronominals across Indian Languages</li> <li>● Joking and Avoidance relationships in Society and Languages</li> <li>● Proverbs, Folk tales and Social Decorum</li> <li>● Language, Dialects and Geography</li> <li>● Speech Community and Linguistic Identity with reference to Language Movements in India</li> </ul>
UNIT 4	Language Variation <ul style="list-style-type: none"> <li>● Labov and Language variation</li> <li>● Sapir-Whorf Hypothesis: Linguistic Determinism and Linguistic Relativity</li> <li>● Language and Gender: Feminist Discourse and Masculinity studies in relation to Indian Languages</li> </ul>
UNIT 5	Applied fields in Language and Society <ul style="list-style-type: none"> <li>● Language Education policies</li> <li>● Indian Constitution and Linguistic rights</li> <li>● Bilingualism, Multilingualism</li> <li>● Language change and Sociophonetic studies</li> <li>● Sociolinguistics of Sign Languages</li> <li>● Politeness Phenomena manifested in terms of pronominal usage and the use of syntactic strategies to achieve politeness</li> </ul>

#### Suggested Reading:

- Brown, P. & Levinson, S. 1987. Politeness: Some Universals in Language Usage. CUP
- Crystal, D. 2001. Language and the Internet. CUP
- Coulmas, Florian. 2013. Sociolinguistics: The Study of Speaker's Choices. Cambridge University Press.
- Fasold, R. W. and Connor-Linton, J. (eds.) 2013. An Introduction to Language and Linguistics. Cambridge: Cambridge University Press.
- Fishman, J., A. Tabourwe-Keller, M. Clyne, Bh. Krishnamurti, M. Abdul Aziz (eds.) The Fergusonian Impact. Vol. 2, Sociolinguistics & the Sociology of Language.
- Hudson, R. 1996. Sociolinguistics. Cambridge University Press.
- International Journal of the Sociology of Language. pp. 35-54.
- Jain, Dhanesh Kumar. 1973. Pronominal Usage in Hindi. University of Pennsylvania doctoral dissertation.
- Peter Trudgill's. 2020. Sociolinguistics: An introduction to language and society. Penguin Books
- Subbarao, K.V., R.K. Agnihotri, & A. Mukherjee. 1991. Syntactic Strategies and Politeness Phenomena.
- Wardhaugh, Ronald (2009). An Introduction to Sociolinguistics. Wiley-Blackwell.

#### Course Outcomes (CO):

At the end of this course students will be able to:

CO1: Recognize the interfaces between social variables and linguistic variables

CO2: Analyze the main phonetic, phonological structures of a language and to compare them to the cross-linguistically more frequent structures

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CO3: To demonstrate different perspectives such as Conflict, Functional and Interactional models to study the structures of the society and the verbal repertoire

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	3	2	2				3	3
CO2	2	3	3	2	2				3	3
CO3	2	3	3	2	2				3	3
CO4	2	3	3	3	2				3	3
CO5	2	3	3	3	2				3	3

## **DSE 2: Adaptations, Relocations and Reworking Studies (DSE026A)**

### **Course Objective**

- Look closely into the relation between cinema and literature, with the help of a few samples of fiction (and other forms) made into films.
- Understand the various ways in which literature and the moving image diverge as well as correspond through the theory of narrative while being a source of long conflict through much of the history of film studies.
- Understand the politics and process of adaptation of literary forms into cinematic forms
- Understand elementary concepts of cinema, cinema history and practice and the basics of adaptation theory.

### **Course Content**

Unit 1	<b>Theories, practices, forms, adaptations, migrations</b> "What is Adaptations?" Adaptations. (Critical Idiom series) Critical Essay on Transformations. Adaptations Across Medium: From Text to Image. Intertextuality Counter Discourses: J.M. Coetzee's 'Foe OR Jean Rhys's Wide Sargossa Sea.
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Unit 2	<b>Myth and Newness : Across Cultures</b> Sashi Tharoor: The Great Indian Novel Thomas Mann: "The Transposed Head" & Girish Karnad's Hayavadana
Unit 3	<b>Indian Reworkings:</b> The Yayati Story V.S. Khandekar: Yayati Girish Karnad: Yayati Adya Rangacharya: Sanjeevni. Raj Gopalachari: Some Chapters on Yayati
Unit 4	<b>Western Reworkings:</b> The Hamlet Narrative Tom Stoppard: Rosencrantz and Guildenstern are dead Hamlet: The Film (BBC Production)
Unit 5	<b>Robin Cohen</b> Introduction (Chapter 1) to <i>Global Diasporas</i> <b>Butler, Octavia E.</b> <i>Parable of the Sower</i>

### Suggested Readings

- Beja, Morris. Ed. "Adaptation' from the Anthology". Film and Literature.
- Bluestone, Bernard. "Introduction" Novels into Films. Indiana University Press

### Course Outcomes

**At the end of the course the student will be able to-**

**CO1:** Be acquainted with filmic adaptations and film studies within the context of cultural studies.

**CO2:** Understand how adaptations enable us to rework literature and rethink attitudes about issues of gender, ethnicity, class, history, and identity.

**CO3:** Make comprehensive comparative analyses of film and fiction as they will be familiar with terms and theory pertaining to film studies and adaptation studies.

**CO4:** Learn politics and processes of adaptation

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

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Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	3	3	3	2	2	3	3	3
CO2	3	3	3	3	2	2	2	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3

## SEMESTER - III

### Core Course 7: Critical Theory (MEN007A)

#### Course Objectives

- undertake an in-depth study of structuralism and post-structuralism theories, their application in literary studies
- critique gender discrimination and ideological formations
- equip students with essential tools of research in literary studies via introducing them to modernism and post-modernist theoretical postulations in literary studies
- enable students to apply theoretical postulations concerned with cultural studies in literary texts.
- to equip students with postcolonial theory and practice

#### Course Content

<b>UNIT 1</b>	<b>Structuralism and Post-structuralism</b> Ferdinand de Saussure: 'Nature of the Linguistic Sign' Roland Barthes: 'Death of the Author' Michel Foucault: 'What is an Author?' Jacques Derrida: 'Structure, Sign and Play in the Discourse of Human Sciences'
<b>UNIT 2</b>	<b>Feminist Theory</b> Sandra M. Gilbert and Susan Gubar: Chapter 2 of <i>The Mad Woman in the Attic</i> Monique Wittig: 'One is Not Born a Woman' Judith Butler: Excerpts from Chapter 3 'Subversive Bodily Acts,' <i>Gender Trouble: Feminism and the Subversion of Identity</i>
<b>UNIT 3</b>	<b>Modernism and Postmodernism</b> Louis Althusser: Excerpts from <i>Ideology and Ideological State Apparatuses</i> Jean Francois-Lyotard: 'Defining the Postmodern' Jean Baudrillard: 'The Procession of Simulacra'

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<b>UNIT 4</b>	<b>Cultural Studies</b> Stuart Hall: 'Cultural Studies and Theoretical Legacies' Jurgen Habermas: 'The Public Sphere: An Encyclopedia Article' Raymond Williams: 'Literature'
<b>UNIT 5</b>	<b>Postcolonial Theory</b> Edward Said: <i>Orientalism</i> (Introduction) Chinua Achebe: 'Colonialist Criticism' Ngugi wa Thiong'o: 'Quest for Relevance' Michael Hardt and Antonio Negri: 'Empire'

### Suggested Reading:

- Eagleton, Terry (1983). *Literary Theory: An Introduction*. Oxford: Blackwell.
- Leitch, Vincent B, et al., eds. (2010). *The Norton Anthology of Theory and Criticism*. New York: W. W. Norton. 845-867; 1895-1910.
- Lodge, David (1988). *Modern Criticism and Theory: A Reader*. New Delhi: Longman.
- Norris, Christopher (2002). *Deconstruction: Theory and Practice* (Chapter 2). London: Routledge.
- Thiong'o, Ngugi wa (1986). *Decolonizing the Mind: The Politics of Language in African Literature*. London: Oxford. 87-109.

### Suggested Extra Readings:

- Ashcroft, Bill, et al. (2002). *The Empire Writes Back: Theory and Practice in Post-Colonial Literatures*. London: Routledge.
- Barry, Peter (1999). *Beginning Theory: An Introduction to Literary and Cultural Theory*. Manchester and New York: Manchester UP.
- Tyson, Lois (2013) *Critical Theory Today*. New York: Routledge.

### Course Outcomes (CO):

**At the end of the course students will be able to-**

**CO1:** Familiarize students with the literary premises and intellectual background pertinent to important eras of the literary and critical theory.

**CO2:** Encourage students to discover their own literary and critical "theories" as they read.

**CO3:** Know how to read, comprehend, discuss, analyze, and interpret critical texts of all types. Special emphasis will be placed on the cultivation of critical thinking, writing, and conversational skills.

**CO4:** Historicize and contextualize foundational theoretical and critical texts.

**CO5:** Employ critical methodologies appropriate to the practice of critical disciplines.

*Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>CO1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>1</b>
<b>CO2</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>

*Ruchida Bauman*  
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CO3	3	3	3	3	1	3	2	3	3	3
CO4	3	3	3	2	2	1	1	3	3	2
CO5	3	3	3	2	2	3	2	3	3	3

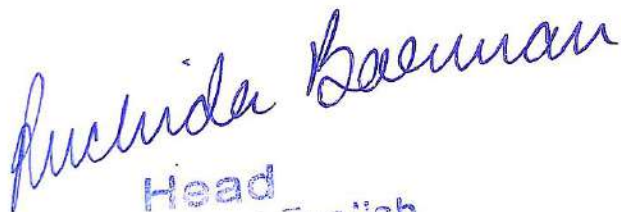
### Core Course 8: Literature from Victorians to Moderns (MEN008A)

#### Course Objectives

- Familiarize the students to the literature produced in Britain in the 19<sup>th</sup> and 20<sup>th</sup> centuries.
- Enable students to understand the concept of marriage and sexuality, the concept of utilitarianism and its role in human life.
- Enable students to understand the existing conflict between faith and doubt in Victorian society
- Enable the students to know about the modernist canon founded on Ezra Pound's idea of 'make it knew' Understand the historical background including the socio political changes in 20<sup>th</sup> century
- Understand the literary criticism and innovative techniques introduced by the writers of 20<sup>th</sup> century.

#### Course Content

<b>Unit 1</b>	<b>Walter Pater</b> The Postscript from <i>Appreciations: An Essay on Style</i> <b>Mathew Arnold</b> The Study of Poetry
<b>Unit2</b>	<b>Charlotte Bronte</b> Jane Eyre <b>Charles Dickens</b> Hard Times
<b>Unit 3</b>	<b>Mathew Arnold</b> Thyrsis <b>Lord Alfred Tennyson</b> The Lotos Eaters <b>Robert Browning</b> A Grammarian's Funeral Prophyria's Lover <b>Gerard Manley Hopkins</b> The Windhover
<b>Unit 4</b>	<b>W.B. Yeats</b> Sailing to Byzantium Lapiz Lazuli <b>T.S. Eliot</b> The Wasteland

  
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<b>Unit 5</b>	<b>Virginia Woolf</b> To The Lighthouse <b>George Orwell</b> 1984 / Animal Farm
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### Suggested Readings

- Chakrabarty, Dipesh, Provincialising Europe.
- Ford, Boris, General Editor. From Dickens to Hardy, Pelican History of English Literature, Vol. VI
- Moers, Ellen. Literary Women. London, The Women's Press, 1978.
- Woolf, Virginia. "Elizabeth Barrett Browning" from *The Common Reader*.

### Course Outcomes:

**At the end of the course, the student will be able to-**

**CO1:** Understand the prevailing conflict between science and religion in Victorian era.

**CO2:** Comprehend the concept of marriage and sexuality and its impact on the then society.

**CO3:** Understand the new techniques i.e. Psycho analysis and stream of consciousness.

**CO4:** Analyze the various aspects of women's movement along with the different causes contributed to the rise of such movement and the aftermath of the movement and its impact on society.

**CO5:** Analyze the decay and decadence of morality and human values in the modern age.

*Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	1	2	1	2	2	3	3	2
CO2	3	2	2	2	2	2	2	3	3	2
CO3	3	3	3	2	2	2	2	3	3	2
CO4	3	2	3	2	3	2	3	3	3	2
CO5	3	2	2	2	3	3	3	3	3	3

### Core Course 9: American Literature (MEN009A)

#### Course Objectives

- Cover a wide area of American literature across genres, ethnicities and historical times
- Understand the historical background of American literature and the American dream.
- Understand the changes brought about by modernism and urbanization in the American cultural landscape.
- Engage the student in understanding the changing notions of class, gender, ethnicity in a postcolonial, diasporic and neo-colonial world order.

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- Engage the student in understanding the cultural milieu of America through the various forms and movements in literature
- Give a glimpse into social realism and American novel, folklore and American novel.
- Develop a skill to appreciate the American poetry.

### Course Content

<b>Unit 1</b>	<b>Walt Whitman</b> A Passage to India <b>Wallace Stevens</b> Emperor of Ice cream <b>Ralph Waldo Emerson</b> The Snow Storm <b>Emily Dickinson</b> Hope is a thing with Feathers I felt a Funeral in my Brain
<b>Unit2</b>	<b>Ralph Waldo Emerson</b> Self-Reliance <b>Henry David Thoreau</b> Civil Disobedience <b>Walt Whitman</b> Introduction to Leaves of Grass
<b>Unit 3</b>	<b>Edgar Allen Poe</b> The tell-tale heart <b>Willa Cather</b> On Gull's Road <b>Nathaniel Hawthorne</b> Young Goodman Brown
<b>Unit 4</b>	<b>Alice Walker</b> Color Purple <b>F Scott Fitzgerald</b> The Great Gatsby
<b>Unit 5</b>	<b>Eugène O'Neil</b> The Hairy Ape <b>Arthur Miller</b> The Death of A Salesman

### Suggested Readings:

- Fisch, Audrey The Cambridge Companion to the African American Slave Narratives. Cambridge: Canbridge Univ Press, 2007.
- Mathiesson, F.O. The American Renaissance.
- Matthews, John T. (Ed.) A Companion to Modern American Novel 1900-1950. West Sussex: Wiley-Blackwell, 2013
- Poirer, Richard. A World Elsewhere.
- Ruland Richard & Malcolm Bradbury. From Puritanism to Postmodernism
- Serafin, Steven R. & Alfred Bendixen. Ed. The Continuum Encyclopaedia of American Literature New York: Continuum, 2003
- Tanner, Tony. The Reign of Wonder.

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### Course Outcomes

At the end of the course, student will be able to –

**CO1:** Understand that the American themes of self reliance individualism, sin and redemption were shaped through its rich and varied literature.

**CO2:** Understand the concepts like Antebellum and Postbellum America; Puritanism; Transcendentalism; The American Romantics and American Frontier. Understand about multiculturalism.

**CO3:** Inculcate a rhetorical approach to the literary study of American texts and also the conceptions, generalizations, myths and beliefs about American cultural history.

**CO4:** Critically analyze American literary texts in the light of several movements in literature.

**CO5:** Understand how society, culture and politics affect literature.

*Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	2	3	1	2	3	2	2
CO5	3	3	3	2	2	3	3	3	3	2

### DSE 3: Nation, Boundaries and Identities (MEN015A)

#### Course Objectives

- Provide a basic understanding of the idea of nation-state, identity and boundaries.
- Familiarise students with multiple narratives on nation formation and nationalism through an intersectional standpoint.
- Introduce students to the politics behind the social construction of Identities.
- Understand the mode in which power and privilege works within the context of citizenship.

#### Course Content

UNIT 1	<b>Concept of Communities, Nation and National</b>
	The unit explores the idea of nation and nationalism. The notion of belongingness to - an identity, a territory, an ethnic group, shared belief systems and so on - that

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	<p>could delineate on multiple levels the notions of being national and anti- national.</p> <p>Discuss the idea of Nation, State, Narrative of Nation, Citizenship and Right, National and Anti-national</p> <ol style="list-style-type: none"> <li>1. Ernest Renan's "What is a Nation?"</li> <li>2. Ernest Gellner's Nation and Nationalism(excerpts)</li> <li>3. Partha Chatterjee's ,The Nation and its Fragments: Colonial and Postcolonial Histories</li> <li>4. Homi Bhabha's 'Dissemination: Time, Narrative, and the Margins of the Modern Nation' in Homi Bhabha's Nation and Narration.</li> <li>5. Etienne Balibar's "Citizen Subject" and Dan Smith's "Ethical Uncertainties of Nationalism "</li> </ol>
<b>UNIT 2</b>	<p><b>A Nationalist Discourses</b></p> <p>This unit explores multiple discourses on nationalism that emerge from various parts of the world and how these discourses are formulated and reformulated based on socio-political factors of a particular period. A significant focus of the unit is to trace how nationalist discourses are largely defined by the presence of the 'other.'</p> <ol style="list-style-type: none"> <li>1. <i>Kanthapura</i> by Raja Rao</li> <li>2. <i>Road from The Elephant Pass</i> by Nihal De Silva</li> <li>3. <i>Bread Giver</i> by Anzia Yezierska</li> </ol>
<b>UNIT 3</b>	<p><b>Borders and Bordering Practices</b></p> <p>This unit attempts to capture some of the notions of borders, the need for these borders and various bordering practices that exclude people/citizens to be part of the nation state.</p> <ol style="list-style-type: none"> <li>1. <i>Tamas</i> by Bhishm Sahni</li> <li>2. <i>Tropic of Orange</i> by Karen Tei Yamashita</li> <li>3. <i>The Refugees</i> by Viet Thanh Nguyen</li> </ol>

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<b>UNIT 4</b>	<p><b>Migration</b> The unit explores some of the questions that processes of migration poses to the larger understanding of nation-state , as well as to that of political and cultural identity that nationalist discourses attempts to assert.</p> <ol style="list-style-type: none"> <li>1. <i>The Joy Luck Club</i> by Amy Tan</li> <li>2. <i>Exit West</i> by Mohsin Hamid</li> <li>3. <i>On Beauty</i> by Zadie Smith</li> </ol>
<b>UNIT 5</b>	<p><b>Post-coloniality on Temporal and Spatial Vectors</b> This module will introduce coloniality, modernity as well as spatiality thereby linking the discourses on postcolonial question with time and space. Readings around theorisations of space and human geography, as well as basic postcolonial concepts will be included here.</p> <ol style="list-style-type: none"> <li>1. <i>Waiting for the Barbarian</i> by J M Coetzee</li> <li>2. <i>The Hundred Foot Journey</i> by Richard C Morais</li> </ol>

### Suggested Reading:

- Ahmad, Aijaz. *In Theory: Nations, Classes, Literatures*. Verso, 1992.
- Anderson, Jonathan and Harriet Ritvo (ed.). *Macropolitics of Nineteenth-Century Literature: Nationalism, Exoticism, Imperialism*. Duke UP, 1995.
- Benedict. *The Specter of Comparisons: Nationalism, Southeast Asia, and the World*. Verso, 1998.
- Bhabha, Homi K, ed. *Nation and Narration*. Routledge, 1990.
- Chakrabarty, Dipesh and Homi K. Bhabha (ed). *Habitations of Modernity: Essays in the Wake of Subaltern Studies*. U of Cambridge UP, 1999.
- Chakrabarty, Dipesh. *Provincializing Europe: Postcolonial Thought and Historical Difference*. Princeton UP, 2000.
- Corse, Sarah M. *Nationalism and Literature*. Cambridge UP, 1996.
- Eagleton, Terry, ed. *Nationalism, Colonialism and Literature*. U of Minnesota P, 1990.
- Featherstone, Mike ed. *Nationalism, Globalization and Modernity*. Sage 1990.
- Gellner, Ernest. *Encounters with Nationalism*. Blackwell, 1994.
- Jameson, Fredric and Masao Miyoshi (ed.). *The Cultures of Globalization*.
- Kaplan, Caren ed. *Between Woman and Nation*. Duke UP, 1999
- Larsen, Neil. *Determinations: Essays on Theory, Narrative and Nation in the Americas*. Verso, 2001.
- Lazarus, Neil. *Nationalism and Cultural Practice in the Postcolonial World*.
- Levy, Roger. *Scottish nationalism at the Crossroads*. Scottish Academic Press, 1990.
- Lewis, Pericles. *Modernism, Nationalism, and the Novel*. Cambridge UP, 2000.
- Mbembe, Achille. *On the Postcolony*. University of California P, 2001.
- McIntock, Anne, Aamir Mufti, Eli Shohat (ed.). *Dangerous Liaisons: Gender, Nation and Postcolonial Perspectives*. U of Minnesota P, 1997.
- Moghadam, M. Valentine (ed.). *Gender and National Identity: Women and Politics in Muslim Societies*. Zed Books, 1994.
- Mosse, George L. *Nationalism and Sexuality*. H. Fertig, 1985.
- Princeton UP, 2003.

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- Sangari, Kumkum. *The Politics of the Possible*. Anthem Press, 2002. Simpson, David. *Romanticism, Nationalism and the Revolt Against Theory*. U of Chicago P, 1993.
- Smith, Anthony D. *Nationalism: Theory, Ideology, History*. Polity, 2001.

### Course Outcomes (CO):

#### Students will be able to:

**CO1** – To interpret and apply the concepts and ideas introduced in the class to various spaces of engagement - local, national and global.

**CO2** - Recognize the necessity to engage with multiple narratives and the intersection of gender, caste, religion etc, in framing the contours of national(ism).

**CO3** - Problematised singular understanding of nationalism and Identity

**CO4** - Critically evaluate and compare the discourse on citizenship with that of the discourse on statelessness

**CO5** - Locate and position issues, problems, and areas that can generate new modes of thinking about spatiality and temporality in the context of postcolonial discourses

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	2	2	2	2	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	2	2	2	3	3	2

### DSE 3: Gender and Identity (MEN019A)

#### Course Objectives

- Understand the difference between “sex” and “gender” and be able to explain social construction theories of identity.
- Demonstrate an understanding of the “personal is political” through the application of classroom learning to personal life, the workplace, the community, and active civic engagement.
- Analyze historical and contemporary systems of privilege and oppression, with special attention to the ways gender intersects with race, class, sexuality, ethnicity, ability, religion, and nationality.

#### Course Content

UNIT 1	<b>Gender and Self</b> Pride and Prejudice by Jane Austen Orlando by Virginia Woolf
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UNIT 2	<b>Gender and Space</b> Home by Manju Kapoor A Thousand Splendid Suns by Khaled Hosseini
UNIT 3	<b>Gender Caste, Ethnicity and Race</b> The Weave of My Life by Urmila Pawar Color Purple by Alice Walker
UNIT 4	<b>Gender, Disability and Concept of Beauty</b> A Room Called Earth by Madeleine Ryan Bridget Jones' Diary by Helen Fielding
UNIT 5	<b>Gender and Place</b> Opening Belle by Maureen Sherry The Map of Salt and Stars by Zeyn Joukhadar

### Suggested Reading:

- Basu Aparna(1999) Women's Education in India in Ray and Basu (edt): From Independence Towards Freedom, OUP, New Delhi.
- Bhasin Kamala (2000): Understanding gender, Kali for women, N. Delhi.
- Chakravarty Uma (2003), Gendering caste through a feminist lens, Stree, Calcutta.
- Chodhuri Maitreyee (2004): Feminism in India, Women Unlimited, New Delhi.
- Courting Disaster, PUDR report.
- Davis Kathy, Evans Mary, Lorber, J (edt) (2006): Handbook of Gender and Women's studies, Sage, UK.
- Delamont Sara: Feminist Sociology: Feminist Concepts, Contribution to women's studies series, Part-I, II, III, RCWS, Mumbai.
- Foucault, Michel. "17 March 1976." Society Must Be Defended: Lectures at the College de France 1975-1976. Trans. David Macey. New York: Picador, 1976.
- Freedman Jane: Feminism, Viva Books, New Delhi, 2002.
- Geetha V.: Gender, Stree, Calcutta, 2002.
- Geetha V.: Patriarchy, Stree, Calcutta, 2007.
- Ghadially Rehana (Edt): Urban Women in Contemporary India, Sage Publications, 2007.
- Holloway, Karla FC. "Bloodchild" Private Bodies, Public Texts: Race, Gender and a Cultural Bioethics. Durham: Duke University Press,
- IGNOU : Kits on Women in Indian Contexts, Delhi
- Kaplan Karen, An Introduction to Women's Studies: Gender in a Transnational World. 2nd ed. Eds. Inderpal Grewal and New York: McGraw Hill, 2006.
- Karat Brinda: Survival and Emancipation, Three essays Collective, 2005.
- Khullar Mala(edt.): Writing the Women's Movement- A Reader, Zubaan, New Delhi, 2005.
- Kimmel Michael: The Gendered Society, Oxford, NY, 2008.
- Radha Kumar: History of Doing, Kali for Women, New Delhi, 1992.
- Rege Sharmila: Sociology of gender, Sage, New Delhi, 2003

### Course Outcomes (CO):

#### The student will be able to:

**CO1:** Define and explain the practices of the field of Women's and Gender Studies, as well as properly use the principal terms in the field.

**CO2:** Recognize societal institutions and power structures that occur within patriarchal society, and analyze the ways

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in which these institutions and structures impact the material realities of women's and men's lives differently.

**CO3:** Identify the intersection of coursework and personal experience.

**CO4:** Understand how knowledge from different cultural perspectives affects one's understanding of Women's and Gender Studies in relation to prominent institutions and practices in society.

**CO5:** Connect knowledge and experience, theory and activism, and Women's and Gender Studies to other courses and fields of study.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	3	1	3	3	3
CO2	3	2	3	3	2	2	3	3	3	2
CO3	2	2	2	3	3	2	3	3	2	1
CO4	3	3	3	3	3	2	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

### **DSE 3 – Issues in Applied Linguistics (MEN023A)**

- Course Objectives**

- The students will be introduced with the latest issues in Linguistics related to Translation.
- The students will be introduced with the latest issues in Linguistics related to Media.
- The students will be introduced with the latest issues in Linguistics related to Business Communication.
- The students will be introduced with the latest issues in Linguistics related to English Language Teaching.
- The students will be introduced with the latest issues in Linguistics related to Lexicography.

### **Course Content**

<b>UNIT 1</b>	Linguistics and Translation Principles of translation; types of translation; interpretation and transcreation; problems of translation
<b>UNIT 2</b>	Linguistics and Media Language use in print media; language in advertising; language in TV and cinema;

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	political discourse; language and empowerment
<b>UNIT 3</b>	Linguistics and Business Communication Interpersonal and business communication; message structure and message rewriting; effective textual strategies: clarity, conciseness, consistency and coherence; content, style and persuasion; document summarization; report writing.
<b>UNIT 4</b>	Linguistics and Language Teaching Learning theories and language teaching; notions of mother tongue (M.T.) and other tongue (O.T.); second and foreign language teaching; methods of language teaching; syllabus design and language testing.
<b>UNIT 5</b>	Linguistics and Lexicography Structure and function of lexeme, types of dictionaries; dictionary making: collection, selection and organization of materials; problems in dictionary making.

#### **Suggested Reading:**

- Hatim B & I Mason. 1990. Discourse and the Translator. London: Longman
- Lehman, Carol M. & DuFrene, Debbie D. 2010 Business Communications. Mason, USA:
- Munday J. 2001. Introducing Translation Studies: Theories and Applications. London:
- Richards J C & Rogers T S (2001) Approaches and Methods in Language Teaching (2<sup>nd</sup> edition) Cambridge: CUP
- Routledge
- South-Western Cengage Learning.
- Wray Alison, Trott Kate, & Bloomer Aileen. 1998. Projects in Linguistics. London: Arnold
- Yule, G. 1996. The study of language. Cambridge: Cambridge, University Press.

#### **Course Outcomes (CO):**

At the end of the course the students will be able to

CO1: Recognize the interfaces between social variables and linguistic variables

CO2: Analyze the main phonetic, phonological structures of a language and to compare them to the cross-linguistically more frequent structures

CO3: To demonstrate different perspectives such as Conflict, Functional and Interactional models to study the structures of the society and the verbal repertoire

CO4: Identify latest issues in Linguistics related to English Language Teaching.

CO5: Identify the latest issues in Linguistics related to Lexicography.

*Course Articulation Matrix: (Mapping of  
COs with POs and PSOs)*

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Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>CO1</b>	2	3	3	2	3				3	3
<b>CO2</b>	2	3	3	2	3			1	3	3
<b>CO3</b>	2	3	3	2	3				3	3
<b>CO4</b>	2	3	3	2	3				3	3
<b>CO5</b>	2	3	3	2	3				3	3

### **DSE 3: Violence, Memory and Resistance Literature (DSE027A)**

#### **Course Objective:**

- Explore the nature of social, political, and cultural resistance.
- Examine meaning, motivation and causes for different kinds of resistance; and the questioning of hegemonic forces, class, social and political changes.
- Understand the ways in which violence is represented, remembered, and memorialized across varied contexts.
- Understand the trajectory of events which are as singular and particular but highlight continuities and disjunctions within and amongst the larger structures of violence and war.

#### **Course Content**

Unit 1	<b>The Holocaust</b> Primo Levi, If This Is a Man. Trans. Stuart Woolf (London: Abacus, 1987. First Pub. 1958) Shoshana Felman and Dori Laub, Testimony: Crises of Witnessing in Literature, Psychoanalysis, and History pp. xiii-xx, and Chapter 3.
Unit 2	<b>Resistance</b> J.P. Sartre: "Freedom and Responsibility" Martin Luther King: "I have a Dream" August 28th, 1963 Bhagat Singh: "What is Revolution?" Nelson Mandela: "I am Prepared to Die" April 20th, 1964

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Unit 3	<p><b>Rajinder Singh Bedi,</b> Lajwanti.    An Epic Unwritten: <i>The Penguin Book of Partition Stories</i> (Delhi: Penguin, 1998), pp. 14-29.</p> <p><b>Rajeswari Sunder Rajan</b> Life After Rape: Narrative, Rape and Feminism,    <i>Real and Imagined Women: Gender, Culture and Postcolonialism</i> (London: Routledge, 1993)</p> <p><b>Yasmin Saikia</b> Beyond the Archive of Silence: Narratives of Violence of the 1971 Liberation War of Bangladesh,    <i>History Workshop Journal</i> 58 (2004): 274-286.</p>
Unit 4	<p><b>Marianne Hirsch,</b> Marked by Memory: Feminist Reflections on Trauma and Transmission.    <i>Extremities: Trauma, Testimony, and Community</i> (Urbana and Chicago: University of Illinois Press, 2002), pp. 71-91.</p> <p><b>Ghassan Kanafani</b> Returning to Haifa.    Palestine's Children; Returning to Haifa and Other Stories. Trans. Barbara Harlow and Karen E. Riley (Boulder, London: Lynne Rienner Publishers, 2000), pp. 149-196</p> <p>Amos Oz, Judas. Trans. Nicholas de Lange (London: Chatto &amp; Windus, 2014).</p> <p>Edward Said, The Question of Palestine</p>
Unit 5	<p>Rohinton Mistry: Such a Long Journey (1991)</p> <p>Sharan Kumar Limbale: The Outcaste: Akkarmashi (2008)</p> <p>Claude McKay: "If We Must Die"</p> <p>Langston Hughes: "Dream Deferred"</p>

### Suggested Readings:

- Burke, Edmund. The French Revolution.
- Carthy, Edward Said, Aamir Mufti
- Chandra, Sudhir. Enslaved Daughters: Colonialism, Law and Women's Rights OUP (1998) 2nd ed. 2008.
- Crossman, Richard. ed. The God That Failed.
- Dickens, Charles. A Tale of Two Cities.
- Koestler, Arthur. Darkness at Noon.
- Nandy, Ashis. The Illegitimacy of Nationalism, Delhi, OUP (1994), 1996

### Course Outcomes

**At the end of the course the student will be able to-**

**CO1:** Understand the key concepts and different terms related to violence.

**CO2:** Understand how violence and resistance are inter-related in personal, social, political and economical context.

**CO3:** Gain insights into the theoretical as well as social aspects of violent events and how they are commemorated.

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**CO4:** Analyze and evaluate through critical readings the themes such as trauma, exile, the idea of the refugee, borders, and the nation-state.

**CO5:** Relate the unified concept of violence and resistance through the lens of memory in the daily life and evaluate its effect.

*Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	3	3	3	3	2
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	2	3	3	3	3
CO4	3	3	3	2	3	2	3	3	3	2
CO5	3	3	3	3	3	2	3	3	3	3

### **Skill Enhancement Course 1: Introduction to Theatre and Performance (DEN009A)**

#### **Course Objectives:**

- The course is intended for students who specialize in English Literature. The idea is to acquaint them with historical processes at work to understand the way in which techniques/methodology of drama have evolved over a period of time.
- There are two aspects to this course. One is the development of aesthetics in the Indian context from the pre-independence to post- independence period. The course also looks at censorship acts the politics of the market and other factors to locate the socio-political context of drama. There will also be a discussion of the popular forms of performance in India.
- The second aspect is the development of theories and practice of drama in Europe and their impact on the Indian context.

#### **Course Content**

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Unit 1	<b>Introduction</b> <ul style="list-style-type: none"> <li>• What is a text?</li> <li>• What is a performance?</li> <li>• The uniqueness of the dramatic text: Literature and/or Performance?</li> <li>• The politics of a Dramatic text: endorsement status quo vs. subversion</li> </ul>
Unit 2	<b>Theories of Performance</b> <ul style="list-style-type: none"> <li>• Performance theory (Richard Schechner/Dwight Conquergood)</li> <li>• Radical theories (Bertolt Brecht Augusto Boal)</li> <li>• Classical theories (Natyashastra Aristotle)</li> </ul>
Unit 3	<b>The State the Market and the History of Theatre</b> <ul style="list-style-type: none"> <li>• Under British rule (Viceroy Northbrook–censorship <i>Neeldarpan Nabanna</i>– IPTA)</li> <li>• (Popular forms: Jatra Tamasha Nautanki Burrakatha Dastangoi and others)</li> <li>• Modern Indian theatre in the post-independence period <ul style="list-style-type: none"> <li>○ (Bourgeois theatre and theatre of change Feminist theatre)</li> <li>○ (Street theatre Janam)</li> </ul> </li> </ul>
Unit 4	<b>Modern Western theatre</b> <ul style="list-style-type: none"> <li>• Naturalism (Realism) (Stanslavisky)</li> <li>• Epic theatre: theatre as criticism <ul style="list-style-type: none"> <li>○ Brecht Dario Fo and France Rame)</li> </ul> </li> <li>• Theatre that resists the state and market</li> </ul>
Unit 5	<b>The Performative Act</b> <ul style="list-style-type: none"> <li>• Performance space (in the round proscenium amphitheatre thrust stage etc.)</li> <li>• Space Lights Costumes Sets</li> </ul>

### Readings

- 'Faith and the Sense of Truth' Section I (pp. 121-23) From chapter 8
- Stanislavski Constantin. 1936. *An Actor Prepares*. London: Methuen 1988 'A Short Organum for the Theatre' (para 26 - 67) (pp.186-201)

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- Brecht Bertolt. *Brecht on Theatre: The Development of an Aesthetic*. Trans. and Ed. Willett John. New York: Hill and Wang 1957.
- ‘Breaking Down the Fourth Wall’ (pp. 73-74)
- Dario Fo. *The Tricks of the Trade*. Trans. Joe Farrell. London: Methuen Drama 1991.  
‘The Fan and the Web’ (pp. xvi -xix)
- Schechner Richard. *Performance Theory* New York: Routledge 2002

### Course Outcomes

**CO1** - The students opting for this course will be able to understand the different theories of drama in Europe and India both from the point of view of theory and performance.

**CO2** - The students will be able to make connections between socio-economic processes at work and the emergence of a certain kind of dynamic within theatre.

**CO3** - As this is a Skill Enhancement Course the students will put up a performance at the end of the course making use of the different kinds of aesthetics they have studied.

**CO4** – Students will be able to understand and express ‘self’.

*Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	1	2	3	2	3	3	2	2
CO2	2	3	2	2	2	2	2	2	2	2
CO3	1	3	1	2	2	3	2	1	3	3
CO4	1	3	3	3	3	3	3	3	3	3

## SEMESTER IV

### Core Course 10: Post-Colonial Literature (MEN010A)

#### Course Objectives

- Introduce the students to post colonial literature that includes the theory and concepts of post colonial studies.
- Develop the students’ understanding of the cultural politics of imperialism.
- Trace the trajectory from the colonial subaltern’s subordination to assertions of agency
- Problematize the idea of postcolonial literature and ask whether the geographically and culturally dispersed authors can be subsumed under the umbrella term ‘postcolonial’.

#### Course Content

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<b>Unit 1</b>	<b>Werner Sollers:</b> "Who is Ethnic" from <i>The Postcolonial Studies Reader</i> (Ashcroft et al.) <b>Arun Prabha Mukherjee</b> Chapter 1 (Introduction) from <i>Oppositional Aesthetics: Readings from a Hyphenated Space</i> <b>Ashis Nandy</b> Introduction to <i>The Intimate Enemy</i>
<b>Unit2</b>	<b>Derek Walcott</b> Ruins of a Great House <b>A.D. Hope</b> The Death of the Bird <b>Gabriel Okara</b> Once Upon a Time <b>Keki N. Daruwalla</b> Pestilence in Nineteenth Century Calcutta from <i>An Anthology of Commonwealth Poetry</i> ed. C.D. Narsimhaiah
<b>Unit 3</b>	<b>Margaret Atwood</b> Gertrude Talks Back <b>Fyodor Dostoevsky</b> The Dream of a Ridiculous Man <b>Sadhu Binning</b> Lesson of a Different Kind
<b>Unit 4</b>	<b>Shyam Selvadurai</b> Funny Boy
<b>Unit 5</b>	<b>Buchi Emcheta</b> The Bride Price

### Suggested Readings

- Ashcroft, Bill, Gareth Griffiths & Helen Tiffin. Eds. *The Postcolonial Studies Reader*. New York & London: Routledge (1995) 1997.
- Australia. South Yaara: Hyland House, 1990
- Boehmer, Elleke. *Colonial & Postcolonial Literature* (1995). New Delhi: OUP, 2006.
- Bose, Sugata. "Post-Colonial Histories of South Asia: Some Reflections". *Journal of Contemporary History*. Vol. 38, No. 1, (Jan., 2003), pp. 133-146
- Cilano, Cara N. *Contemporary Pakistani Fiction in English: Idea, Nation, State*, New York: Routledge, 2013
- Gandhi, Leela. *Postcolonial Theory*. Edinburgh: Edinburgh Univ. Press.
- Mukherjee, Meenakshi. *The Perishable Empire: Essays on Indian Writing in English*. OUP, 2002.

### Course Outcomes

**At the end of the course, student will be able to–**

**CO1:** Understand the themes of colonialism, liberation, independence, tradition, modernity, individualism, community, socialism and capitalism.

**CO2:** Acquainted with the key concepts of postcolonial literary theory through the study of postcolonial texts

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**CO3:** Understand and analyze how the colonial power has provoked from the nation in their search for a literature of their own.

**CO4:** understand ways in which literary theory applies to their own lives and cultures in Postcolonial literature.

**CO5:** Evaluate and apply post colonial theories through different texts.

*Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	3	3	2	2
CO2	2	3	2	2	2	2	2	2	2	2
CO3	3	3	3	2	2	3	2	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	2	2	2	3	3	2

### **Core Course 11: World Literature (MEN011A)**

#### **Course Objectives**

- To attain a broad knowledge of various literary traditions both in their specificity and interrelation
- To provide a working knowledge of the characteristics of various literary genres.
- To develop analytical skills and critical thinking through reading, discussion, and written assignments.
- To broaden a student's intercultural reading experience.
- To deepen a student's awareness of the universal human concerns that are the basis for literary works.
- To stimulate a greater appreciation of language as an artistic medium and of the aesthetic principles that shape literary works.
- To understand literature as an expression of human values within an historical and social context.

#### **Course Content**

<b>Unit 1</b>	<b>Gabriel Garcia Marquez</b> Love in the Time of Cholera
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<b>Unit2</b>	<b>Geradine Brooks</b> March <b>Harper Lee</b> To Kill a Mocking Bird
<b>Unit 3</b>	<b>Eugene Ionesco:</b> Rhinoceros OR <b>Anton Chekhov:</b> The Cherry Orchard
<b>Unit 4</b>	<b>Milan Kundera</b> The Unbearable Lightness of Being
<b>Unit 5</b>	<b>Valadimir Nobokov</b> Lolita

### Suggested Readings:

- Bandyopadhyay, Sibaji. ed., Thematology, Literary Studies in India, Volume III, Jadavpur University, Kolkata
- Chanda, I. Literary Historiography. Literary Studies in India, Volume I, ed. Jadavpur University, Kolkata
- Chevrel, Yves. Comparative Literature Today : Methods and Perspectives
- Dasgupta, Subha C. ed. Geneology, Literary Studies in India, Vol. II, Jadavpur University, Kolkata
- Dev, Amiya and Sisir Kumar Das.eds. Comparative Literature : Theory and Practice,
- Dev, Amiya. The Idea of Comparative Literature
- University Press, Bloomington, London, Appendix 1, history
- Weisstein, Ulrich. Comparative Literature and Literary theory, Survey and Introduction, Indiana
- Zepetenek, Steven Totosy de. Comparative Literature : Theory Method, Application

### Course Outcomes

**At the end of the course, student will be able to–**

**CO1:** develop a comparative understanding of national literatures in the context of a globalizing world, and an ability to situate texts in their cultural and historical contexts.

**CO2:** appreciate the aesthetic qualities of literary texts and develop an awareness of influential critical and interpretive methods.

**CO3:** demonstrate a general understanding of the conventions of literary genres and of the major developments in literary history.

**CO4:** to identify theoretical developments in the field of world literature.

**CO5:** demonstrate ability to express oneself orally and in writing in a clear, coherent and persuasive manner, and to construct an interpretive argument.

### *Course Articulation Matrix: (Mapping of COs with POs and PSOs)*

<b>Course Outcomes</b>	<b>Program Outcomes</b>	<b>Program Specific Outcomes</b>
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*Ruchida Bauman*  
Head  
Department of English  
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	1	3	3	3	2
CO2	2	2	3	2	2	2	2	3	3	2
CO3	3	3	3	2	2	2	3	3	3	2
CO4	3	2	3	3	2	2	2	3	3	2
CO5	2	1	2	3	2	2	2	3	2	2

### **Core Course 12: Dissertation II (MEN012A)**

#### **Course Objectives:**

- To develop research aptitude in students so that they can design and conduct an original and ethical research.
- To make students write a dissertation in the MLA format.
- To learn researches like empirical/data based (quantitative, qualitative, or mixed-methods)
- To do critical review of research and theory.
- To gain insights about the domain researched and critically reflecting on the steps of the research process.

#### **Course Content**

Unit 1	Abstract & Introduction: Understanding the area of research, ethical guidelines of research, and finalization of Topic; Theoretical underpinnings
Unit 2	Review of Literature: Understanding and exploration of related research in the discipline
Unit 3	Methodology: Designing the Study, Methods of Data Collection as per the requirements of the topic and design
Unit 4	Data Analysis & Discussion: Qualitative and/or Quantitative Analysis as per the design and aims of the research

#### **Course Outcomes**

CO 1: Students will be able to design and conduct an original and ethical research.

CO 2: Students will be able to write a dissertation in the MLA format.

CO 3: Students will learn researches like empirical/data based (quantitative, qualitative, or mixed-methods)

CO 4: Students will be able to do critical review of research and theory.

CO 5: They will gain insights about the domain researched and critically reflecting on the steps of the research process.

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**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	3	2	1		2	3	3	2
CO2	3	3	3	2	2	2	2	3	3	3
CO3	3	3	3	2	2	2	3	3	3	2
CO4	3	1	2	2	3	2	3	3	3	2

#### Discipline Specific Elective 4

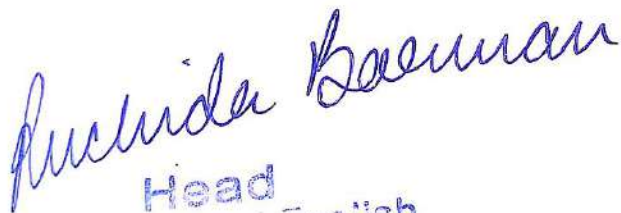
#### DSE 4: Popular Culture (MEN016A)

##### Course Objectives

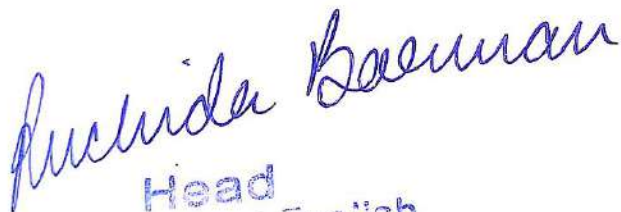
- To understand the politics of production, distribution and dissemination of ideologies within and without popular cultures in India
- To trace a history of the origin and development of popular culture in India
- To recognize the politics involved in creating content for mass consumption
- To understand the theoretical and academic debates that surround popular culture studies
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##### Course Content

<b>UNIT 1</b>	<b>Introduction: What is Popular Culture</b> This section is intended to be an introduction to popular culture and the presence of popular culture studies in academia. It will engage with the divergent strands of popular culture studies as agential or escapist and how it operates within the country.
	What is Popular Culture? The History and Evolution of the Genre
	Popular Culture Studies in Academia
	Popular Culture in India
	Mass media, subculture, counterculture, mainstream, consumerism,
	globalization, sensationalism, cyberculture, contraculture and other keywords.

  
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<b>UNIT 2</b>	<p><b>Cinema and Music</b></p> <p>This unit will engage with the ever popular Hollywood and the dominant discourses that surround it whether it be agency or popularity and the homogenization that comes with it. The intention is to use this vantage point to demystify Hollywood and re-engage with popular cinema and music from across the country.</p> <p>Hollywood Cinema and Music</p> <p>Bollywood Cinema and Music</p> <p>Regional Cinema and Music</p> <p><i>The Great Gatsby</i> by F Scott Fitzgerald</p> <p><i>The Age of Movies: Selected Writings</i> of Pauline Kael</p>

  
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<b>UNIT 3</b>	<p><b>Everyday and Street Culture</b></p> <p>This module engages with the everyday and street cultures that become part of our practices of the daily. It looks at a wide variety of cultural forms from television, sports, street food, fine dining, shopping, eating out, home delivery, stardoms, fan cultures to fashion.</p> <ul style="list-style-type: none"> <li>• Television</li> <li>• Reality Shows</li> <li>• Television Dramas</li> <li>• Cricket and Sports</li> <li>• Street Food</li> <li>• Shopping</li> <li>• Stardoms and Fan Cultures</li> <li>• Fashion : Elite and Street, Sustainable Fashion etc</li> </ul> <p><i>The Devil Wears Prada</i> by Laurence Weishberger  <i>Shopoholic Series</i> by Sophie Kinsella (any one book)</p>
<b>UNIT 4</b>	<p><b>Folkculture and Festivals</b></p> <p>This unit will engage with cultural festivals, melas, art forms, folk cultural forms and other expressions. It will look into the politics of appropriation and subversion and examine the ideas of subcultures, countercultures, contracultures and mainstream cultures.</p>

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<p><b>UNIT 5</b></p>	<p><b>Social Media Cultures</b>  This section deals with the ubiquitous and inescapable social media landscape we operate within. It will engage with ideas of space and place as reconstituted by these public-private and surveilled spaces and what it does to create our sense of selves and identities.</p> <p>Facebook, Instagram, Whatsapp, Twitter</p> <p>Youtube, Vimeo, Dailymotion</p> <p>Digital Fandoms</p> <p>Open Source and Torrents</p> <p>Art and Aesthetics in the Age of Digitization</p> <p>Cyberspace, Surveillance and Security</p> <p>Celebrity Cultures</p> <p>Online Shopping</p> <p><u>Eleven</u> by David Llewellyn</p> <p><u>The Book of Numbers</u> by Joshua Cohen</p> <p>NW by Zadie Smith</p> <p>Instagram poetry by Atticus, Tyler Knott Gregson, Christopher Pointdexter, Makeblackpoetry.</p>
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**Suggested Reading:**

- Allison Maccracken: "Tumblr Youth Subcultures and MediaEngagement"
- Andrew Ross: "Hacking Away at the Counterculture" Shanti Kumar: "Digital Television in Digital India"
- Arvind Rajgopal: Excerpts from *Politics After Television*
- Ashis Nandy and Vinay Lal: Introduction from *Fingerprinting Popular Culture*
- Bhaskar Mukhopadhyay: "The Discreet Charm of IndianStreet Food"
- Boria Majumdar: "Soaps, serials and the CPI(M), Cricket Beats Them All: Cricket and Television in ContemporaryIndia"
- Dick Hebdige: "Travelling Light: One Route into MaterialCulture"
- Donald B Costello: "From Counterculture to Anticulture"
- Freccero: Excerpts from *Popular Culture: An Introduction*
- Guy Debord: Excerpts from *Society of the Spectacle* Ravikant: "Architecture of intellectual sociality: Tea andCoffeehouses in Post-colonial Delhi"
- Leo Lowenthal: "The Debate Over Art and

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- Popular Culture: A Synopsis"
- Milton Yinger: "Contraculture and Subculture"
  - Peter Kvetto: "Private Music: Individualism, Authenticity and Genre Boundaries in the Bombay Music Industry"
  - Rukmini Pande: Excerpts from *Squee from the Margins: Fandom and Race*
  - Sangeet Kumar: Twitter as Liveness: #Shamed in Sydney and the Paradox of Participatory Live Television
  - Shikha Jhingan: "Sonic Perspectives on Films" (a youtube video by Lopez Design) Narratives from the Hinglish Project by CSDS/ Sarai and SOAS. - <https://sarai.net/hinglish-workshop-2015-recordings/>

### Course Outcomes (CO):

Students will be able to-

**CO1** - Develop research questions and debates around theorizing popular cultures in India

**CO2** - Evaluate contradictory and aberrant readings within popular narratives

**CO3** - Examine and evaluate the politics of visibility embedded in popular narratives

**CO4** - Negotiate with the politics of production, distribution and dissemination through a nuanced engagement with theory and practice

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	3	2	1		2	3	3	2
CO2	3	3	3	2	2	2	2	3	3	3
CO3	3	3	3	2	2	2	3	3	3	2
CO4	3	1	2	2	3	2	3	3	3	2

### DSE 4: Gender and Intersectionality (MEN020A)

#### Course Objectives

- To provide an effective educational program that will equip students to utilize the frameworks of various disciplines in order to analyze women, gender and sexuality in meaningful ways.
- To produce interdisciplinary/intersectional student research that addresses political and practical issues of gender in relation to race, ethnicity, class, sexuality, privilege and power.
- To prepare students to meet the needs of an increasingly ethnically and gender-diverse workplace.

#### Course Content

<b>UNIT 1</b>	<b>Gender and Diaspora</b> Americanah by Chimamanda Ngozi Adichie Sister of My Heart by Chitra Banerjee Divakaruni
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<b>UNIT 2</b>	<b>Gender Language and Popular Culture</b> The Myth of Mars and Venus by Deborah Cameron Left Hand of Darkness by Ursula K Le Guin
<b>UNIT 3</b>	<b>Gender and Religion</b> Samskara by U R Ananthmurthy White Teeth by Zadie Smith
<b>UNIT 4</b>	<b>Gender Environment and Livelihood</b> Cry, The Peacock by Anita Desai The Adivasi Will Not Dance: Stories by Hansda Sowvendra Shekhar
<b>UNIT 5</b>	<b>Gender and Nationality</b> The Good Muslim by Tehmima Anam Poems by Jean Arasanayagam

#### **Suggested Reading:**

- Bina Agarwal, A Field of One's Own: Gender and Land Rights in South Asia, Cambridge, Cambridge University Press, 1994.
- Carolyn Merchant, Earthcare: Women and the Environment, New York, Routledge, 1996.
- Cooper, H. M. (1988). Organizing knowledge syntheses: A taxonomy of literature reviews. Knowledge in Society, 1(1), 104-126.
- Cronin, P., Ryan, F., & Coughlan, M. (2010). Undertaking a literature review: A step-by-step approach. British Journal of Nursing, 17(1), 38-43.
- Davis, K., Drey, N., & Gould, D. (2009). What are scoping studies? A review of the nursing literature. International Journal of Nursing Studies, 46(10), 1386-1400.
- Fink, A. (2010). Conducting research literature reviews : From the internet to paper (3rd ed.). Los Angeles: Sage Publications.
- George, M. W. (2008). The elements of library research :What every student needs to know. Princeton, N.J.: Princeton University Press.
- Karen J Warren, (ed.) Ecofeminism: Women, Culture, Nature, Bloomington, Indiana•
- Krishna S(ed) Women's Livelihood Rights, recasting citizenship for development (2007) New Delhi: Sage. 247-259.
- Rosi Braidotti, Ewa Charkiewicz, Sabine Hausler• & Sasika Wieringa, (eds.) Women, the Environment and Sustainable Development, London, Zed Books, 1994.
- Sontheimer S (ed) Women and the Environment: A reader, Crisis and Development in the ThirdWorld (1991) London: Earthscan publications
- Srinivasan N (2009) Microfinance in India:State of the

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sector report 2008 New Delhi: SageWal S & Bhanerji S Women and Globalization (2007) New Delhi: Sarup and Sons University Press, 1997.

### Course Outcomes (CO):

**CO1:** Understand the role of translation in the production of textual and cultural meaning

**CO2:** Think about the multiple ways in which globalization affects contemporary culture

**CO3:** Develop the critical skills to write longer research papers that display clear knowledge of research protocols—including conventions of proper attribution and citation—on a topic of literary, cultural, and/or political relevance

**CO4:** Develop the skills to move among and between diverse cultures, including on-site research and travel abroad as means of participation in culture.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	3	3	3	1	2	3	3	3	3
CO2	2	2	2	3	3	2	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3

### DSE 4 – Translation: Concepts and Challenges (MEN024A)

#### Course Objectives

- To develop the skills of translation among the learners through practice in the translation of various types of texts and enhance their employability in various sectors like language and literature studies, publishing houses, business, tourism, journalism and national and international non-government agencies.
- To sharpen the skills of practicing translators and enhance their competence.
- To enable the learners to translate texts and speeches from English to Hindi and Hindi to English.
- To encourage the learners to appreciate the cultural and linguistic diversity of their environment.
- To encourage translation practices from one language to another for multidisciplinary approach in study

#### Course Content

<b>UNIT 1</b>	Nature and Scope of Translation Meaning, Nature and Scope of Translation Relevance of Translation in the age of Globalization Literal Translation and trans-creation Difficulties of Translating from English into Hindi/Hindi to English Duties and Responsibilities of a Translator, Limitations of Translation
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<b>UNIT 2</b>	<p>Functional Translation</p> <p>Understanding Phrase Structure in English and Hindi</p> <p>Understanding Sentence Structure in English and Hindi</p> <p>Using Dictionaries and Thesaurus in Translation</p> <p>Translation of Registers and Technical Terms</p> <p>Translation of sample non-literary and technical passages and texts like scientific, sociological, political speeches and philosophical texts</p> <p>(Practice in Translation: One passage of 500 words each shall be chosen from four categories for translation during this course)</p>
<b>UNIT 3</b>	<p>Translation of Official Documents</p> <p>Importance of translating official documents</p> <p>Translation of administrative terminology</p> <p>Translation of official communications, various types of official forms and formats</p> <p>Translation of reports like administrative reports, reports of NGOs, corporate houses and international funding agencies like UNICEF, World Bank, DFID, UNDP etc</p> <p>Machine Translation: Advantages and Disadvantages</p> <p>(Practice in Translation: One passage of 500 words shall be chosen from four categories for translation during this course)</p>
<b>UNIT 4</b>	<p>Literary Translation</p> <p>Nature and scope of literary translation</p> <p>Role of literary translation over the ages</p> <p>Translation of idioms, proverbs and culture-specific terms</p> <p>Standardization of Hindi Terms and Expressions</p> <p>Translation of sample literary texts like essays, travelogues, criticism, biographies and autobiographies, children's books, stories and excerpts from novels</p> <p>(Practice in Translation: One passage of 500 words shall be chosen from four categories for translation during this course)</p>
<b>UNIT 5</b>	<p>Project Work</p> <p>Translation of a text of 2500- 3000 words from Hindi to English/English to Hindi</p>

#### Suggested Reading:

- Basnett-Mc Guire, S. 1980. Translation studies. London and New York: Methuen.
- Catfor, G.C. 1965. A linguistic theory of translation: an essay in applied linguistics. London: Pinter publishers.
- Chatman, Seymour (ed.) (1971), Literary Style: A Symposium, Oxford : OUP
- Eugene, N. 1964. Toward a Science of Translation. Leiden: E.J. Brill.
- Newmark, P. 1988. A Textbook of Translation. England, Hempstead: Prentice Hall.

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- Thornborrow and Shan Wareing (1998), Patterns in Language : An Introduction to Language and Literary Style, London : Routledge

### Course Outcomes (CO):

By the end of this course the students will be able to:

CO1: apply the skills of translation in everyday communication in the fields of business, journalism and mass communication, politics and tourism

CO2: Translate simple literary passages in English into Hindi and vice versa for academic and non-academic purposes

CO3: Translate the official communication/documents in English into English and vice versa and facilitate faster channels of communication in the organizations where they are working

CO4: Appreciate the cultural and linguistic diversity of their environment.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcomes	Program Outcomes							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	2	3			2	3	3
CO2	3	3	3	2	3			2	3	3
CO3	2	3	3	2	2				3	3
CO4	2	3	3	2	2				3	3

### DSE 4: Green Literature (MEN028A)

#### Course Objective:

- Understand man's changing relationship with Ecology through fictionally factual and non fictional writings.
- Investigate and interpret interrelationship between literature and environment, also known as 'environmental humanities'.
- Understand the historical, demographic, physical, social, economic and institutional attributes of urbanization which along with innate biological and behavioural characteristics, constitute the multi-sectoral and multi-level determinants of urban health and well-being.
- Advocate a more thoughtful and ecologically sensitive relationship of man to nature.

#### Course Content

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Unit 1	<b>Ecocriticism Theory</b> Cherryl Glotfelty : Literary Studies in an Age of Environmental Crisis William Howarth : Ecocriticism in Context Karren J. Warren : “What are the Ecofeminists saying?”
Unit 2	Gieve Patel: On Killing a Tree A.D. Hope: Moschus Mochiferous W.S Merwin : End of the Day Margaret Atwood: Red Fox Gary Snyder : From “Turtle Island
Unit 3	Selections from Aldo Leopold’s Sand Country Almanac( The Land Ethic) Selections from Edward Abbey’s Desert Solitaire(Water,and Serpents of Paradise)
Unit 4	Amitav Ghosh : The Hungry Tide
Unit 5	Rabindranath Tagore : Muktha Dhara

#### Reference Books:

- Beginning Theory, Peter Barry, Vinod Vasishtha, 2010, 3rd edition
- Ecofeminism, Maria Mies & Vandana Shiva, Rawat Publications 1993, 1Edition
- The Green Studies Reader: From Romanticism to Eco criticism, Laurence Coupe Routledge (3 August 2000) 1Edition
- The Oxford Handbook of Eco criticism, Greg Garrard, Oxford University Press 2014.

#### Course Outcomes

**At the end of the course the student will be able to-**

**CO1:** Apply the study as a tool to explore the way nature / environment is understood, imagined and made.

**CO2:** Critically analyze urban health and well-being as an outcome of the complexities of the urban way of life

**CO3:** Develop critical awareness about sustainability practices

**CO4:** Explore issues such as environmental crisis, human greed, critiquing cultural and socio-historical contexts, capitalism, consumerism

**CO5:** Develop multi-disciplinary approach by studying environmental anthropology, environmental history, and environmental philosophy

#### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcomes	Program Specific Outcomes
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s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	3
CO2	3	2	3	2	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

### **Ability Enhancement Course 2: Introduction to Creative Writing in Media (DEN011A)**

#### **Course Objectives:**

- This course introduces students to the concepts of 'creativity' in general and 'creative writing' in particular. This paper focuses especially on writing for the media ranging from newspapers and magazines to emerging new media forms. After being given a foundation in the theoretical aspects of writing for the media real life examples will provide a practical exposure.
- This course will encourage students to be active readers and writers who will engage with contemporary issues in a well informed manner. This course will be of interest to those students who wish to pursue creative writing especially those who wish to work in the media.

#### **Course Content**

Unit 1	<b>What is Creative Writing?</b> a) Defining and Measuring Creativity b) Inspiration and Agency Creativity and Resistance c) What is Creative Writing? Can it be taught? <b>d) The importance of Reading</b>
Unit 2	<b>The Art and Craft of Creative Writing</b> a) Styles and Registers b) Formal and Informal Usage c) Language Varieties Language and Gender d) Disordered Language e) Word order Tense and Time Grammatical differences

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Unit 3	<b>Writing for the Media</b> a) Introduction to Writing for the Media b) Print Media c) Broadcast Media d) New Media e) Advertising and Types of Advertisements
Unit 4	<b>Revising Rewriting and Proof Reading</b> a) Revising b) Rewriting c) Proof reading and proof-reading marks

#### References:

- *Creative Writing: A Beginners' Manual* by Anjana Neira Dev et al. For The Department of English University of Delhi New Delhi Pearson 2008.
- Recommended Additional Resources: *English for Journalists* (vol 2) by Wynford Hicks. Routledge: New York 2007.

#### Course Outcomes

**CO1** - This course will introduce students to the idea that creativity is a complex and varied phenomenon which has an important relationship with social change.

**CO2** - Students will become familiar with ideas about language varieties and the nuances of language usage.

**CO3** - Students will be introduced to the language and types of media writing across forms and genres.

**CO4** - This course will encourage students to revise their work critically and inculcate the skills of proofreading.

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**BOARD OF STUDIES : B.A. (Hons) Psychology**  
**FOR ACADEMIC SESSION 2022-25**

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## **PROGRAMME DESCRIPTION**

The Bachelor of Arts (Honors) in Psychology is a full-time undergraduate programme offered to students pursuing their Bachelor of Arts degree at JECRC University. The Honors program is offered to students who have passed their 12<sup>th</sup> Grade with at least 50% in any of the disciplines offered by the school. The program offers papers from different disciplines of psychology along with laboratory and field experience, elementary statistics and research.

### **Vision:**

The Psychology Department's vision is to gain national and international recognition as a research-oriented, teaching-intensive department while using advance scientific knowledge to develop innovative solutions for important life problems both locally and globally.

### **Mission:**

- To promote the advancement of scientific discipline of psychology through the synergistic relationship between teaching, research, and service.
- To provide competence & interdisciplinary knowledge to students so they are able to develop skills and are ready for vocational world.
- To prepare skilled psychologist and counselors to create awareness about mental health at community, national & international level.
- To cultivate in students professional ethics, a sense of social responsibility, cultural sensitivity, and good citizenship in a globalized world.

  
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**B.A. (HONS) PSYCHOLOGY**  
**DEPARTMENT OF PSYCHOLOGY**  
**COURSE STRUCTURE FOR THE BATCH (2021-2022)**

<b>FIRST SEMESTER</b>								
<b>Course Code</b>	<b>Course Name</b>	<b>L (Hrs)</b>	<b>T (Hrs)</b>	<b>P (Hrs)</b>	<b>L (Credit)</b>	<b>T (Credit)</b>	<b>P (Credit)</b>	<b>Total Credit</b>
<b>CORE COURSES</b>								
<b>BPS001C</b>	INTRODUCTION TO PSYCHOLOGY	4	0	0	4	0	0	4
<b>BPS002C</b>	SOCIAL PSYCHOLOGY-I	4	0	0	4	0	0	4
<b>BPS003D</b>	STATISTICAL METHODS FOR PSYCHOLOGY	4	1	0	4	1	0	5
<b>BPS015C</b>	INTRODUCTION TO PSYCHOLOGY LAB	0	0	2	0	0	1	1
<b>BPS016C</b>	SOCIAL PSYCHOLOGY-I LAB	0	0	2	0	0	1	1
<b>FOUNDATION COURSES</b>								
<b>DCA001A</b>	WEB DEVELOPMENT	2	0	0	2	0	0	2
<b>DCA002A</b>	WEB DEVELOPMENT LAB	0	0	2	0	0	1	1
<b>DEN001A</b>	COMMUNICATION SKILLS	2	0	2	2	0	2	3
<b>DEN001B</b>	COMMUNICATION SKILLS LAB							
<b>DIN001A</b>	CULTURAL EDUCATION-I	2	0	0	2	0	0	2
<b>DCH001A</b>	ENVIRONMENTAL STUDIES	2	0	4	2	0	2	4
	<b>Total</b>							<b>27</b>

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SECOND SEMESTER								
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L (Credit)	T (Credit)	P (Credit)	C
CORE COURSES								
BPS004C	BIOLOGICAL BASIS OF BEHAVIOUR	4	0	0	4	0	0	4
BPS005D	HUMAN DEVELOPMENT AND PEDAGOGY	4	1	0	4	1	0	5
BPS006C	BASICS OF PSYCHOPATHOLOGY	4	0	0	4	0	0	4
BPS017C	PSYCHOBIOLOGY LAB	0	0	2	0	0	1	1
BPS018C	BASICS OF PSYCHOPATHOLOGY LAB	0	0	2	0	0	1	1
DISCIPLINE SPECIFIC ELECTIVE (DSE)								
	DISCIPLINE SPECIFIC ELECTIVE-I (DSE-I)	4	1	0	4	1	0	5
FOUNDATION COURSES								
DCO011A	PRESENTATION SKILLS USING CANVA	0	0	2	0	0	1	1
DEN002A	PROFESSIONAL SKILLS	2	0	0	2	0	0	2
DEN002B	PROFESSIONAL SKILLS LAB	0	0	2	0	0	1	1
DIN002A	CULTURE EDUCATION-II	2	0	0	2	0	0	2
	<b>Total</b>							<b>26</b>

  
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THIRD SEMESTER								
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L(Credit)	T(Credit)	P(Credit)	C
CORE COURSES								
BPS007D	RESEARCH METHODS IN PSYCHOLOGY	4	1	0	4	1	0	5
BPS008C	FUNDAMENTALS OF COGNITIVE PSYCHOLOGY	4	0	0	4	0	0	4
BPS019C	FUNDAMENTALS OF COGNITIVE PSYCHOLOGY LAB	0	0	2	0	0	1	1
DISCIPLINE SPECIFIC ELECTIVE (DSE)								
	DISCIPLINE SPECIFIC ELECTIVE (DSE-II)	4	1	0	4	1	0	5
FOUNDATION COURSES								
DCH004A	ADVANCED SPREADSHEET LAB	0	0	2	0	0	1	1
DEN003A	LIFE SKILLS-I (PERSONALITY DEVELOPMENT)	1	0	2	1	0	1	2
DIN003A	VALUE EDUCATION-I	1	0	0	1	0	0	1
OPEN ELECTIVE (OE)								
	OPEN ELECTIVE-I	3	0	0	3	0	0	3
BPS048C	RESEARCH METHODOLOGY	3	0	0	3	0	0	3
	Total							25

  
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FOURTH SEMESTER								
Course Code	Course Name	L (Hrs)	T (Hrs)	P (Hrs)	L (Credit)	T (Credit)	P (Credit)	C
CORE COURSES								
<b>BPS009C</b>	COUNSELING AND THERAPIES	4	0	0	4	0	0	4
<b>BPS010C</b>	SOCIAL PSYCHOLOGY-II	4	0	0	4	0	0	4
<b>BPS020C</b>	SOCIAL PSYCHOLOGY-II LAB	0	0	2	0	0	1	1
<b>BPS021C</b>	COUNSELING AND THERAPIES LAB	0	0	2	0	0	1	1
DISCIPLINE SPECIFIC ELECTIVE (DSE)								
	DISCIPLINE SPECIFIC ELECTIVE (DSE-III)	4	1	0	4	1	0	5
FOUNDATION COURSES								
<b>DCO012A</b>	BLOGGING, VLOGGING AND PODCASTING	0	0	2	0	0	1	1
<b>DMA011A</b>	LIFE SKILLS-II(APTITUDE)	1	0	2	1	0	1	2
<b>DIN004A</b>	VALUE EDUCATION-II	1	0	0	1	0	0	1
	OPEN ELECTIVE-II	3	0	0	3	0	0	3
	<b>Total</b>							<b>22</b>

  
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## SYLLABUS:

### Semester –I

### BPS001C - INTRODUCTION TO PSYCHOLOGY (Core Course)

#### COURSE OBJECTIVES:

1. Provide sufficient knowledge and information about the nature and scope of psychology.
2. Identify, and create an understanding of individual, social and cultural diversity
3. Compare & construct the knowledge of human behavior in social contexts and situations.
4. Apply and integrate theoretical knowledge in various practical situations and display usefulness of psychological concepts

#### Syllabus:

UNIT	DETAILS
UNIT-1	Psychological Perspectives and Approaches: Definitions of Psychology, Scope, Brain, Mind & Behavior, Methods, Subfields, Psychology in modern India. Sensation & Perception: Sensation, Absolute threshold. Difference threshold. JND. Psychophysics and psychophysical methods, Depth perception: Monocular and binocular cues. Perceptual constancies. Extra sensory perception. Attention. Factors affecting attention-subjective and objective.
UNIT-2	Learning: Definition. Trial and error learning, Classical conditioning, Operant conditioning: Reinforcement, punishment, shaping, schedules of reinforcement. Social and cognitive learning: Observational learning. Latent learning, Insight learning. Memory: Encoding, storage and retrieval processes. Sensory, short term and long-term memories. Chunking, Measuring memory: Forgetting, amnesia, Strategies for remembering.
UNIT-3	Motivation and Emotion: Physiological and cognitive bases of motivation; expression and perception of emotions; physiological correlates and theories of emotion.
UNIT-4	Intelligence: Concept of intelligence: Psychometric and cognitive approaches to intelligence; Gardner's multiple intelligences; Emotional Intelligence, Heredity, environment and intelligence; Group differences in intelligence; Extremes of intelligence
UNIT-5	Self & Personality: Nature of personality; Bio psychosocial foundations of personality; Culture, gender and personality; Theories & approaches, Measuring personality. Know Thy Self: Self-Concept, Self-Esteem, Self-Efficacy & Self-regulation Self-determination theory; Enhancing cognitive potential and self enhancement.

#### COURSE OUTCOMES:

CO 1: Demonstrate an understanding of theoretical perspectives in psychology, key terms, concepts, and principles associated with major topics in psychology.

CO 2: Evaluate & acquire both factual knowledge and the ability to conceptualize and apply this knowledge to their own behavior

  
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CO 3: Apply principles of the scientific method and critical thinking in Psychology.  
CO 4: Asses the ways of interacting with others and their roles in culture and society.

  
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## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	2				1	1			3	2		1	
CO2	3	3	2	1		2	2	1			3	2	1	2		2	
CO3	1	3	2	3	3	1						2		1		2	3
CO4			1		2		2	3		3	2						3

**3 = Highly Related; 2 = Medium; 1 = Low**

### REFERENCES:

- Baron, R. & Misra, G. (2016). *Psychology*. 5th Edition. New Delhi: Pearson.
- Ciccarelli, S. K., White, N.J., & Misra, G. (2017). *Psychology*, 5th Edition. South Asian Edition. New Delhi: Pearson Education.
- Galotti, K.M. (2014). *Cognitive Psychology: In and Out of the Laboratory*, 5th Edition. New Delhi: Sage.
- Morgan, C.T., King, R.A., Weisz, J.R. and Schopler, J. Introduction to Psychology. Singapore: McGraw Hill.
- Atkinson, R.L., Atkinson, R.C., and Hilgard, E.R. Introduction to Psychology. Harcourt Brace Jovanovich Inc.

### BPS002C – SOCIAL PSYCHOLOGY-I (Core Course)

#### COURSE OBJECTIVES:

- Development of the self and the dynamics of interpersonal attraction, prosocial behaviour, aggression, prejudice, group processes and attitude formation and change in a social context.
- Appreciate how individual behavior is influenced by social and cultural contexts.
- Develop an understanding of functioning of dyads, groups and organization.
- Understand how social problems can be analyzed in terms of various social psychological theories.

#### Syllabus:

UNIT	DETAILS
<b>UNIT-1</b>	Introduction: Nature and scope of Social Psychology; Levels of social analysis; Critique to Social Psychology Overview of the history and current trends of Social Psychology (Including development in India)

  
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<b>UNIT-2</b>	Understanding self and evaluating the social world: Making of the self; Social Cognition, Social Perception, Impression Management Attitudes (Attitude-Behavior Link; Strategies for attitude change)
<b>UNIT-3</b>	Social Interactions and Influence: Interpersonal Attraction, Social Influence Processes (Conformity, Compliance and Obedience)

  
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<b>UNIT-4</b>	Group Dynamics: Nature of Groups; Basic Processes, Group Performance, Group Decision Making; Group Interaction (Facilitation, Loafing)
<b>UNIT-5</b>	Aggression & Pro-Social behavior: Aggression, Causes of Human Aggression, Prevention and Control of Aggression, Pro Social behavior & altruism.

### COURSE OUTCOMES:

CO 1: Understanding of basic concepts and familiarity with relevant methods students will be able to learn the applications of psychology in everyday life.

CO 2: Learn the applications of psychology in their social life by getting acquainted with the skills pertaining to social reality and evaluating the social situations.

CO 3: Comprehend the nature of scientific methods employed to study behavior in the social context.

CO 4: Describe the development of the self and the dynamics of interpersonal attraction, pro social behavior

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3		1	1	3	2	1		1	2	1	2	3		2	3
CO2	1		3	2	3				1	2		2	1	3	3	2	
CO3	1	3	2		1	2	2		2						1		
CO4				1			2	1		2	2	3	1				1

**3 = Highly Related; 2 = Medium; 1 = Low**

### REFERENCES:

- Baron, R.A., Byrne, D. & Bhardwaj, G. (2010). *Social Psychology* (12th Ed.). New Delhi: Pearson.
- Baumeister, R.F. & Bushman, B.J. (2018). *Social Psychology and Human Nature*. New Delhi: Cengage Learning
- Misra, G. (2009). *Psychology in India: Theoretical and Methodological Developments* (ICSSR Survey of Advances in Research), Vol 4. New Delhi: Pearson.
- Singh A.K., (2015). *Social Psychology*. PHI Learning Pvt Ltd, Delhi.
- Feldman, R.S. (1995). *Social Psychology*: N.J. Prentice Hall.
- Myers, David G., Sahajpal, P., Behera, P. (2010). *Social Psychology* (10<sup>th</sup> ed). New Delhi: McGraw Hill.
- Aronson, E. Ellsworth, P., Calsmith, J.M. & Gonzales, M.H. (1990). *Methods of Research in Social Psychology*. NY: McGraw Hill.

  
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**BPS003D – STATISTICAL METHODS FOR PSYCHOLOGY (Core course)****COURSE OBJECTIVES:**

1. Familiarize with the psychological research and basics of statistical methods and tools used in descriptive statistics of quantitative research.
2. Develop competence in test construction and taking appropriate decisions based on test scores.
3. Understand the statistical concepts of psychological assessment
4. Develop understanding of the ethics, culture and best practices in psychological assessment.

**Syllabus:**

UNIT	DETAILS
UNIT-1	Introduction to Psychological Assessment: Theory and Practice challenges of Psychological measurement: Frequency Distribution Introduction, frequency table: Raw and grouped data Diagrams and graphs-Pie diagram, histogram, frequency polygon- Frequency curves, Ogives.
UNIT-2	Test construction: Steps in test development, item analysis, types of psychological tests Measure of Central Tendency Meaning-Characteristics-Mean, median, mode- Computation merits and demerits.
UNIT-3	Measure of Dispersion Range: quartile deviation, mean deviation, standard deviation and variance- Coefficient of variance.
UNIT-4	Correlation: Concept and Types- Pearson's Product Moment Correlation (Assumed & Actual Mean), Spearman's rank order correlation, Standard error of mean $\bar{t}$ test (Independent group), Interpretation of $\bar{t}$ values & levels of significance.
UNIT-5	Applications of Psychological testing: clinical, organizational and business, Educational counseling, military and career guidance settings. Ethical Issues of Psychological Testing, International guidelines and challenges of cultural applications.

**COURSE OUTCOMES:**

CO1: Explain and apply the concepts and procedures of descriptive statistics

CO2: Define and identify basic concepts in inferential and descriptive statistics.

CO 3: Create in-depth knowledge about the psychological concepts using the tools of statistics.

CO 4: Create in-depth knowledge about the ethics, culture and practices in psychological assessment.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5

  
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CO1	3	1		2	1		3		1	3		3		1	2	2	
CO2	2	3	1						1	3		3		2	1	2	

  
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CO3	3	3	2	2	2	3	2		1	3		2		2		1	
CO4	1	3	1		1		1	3				1	2	2		3	1

**3 = Highly Related; 2 = Medium; 1 = Low**

## REFERENCES:

- Broota, K.D. (1992). *Experimental design in behavioural research*, Wiley Enstein, New Delhi.
- Garrett, H.E. (2005). *Statistics in Psychology and Education* -12th Indian Reprint. Delhi: Paragon International Publishers
- Mangal, S.K.(2002), *Statistics In Psychology and Education.(2nd ed)*, New Delhi: Prentice Hall.
- Singh A.K. (2006). *Tests, Measurement and Research Methods in Behavioural Sciences*(5th Ed.).BharatiBhavan. Patna.
- Aron, A., Aron, E. N., & Coups, E. J. (2007). *Statistics for Psychology. (4<sup>th</sup>Ed.)* India: Pearson Education
- Chadha, N. K. (1991). *Statistics for Behavioral and Social Sciences*. New Delhi: Reliance Pub. House.

## BPS015C –INTRODUCTION TO PSYCHOLOGY LAB

### COURSE OBJECTIVES:

1. To understand administration of psychological tests, interpretation of scores and report writing.
2. To learn evaluation procedures and evaluation of psychological tests.
3. To develop skills of psychology on the basis of psychological test results.
4. To develop the scientific aptitude for conducting experiments

### Syllabus: Psychometric tests/ Experiments/ Projects based on following

#### (Any 5)

1. Perceptual illusions and constancies
2. Learning
3. Memory
4. Forgetting
5. Emotions
6. Motivation
7. Achievement
8. Aptitude

❖ **Survey based project**

❖ **Assignment**

### COURSE OUTCOMES:

CO 1: Administration and interpretation of psychological tests

CO 2: Evaluate subjects on the basis of the results of the tests

CO 3: Learn the methodology of using the tests manuals and writing reports

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CO 4: Gain the insight of conducting experiments

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	1		2	3	3		1			1	2	3	2			2
CO2	3	2						1	1			2	3	3	2		
CO3	3	2	1	1	1	2		2			2		3	3	2		
CO4	3			2	3	2		2	1		1	2	3	2	3		2

**3 = Highly Related; 2 = Medium; 1 = Low**

**BPS016C – SOCIAL PSYCHOLOGY-I LAB  
COURSE OBJECTIVES:**

1. To understand the administration of tests based on concepts of Social psychology
2. To learn the variety of practical methods used in social psychology
3. To apply theories within social domain of psychology practically through psychometric test
4. To understand the concepts of social surveys and social psychology experiments

**Syllabus: Psychometric tests/ Experiments/ Projects based on following  
(Any 5)**

1. Analysis of Self
2. Social attitude
3. Interpersonal attraction
4. Aggression
5. Prosocial Behavior
6. Decision Making
7. Social Perception
8. Level of compliance

- ❖ Character analysis
- ❖ Sociometry

**COURSE OUTCOMES:**

- CO 1: Administration of social psychology tests and their importance in assessing social phenomenon  
 CO 2: Learn several of methods to analyze social data in psychology  
 CO 3: Able to apply the knowledge of social psychology in practical domain  
 CO 4: Able to design surveys and social experiments

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	1		2	3	3		1			1	2	3	2			2
CO2	3	2				2		1	1			2	3	3	2		3
CO3	3	2	1	1	1	2		2			2		3	3	2		3
CO4	3			2	3	2		2	1		1	2	3	2	3		2

**3 = Highly Related; 2 = Medium; 1 = Low**

**Semester –II**

**BPS004C – BIOLOGICAL BASIS OF BEHAVIOUR (Core Course)**

**COURSE OBJECTIVES:**

1. Understand CNS, brain structures and related functions.
2. Recognize sensory and motor divisions of the Nervous System.
3. Identify the process by which memories are formed and the neurological pathways related to hunger, emotions and sleep.
4. Analyze the various sleep disorders and circadian rhythms in sleep.

**Syllabus:**

UNIT	DETAILS
<b>UNIT-1</b>	Introduction to Physiology: Origin, Nature, Importance. Neurons: Structure, Synapses and reflexes, Neural Impulse Transmission, Neural Transmitter, Role of Neurotransmitters. Homeostasis, Mechanism of Homeostasis.
<b>UNIT-2</b>	Nervous System: CNS, PNS, Lateralization of Brain, Techniques used for studying Brain Pathology.
<b>UNIT-3</b>	Physiological Basis of Behavior: Sensation, Structure & function of Visual & Auditory System, Endocrine System & Behavior, Nature, Role of hormones on Human behavior.
<b>UNIT-4</b>	Physiology of Motivation & Emotions: Neural basis of Motivation & Emotions, Communication of Emotions, Physiological theories of Motivation & Emotions, Role and mechanism of Hunger and Thirst.
<b>UNIT-5</b>	Circadian Rhythms – Homeostasis, Mechanism of Homeostasis. Dreams: Sleep Cycle, REM, nREM, Sleep Cycle. Disorders of Sleep, Insomnia, Narcolepsy, Slow waves Sleep.

**COURSE OUTCOMES:**

CO 1: Understand the fundamental physiological processes, historical development and scientific methods underlying human behavior.

CO 2: Create better understanding about the working of Nervous System.

  
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CO 3: Apply learning the complexities associated with the formation of memories and neurological pathways related to hunger, emotions, and sleep.

  
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CO 4: Learn diagnosis of the sleeping patterns and disorders based on the knowledge of circadian rhythms in sleep.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4	PSO5
CO1	3	1		2	1		3		1	3		3		1	2	2	
CO2	2		1						1	3				2	1	2	
CO3	3	3	2	2	2	3	2		1	3		2				1	
CO4	1		1		1		1	3				1	2			3	1

**3 = Highly Related; 2 = Medium; 1 = Low**

**REFERENCES:**

- Carlson, N.R. (2004). *Physiology of behaviour (8th.ed.)*. Allyn& Bacon. Boston
- Pinel, J.P.J. (2000). *Biopsychology (4th. ed.)*. Allyn& Bacon. Boston.
- Rosenweig, M.R., Leiman, A.L. & Breedlove, S.M. (1999). *Biological psychology: An introduction to behavioral, cognitive, clinical neuroscience. (2nd Ed.)*. Sinauer Associates, Inc. USA.
- Kolb, B. & Whishaw I. (2009): *Fundamentals of Human Neuropsychology*. Worth Publishers. New York.
- Klein, S.B., & Thorne, M.B. (2006). *Biological Psychology*. New York: Worth Publishers.
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**BPS005D – HUMAN DEVELOPMENT AND PEDAGOGY (Core Course)**

**COURSE OBJECTIVES:**

1. Examine and discuss major theories of child development
2. Analyze the interdependence of the cognitive, psychosocial and physical domains of development.
3. Examine and evaluate the role of play and its relationship to development at various stages.
4. Analyze the effect of biological, environment & cultural influence on developmental of children of all ages.

  
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**Syllabus:**

UNIT	DETAILS
<b>UNIT-1</b>	Introduction: Meaning and concept of development, lifespan perspective, theories of development, factors influencing development (Nature & Nurture), principles of growth and development, difference between growth, maturation and development.
<b>UNIT-2</b>	Prenatal & Infancy Period: Genetic foundations, prenatal development, environmental influences, child birth and birth complications, motor and perceptual development in infancy, early deprivation and enrichment.
<b>UNIT-3</b>	Development in Childhood: Pre-school, middle and late childhood, physical, cognitive, intellectual, language, social, moral, and emotional development.
<b>UNIT-4</b>	Adolescence & Young Adulthood: Puberty, transition to adulthood, psychological impacts of pubertal events, sexuality in adolescent health, challenges of cognitive development, forming relationships and choosing career, Old age: Problems & developmental/psychological issues.
<b>UNIT-5</b>	Areas of Development: Cognitive development (Piagetian, Core-Knowledge and Vygotskian, information processing perspective), components and theories of language development, emotional development and theory of attachment, moral development and theory of social understanding.

**COURSE OUTCOMES:**

CO 1: Understand the theories related to child development.

CO 2: In-depth understanding of cognitive, psychological and physical domains of development.

CO 3: Analyze how play is important in relationship to child development at various stages.

CO 4: Apply how biological, environmental, and cultural factors influence child development at various levels of age.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS O1	PS O2	PSO 3	PS O4	PS O5
CO1	3	3		1	1	3	2	1		1	2	1	2	3		2	3
CO2	1		3	2	3				1	2		2	1	3	3	2	2
CO3	3	3	2		3	2	2		2						1		2
CO4	3			1	3		2	1		2	2	3	1				1

**3 = Highly Related; 2 = Medium; 1 = Low**

**References:**

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- Berk, L. E. (2010). Child Development. (9<sup>th</sup> Ed.). New Delhi: Prentice Hall.
- Hurlock, E. B. (1959). Developmental psychology. New York: McGraw-Hill.
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## **BPS006C– BASICS OF PSYCHOPATHOLOGY (Core Course)**

### **COURSE OBJECTIVES:**

1. Acquire knowledge and skills for distinguishing normal and abnormal behavior and learn the criteria of determining abnormality.
2. Develop familiarity with the current diagnostic systems (current edition of the Diagnostic and Statistical Manual of Mental Disorders and International Classification of Diseases- Mental Disorder section).
3. Develop sensitivity towards individual and cultural diversity
4. Understand clinical picture and etiology of major psychological disorders.

### **Syllabus:**

<b>UNIT</b>	<b>DETAILS</b>
<b>UNIT-1</b>	Introduction: Criteria Of Abnormality, Causal Factors, Classification (DSM & ICD), Clinical Assessment, Intervention.
<b>UNIT-2</b>	Schizophrenia spectrum and other psychotic disorders, Dissociative Disorders, Somatic symptom & related disorders (Clinical picture & cases)
<b>UNIT-3</b>	Depressive Disorders, Bipolar and related disorders, Anxiety Disorders, Obsessive-Compulsive and related disorders, Trauma- and stressor-related disorders, Disruptive, impulse-control, and conduct disorders (Clinical picture & cases)
<b>UNIT-4</b>	Sexual Disorders, Gender dysphoria, Personality disorders, Substance Related Disorders(Clinical Picture & dynamics)
<b>UNIT-5</b>	Neurocognitive & Neurodevelopmental disorders: Learning Disabilities, Autism Spectrum Disorder, Attention Deficit Hyperactivity Disorder(Clinical picture and dynamics)

### **COURSE OUTCOMES:**

CO1: Understand about abnormality and so that one becomes able to distinguish between normal and abnormal behavior.

CO2: Learn about current diagnostic systems of mental disorders.

CO3: Become sensitive towards individual and cultural diversity.

CO4: Analyze & apply the clinical picture and etiology of major psychological disorders.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Cour se Outc ome</i>	<b>Program Outcome</b>	<b>Program Specific Outcome</b>

  
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS O1	PS O2	PS O3	PSO 4	PS O5
CO1	3	3		2	1	3	2	2		1	2	1	2	3		2	3

  
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CO2	3		3	2	3			2	1	2		2	3	3	3	2	2
CO3	3	3	2		3	2	2		2						1		2
CO4	3			1	3		2	2		2	2	3	3				1

**3 = Highly Related; 2 = Medium; 1 = Low**

#### REFERENCES:

- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders. (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Bennett, P. (2006). Abnormal and Clinical Psychology: An Introductory Textbook. New York: Open University Press.
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#### BPS017C –PSYCHOBIOLOGY LAB

##### COURSE OBJECTIVES:

- To understand the core practical premises of biological psychology
- To explore applications and implications of key concepts from Biopsychology
- To develop aptitude of basic research methods and techniques in Biological Psychology.
- To cultivate the critical thinking and research methods necessary to administer experiments & evaluate hypotheses

##### Syllabus: Psychometric tests/ Experiments/ Projects based on following

##### (Any 5)

- Biofeedback
- Arousal & Reaction Time
- Neural basis of Emotions
- Hormonal effects
- Hunger/ thirst
- Dreams
- Insomnia
- Sleep disorders

❖ **Case study**

❖ **Brain studies review**

##### COURSE OUTCOMES:

- CO 1: Develop practical aptitude towards the theoretical concepts of biopsychology  
CO 2: Enhance ability to practically apply the key concepts of biopsychology  
CO 3: Ability to organize and use certain research methods in biopsychology  
CO 4: Formulate hypotheses and evaluate results

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3		2	1	3	2	2		1	2	1	2	3		2	3
CO2	3		3	2	3			2	1	2		2	3	3	3	2	2
CO3	3	3	2		3	2	2		2					3	1	3	2
CO4	3			1	3		2	2		2	2	3	3	3		3	1

**3 = Highly Related; 2 = Medium; 1 = Low**

**BPS018C - BASICS OF PSYCHOPATHOLOGY LAB  
COURSE OBJECTIVES:**

1. To understand practical issues related to psychological assessment of mental disorders
2. To learn selection & application of psychometric tests for assessing psychopathology
3. To analyze diagnostic tests of abnormal behavior
4. To use methods of case study, interview & observation to understand real-world problems in relation to abnormality

**Syllabus: Psychometric tests/ Experiments/ Projects based on following  
(Any 5)**

1. WAIS (Performance/ Verbal)
2. MMPI
3. TAT
4. Rorschach
5. Anxiety Scale/ Death Anxiety
6. Depression
7. Reaction to frustration
8. EPQ/ EPI

- ❖ **Project on any of the Disorders**
- ❖ **Case or research analysis on Sexual variants / gender dysphoria**
- ❖ **Analytical report on recent DSM version**

**COURSE OUTCOMES:**

CO 1: Students will learn to psychologically assess the issues of abnormality  
CO 2: Students will learn the basic diagnostic tests administered for psychopathology  
CO 3: Students will learn the application of the psychometric tests

  
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CO 4: Students will learn various assessment techniques in psychopathology

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1		2	1	3	1	2		1	2	1	2	3		1	3
CO2	2	2	3	2	3			2	1	2		2	3	3	3	1	2
CO3	3	3	2		3	2	2		2						1	3	2
CO4	3			1	3		2	2		3	3	3	3			3	1

**3 = Highly Related; 2 = Medium; 1 = Low**

  
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## BPS024C - Introduction to Positive Psychology

### COURSE OBJECTIVES:

1. Introduce students to the basic concepts of Positive Psychology.
2. Discuss the historical development of positive psychology.
3. Understand the core theory and methods of positive psychology.
4. Explore the research advances and applications of Positive Psychology.

### Syllabus:

UNIT	DETAILS
UNIT-1	Definition; goals & assumptions;
UNIT-2	Historical development- Origins, Development, and Influences
UNIT-3	<b>Core theory and methods:</b> -Initial theory: three paths to happiness -PERMA -Character Strengths and Virtues -Flow
UNIT-4	Research advances and applications of Positive Psychology

### COURSE OUTCOMES:

CO1: Learn about how positive psychology will help tackle everyday problems.

CO2: Understand how Positive Psychology as a discipline developed and apply it to present day scenario.

CO3: Develop a proper understanding of core theories and methods in positive psychology.

CO4: Understand research advances and applications of Positive Psychology and be well versed with recent trends in Positive Psychology.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3			2	2			3	2	3	2		3	3
CO2	3	1		3	1	3						3	3	2	3	3	3
CO3	3	2					3		2			3	2	1			3
CO4	3	2			3	2			2			3	2	1	3		3

**3 = Highly Related; 2 = Medium; 1 = Low**

## REFERENCES:

- Hand book of Positive Psychology; Snyder C.R., Lopez Shane J. 2005, Oxford University Press.
- Snyder, J.L. Shane (2005). Handbook of Positive Psychology, Oxford University Press.
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- Seligman, M., & Csikszentmihalyi, M. (2000): Positive Psychology: An Introduction. American Psychologists.

## Semester –III

### BPS007D – RESEARCH METHODS IN PSYCHOLOGY (Core Course)

## COURSE OBJECTIVES:

1. Develop awareness of the basic features of various types of research and understanding of the use of basic terminology used in human research.
2. Understand the distinctive features of a select qualitative research methods and plan small qualitative research.
3. Understand the importance of maintaining ethical and moral integrity of the researcher.
4. Educate with the process and the methods of quantitative and qualitative psychological research traditions.

## Syllabus:

UNIT	DETAILS
UNIT-1	Fundamentals of research methods in psychology: Scientific research, Variables- operational definitions; Problem: Define problem, criteria of problem statements; Hypothesis: Types of hypothesis, Hypothesis testing, Planning research, Steps in scientific research.
UNIT-2	Populations and Samples in Research: Sampling fundamentals: universe, population, sample size, sampling frame, Sampling process and sampling error; Types of sampling.
UNIT-3	Methods of Data Collection: Observation technique, Questionnaires; attitude scales; projective tests; sociometry; psychometric tests; Surveys; Interview methods & Focus Group Discussion and case studies.
UNIT-4	Experimental Research Design: Definition of experiment, importance of experiment in psychology, field vs Laboratory experiment; Experimental designs: within group and between group designs. Matched pair design, Single participant design.
UNIT-5	Psychological testing: Characteristics of a test, scales of measurement standardization, reliability, validity, norms, applications & issues.

**COURSE OUTCOMES:**

CO1: Become aware about the role of various types of research and terminologies associated with human research.

CO2: Able to plan simple research strategies and its requirements.

CO3: Able to plan qualitative methodologies in research.

CO4: Develop in-depth understanding of qualitative and quantitative methodologies in human research.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1		2	1	3	1	3		1		1	2	3		1	3
CO2	3	2	3	2				3	1	2		2	3	3	3	2	3
CO3	3	3	2			2	2	3	2			3			1	3	2
CO4	3			1	1		1	3		3	3	3	3			3	1

**3 = Highly Related; 2 = Medium; 1 = Low**

**BPS008C– FUNDAMENTALS OF COGNITIVE PSYCHOLOGY (Core Course)**

**COURSE OBJECTIVES:**

1. Develop a core competency in the area of cognitive psychology, focusing on topics such as language, memory, problem solving, reasoning and decision making.
2. Communicate how the human brain interprets and manipulates information.
3. Understand human psychology from cognitive perspective and participate as an active recipient of cognitive phenomena around us.
4. Analyze various cognitive phenomena of everyday experience often taken for granted.

**Syllabus:**

UNIT	DETAILS
UNIT-1	Introduction to Cognition: Meaning and various cognitive processes, interdisciplinary nature. Development, Emergence, Alternate approaches & Research Methods in Cognitive psychology.

  
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<b>UNIT-2</b>	Perceptual Processes: Object Recognition, Attention, Consciousness, Perceptual Organizational Processes; Multisensory interaction and Integration - Synesthesia, Comparing the senses, Perception and Action.
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<b>UNIT-3</b>	Memory: Working Memory- Research on working Memory, Factors affecting the capacity of working memory, Baddeley's working memory Approach; Long Term Memory: Memory Strategies: Practice, Mnemonics using Imagery, Mnemonics using organization, Metacognition
<b>UNIT-4</b>	Language Comprehension and Production: Psycholinguistics and Neurolinguistics; Speech Perception- Characteristics, Theories; Reading & Writing process, Bilingualism
<b>UNIT-5</b>	Problem Solving, Reasoning and Decision Making: Approaches, Factors, Creativity, Heuristics in decision making- representativeness, availability and Anchoring and adjustment; The framing effect, Overconfidence in decisions, The Hindsight Bias.

### COURSE OUTCOMES:

CO 1: Learn about cognitive psychology and its related topics like language, memory, problem solving, reasoning and decision making.

CO 2: Learn about the interpretation ability of brain in manipulating information.

CO 3: Comprehend the knowledge of cognitive phenomenon of daily life

CO 4: Critically evaluate the cognitive aspects of knowledge and will develop holistic view of the experience

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3		2	2	3	1	2		1		1	2	3		1	3
CO2	2	2	3	2				2	1	2		2	3	3	3	2	3
CO3	3	3	2			2	2	1	1			3	2		1	2	1
CO4	1			1	3		1	3		3	3	3	3			3	1

**3 = Highly Related; 2 = Medium; 1 = Low**

### References:

- Matlin M.W. (2003).Cognition 5th Edition, London: Wiley Publication.
- Riegler, B.R., Reigler, G.L. (2008), Cognitive Psychology- Applying the Science of Mind. 2nd Edition, New Delhi: Pearson Education.
- Benjafield J G (2007). Cognition.ThirdEdition.Delhi: Oxford University Press
- Goldstein B.E.(2008).Cognitive Psychology. 2nd Edition, London: Wadsworth

### BPS019C – FUNDAMENTALS OF COGNITIVE PSYCHOLOGY LAB COURSE OBJECTIVES:

1. To develop an understanding of mental processes through psychometric tests

  
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2. To draw connections between mind, brain and behavior through observation & experiments
3. To learn about available tools for analyzing data regarding cognitive processes
4. To demonstrate domains of cognition through experimentation

  
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**Syllabus: Psychometric tests/ Experiments/ Projects based on following (Any 5)**

1. Cognitive control
2. Reasoning
3. Problem solving skills
4. Perceptual styles
5. Working memory
6. Change blindness
7. Mnemonics
8. Psycholinguistics

- ❖ Comparative study of psycholinguistics and neurolinguistics
- ❖ Project on NLP or other advanced cognition expansion methods
- ❖ Psychological review on recent advancement in Cognitive Psychology

**COURSE OUTCOMES:**

CO1: Students will be acquainted with psychometric tests for analyzing mental processes

CO2: They will be use techniques of observation & experimentation to understand mind, brain & behavior

CO3: Students will be able to collect data for analyzing cognitive processes

CO4: Students will be able to understand different practical domains of cognitive psychology

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3		2	2	3	1	2		1		1	2	3	2	1	3
CO2	2	2	3	2				2	1	2		2	3	3	3	2	3
CO3	3	3	3			2	2	1	1			3	2		1	2	
CO4	3		2	1	3		1	3		3	3	3	3	2		3	

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## **BPS031C- GENDER DIVERSITY AND INCLUSION (LGBTQIA+)**

### **COURSE OBJECTIVES:**

1. Acquiring foundational knowledge and theories of gender diversity and inclusion.
2. Recognize and focus on the issues related to LGBTQIA+ and understand the eminence of their identity development.
3. Inculcate the importance of gender equality and gender diversity in contemporary times and various areas.
4. Develop an understanding about the importance framework of Queer therapy.

### **Syllabus:**

<b>UNIT</b>	<b>DETAILS</b>
<b>UNIT-1</b>	Gender diversity: Definition, nature & understanding at global and national level, concept of inclusion and related issues, factors accounting gender diversity and its importance.
	Gender inequality: Areas, nature & growth, stigma as the basis of gender inequality,

<b>UNIT-2</b>	fostering gender equality and diversity in the workplace and other areas, impact of gender inequality and gender diversity.
<b>UNIT-3</b>	Management of diversity, women empowerment and Indian society, meta theories on the origin of sex differences; quantifying femininity and muscularity.
<b>UNIT-4</b>	LGBTQIA+: Definition of LGBTQ Psychology, LGBTQ identity development in youth, contemporary contexts of LGBTQ issues, Queer affirmative theory and its benefits

## COURSE OUTCOMES

CO1: Analyse issues associated with LGBTQ community and gender inequality.

CO2: Identifying the problems and integrating the significant of Queer therapy in recent contexts.

CO3: Enhance the important significance of diversity and how it shapes life experiences.

CO4: Gaining an increased understanding of how to manage issues of diversity in multiple areas.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3							2		3	3	3			3	3
CO2	3								2		3	3	3	1		3	3
CO3	3								2		3	3	3			3	3
CO4	3		3	3	3			3	2	3	3	3	3			3	3

**3 = Highly Related; 2 = Medium; 1 = Low**

## REFERENCES:

- Harper, A., Finnerty, P., Martinez, M., Brace, A., Crethar, H. C., Loos, B., ... Hammer, T. R. (2013). Association for Lesbian, Gay, Bisexual, and Transgender Issues in Counseling Competencies for Counseling with Lesbian, Gay, Bisexual, Queer, Questioning, Intersex, and Ally Individuals. *Journal of LGBT Issues in Counseling*, 7(1), 2–43. doi:10.1080/15538605.2013.755444
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- Rudman, L. A. & Glick, P. G. (2008). *The Social Psychology of Gender*. New York: Guilford Press.
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**Semester –IV**

**BPS009C – COUNSELLING AND THERAPIES (Core Course)**

**COURSE OBJECTIVES:**

1. Define and understand the purpose of guidance and counseling
2. Get an overview of different types of counseling specialties.
3. Understanding counseling theories.
4. Understand the counseling process and appreciate ethical practices in counseling.

  
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**Syllabus:**

UNIT	DETAILS
<b>UNIT-1</b>	Introduction: Counseling, & Guidance: Definition and Purpose; Application : Applications: Child Counseling; Career Counseling; Crisis Intervention: Suicide, Grief, and Sexual Abuse, Marriage, Couple and family Counseling, School and college counseling, Abuse and Disability Counseling.
<b>UNIT-2</b>	Therapeutic Processes: Building Therapeutic Relationships; Working in a Therapeutic Relationship; Termination, Expectations and goals; characteristics of counselee and counselors; role and functions of the counselors.
<b>UNIT-3</b>	Counseling Theories 1: Psychoanalytic, Adlerian, Humanistic Approaches: Client-Centered, Gestalt, Existential
<b>UNIT-4</b>	Counseling Therapies 2: Behavioral Therapy, REBT, Reality Therapy, Cognitive therapy, Dialectical Behaviour Therapy Solution focused counseling, Integrative approach
<b>UNIT-5</b>	Ethics and Multicultural issues: Ethical and Legal aspects of counseling, Counseling in a multicultural society.

**COURSE OUTCOMES:**

CO 1: Learn the purpose and scope of counseling and guidance

CO 2: Analyze different skills and specialties of counseling

CO 3: Learn the theories and concepts of counseling and guidance that will help in real life settings of counseling sessions

CO 4: Knowledge of conducting counseling sessions and will also be updated about the ethics of counseling settings and rights of the counselee.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3		2	2	3	3	2		1	3		2	3	2	1	3
CO2	2	2	3	2		1		2	1	2		2	3	3	3	2	3
CO3	3	3	3			2	3	1	2		2	3	2		1	2	2
CO4	3		2	2	3		1	3		3	3	3	3	2		2	3

**3 = Highly Related; 2 = Medium; 1 = Low**

**REFERNCES:**

- Cormier, S., & Hackney, H. (2013) Counseling strategies and interventions (8th International Edition). London: Pearson.

  
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- Seligman, L. & Reichenberg, L.W. (2010). Theories of Counseling and Psychotherapy: Systems, Strategies, and Skills (3rd Ed). New Delhi: Pearson

## **BPS010C – SOCIAL PSYCHOLOGY-II (Core Course)**

### **COURSE OBJECTIVES:**

1. Apply the knowledge of social psychological research to individual and societal problems.
2. Demonstrate the knowledge in social psychological research to resolve everyday social issues.
3. Evaluate the strengths and weaknesses of applied research.
4. Analyze the strengths and weaknesses of policies and interventions.

### **Syllabus:**

<b>UNIT</b>	<b>DETAILS</b>
<b>UNIT-1</b>	Background and Key Social Psychological Theories & Research Techniques in Applied Social Psychology
<b>UNIT-2</b>	Social psychology and health: Health belief model, health compromising behaviors; health promotion, cognitive response and dual process models of persuasive change; stress and health.
<b>UNIT-3</b>	Social psychology and environment: Human interaction with environment, environmental hazards and challenges; environmental attitudes, risk perceptions, encouraging pro-environmental behavior.
<b>UNIT-4</b>	Social psychology and consumer behavior: Economic and social-psychological approaches, meanings of money, social beliefs and value systems, consumer socialization.
<b>UNIT-5</b>	Understanding Yourself and Your Relationships, Youth Experiences Related to Education and Social Problems, Family Violence, addiction & law

### **COURSE OUTCOMES:**

CO 1: Learn the importance of social psychological research for dealing with the issues of individual and the society.

CO 2: Apply research to the students to be able to resolve day-to-day social issues.

CO 3: Compare the strengths and weaknesses of applied research.

CO 4: Compare the strengths and weaknesses of policies and interventions.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	<b>Program Outcome</b>												<b>Program Specific Outcome</b>				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	1		3	3	2		2	3		2	3	2	2	
CO2	2	2	3	1		1		2	1	2		2	3	3	3	2	
CO3	3	3	3			2	3	1	2		2	3	2		1	2	

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CO4	3		2	2			1	3		3	3	3	3	2		2	
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3 = Highly Related; 2 = Medium; 1 = Low

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## REFERENCES:

- Baron, R. A., Branscombe, N. R. & Byrne, D. (2009). *Social psychology (12thed.)*. New York: Pearson Education.
- Myer, D.G. (2012). *Social psychology (11thed.)*. New York: McGraw Hill.
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- Taylor, S.E., Peplau, L.A., & Sears, D.O. (2006). *Social psychology (12thed.)*. New Jersey: Pearson Education.
- Deaux, K. & Wrightsman, L. (2001). *Social Psychology*. California: Cole Publishing
- Misra, G. (1990). *Applied Social Psychology*. New Delhi: Sage.

## BPS020C – SOCIAL PSYCHOLOGY-II LAB

### COURSE OBJECTIVES:

1. To understand the methods of investigation used in advanced social psychology
2. To assess experimental methods and analyze data of social psychology experiments
3. To familiarize students with practical applications of social psychology in different settings.
4. To analyze real-world problems using psychometric tests in social psychology

### Syllabus: Psychometric tests/ Experiments/ Projects based on following (Any 5)

1. Health belief
2. Pro-environment behavior
3. Consumer Socialization
4. Person perception
5. Pro-social behavior
6. Social conformity
7. Cooperation and competition
8. Experiential deprivation

- ❖ **Project on prevailing Social issue**
- ❖ **Psychological analysis of close relationships**

### COURSE OUTCOMES:

- CO 1: Students will be able to understand methods of assessment in advanced social psychology  
CO 2: Students will be able to apply and analyze experiments on the concepts of social world  
CO 3: Students will learn practical aspects of social psychology theories in different contexts  
CO 4: Students will gain proficiency in using psychometric tests to solve real issues of society

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	1		3	3	2		2	3		2	3	2	2	3
CO2	2	1	3	1		1	2	2	1	2		2	3	3	3	2	3
CO3	3	3	3	3		2	3	1	2		2	3	2		1	2	3
CO4	3		2	2			1	3		3	3	3	3	2		2	3

**3 = Highly Related; 2 = Medium; 1 = Low**

**BPS021C – COUNSELLING AND THERAPIES LAB  
COURSE OBJECTIVES:**

1. To understand the administration and analysis of psychometric tests of vocational counseling
2. To understand selection & application of aptitude & creativity assessment tests
3. To equip the students with professional and practical skills specific to counseling psychology
4. To develop applied counseling and communication skills required for working in the counseling contexts

**Syllabus: Psychometric tests/ Experiments/ Projects based on following  
(Any 5)**

1. Study of grief
2. Suicidal tendencies
3. Marital relationship
4. Substance abuse
5. Adjustment
6. Counseling skills analysis
7. Identifying causes for therapies
8. Assessment of Interpersonal orientation of feelings / behavior

- ❖ Use of SPSS
- ❖ Analytical Reports on Mock Counseling sessions
- ❖ Writing Case Profile for diagnosis purpose
- ❖ Counselee interview report

**COURSE OUTCOMES:**

- CO 1: Students will be able to administer tests for vocational counseling  
 CO 2: Student will understand the application of aptitude & creativity assessment techniques  
 CO 3: Students will be equipped with professional & practical skills of counseling psychology  
 CO 4: Students will develop applied knowledge of counseling skills

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3		3	3	3	2		2	3		2	3	2	2	3
CO2	2					1		2	1	2		2			3	2	
CO3	3	3	3	3	3	2		1			2	3	2		1	2	3
CO4	3	2	2	2			1	3		3	3	3	3	2		2	3

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#### **Sem 4: BPS032C- GENDER AND MENTAL**

#### **HEALTHCOURSE OBJECTIVES**

1. Introduce the theoretical concept of the importance of mental health among different gender.
2. Enhance the understanding and skills of various factors affecting the mental health.
3. Understanding the importance of psychological side of sexuality.
4. Inculcate the knowledge of risk factors associated with gender and other areas of mental health.

#### **Syllabus:**

UNIT	DETAILS
UNIT-1	Understanding gender and mental health, gender differences in mental health, impact on mental health, association between gender and mental health.
UNIT-2	Gender and mental in Indian context, biological and sociocultural influences on gender and mental health; impact of media on mental health of men & women; Key issues affecting women's mental health.
UNIT-3	The psychological side of human sexuality: Cognitive differences; social & personality differences, theories of gender role development and its importance.
UNIT-4	Gender specific risk factors; association between gender and emotional health; gender and mental dysfunction

#### **COURSE OUTCOMES**

CO1: Gaining increased knowledge and exposure about the determinants of specific mental health risks.

CO2: By exploring the importance and association between gender and mental health.

CO3: Develop and expand clarity about theories and development of gender role.

CO4: Able to plan and become aware about mental health and human sexuality among the society.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome												Program Specific Outcome				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3		3		3			3	2		3	3	3			3	3
CO2	3		3		3			3	3		3	3	3			3	3
CO3	3	2	3		3			3			3	3	3			3	3
CO4	3		3	3	3			3	2		3	3	3	2		3	3

  
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**3 = Highly Related; 2 = Medium; 1 = Low**

**REFERENCES:**

1. Bosson, Vandello, & Buckner (2019) Gender and psychological health. In *The Psychology of Sex and Gender* (pp. 442-475), Thousand Oaks, CA: Sage
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4. Rosenfield, S., & Mouzon, D. (2013). Gender and mental health. In *Handbook of the sociology of mental health* (pp. 277-296). Springer, Dordrecht.

  
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**BOARD OF STUDIES : M.A. Clinical Psychology**  
**FOR ACADEMIC SESSION 2021-22**

*Vandita Kuman*  
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## **PROGRAMME DESCRIPTION**

Masters of Arts in Clinical Psychology or MA Clinical Psychology is a full time postgraduate course of two years, which is divided into four semesters at JECRC University. Clinical psychology addresses a breadth of mental, emotional and behavioral disorders. Clinical psychology is designed to integrate the science of psychology with the prevention and treatment of a wide variety of complicated human problems. The eligibility criteria for this course require BA Hons. degree in psychology/clinical psychology with a minimum of 55% aggregate from a recognized college/university.

### **Vision:**

The Psychology Department's vision is to gain national and international recognition as a research-oriented, teaching-intensive department while using advance scientific knowledge to develop innovative solutions for important life problems both locally and globally.

### **Mission:**

- To promote the advancement of scientific discipline of psychology through the synergistic relationship between teaching, research, and service.
- To provide competence & interdisciplinary knowledge to students so they are able to develop skills and are ready for vocational world.
- To prepare skilled psychologist and counselors to create awareness about mental health at community, national & international level.
- To cultivate in students professional ethics, a sense of social responsibility, cultural sensitivity, and good citizenship in a globalized world.

  
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**M.A. (CLINICAL PSYCHOLOGY)  
DEPARTMENT OF PSYCHOLOGY  
COURSESTRUCTURE for the batch (2021-2022)**

			FIRST SEMESTER						
Course Code	Course Name	L (hrs)	T (hrs)	P (hrs)	L (C)	T (C)	P (C)	Total C	
	Core								
MPS001A	Introduction to Clinical Psychology	4	0	0	4	0	0	4	
MPS002A	Psychology of Personality	4	0	0	4	0	0	4	
MPS003A	Research Methods in Clinical Psychology-I	4	1	0	4	1	0	5	
MPS030A	Psych Practical Lab –I	0	0	4	0	0	2	2	
	Discipline Specific Elective I (Choose from Group A,B,C,D)				4	1		5	
MPS033A	Ability Enhancement Compulsory Course-I (AECC-I) Psychology of Indian Perspective	3	1	0	3	1	0	4	
	TOTAL				19	3	2	24	

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## SYLLABUS:

### SEMESTER –I

#### MPS001A: Introduction to Clinical Psychology

#### COURSE OBJECTIVES:

1. To demonstrate an awareness of the range of mental health problems with their underlying causal factors
2. To understand the working knowledge of the theoretical application of clinical models and interventions
3. To be able to integrate alternative or complementary theoretical frameworks in overall management of mental health problems.
4. To familiarize students with psychological assessments and interventions in the field of clinical psychology

UNIT	DETAILS
UNIT-1	Introduction: Scope of clinical psychology; overview of the profession and practice; history and growth; professional role and functions; current issues and trends; areas of specialization; ethical and legal issues; code of conduct.
UNIT-2	Mental health and illness: Mental health care – past and present; stigma and attitude towards mental illness; concept of mental health and illness; perspectives, Epidemiology: Epidemiological studies in Indian context; socio-cultural correlates of mental illness
UNIT-3	Self and relationships: Self-concept, self-image, self-perception and self-regulations in mental health and illness; learned helplessness and attribution theories; social skill model; interpersonal and communication models of mental illness; stress diathesis model, resilience, coping and social support
UNIT-4	Introduction to Clinical Assessment and Interventions Assessment Processes: planning, data-collecting, interpreting, and communicating findings; Clinical Interview: components and basic skills; Diagnosis and Classification: basic issues and skills; Other assessment components and skills (Intellectual, Neuropsychological, Personality and Behavioral assessment)
UNIT-5	General issues in interventions: Nature of specific therapeutic variables (client, therapist, relationship). Course of intervention; Various perspectives (briefly): Psychodynamic, Humanistic-Existential, Behavioral-Cognitive, Group & Family

#### COURSE OUTCOMES:

- CO 1: Apply the knowledge of clinical psychology by understanding the roots of mental health  
CO 2: Evaluate different clinical models for deeper understanding of mental health issues  
CO 3: Analyze and apply different assessments and interventions of clinical psychology  
CO 4: Apply basic clinical assessments for self-analysis

  
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## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2			1		1	3	2	3
CO2	3	1	2		2	2		3		1
CO3	3	2	3		3		3	3	2	2
CO4	2	2	3				2	2		1

**3 = Highly Related; 2 = Medium; 1 = Low**

## REFERENCES:

- Achenback, T.M. (1974). Developmental Psychopathology. New York: Ronald Press.
- Brislin, R. W. (1990). Applied Cross cultural psychology. New Delhi: Sage publications.
- Buss, A.H. (1966). Psychopathology. NY: John Wiley & Sons.
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- Irallagher, B. J. (1995). The sociology of mental illness (3rd ed.). New York: Prentice hall.
- Hecker, J., & Thorpe, G. (2015). Introduction to clinical psychology. Psychology Press.
- Kaker, S. (1981). The Inner world: a psychoanalytic study of childhood and society in India. New Delhi: Oxford University Press.
- Mash, E.J & Wolfe, D.A. (1999). Abnormal Child Psychology. New York: Wadsworth Publishing
- Millon, T., Blaney, P.H. & Davis, R.D. (1999). Oxford Textbook of Psychopathology. New York: Oxford University.
- Pfeiffer, S.I. (1985). Clinical Child Psychology. New York: Grune & Stratton.
- Radley, A. (1994). Making sense of illness: The social psychology of health and disease. New Delhi: Sage Publications.
- Rao, H.S.R & Sinha D. (1997). Asian perspectives in Psychology (Vol. 19). New Delhi: Sage publications:
- Saraswathi, T.S (1999). Culture, Socialization and human development. New Delhi: Sage publications.
- Walker, C.E & Roberts, M.C. (2001). Handbook of Clinical Child Psychology (3rd ed.). Canada: John Wiley & Sons

## MPS002A: Psychology of Personality

### COURSE OBJECTIVES:

1. To describe and differentiate among the major psychological approaches, terms, and theories which explain personality.
2. To practically apply acquired insight of personality to one's own life

  
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3. To be able to compare and discuss different personality theories with regards to strengths and weaknesses

  
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4. To apply critical perspectives & cultural competence through interpersonal awareness and sensitivity of others

UNIT	DETAILS
<b>UNIT-1</b>	Who am I? Understanding the Building Blocks of Personality, Personality Traits, Situations and Behaviors, Personality Assessment, Personality Judgment, Using Personality Traits to Understand Behavior
<b>UNIT-2</b>	Biological aspects: Anatomy and Physiology of Personality, Genetics, Personality Stability, Inheritance of Personality, The Neuroscience of Personality, Intrapsychic Foundations of Personality
<b>UNIT-3</b>	Psychoanalytic aspects of personality, Neo-analytic and ego aspects, Behaviorist and learning aspects, Cognitive and social-cognitive aspects, Trait and skill aspects
<b>UNIT-4</b>	Humanistic, existential, and positive aspects of personality, Person-situation interactionist, Regulation and Motivation: Self-Determination Theory
<b>UNIT-5</b>	Gender and Personality, Male-female differences, Stress, adjustment, & health differences, Sexual Orientation & personality issues.

### COURSE OUTCOMES:

CO 1: Understand the of basis of personality development through theories, approaches & different models

CO 2: Apply the different aspects of personality development for clinical analysis

CO 3: Develop research design to conduct clinical research projects based on personality, behavior and mental health issues

CO 4: Use clinical assessment tools for understanding the difference between various traits and types of personality for clinical/research purpose

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>CO1</b>	3	3			2	1		3	1	3
<b>CO2</b>	2	2						3	2	2
<b>CO3</b>	2	2	3			1	3	1	1	3
<b>CO4</b>	1	2	3					2		2

**3 = Highly Related; 2 = Medium; 1 = Low**

### REFERENCES:

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- Gedo, J. E. (2002). The enduring scientific contributions of Sigmund Freud. Perspectives in Biology and Medicine, 45, 200-211
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- Olson, M., & Hergenhahn, B. R. (2011). An introduction to theories of personality (8th ed.). New York: Pearson. [Chapter 15 — Abraham Maslow, pp. 466-499.]
- Ryckman, R. M. (2013). Theories of Personality (10th ed.). Belmont, CA: Wadsworth/Cengage.

### **MPS003A: Research Methods in Clinical Psychology-I**

#### **COURSE OBJECTIVES:**

1. To understand the basics of scientific process of quantitative research
2. To be able to understand & apply the knowledge of variables, sampling and methods of data collection
3. To use the knowledge of experimental designs to design an experiment in quantitative research
4. To comprehend and use the knowledge of identifying faults in research designs and designing an experimental quantitative research proposal

<b>UNIT</b>	<b>DETAILS</b>
<b>UNIT-1</b>	Philosophical roots of quantitative research; History of scientific research in psychology; Definition of research; Purpose and need of psychological research. Experimental, Exploratory, Correlational and descriptive research in psychology; Ethical issues in psychological research
<b>UNIT-2</b>	Conceptualization, operationalization and measurement; Causality and experimentation; Definition and nature of variables; operationally defining variables; Independent variables; Dependent variables; formulation of research problems and hypothesis; Different types of hypothesis; Experimental manipulation and control of variables; steps in quantitative research
<b>UNIT-3</b>	Population and sample: Basic assumptions; Sampling distribution; Sampling techniques: probability and non-probability sampling
<b>UNIT-4</b>	Methods of data collection: observational methods, surveys, questionnaires, interviewing methods, case study methods, and psychometric tests.
<b>UNIT-5</b>	Adequate vs. Inadequate (faulty) research design; Types of experimental design based on subjects and factors; Within-subjects, between subjects, single subject, single factor, and factorial design; Sources of error variance and its management in the various types of experimental designs; Mixed designs.

#### **COURSE OUTCOMES:**

- CO 1: Demonstrate knowledge of research designs in quantitative research and the scientific process of research
- CO 2: Design an experiment with manipulation can control of the variables.
- CO 3: Differentiate various data collection and sampling methods employed in quantitative research
- CO 4: Write a quantitative research proposal in the domain of Clinical Psychology

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	1	2	3						1	3
CO2	2	2	3		2		2	2	2	
CO3	3	1	3		3	1			2	1
CO4	2	2	3		2				2	3

**3 = Highly Related; 2 = Medium; 1 = Low**

**REFERENCES:**

- Bordens, K. S., & Abbott, B.B. (2006). Research and design methods: A process approach(6 ed.). New Delhi: Tata McGraw-Hill Company Limited
- Breakwell, G. M., Hammond, S., Fife-Shaw, C., & Smith, J. A. (Ed.). (2006). Research methods in psychology (3 ed.). New Delhi: Sage.
- Coolican, H.(2004). Research methods and Statistics in Psychology. London: Hoddes Arnold
- Gravetter,F. J., &Forzana, L. A. (2015). Research methods for behavioral sciences (5 ed.). Stamford, CT:Wordsworthcengage learning.
- Goodwin, C. J. (2002). Research in psychology: Methods and design (3rd ed.). New Jersey: John Wiley & Sons, Inc.
- Kerlinger, N. (1996). Foundations of behavioural research. India: Prentice Hall
- Rosnow, R. L., & Rosenthal, R. (2002). Beginning behavioral research: A conceptual primer (4ed.). New Jersey: Prentice Hall.
- Singh, A. K. (1997). Test, measurements and research methods in behavioural sciences. Patna: BharathiBhavan Publishers and Distributors.

**MPS030A: Psych Practical Lab-I**

**COURSE OBJECTIVES:**

1. To use relevant criteria to assess the quality and appropriateness of a psychological test and evaluate its strengths and weaknesses for clinical purposes.
2. To be able to synthesize and integrate collateral information from multiple sources and discuss the rationale for psychological assessment as relevant to the areas being assessed
3. To use the knowledge of administration of psychometric testee to apply psychological assessment in clinical context.
4. To comprehend and use the knowledge to integrate the findings in service activities.

**Psychometric tests/ Experiments/ Projects based on following**

  
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1. Introduction and administration of Case history
2. Mental status examination (MSE)
3. Muller Lyer Illusion

  
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4. Personality Inventories
5. Self-esteem scales

- ❖ Collection of reports based on MSE
- ❖ Using personality tests for identifying clinical mental health issues
- ❖ Attending seminar of relatable topics

#### **COURSE OUTCOMES:**

CO 1: Carry out the clinical work-up and discuss the diagnostic possibilities based on the history and mental status examination of the clients with psychological/neuropsychological problems

CO 2 Select and justify the use of psychological tests and carry out the assessment as per the specified procedures in investigating the relevant domains.

CO 3: Interpret the findings in the backdrop of the clinical history and mental status findings and arrive at a diagnosis.

CO 4: Prepare the report of the findings as relevant to the clinical questions

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3						3	1	3
CO2	1	2		2		3		1	3	3
CO3	3	1		2		3		3	2	3
CO4	3	1						3	1	2

**3 = Highly Related; 2 = Medium; 1 = Low**

#### **REFERENCES:**

- Bellack, A.S. & Hersen, M. (1998). Comprehensive Clinical Psychology: Assessment (Vol. 4). London: Elsevier Science Ltd.
- Choudhary, U. (1960). An Indian modification of the Thematic Apperception Test. Calcutta: Shree Saraswathi Press.
- Exner, J.E. (2002). The Rorschach – A Comprehensive System, (4th ed., Vol.1). New York: John Wiley and Sons.
- Freeman, F.S. (1965). Theory and practice of psychological testing. New Delhi: Oxford and IHBN.
- Hersen, M., Segal, D.L., & Hilsenroth, M.J. (2004). Comprehensive handbook of psychological assessment (Vols. 1-2). New York: John Wiley & Sons.
- Murray, H.A. (1971) The Thematic Apperception Test manual. London: Harvard University Press.

  
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**Sem 1: MPS021A: Introduction to Art therapy as supportive**

**therapyCOURSE OBJECTIVES:**

1. Introduce students to the basic concepts of Art Therapy.
2. Discuss Art Therapy as a supportive therapy in General Illnesses
3. Understand Art Therapy as a supportive therapy for children who have experienced trauma
4. Explore art therapy as a supportive therapy for eating disorders

**Syllabus:**

UNIT	DETAILS
UNIT-1	Art Therapy- Definition and History
UNIT-2	Art Therapy as a supportive Therapy in General Illnesses: -Cancer -Heart Disease

  
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<b>UNIT-3</b>	<b>Art Therapy as a supportive Therapy for Children who have experienced Trauma</b> -Alleviating Trauma induced emotions within children
<b>UNIT-4</b>	<b>Art Therapy as a supportive Therapy for Eating Disorders</b> -Anorexia -Bulimia -Binge Eating

### **COURSE OUTCOMES:**

**CO1:** Learn how art therapy developed as a psychotherapy

**CO2:** Understand how Art Therapy may be used as a supportive therapy in general illnesses

**CO3:** Develop and understanding about how art therapy may be used as a supportive therapy for children who have experienced trauma

**CO4:** Explore how art therapy may be useful in dealing with eating disorders

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>							<b>Program Specific Outcome</b>		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>CO1</b>		2	2			1	3	3		
<b>CO2</b>	2	3	2	2		1	3	3	3	3
<b>CO3</b>	2	3	2	2		1	3	3	3	3
<b>CO4</b>	2	3	2	2		1	3	3	3	3

**3 = Highly Related; 2 = Medium; 1 = Low**

### **REFERENCES:**

- Rubin, Judith A. (2010). Introduction to Art Therapy—Sources & Resources. Routledge.
- Malchiodi, Cathy A. (2003). Handbook of Art Therapy. The Guilford Press
- Moschini, Lisa. B. (2019). Art, Play, and Narrative Therapy. Taylor & Francis

### **MPS033A: Psychology of Indian Perspective (AECC-I)**

#### **COURSE OBJECTIVES:**

1. To develop an understanding of the concepts of Indian psychological thought.
2. To understand the process of self and personality from a developmental perspective and its involvement in health and healing.

  
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3. To facilitate an understanding into mapping selfhood in the context of relationships, motivation, action and agency.
4. To learn to formulate strategies to address issues in therapeutic, educational and organizational settings from the indigenous Indian perspective.

## Syllabus:

UNIT	DETAILS
UNIT-1	Introduction: What is Indian psychology; relevance and scope; historical developments; distinction from western psychology.
UNIT-2	Indian Perspectives on Cognition: Nature of reality; manas and higher mental states; types of knowing; methods of knowing; yoga as research method.
UNIT-3	Self and Consciousness: What is self? self as consciousness; states of consciousness; self as knower, as enjoyer, as doer; ego-identity and soul identity; self and society
UNIT-4	Health, Happiness and Well-being: Concepts; mental health — concept, symptoms and treatment; suffering and healing; theories of happiness and well-being; self-growth and liberation

## COURSE OUTCOMES:

CO 1: Being students of Indian origin, the students will be able to understand the Indian psychological thought more effectively.

CO 2: Students will be able to discover more perspective about their own personality, their self, and will be able to use that for healing and health.

CO 3: With selfhood mapping the students will be able to have better perspective about relationships, motivation, action and agency.

CO 4: The students will learn to apply indigenous Indian perspective in issues in therapeutic, educational and organizational settings.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2		2	1		1	3	2	3
CO2	3	2	2		2	2		3		1
CO3	3	2	3		3		3	3	2	2
CO4	3	2	3				2	2	2	1

**3 = Highly Related; 2 = Medium; 1 = Low**

## REFERENCES:

- Bhawuk, D, (2011). *Spirituality and Indian Psychology: Lessons from the Bhagavad Gita*.

  
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- Rao, K, R. & Paranjpe, A.C. (2017). *Psychology in the Indian Tradition*. New Delhi: D.K. Print world.
- Rao, K, R., Paranjpe, A.C. & Dalal, A.K. (Eds.) (2008). *Handbook of Indian Psychology*. New Delhi: Cambridge University Press.
- Rama, S. (2007). *Perennial Psychology of the Bhagvad Gita*. New Delhi: Himalayan Institute Press.

  
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			<b>SECOND SEMESTER</b>					
Course Code	Course Name	L (hrs)	T (hrs)	P (hrs)	L (C)	T (C)	P (C)	Total C
	<b>Core</b>							
MPS004A	Psychopathology – I	4	0	0	4	0	0	4
MPS005A	Psychology of Cognition	4	0	0	4	0	0	4
MPS006A	Research Methods in Clinical Psychology- II	4	1	0	4	1	0	5
MPS031A	Psych Practical Lab –II	0	0	4	0	0	2	2
	<b>Discipline Specific Elective II</b> (Choose from Group A,B,C,D)	4	1	0	4	1	0	5
	<b>OPEN ELECTIVE</b>							
	OPEN ELECTIVE 1	2	1	0	2	1	0	3
	<b>TOTAL</b>				<b>18</b>	<b>3</b>	<b>2</b>	<b>23</b>

## SEMESTER –II

### MPS004A: Psychopathology -I

#### COURSE OBJECTIVES:

1. To understand the etiology and current classificatory systems of mental disorders
2. To learn about the different symptoms, course and prognosis of mental disorders
3. To be able to differentiate and apply the knowledge of mental disorders as per Indian and western perspective
4. To use and apply the knowledge of psychiatric disorders for the purpose of internship and clinical training

UNIT	DETAILS
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<b>UNIT-1</b>	Introduction to psychopathology: Definition; concepts of normality and abnormality; clinical criteria of abnormality; continuity (dimensional) versus discontinuity (categorical), and prototype models of psychopathology; classification and taxonomies – reliability and utility; classificatory systems DSM, ICD, currently in use and their advantages and limitations. Approach to clinical interviewing and diagnosis; case history; mental status examination; organization and presentation of psychiatric information; diagnostic formulation
<b>UNIT-2</b>	Indian thoughts: Concept of mental health and illness; nosology and taxonomy of mental illness; social identity and stratification (Varnashrama Vyawastha); concept of – cognition, emotion, personality, motivation and their disorders.
<b>UNIT-3</b>	Signs and symptoms: Disorders of consciousness, attention, motor behavior, orientation, experience of self, speech, thought, perception, emotion, and memory. Organic mental disorders: Dementia, delirium and other related conditions with neuralgic and systemic disorders – types, clinical features, etiology and management.
<b>UNIT-4</b>	Psychoses: Schizophrenia spectrum and other psychotic disorders, affective disorders, delusional disorders and other forms– types, clinical features, etiology and management. Neurotic, trauma & stressor-related and somatic symptom and other related disorders: types, clinical features, etiology and management.
<b>UNIT-5</b>	Behavioral, emotional and developmental disorders of childhood and adolescence: Intellectual disabilities and neurodevelopmental disorders: Classification, etiology and management

#### **COURSE OUTCOMES:**

CO 1: Contrast and compare the models of etiology of mental disorders

CO 2: Demonstrate the ability to use DSM V and ICD classificatory systems

CO 3: Apply the understanding of skills required to diagnose various disorders.

CO 4: Write case study reports with mental status examination and case history.

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2						2	1	3
CO2	3	2		1		3		1	3	3
CO3	3	1		1	2	2		3	3	3
CO4	3	2						3	2	3

**3 = Highly Related; 2 = Medium; 1 = Low**

**REFERENCES:**

- Adams, H.E., Sutker, P.B. (2001). Comprehensive handbook of psychopathology (3rd Ed.). New York: Kluwer Academic publishers.
- Ahuja N (2002). A short textbook of Psychiatry (5th edition). New Delhi. Jaypee Brothers. 2.
- Sadock, B.J. & Sadock, V.A. (2003).
- American Psychological Association. (1998). Diagnostic and statistical manual of mental disorders (4th .ed.): text revision (DSM-IV-TR). New Delhi: Jaypee Brothers Medical Publishers (pvt) Ltd.
- Hecker, S.E. & Thorpe, G.L. (2005). Introduction to clinical psychology: Science, practice & ethics. Delhi: Pearson Education, Inc
- Kaplan & Sadock's Synopsis of psychiatry: Behavioral sciences/clinical psychiatry (9th. Ed.). Philadelphia: Lippincott Williams & Wilkins.
- Millon, T., Blaney, P., & Davis, R.D. (1998). The oxford textbook of psychopathology. London: Oxford University Press.
- Smith, N.W. (2001). Current systems in psychology: History, theory, research & applications. USA: Wadsworth/Thomson learning.

**MPS005A: Psychology of Cognition**

**COURSE OBJECTIVES:**

1. Develop a core competency in the area of cognitive psychology, focusing on topics such as language, memory, problem solving, reasoning and decision making.
2. Communicate how the human brain interprets and manipulates information.
3. Understand human psychology from cognitive perspective and participate as an active recipient of cognitive phenomena around us.
4. Analyze various cognitive phenomena of everyday experience often taken for granted.

**Syllabus:**

UNIT	DETAILS
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<b>UNIT-1</b>	Introduction to Cognition: Meaning and various cognitive processes, interdisciplinary nature. Development, Emergence, Alternate approaches & Research Methods in Cognitive psychology.
<b>UNIT-2</b>	Perceptual Processes: Object Recognition, Attention, Consciousness, Perceptual Organizational Processes; Multisensory interaction and Integration - Synesthesia,

  
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	Comparing the senses, Perception and Action.
<b>UNIT-3</b>	Memory: Working Memory- Research on working Memory, Factors affecting the capacity of working memory, Baddeley's working memory Approach; Long Term Memory: Memory Strategies: Practice, Mnemonics using Imagery, Mnemonics using organization, Metacognition
<b>UNIT-4</b>	Language Comprehension and Production: Psycholinguistics and Neurolinguistics; Speech Perception- Characteristics, Theories; Reading & Writing process, Bilingualism
<b>UNIT-5</b>	Problem Solving, Reasoning and Decision Making: Approaches, Factors, Creativity, Heuristics in decision making- representativeness, availability and Anchoring and adjustment; The framing effect, Overconfidence in decisions, The Hindsight Bias.

### COURSE OUTCOMES:

CO 1: Learn about cognitive psychology and its related topics like language, memory, problem solving, reasoning and decision making.

CO 2: Learn about the interpretation ability of brain in manipulating information.

CO 3: Comprehend the knowledge of cognitive phenomenon of daily life

CO 4: Critically evaluate the cognitive aspects of knowledge and will develop holistic view of the experience

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>CO1</b>	3	1		1				2	1	
<b>CO2</b>	3	2			1	3		2		1
<b>CO3</b>	3	2	2		2	3		2		2
<b>CO4</b>	3	1	2		2			2		3

**3 = Highly Related; 2 = Medium; 1 = Low**

### References:

- Matlin M.W. (2003).Cognition 5th Edition, London: Wiley Publication.
- Riegler, B.R., Reigler, G.L. (2008), Cognitive Psychology- Applying the Science of Mind. 2nd Edition, New Delhi: Pearson Education.
- Benjafield J G (2007). Cognition.ThirdEdition.Delhi: Oxford University Press
- Goldstein B.E.(2008).Cognitive Psychology. 2nd Edition, London: Wadsworth

  
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## MPS006A: Research Methods in Clinical Psychology-II

### COURSE OBJECTIVES:

1. To understand skills on designing qualitative & clinical research
2. To be able to collect qualitative data using various methods in the field of clinical psychology
3. To develop the skills of manual and computer aided data analysis in interdisciplinary research
4. To apply skills of proposal writing and reporting qualitative research.

UNIT	DETAILS
UNIT-1	Defining qualitative research; Historical development of qualitative research; Key philosophical and methodological issues in qualitative research; Different traditions of qualitative research; Grounded theory, Narrative approach, Ethnography, Action research and Discourse analysis
UNIT-2	Conceptualizing research questions, issues of paradigm, Designing samples, Theoretical sampling, Contrasting qualitative with quantitative approach in research process Issues of Credibility and trustworthiness
UNIT-3	What is qualitative data? Various methods of collecting qualitative data: participant observation, interviewing, focus groups, life history and oral history, documents, diaries, photographs, films and videos, conversation, texts and case studies
UNIT-4	Analyzing Qualitative Data: Different traditions of qualitative data analysis; thematic analysis, Narrative analysis, Discourse analysis, Content analysis
UNIT-5	Review of different article related to the different traditions of qualitative research. Developing Qualitative research proposal, Qualitative data analysis software, Simulated techniques on different data collection methods

### COURSE OUTCOMES:

CO 1: Contrast and compare different qualitative research methods

CO 2: Design qualitative research study and use different data collection techniques

CO 3: Apply the knowledge of manual & computer aided data scrutiny for analyzing result.

CO 4: Create research proposal and conduct qualitative research

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	2		2			2		2
CO2	3	2	2		2	2		1		2
CO3	3	2	3	1	2	2	3	1		1
CO4	3		3							1

3 = Highly Related; 2 = Medium; 1 = Low

### REFERENCES:

  
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- Creswell, J. W., & Poth, C. N. (2017). Qualitative inquiry and research design: Choosing among five approaches. Los Angeles, CA: Sage.
- Ritchie, J., Lewis, J., McNaughton Nicholls, C., & Ormston, R. (2014). Qualitative research

  
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- Bryman,A (Ed.)(2007) Sage Benchmarks in social science research methods Vol.I,Vol.II ,Vol.III,and Vol. IV.New Delhi : Sage Publications
- Kvale,S.(Ed.) (1997).Psychology & Post-modernism. New Delhi:Sage Publications
- McGhee, P. (2001). Thinking critically about qualitative research in psychology. In P. McGhee, Thinking psychologically (pp.98-111). New York: Palgrave
- Smith,J.A.(ed.)(2003).Qualitative psychology: A practical guide to research methods.New Delhi: Sage.
- Smith,J.A., Harre,R., &Langenhove,L.V.(eds.).(1995).Rethinking methods in psychology. NewDelhi:Sage.
- Willig,C.(2001).Introducing qualitative research in psychology: Adventures in theory and method. Buckingham:Open University Press

### **MPS031A:Psych Practical Lab-II**

#### **COURSE OBJECTIVES:**

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores
2. To be able to synthesize and integrate collateral information from multiple sources and discuss the rationale for psychological assessment as relevant to the areas being assessed
3. To acquaint the students with the basic procedure and design of psychology experiments.
4. To encourage and guide the students to undertake a small-scale research project.

#### **Psychometric tests/ Experiments/ Projects based on following**

1. Introduction and administration of Case history
2. Emotional Intelligence Scale
3. Clinical Analysis Questionnaire
4. Bhatia Battery
5. Projective techniques

- ❖ **Project on clinical cases**
- ❖ **Using projective techniques**
- ❖ **Writing analysis of National & International research papers**

#### **COURSE OUTCOMES:**

CO 1: Carry out the clinical work-up and discuss the diagnostic possibilities based on the history and mental status examination of the clients with psychological/neuropsychological problems

CO 2 Select and justify the use of psychological tests and carry out the assessment as per the specified procedures in investigating the relevant domains.

CO 3: Interpret the findings in the backdrop of the clinical history and mental status findings and arrive at a diagnosis.

CO 4: Prepare the report of the findings as relevant to the clinical questions

  
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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3		2			2	3	1	3
CO2	1	2		2		3	3	1	3	3
CO3	3	1		2		3		3	2	3
CO4	3	1		2				3	1	2

**3 = Highly Related; 2 = Medium; 1 = Low**

**REFERENCES:**

- Bellack, A.S. & Hersen, M. (1998). Comprehensive Clinical Psychology: Assessment (Vol. 4). London: Elsevier Science Ltd.
- Choudhary, U. (1960). An Indian modification of the Thematic Apperception Test. Calcutta: Shree Saraswathi Press.
- Exner, J.E. (2002). The Rorschach – A Comprehensive System, (4th ed., Vol.1). New York: John Wiley and Sons.
- Freeman, F.S. (1965). Theory and practice of psychological testing. New Delhi: Oxford and IHBN.
- Hersen, M., Segal, D.L., & Hilsenroth, M.J. (2004). Comprehensive handbook of psychological assessment (Vols. 1-2). New York: John Wiley & Sons.
- Murray, H.A. (1971) The Thematic Apperception Test manual. London: Harvard University Press.

**Sem 2: MPS022A: Art therapy**

**Techniques –I**

**COURSE OBJECTIVES:**

1. Discuss the evolution of art therapy techniques
2. Understand different art therapy techniques of evoking expression within the client
3. Explore various techniques on how to facilitate expression within the client through art therapy
4. Using techniques to facilitate decisions on what to do and why to do it.

**Syllabus:**

UNIT	DETAILS
UNIT-1	Evolution of Art Therapy Technique
UNIT-2	<b>Evoking Expression:</b> - Warming Up -Pictorial Stimuli

  
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	-Visual Starters -Using the Non-dominant Hemisphere -Stimulating Materials and Methods -Regressive Media Help in Dealing with Shame -Mental Imagery -A Series of Images
<b>UNIT-3</b>	<b>Facilitating Expression:</b> -Motivational Techniques -Artistic Interventions -Drawing Workbooks and Guides
<b>UNIT-4</b>	<b>Deciding on what to do and why:</b> -Specific Tasks Help a Family to –See Problems

### COURSE OUTCOMES:

**CO1:** Learn about the evolution of art therapy techniques.

**CO2:** Understand how to evoke expression through various art therapy techniques.

**CO3:** Using various art therapy techniques to facilitate expression

**CO4:** Exploring various art therapy techniques to help on deciding what to do and why to do it.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

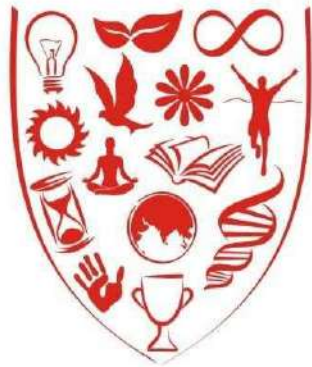
Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>CO1</b>	2		1					2		
<b>CO2</b>	3	3	1	2	1	3	3	3	3	3
<b>CO3</b>	3		1	2	1	3	3	3	3	3
<b>CO4</b>	3		1	2	1	3	3	3	3	3

**3 = Highly Related; 2 = Medium; 1 = Low**

### REFERENCES:

- Rubin, Judith A. (2010). Introduction to Art Therapy—Sources & Resources. Routledge.
- Malchiodi, Cathy A. (2003). Handbook of Art Therapy. The Guilford Press
- Moschini, Lisa. B. (2019). Art, Play, and Narrative Therapy. Taylor & Francis

  
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**BOARD OF STUDIES: B.A. (Hons.) Political Science**

**FOR ACADEMIC SESSION 2021-22**

  
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### **Program Description**

Bachelor of Arts in Political Science (Hons.) is a Three-year Undergraduate programme designed to prepare students to understand the theoretical and practical aspects of Political Science. Political Science equips students with an understanding of the political institutions and laws that govern all businesses function. It also sharpens students understanding of organizational dynamics and human relations. JECRC University offers B.A (Hons.) in Political Science, to enrich the young minds for understanding the current events in a larger context. The students are introduced to the political, social, cultural and economic backgrounds of various countries across the globe. After the successful completion of the course, students can opt for Masters Degree in Political Science, prepare for Civil Services, Competitive Exams, and go for Research in the field of their interest and many more.

### **Vision**

The Department of Political Science endeavors to generate new knowledge and produce students who are trained in Political Science. The primary purpose of the Department is to pursue knowledge and understanding of the political aspects of the human endeavor; to transmit this knowledge to others; to relate this knowledge to the real world in creative, critical, and constructive ways; and to encourage through pedagogical means a real interest in politics.

### **Mission**

The Department of Political Science strives to achieve academic excellence in teaching, research and extension. The mission of the Department is to communicate the knowledge of political science as a scholarly discipline through education of undergraduate students in the core principles and specialties of political science. Our mission is to make the students a politically aware citizen and contribute towards the society and Nation at large.

  
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## Faculty of Humanities and Social Sciences

### Department of Political Science

#### Proposed Course Scheme for 2021-24

#### 1st Semester

SL No	Subject	Lecture (Hrs)	Tutorial (Hrs)	Practical (Hrs)	Credits			Total Credits	Paper Category
					Lecture	Tutorial	Practical		
1	Core Course 1	4	1	0	4	1	0	5	Core
2	Core Course 2	4	1	0	4	1	0	5	Core
3	Core Course 3	4	1	0	4	1	0	5	Core
4	Web Development	2	0	0	2	0	0	2	Fundamental
5	Web Development Lab	0	0	2	0	0	1	1	Fundamental
6	Communication Skills	2	0	2	2	0	1	3	Foundation
7	Culture Education -1	2	0	0	2	0	0	2	Foundation
8	Environment Studies	2		2*	2			4	Fundamental
	<b>Total</b>	<b>20</b>	<b>3</b>	<b>6</b>	<b>20</b>	<b>3</b>	<b>2</b>	<b>27</b>	

#### 2nd Semester

S No	Subject	Lecture (Hrs)	Tutorial (Hrs)	Practical (Hrs)	Credits			Total Credits	Paper Category
					Lecture	Tutorial	Practical		
1	Core Course 4	4	1	0	4	1	0	5	Core
2	Core Course 5	4	1	0	4	1	0	5	Core
3	Core Course 6	4	1	0	4	1	0	5	Core
4	Discipline Specific Elective 1	4	1	0	4	1	0	5	DSE
5	Project Management Lab	0	0	2	0	0	1	1	Fundamental
6	Professional Skills	2	0	2	2	0	1	3	Foundation
7	Culture Education-2	2	0	0	2	0	0	2	Foundation
	<b>Total</b>	<b>20</b>	<b>4</b>	<b>4</b>	<b>20</b>	<b>4</b>	<b>2</b>	<b>26</b>	

  
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### 3rd Semester

S No	Subject	Lecture (Hrs)	Tutorial (Hrs)	Practical (Hrs)	Credits			Total Credits	Paper Category
					Lecture	Tutorial	Practical		
1	Core Course 7	4	1	0	4	1	0	5	Core
2	Core Course 8	4	1	0	4	1	0	5	Core
3	Discipline Specific Elective 2	4	1	0	4	1	0	5	DSE
4	Advance Spread sheet Lab)		-	2			1	1	Fundamental
5	Life Skills-1 (Personality Development)	1	0	2	1	0	1	2	Foundation
6	Value Education-1	1	0	0	1	0	0	1	Foundation
7	Open Elective-I	3	0	0	3	0	0	3	Interdisciplinary
8	Open Elective-II	3	0	0	3	0	0	3	Interdisciplinary
	<b>Total</b>	<b>20</b>	<b>3</b>	<b>4</b>	<b>20</b>	<b>3</b>	<b>2</b>	<b>25</b>	

### 4th Semester

S No	Subject	Lecture (Hrs)	Tutorial (Hrs)	Practical (Hrs)	Credits			Total Credits	Paper Category
					Lecture	Tutorial	Practical		
1	Core Course 9	2	1	0	4	1	0	5	Core
2	Core Course 10	4	1	0	4	1	0	5	Core
3	Discipline Elective 3	4	1	0	4	1	0	5	DSE
5	Python Programming	2	0	0	2	0	0	2	Fundamental
6	Python Programming Lab	0	0	2	0	0	1	1	Fundamental
7	Life Skills 2(Aptitude)	1	0	2	1	0	1	2	Foundation
8	Value Education-2	1	0	0	1	0	0	1	Foundation
9	Research Methodology	2	1	0	2	1	0	3	
	<b>Total</b>	<b>16</b>	<b>4</b>	<b>4</b>	<b>18</b>	<b>4</b>	<b>2</b>	<b>24</b>	

  
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### 5th Semester

S No	Subject	Lecture (Hrs)	Tutorial (Hrs)	Practical (Hrs)	Credits			Total Credits	Paper Category
					Lecture	Tutorial	Practical		
1	Core Course 11	4	1	0	4	1	0	5	Core
2	Core Course 12	4	1	0	4	1	0	5	Core
3	Discipline Elective 4	4	1	0	4	1	0	5	DSE
4	Discipline Elective 5	4	1	0	4	1	0	5	DSE
5	Open Elective-III	3	0	0	3	0	0	3	Interdisciplinary
		19	4	0	19	4	0	23	

### 6<sup>th</sup> Semester

S No	Subject	Lecture (Hrs)	Tutorial (Hrs)	Practical (Hrs)	Credits			Total Credits	Paper Category
					Lecture	Tutorial	Practical		
1	Core Course 13	4	1	0	4	1	0	5	Core
2	Discipline Elective 6	4	1	0	4	1	0	5	DSE
3	Open Elective-IV	3	0	0	3	0	0	3	Interdisciplinary
4	Dissertation							10	Discipline Specific
	Total	11	2	0	11	2	0	23	

S No	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Total
Credits	27	26	25	24	23	23	148

  
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**DEPARTMENT OF POLITICAL SCIENCE**

**ACADEMIC SESSION 2021-22**

**PROGRAM OUTCOME**

<b>PO1</b>	<b>Domain knowledge:</b> Apply the knowledge of domain subjects, science, computer fundamentals, and humanities & social science specialization to the solution of complex individual & social problems
<b>PO2</b>	<b>Critical Thinking:</b> Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives
<b>PO3</b>	<b>Problem Analysis:</b> Stimulate into adopting an enquiring attitude towards the problems encountered, developing solutions & appreciation of the different contexts
<b>PO4</b>	<b>Design/development of solutions:</b> Design solutions for complex psychological, economical, political & social problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
<b>PO5</b>	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
<b>PO6</b>	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex activities with an understanding of the limitations
<b>PO7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
<b>PO8</b>	<b>Ethics:</b> Recognize the diversity and complexity of ethical dilemmas in the real world, and educate oneself to base one's actions on responsibility, and respect for human rights
<b>PO9</b>	<b>Multidisciplinary approach:</b> To develop multidisciplinary perspective in reference to historical, social, psychological, economical, political & cultural context.
<b>PO10</b>	<b>Effective Communication:</b> Articulate ideas and perspectives, by developing and enhancing the communicative skills of listening, speaking, reading, and writing in interpersonal and interactive contexts, in print and in electronic media, for various audiences and purposes
<b>PO11</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

  
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<b>PO12</b>	<b>Self-directed and Life-long Learning:</b> Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological change.
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#### **PROGRAMME SPECIFIC OUTCOMES (PSOs)(Political Science)**

<b>PS0 1</b>	Locate, identify, analyze and evaluate diverse sources of arguments, knowledge and approaches in political science.
<b>PS0 2</b>	Identify, analyze and evaluate the historical origins of contemporary political actors, institutions and systems, and the broader historical context of current political issues and debates.
<b>PS0 3</b>	Understand the world, different societies, and have awareness of ethical problems, social rights, values and responsibility to the self and to others.
<b>PS0 4</b>	Have a sense of civic responsibility. They will evolve an awareness as well as understanding of the professionalism and ethical behavior that guide the discipline of political science with respect to research design, practice and the principles of academic integrity.
<b>PS0 5</b>	Assess how global, national and regional developments affect society. .

**Faculty of Humanities& Social Sciences**

**Department of Political Science**

**BA (Hons.) Political Science**

**Detailed Syllabi**

First Semester						
Course Code	Course Name	Course Category	L	T	P	C
BPO 001A	Understanding Fundamentals of Political Science-I	CORE	4	1	0	5
BPO 002A	Constitutional Development& Democracy in India	CORE	4	1	0	5
BPO 003A	Indian Political Thinkers -I	CORE	4	1	0	5
DCA001 A	Web Development	FUNDAMENTAL	2	0	0	2
DCA002 A	Web Development lab	FUNDAMENTAL	0	0	1	1
DEN001 A	Communication Skills	FOUNDATION	2	0	1	3
DIN001A	Culture Education -1	FOUNDATION	2	0	0	2
DCH001 A	Environment Studies	FUNDAMENTAL	2	0	2	4

  
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**Core Course: BPO001A Understanding Fundamentals of Political Science I (Credits-5)**

**Course Objectives:**

**CO1.** Students will understand the fundamentals of Political Science.

**CO2.** This will enable students to learn about the evolution and usage of Political concepts, ideas and theories.

**CO3.** Students will gain an understanding of the evolution of different forms of Government. **CO4.** Students would acquire knowledge about the role of Political Parties, Pressure Groups and their role in modern times.

**CO5.** Students will have the knowledge of the basic concepts, law, liberty Rights and Duties.

**Course Content**

Unit 1	Meaning , Nature & Scope of Political Science, Difference between Political Philosophy & Political Theory, , Behaviouralism and Post-Behaviouralism
Unit 2	Concepts: Liberty, Equality (Liberal & Marxist perspective) Justice: (Theories of Justice) Law, Rights & Duties, Sovereignty (Monistic & Pluralistic) Power Authority & Legitimacy
Unit 3	Forms of Government: Democracy, Dictatorship, Unitary, Federal, Parliamentary, Presidential (Meaning, Types, Functions, Merits & Demerits)
Unit 4	Organs of Government Legislature, Executive, Judiciary. Separation of Power, Checks & Balance, Rule of Law
Unit 5	Political Dynamics: Political Power, Pressure Groups, Interest Groups. (Meaning, Types, changing role in recent times)

**Course Outcome: Upon completion of this course, students will be able to:**

CO1. Understand the rudimentary of politics and be able to identify the nature and significance of Political Science.

CO2. The students would assess the basic concepts like Liberty, Equality, and Sovereignty etc. and analyze the changes in the context of Globalization and the new world order.

CO3. The students would learn about different forms of government, their merits and demerits and the working in contemporary times.

CO4. The students will have an insight to identify the organs of government and the relevance of theory of separation of power and its application in different world constitutions..

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11

CO1	H				H	M			H			
CO2		H		L								
CO3												
CO4												
CO5		H										

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M		L	
CO2		H			L
CO3			H		M
CO4		M			
CO5	H		M		

### **Books Recommended:**

### **Essential Readings:**

Gauba, O.P.,( 2019),*An Introduction to Political Theory*, New Delhi: Macmillan Publications

Heywood, A.,( 2019),*Politics*, United Kingdom :Macmillan Publications

Agarwal, R.C.,(2018). *Political Theory:Principles of Political Science*, New Delhi: S. Chand & Co

Mahajan, V.D .,(2016), *Political Theory:Principles of Political Science*, New Delhi, Sultan Chand and Sons

Bhargava, R., and Ashok,A., (2016) ,*Political Theory:An Introduction*, New Delhi: Pearson Education

Asirvatham,E., (2015), *Political Theory*, New Delhi : S. Chand & Co. Pvt. Ltd

Gupta, R.L.,( 2014), *Political Theory, New Concepts: New Perspectives*, New Delhi: Sultan Chand and Sons

Vermani, R.C., (2014),*Political Theory:Concepts and Debates*,New Delhi: Geetanjali Publications

Jain, M.P., (2013), *Political Theory*, New Delhi: Atlantic Publications

## **Reference Books:**

- Schmidt, D.E., (2019), *Writing in Political Science: A Practical Guide*, London: Routledge
- Sabine, G.H., & Thorson, L.T., (2018), *A History of Political Theory*, New Delhi: Oxford & IBH Publishing
- Kapur, A.C., (2016), *Principles of Political Science*, New Delhi : Sultan Chand and Sons
- Appadorai, A., (2015) , *Substance of Politics*, Chennai : Oxford University Press
- Hoffman, J.,& Graham, P., (2015), *Introduction to Political Theory*, London: Dorling Kindersely Publishers
- Vincet, A., (2007) , *The Nature of Political Theory*, New York : Oxford University Press
- Das, H. H.,& Choudhary, B.C., (2007), *Political Theory*, Jaipur: National Publishing House
- Kymlicka, W., (2002), *Contemporary Political Philosophy*, New York : Oxford University Press
- Knowles ,D., (2001), *Political Philosophy*, London, Routledge

## **Semester I**

### **Core Course 2: BPO002A Constitutional Development& Democracy in India (Credit-5)**

#### **Course Objectives:**

- CO1.** The students will acquaint themselves with the constitutional design of state structures, institutions, and their actual workings.
- CO2.** The student will learn about the history of Constitutional Development and Constituent Assembly.
- CO3.** Students will learn about the Rights, Duties and Directive Principles of the State Policy.
- CO4.** The students will have the core knowledge of Federalism and its working.
- CO5.** Enable students to understand functioning of Democratic structures in India.

#### **Course Content**

Unit 1	Constitutional Development, (1600-1947), Indian National Movement, Indian Independence Act of 1947
Unit 2	The Constituent Assembly and the Constitution- Philosophy of the Constitution, Preamble , Sources, Features, Fundamental Rights, Fundamental Duties, Directive Principles of the State Policy
Unit 3	Organs of the Government- Legislature, Executive and Judiciary.
Unit 4	Federalism , Division of Powers, Emergency Powers, Fifth and Sixth Schedule
Unit 5	Decentralization and Local Self Government- Panchayati Raj and Municipalities.

**Course Outcome: Upon completion of this course, students will be able to:**

CO1 Evaluate the legacy of British Rule in India.

CO2: Identify different administrative changes introduced by the British and understand about different political associations and their political strategies.

CO3 Trace and describe the Constitutional development of state structure, institutions, and their actual working over time.

CO4 Identify the historical processes and the circumstances in which the Constitution was drafted and about why a particular arrangement in the Constitution was adopted, how the institutions grow in the company of actual politics.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H									
CO2		M									
CO3			M		M						
CO4											
CO5		H						L			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H			
CO2	M	H			
CO3				H	
CO4		M			M
CO5					H



### **Books Recommended:**

#### **Essential Readings:**

Agarwal,R.C,(2018), *Constitutional Development and National Movement of India*,New Delhi Sultan Chand & Sons  
Fadia ,B.L., (2019), *Indian Government and Politics*, Agra, Sahitya Bhawan  
Johari, J.C.,( 2012),*Indian Government and Politics (Vol. I& II)*, New Delhi, Vishal Publications  
Chandra, Bipan , (2017), *In the Name of Democracy*, New Delhi,Penguin BooksPublication

Laxmikanth,M,(2019), *Indian Polity*,Noida, Mc Graw Hill Education

#### **Reference Books:**

Brass,P,( 2009), *Politics of India since Independence*, Hyderabad,Orient Longman  
Datta,P , (2003), *India's Democracy: New Challenges*, New Delhi, Kanishka Publishers and Distributors.  
Pylee,M.V.(1998), *An Introduction to the Constitution of India*,New Delhi, Vikas

#### **Semester I**

#### **Core Course 3: BPO003A Indian Political Thinkers (Credits-**

#### **5) Course Objectives:**

- CO1.** Enables student **to** critically assess the contribution of ancient and modern Indian political thinkers.  
**CO2.** Learn about the contribution of Indian Political thinkers in the development of Indian political system.  
**CO3.** Make the students understand about the relevance of Indian political thought.  
**CO4.** Focus on the distinctive contribution of Indian thinkers in developing the Political thought.  
**CO5.** Understand the rich legacy of Indian thought and culture.

#### **Course Content**

Unit 1	Manu,
Unit 2	Kautilya, Shukra
Unit 3	Raja Ram Mohan Roy, Swami Dayanand Saraswati,, Swami Vivekananda
Unit 4	Raja Ram Mohan Roy Gopal Krishna Gokhle
Unit 5	Bal Ganga Dhar Tilak,, Savarkar

**Course Outcome: Upon completion of this course, students will be able to:**

CO1. Analyze the political thought of important Indian thinkers and their correlation and contradictions.

CO2. The student will be able to do the critical assessment of Indian political thought.

CO3. The student will understand the nature, methods and significance of Indian political thought.

CO4. Develop the interconnectedness between various socio-political issues and draw inferences on the same

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
O1		H									
CO2	M										
CO3					M						
CO4									M		
CO5					L						

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H			
CO2	H	M			
CO3	H		M		
CO4	M				M
CO5					H

**Books Recommended:**

### Essential Readings:

Roy, H., Singh, M.P. (2017), *Indian Political Thought*, Delhi, Pearson  
Roy, H., Singh, M.P. (2011), *Indian Political Thought- Themes and Thinkers* (ed.) Delhi, Pearson  
Pandey, U.S (2011), *Indian Political Thought*, Delhi, D.P.S. Publishing house  
Manav, S. (2012), *Introduction to Indian Political Thought*, Delhi, Raj Publications  
Gaubha, O. P., (2016), *Indian Political Thought*, New Delhi, Mayur Paperback  
Verma V.P., (2017), *Modern Indian Political Thought (Vol.II)*, Agra, Laxmi  
Narayan Agarwal  
Padhy, K.S. , (2014), *Indian Political Thought*, Delhi, OHI Learning Pvt Ltd

### Reference Books:

Bhagwan, V. (2002), *Indian Political Thinkers*, Delhi, Atma Ram & Sons  
Verma, S.L. (2004), *Representative Indian Political Thinkers*, Jaipur, Daulat chand  
Jain Pruthi, R.K. (2009), *Political Philosophy of Mahatma Gandhi*, Delhi, Common  
wealth Adhi, D. (1997), *Political Thinkers of Modern India*, New Delhi, Mittal  
Publications  
Bali, D.R. (1970), *Modern Indian Thought*, New Delhi, Sterling Publishers Pvt. Ltd  
Brown, D.M. (1982), *The White Umbrella: Indian Political Thought from Manu*

to

*Gandhiji*, Mumbai, Jaico

Karunakaran, K.P. (1969), *Religion and Political Awakening in India*,

Meerut, Meenakshi

Mehta, V.R. (1996), *Foundations of Indian Political Thought*, New Delhi, Manohar  
Publications

Naravane, V.S. (1964), *Modern Indian Thought*, Bombay Asia

Thomas, P., and, Deutsch, K.L (eds.), (1986), *Political Thought in Modern India*,  
New Delhi, Sage

Second Semester						
Course Code	Course Name	Course Category	L	T	P	C

BPO004A	Understanding Fundamentals of Political Science II	CORE	4	1	0	5
BPO005A	Indian Political Thinkers-II	CORE	4	1	0	5

  
Head  
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JECRC University, JAIPUR

BPO006A	Political Process in India	CORE	4	1	0	5
	<b>DSE (ANY ONE)</b>					
BPO001A	Nationalism in India	DSE	4	1	0	5
BPO001A	Women and Political Representation	DSE	4	1	0	5
DCA003A	Project Management Lab	FUNDAMENTAL	0	0	2	2
DEN002A	Professional Skills	FOUNDATION	1	0	1	2
DIN002A	Culture Education-2	FOUNDATION	2	0	0	2

## Semester II

### **Core Course: BPO004A: Understanding Fundamentals of Political Science II (Credits-**

#### **5) Course Objectives:**

**CO1.** Introduce the students with the basic concepts and fundamental principles of Political Science.

**CO2.** Enable students to acquire and understand the knowledge of the political science as discipline; its principles, theoretical frameworks and applications.

**CO3.** Acquaint the students with a holistic overview of the organs of the government and their functioning in Polity.

**CO4.** Makes student understand the interrelationship of political science with the other social sciences.

**CO5.** Make students aware about the development of different approaches of political science.

#### **Course Content**

Unit 1	Distinction between Classical and Modern Political Science, Approaches to the study of political science(Normative and Empirical)
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Unit 2	State : Meaning ,Elements, Theories of the origin of State Nation and Nationality, Distinction between Nation and State.
Unit 3	Human Rights- Marxist and Liberal perspective
Unit 4	Political Development, Political Modernization, and Political Culture
Unit 5	Scientific understanding of Politics- Systems Theory- Contribution of David Easton; Structural- Functional Approach- Almond and Kaplan

**Course Outcome: Upon completion of this course, students will be able to:**

**CO1.** Understand and demonstrate the ability to analyze the basic concepts and theories pertaining to political development.

**CO2:** Use and relate multidisciplinary approach.

**CO3.** Provides an insight into the discipline through scientific understanding of politics.

**CO4.** Learn the evolution and usage of new concepts and theories.

**CO5.** Understand about the concept of State and Nation.

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	M									
CO2		M			M	M					

  
 Head  
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CO3				M								
CO4									M			
CO5				H								

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H				L
CO2	H		M		
CO3			M		L
CO4	H				
CO5	H				

**Essential Readings:**

Gauba, O.P., (2019), *An Introduction to Political Theory*, New Delhi: Macmillan Publications

Heywood, A., (2019), *Politics*, United Kingdom :Macmillan Publication

Agarwal, R.C., (2018). *Political Theory: Principles of Political Science*, New Delhi: S. Chand & Co

Bhargava, R., (2016) ,*Political Theory: An Introduction*, New Delhi: Pearson Education

Asirvatham, E., (2015) *Political Theory*, New Delhi : S. Chand & Co. Pvt. Ltd

Gupta, R.L., (2014), *Political Theory, New Concepts: New Perspectives*, New Delhi: Sultan Chand and Sons

Jain, M.P., (2013), *Political Theory*, New Delhi: Atlantic Publications

Vermani, R.C., (2014), *Political Theory: Concepts and Debates*, New Delhi: Geetanjali Publications

**Reference Books:**

Sabine, G.H., & Thorson, L.T., (2019), *A History of Political Theory*, New Delhi: Oxford & IBH Publishing

Johri, J.C., (2019), *Principles of Modern Political Science*, New Delhi : Sterling Publishers

Appadorai, A., (2016) , *Substance of Politics*, Chennai : Oxford University Press

Kapur, A.C., (2015), *Principles of Political Science*, New Delhi : Sultan Chand and Sons

Jonathan, R., (2008), *Issues in Political Theory*, New York, Oxford University Press

Hoffman, J., Graham, P., (2007), *Introduction to Political Theory*, London, Dorling Kindersely Publishers

  
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Das, H. H., & Choudhary, B.C., (2007), *Political Theory*, Jaipur: National Publishing House  
 Vincet, A., (2004), *The Nature of Political Theory*, New York : Oxford University Press  
 Gaus, G.F., & Kukathas, C., (2004), *Handbook of Political Theory*, London, Sage  
 Axford, B., Browning, G., Muggins, R., & Ben Rosamond, (2002,) *Politics: An Introduction*, New York, Routledge  
 Kymlicka, W., (2002), *Contemporary Political Philosophy*, New York : Oxford University Press  
 Knowles, D., (2001), *Political Philosophy*, London: Routledge

## Semester II

### **Core Course BPO005A: Indian Political Thinkers-II (Credit: 5)**

#### **Course Objectives:**

**CO1** The student will assesses the contribution of modern Indian political thinkers.

**CO2** It will enable a student to recognize the distinctive contribution made by Indian thinkers in the making of modern India.

**CO3.** Enable student to understand various strands of thoughts with Indian perspective.

**CO4.** Acquaint the students with contemporary and emerging trends in Politics.

**CO5.** The student will recognize the relevance of Indian Thinkers in present context.

#### **Course Content**

Unit 1	M.K. Gandhi (Social philosophy, Concept of Satya and Ahimsa, Concept of Ram Rajya, and Economic ideas)
Unit 2	B. R. Ambedkar (Social reforms, Political ideas, Role in constitution making)
Unit 3	J.L. Nehru (Democratic Socialism, Nationalism and Internationalism, Non Alignment and Panchsheel)
Unit 4	M.N. Roy (Critique of Marx, Concept of New Humanism, Freedom & Democracy) Ram Manohar Lohiya-Chaukhamba Rajya, Economic, Political & Historical ideas
Unit 5	Vinoba Bhave (Sarvodaya Movement- Bhoodan, Gramdan; New social & Political Order) J.P. Narain (Views on Nationalism, Socialism, Sarvodaya, Total Revolution)

**Course Outcome: Upon completion of this course, students will be able to:**

**CO1** Critically analyze the political and social thought of prominent Indian thinkers.

**CO2:** Explain the relevance of Indian thinkers in recent times.

**CO3** Develop an understanding of the evolution of Indian political thought since independence.

**CO4** Understand various political concepts such as liberty, equality, democracy, nationalism in Indian context.

**CO5** Relate Gandhian thought in modern times.

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H										
CO2	H						L				
CO3			M								
CO4					M						
CO5											

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**



Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M		
CO2	H	M	M		
CO3	H	M	M		
CO4	H	M	M		
CO5	H	M	M		

**Books Recommended:**

**Essential Readings:**

Roy,H.,Singh,M.P.(2017), *Indian Political Thought*,Delhi,Pearson  
 Roy,H.,Singh,M.P.(2011), *Indian Political Thought- Themes and Thinkers* (ed.)  
 Delhi,Pearson  
 Gauba, OP,(2016), *Indian Politcal Thought*, New Delhi, Mayur Paperback  
 Pandey, U.S (2011), *Indian Political Thought*,Delhi, D.P.S.Publishing house  
 Manav,S,(2012), *Introduction to Indian Political Thought*,Delhi, Raj  
 Publications Padhy,K.S , (2014), *Indian Political Thought*,Delhi, OHI Learning  
 Pvt Ltd  
 Verma,V.P.,( 2017), *Modern Indian Political Thought (Vol.II)*, Agra,Laxmi Narayan Agarwal

**Reference Books:**

Bhagwan,V, (2002), *Indian Political Thinkers*,Delhi, Atma Ram & Sons  
 Pruthi,R.K. & Chaturvedi, A., (2009), *Political Philosophy of Mahatma  
 Gandhi*, Delhi,Common wealth  
 Verma,S.L,(2004), *Representative Indian Political Thinkers*, Jaipur,Daulat chand  
 Jain Adhi,D,(1997), *Political Thinkers of Modern India*, New Delhi, Mittal  
 Publications Bali,D.R., *Modern Indian Thought*,New Delhi, Sterling Publishers Pvt.  
 Ltd Brown,D.M (ed), (1970),*The White Umbrella: Indian Political Thought from  
 Manu to  
 Gandhiji*,Bombay,Jaico  
 Karunakaran, K.P., (1996), *Religion and Political Awakening in India*,  
 Meerut,Meenakshi Publications

Mehta, V.R., (1996), *Foundations of Indian Political Thought*, New Delhi,  
 Manohar Naravane, V.S., (1964), *Modern Indian Thought*, Bombay, Asia  
 Publications Pantham, T and Deutsch, K.L. (eds.), (1986), *Political Thought in  
 Modern India*, New Delhi, Sage

Saraswati, C.M., (1998), *Indian Political Thinkers*, Meerut, Meenakshi prakashan

## Semester II

### **Core Course: BPO006A: Political Process in India (Credit-5)**

#### **Course Objectives:**

**CO1.** This will acquaint students an understanding of the political process.

**CO2.** The student will learn the working of 'modern' institutions. **CO3.** It will familiarizes students with the working of the Indian states, paying attention to the contradictory dynamics of modern state power.

**CO4.** It will enable a student to analyze the actual working of the political process in India. **CO5.** The student will understand the regionalism, secularism and caste politics in Indian politics.

#### **Course Content**

Unit 1	<b>Political Parties and the Party System</b> Trends in the Party System; From the Congress System to Multi-Party Coalitions
Unit 2	<b>Determinants of Voting Behavior</b> Caste, Class, Gender and Religion
Unit 3	<b>Regional Aspirations</b> The Politics of Secession and Accommodation

Unit 4	<b>Religion and Politics</b> Debates on Secularism; Minority and Majority Communalism. <b>Caste and Politics</b> Caste in Politics and the Politicization of Caste
Unit 5	<b>The Changing Nature of the Indian State</b> Developmental, Welfare and Coercive Dimensions

**Course Outcome: Upon completion of this course, students will be able to:**

**CO1.** Critically analyzes the working of Indian Democracy.

**CO2.** Identify different aspects of Political Behavior.

**CO3.** Understand the role of State structures and institutions.

**CO4.** Critically assesses the changing nature of politics in India.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	M									
CO2				M							
CO3		H									
CO4						M					
CO5					H		M	M			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M		L	
CO2		L	H	L	
CO3		H			

  
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CO4					M
5		L	M	H	

#### **Essential Readings:**

Political Parties and the Party System: Trends in the Party System; From the Congress System to Multi-Party Coalitions Essential Readings: R. Kothari, (2002) 'The Congress System', in Z. Hasan (ed.) Parties and Party Politics in India, New Delhi:

Oxford University Press, pp 39-55.

E. Sridharan, (2012) 'Introduction: Theorizing Democratic Consolidation, Parties and Coalitions', in Coalition Politics and Democratic Consolidation in Asia, New Delhi: Oxford University Press. 18

#### **Reference Books:**

Y. Yadav and S. Palshikar, (2006) 'Party System and Electoral Politics in the Indian States, 1952-2002: From Hegemony to Convergence', in P. deSouza and E. Sridharan (eds.) India's Political Parties, New Delhi: Sage Publications, pp. 73-115. II

Transforming India: Social and Political Dynamics in Democracy, New Delhi: Oxford University Press, pp. 120-145.

'Integration through Internal Reorganisation', in S. Baruah (ed.) Ethnonationalism in India: A Reader, New Delhi: Oxford University Press, pp. 379-402.

'Understanding Indian Secularism: Learning from its Recent Critics', in R. Vora and S. Palshikar (eds.) Indian Democracy: Meanings and Practices, New Delhi: Sage, pp. 235-256.

N. Menon and A. Nigam, (2007) 'Politics of Hindutva and the Minorities', in Power and Contestation: India since 1989, London: Fernwood Publishing, Halifax and Zed Books, pp.36-60.

: R. Kothari, (1970) 'Introduction', in Caste in Indian Politics, Delhi: Orient Longman, pp.3- 25.

M. Weiner, (2001) 'The Struggle for Equality: Caste in Indian Politics', in Atul Kohli (ed.) The Success of India's Democracy, New Delhi: Cambridge University Press, pp. 193-225.

'The Indian State: Constitution and Beyond', in R. Bhargava (ed.) Politics and Ethics of the Indian Constitution, New Delhi: Oxford University Press, pp. 143-163.

The State, Development Planning and Liberalization in India, New Delhi: Oxford University Press, 1994, pp.1-35.

Verma, (2007) 'Police Agencies and Coercive Power', in S. Ganguly, L. Diamond and M. Plattner (eds.) The State of India's Democracy, Baltimore: John Hopkins University Press, pp. 130-139

## Semester II (DSE- BPO001A)

### DSE: BPO001A Nationalism in India

#### Course Objectives:

**CO1.** This will acquaint students with the methods of non violence and mass agitation.

**CO2.** Students will be able to identify the emergence of nationalism post British.

**CO3.** Students will learn about Gandhi, the development of nonviolent mass action, and the Indian movement for independence.

**CO4.** Identify the social and economic dimensions of freedom struggle movement.

**CO5.** Acquaint the students with the problems of Post Independence Era.

#### Course Content

Unit 1	National movement in India- Rise of Nationalism, Genesis of the Indian National Congress
Unit 2	Moderates and Extremists Causes for the rise of Communalism
Unit 3	Gandhian Era in Indian Freedom Struggle; Freedom movement in Rajasthan
Unit 4	Socio- Economic Dimensions of Indian Freedom Struggle- The demand for partition, Trade Union and Peasant Movements, Role of women in Indian Freedom Struggle
Unit 5	Problems on the Eve of Independence- Partition and Refugee problem, Integration of Princely states, Linguistic Reorganization of the states.

**Course Outcome: Upon completion of this course, students will be able to:**

**CO1.** Understand the freedom struggle of India and India's tryst with destiny.

**CO2.** Evaluate the major developments and key debates in the contemporary society and polity

**CO3.** Frame views on partition and other challenges.

**CO4.** Incorporate the influences that shaped the course of modern India.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		M					H		L		
CO2				H			M	L			

CO3				L				H	M		
CO4								H	L		
CO5								H	L		

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1			H	M	L
CO2		H	M		L
CO3	M	L		H	
CO4	H	M	L		
CO5		M	L	H	

### **Books Recommended:**

#### **Essential Readings:**

Laxmikanth,M,(2019), *Indian Polity*,Noida, Mc Graw Hill Education  
Fadia, B.L,(2019), *Indian Government and Politics*, Agra,Sahitya Bhawan  
Agarwal,R.C., (2018), *Constitutional Development and National Movement of India*, New Delhi ,Sultan Chand & Sons  
Grover, B.L., (2018), *A New Look at Modern Indian History*, New Delhi, S.Chand &Co  
Chandra, B.,(2016),*India's Struggle for Independence*,India, Penguin Random House Talware, M.K., (2014), *History of National Movement and Constitutional Development in India*, Kerela,Mangalam Publications  
Pylee, M.V., (2010), *Constitutional History of India*, New Delhi,S.Chand & Co

#### **Reference Books:**

*Austin, G.,(2010), The Indian Constitution: Cornerstone of a Nation, New Delhi, Oxford University Press*  
*Austin, G., (2003), Working a Democratic Constitution, New Delhi, Oxford University Press*  
*Brass, P., (2009), Politics of India since Independence,Hyderabad, Orient Longman*  
*Morris W.H.J.,(1971), The Government and Politics of India, London, Hutchinson*  
*Pylee, M.V.,( 2013), An Introduction to the Constitution of India, Pune,Vikas Book House.*

**OR**

## **Semester II (DSE BPO001A)**

### **DSE BPO001A Women and Political Representation**

#### **Course Objectives:**

**CO1** Acquaint the students with the complexity of social structures and relations in gender inequality.

**CO2** Brief the students about Women' Representation in the Political sphere

**CO3** Acquaint student with the global overview about Women and Representation.

**CO4** Students will be able to evaluate the Theories of representation.

**CO5.** Students will understand about Women movements and Issues.

#### **Course Content**

Unit 1	Introduction a) Theories of representation b) Voting: types c) Engendering citizenship.
Unit 2	Women's Demand for Representation a) Suffrage movement b) Present demand for quota and types of quota.
Unit 3	Legal and Constitutional Status of Women in India
Unit 4	Women and Political Representation in India a) Reservation of seats for Women b) An overview of women in local government c) Women in Indian Parliament.
Unit 5	Movements and Issues 1. History of the Women's Movement in India 2. Violence against women 3. Work and Labour a. Visible and Invisible work b. Reproductive and care work c. Sex work

**Course Outcome: Upon completion of this course, students will be able to:**

  
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CO1 Have an insight about the theories of representation.

CO2: Evaluate the structures of gender inequalities.

CO3 Have knowledge about the issues related to contemporary Indian women.

CO4 Understand the condition of women in Indian politics.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1					L			H	M		
CO2								H	M	L	
CO3							L	M		H	
CO4	H	M							L		
CO5					L			H	M		

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M		H	L	
CO2		L	M	H	
CO3		M	L		H
CO4	H		M	H	
CO5			M	L	H

**Books Recommended:****Essential Readings:**

Rowbotham, Sheila. (1993) Women in Movements. New York and London: Routledge, Section I, pp. 27-74 and 178-218.

Jayawardene, Kumari. (1986) Feminism and Nationalism in the Third World. London: Zed Books, pp. 1-24, 71-108, and Conclusion.

Forbes, Geraldine (1998) Women in Modern India. Cambridge: Cambridge University Press, pp. 1-150

Funk, Nanette & Mueller, Magda. (1993) Gender, Politics and Post-Communism. New York and London: Routledge, Introduction and Chapter 28.

Chaudhuri, Maiyatee. (2003) 'Gender in the Making of the Indian Nation State', in Rege, Sharmila. (ed.)

The Sociology of Gender: The Challenge of Feminist Sociological Knowledge. New Delhi: Sage.

Banarjee, Sikata. (2007) 'Gender and Nationalism: The Masculinisation of Hinduism and Female Political Participation', in Ghadially, Rehana. (ed.) Urban Women in Contemporary India: A Reader. New Delhi: Sage.

<b>Third Semester</b>						
<b>Course Code</b>	<b>Course Name</b>	<b>Course Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
BPO007 A	Western Political Thinkers(From Plato to Marx)	CORE	4	1	0	5

BPO008 A	International Relation and Global Politics	CORE	4	1	0	5
<b>(DSE) Any one</b>						
BPO014 A	United Nations and Global Conflicts	DSE	4	1	0	5
<b>OR</b>						
BPO014 A	International Law	DSE	4	1	0	5
DCA00 4A	Advance Spread Sheet Lab	FUNDAMENT AL	0	0	2	2
DEN00 3A	Life Skills-1 (Personality Development)	FOUNDATION	1	0	2	3
DIN003 A	Value Education-1	FOUNDATION	1	0	0	1
<b>Open Elective</b>						
DPO00 1A	Governance issues and challenges		3	0	0	3
DPO00 1A	Social and Political thought of Mahatma Gandhi		3	0	0	3

### Semester III

#### **Core Course BPO007A: Western Political Thinkers (Credit-5) Course Objectives:**

**CO1.** To acquaint students with classical tradition in Political Theory from Plato to Green.

**CO2.** Introduce the student with the thoughts and ideas of thinkers from west.

**CO3.** To generate a critical awareness about the traditions of political thought in the West.

**CO4.** To understand how the Western Political Thinkers explained and analyzed political events and problems of their times and prescribed solutions.

**CO5.** Familiarize the students about role of Western Political Thought in developing political ideas and thought.

**Course Content**

Unit 1	Plato (Concept of Justice& Ideal State, Views on Education, Communism of Wives and Property, Plato's second best state)
Unit 2	Aristotle (Criticism of Plato, Slavery, Citizenship, Concept of Best State; Theory of Revolution)
Unit 3	Niccollo Machiavelli (Human Nature, Political ideas : Monarchy; National sovereignty; Statecraft, Church vs. State, as a modern thinker)
Unit 4	Thomas Hobbes( Natural Laws, Social Contract , State) John Locke (Ideas on Natural rights with reference to property, Social Contract, limited State, Theory of Consent) Jean Jacques Rousseau (State of Nature, Social Contract, General Will)
Unit 5	George Wilhelm Fredrick Hegel (Dialectics & Theory of State) Thomas Hill Green (Theory of State, Resistance to State & War)

**Course Outcome: Upon completion of this course, students will be able to:**

**CO1.** Acquire knowledge about western political thinkers and their views on state- craft.

**CO2.** Identify the rudimentary context and central arguments and aims of the concerned thinker.

**CO3.** Understand different perspectives and approaches to state, politics, government, sovereignty, citizenship.

**CO4.** Analyze the contribution of Western political thinkers.

### Course Articulation Matrix: (Mapping of COs with POs and PSOs)

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		H						M			
CO2			L				M	H			
CO3		M					L		H		
CO4		H									
CO5							M	L			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	M		L
CO2		M	L		H
CO3	L			H	M
CO4	H		M		L
CO5	H		L	M	

### Books Recommended:

### Essential Readings:

Sharma, U., & Sharma, S.K.,(2021), Western Political Thought: From Plato to Burke, New Delhi , Atlantic Publishers  
 Wayper, C.L.,(2018),Political Thought, India, Aitbs Publishers  
 Gauba, O.P., (2017), Western Political Thought, New Delhi, Mayur Paperbacks  
 Suda, J.P., (2016), History of Political Thought: (Vol. I&II), Merrut, K. Nath & Co Mukherjee S. (2011), History of Political Thought: Plato to Marx, New Delhi,Prentice Hall of India

  
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## **Reference Books:**

Sabine, G.H., (2019), History of Political Theory, New Delhi, Oxford and IBH Publishing Co. Pvt. Ltd.  
Skoble, A. J., (2007), Political Philosophy: Essential Selections, New Delhi, Pearson Education  
Adam, I., & Dyson, R.W., (2007), Fifty Great Political Thinkers, London, Routledge  
Nelson B.R., (2006), Western Political Thought, New Delhi, Pearson Education  
Boucher, D., & Kelly, P., (2003), Political Thinkers: From Socrates to the Present, London, Oxford University Press  
Parekh, B., & Pantham, T., (1987), Political Discourse: Explorations in Indian and Western Political Thought, New Delhi, Sage Publications  
Jones, W.T., (1961), Masters of Political Thought, (Vol.1), London, George Harrap & Co

## **Semester III**

### **Core Course BPO008A: International Relations and Global Politics (Credit-5)**

#### **Course Objectives:**

**CO1.** Enable student to deal with the concepts and dimensions of international relations

**CO2** Analyze different theories highlighting the major debates within the different theoretical paradigms.

**CO3** It highlights the various aspects of conflicts and conflict resolution.

**CO4** Understand the concept of Power and its importance in International Relations.

**CO5** Explain the importance of Regional Co-operation.

#### **Course Content**

Unit 1	Approaches to International Politics- Idealism; Realism – Morgenthau; Neo-Realism- Kenneth Waltz; Post-War International Developments- End of Colonialism, & Democratization of the World
Unit 2	Concepts - National Interest, Collective security Role of Power a) Concept of power b) Balance of power: Uni-polarity, Bipolarity and Multi- polarity c) Nation-state, national interest, national power.

Unit 3	Non-Alignment- Evolution and contemporary relevance; New International Economic Order (NIEO); North – South Dialogue; South- South Dialogue-
Unit 4	Associations of Regional Co-operation- ASEAN; SAARC; EU Contemporary Global Concerns- Human Rights; Environment and Ecological concerns
Unit 5	Non-state actors: multinational corporations, transnational corporations, intergovernmental organizations, global civil society.

**Course Outcome: Upon completion of this course, students will be able to:**

CO1 Evaluate and understand the different paradigms of International Relations.

CO2: Identify and understand the theoretical debates and issues of current global politics.

CO3 Recognize and understand various regional organizations and understand contemporary global challenges.

CO4 Provide a framework to understand International relations and their practical application.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H						M		L		
CO2									H	L	
CO3							M	L	H		
CO4							L	H			
CO5								H	M		

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H		M	L	
CO2			H	M	L
CO3		M	H		L
CO4			H	M	L
CO5		M	L		H

### **Books Recommended:**

### **Essential Readings:**

Ghai,U R, Ghai,K K,(2017),*International Politics: Theory and Practice*, Jalandhar, New Academic Publishing Company  
 Arora, P, (2012), *International Politics*, New Delhi, Cosmos Bookhive Pvt. Ltd  
 Chander,P.,(2010), *International Relations*,New Delhi, Cosmos Bookhive Pvt. Ltd.  
 Goldstein,J .S., ,and Pevehouse, J.C.,(2011), *International Relations(VIII Edn)* New Delhi,Pearson.

### **Reference Books:**

Axford,B, Browning, G,Muggins ,R,& R Ben, (2002), *Politics: An Introduction*, New York,Routledge  
 Basu,R.,(2004), *United Nations Organization*,New Delhi, Sterling Publishers  
 Basu,R.,(2017),*International Politics; concept, theories and issues*, New Delhi,Sage  
 Deutsch, K. W.,(1989), *The Analysis of International Relations*, New Delhi, Prentice Hall  
 Griffiths,M,(2004),*Key Concepts in International Relations*, London,Routledge  
 Huntington,S.P.,(1996), *The Clash of Civilizations and the Remaking of World Order*,New York,Simon and Schuster  
 Misra,K.P., & Beal ,R.S.(eds.),(1980), *International Relations Theory :Western and Non-Western Perspectives*,New Delhi,Vikas Publications  
 Morgenthau, H. J. (1981), *Politics among Nations*, Calcutta,Calcutta References Scientific Book Agency  
 Melkote,R. S. and Rao,N.A.(1992), *International Relations*,New Delhi, Sterling Publishers  
 Nye ,J.S.Jr., (2009),*Understanding International Conflicts- An Introduction to theoryand History (VII edn)*,New York,Pearson Longman  
 Palmer and Perkins,(2004),*International Relations*,New Delhi, AITBS Publishers and Distributors  
 Ray,Ashwini,(2004),*Western Realism and International Relations A Non Western*

  
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view, NewDelhi,Foundation Books  
Sharma,SR ,(2003), *US Iraq War: An Erosion of UN Authority*, New Delhi,Mohit  
Publishers

**DSE BPO014A: United Nations and Global Conflicts (Credit-5)**

**Course Objectives:**

- CO1.** Enable student to understand the structure, composition and role (political and non-political) of United Nations.  
**CO2.** Acquaints the students with the importance of UN and its relevance in the contemporary times.  
**CO3.** Acquaint the students with existing, contemporary and emerging issues and trends that shape global polity.  
**CO4.** Understand the inner workings of the United Nations and its specialized organs.  
**CO5** Asses the role of United Nations in Peace Making.

**Course Content**

Unit 1	The United Nations :Principles and Objectives
Unit 2	Structures and Functions: General Assembly; Security Council, and Economic and Social Council; the International Court of Justice and the specialized agencies])
Unit 3	Peace Keeping, Peace Making and Enforcement, Peace Building and Responsibility to Protect (e) Millennium Development Goals
Unit 4	Major Global Conflicts since the Second World War (a) Korean War (b) Vietnam War (c) Afghanistan War (d) Balkans: Serbia and Bosnia
Unit 5	Assessment of the United Nations as an International Organization: Imperatives of Reforms and the Process of Reforms

**Course Outcome: Upon completion of this course, students will be able to:**

CO1. Critically analyze about UN's performance in the context of the contemporary global system.

CO2: Learn how to prepare for Model United Nations conferences.

CO3 Understand and learn how to engage in research, simulations, debates, and presentations.

CO4. Analyze parliamentary procedures in the United Nations.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	
CO1	H								M			1
CO2	H							M				1
CO3							L	M	H			
CO4				M					H			1
CO5				L				H	M			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	L		M
CO2		H	M	L	
CO3		M	L	H	
CO4		L	M		H
CO5		H			L

### **Books Recommended:**

### **Essential Readings:**

- Basu, R., (2004), *The United Nations, Structure and Functions of an International Organization*, New Delhi, Sterling Publishers Pvt. Ltd.
- Ramcharit, S. ,(1998), *United Nations and World Politics*, New Delhi, Kanishka Publishers
- Saksena, K.P., (1993), *Reforming the United Nations : The Challenge of Relevance*, New Delhi, Sage.
- Thakur, R., (2006), *The United Nations, Peace and Security: From Collective Security to Responsibility to Protect*, Bengaluru, Cambridge University Press
- Gosh, P., (2016) *International Relations*. India: Prentice Hall India Learning Private Limited.
- Ghai, U.R. (2014) *International Politics: Theory and Practice*. Jalandhar: New Academic Publishing.
- Baylis, J. and Smith, S., (2011), *The Globalization of World Politics: An Introduction to International Relations*, New York, Oxford University Press

### **Reference Books:**

- Baehr, P. R. and Gordenker, L. Gordenker, (1994), *The United Nations in 1990s*, Macmillan, Hamshire
- Ghali, B.B., (1992), *An Agenda for Peace*, United Nations, New York.
- LeRoy, A., (1991) *Bennett, International Organization : Principles and Issues*, Prentice Hall, New Jersey
- Wein, Thomas, Wein, G, Forsyth, David P, Coate, Roger A., (1994), *The United Nations and Changing World Politics*, Boulder, Westview Press
- Kayathwal, (1998), *The United Nations: Retrospect and Prospect*, Jaipur, Pointer Publishers

**OR**

### **Semester III**

### **DSE BPO014 A: International Law (Credit-5)**

#### **Course Objectives:**

- CO1.** Will orient the students with the laws governing the conduct of independent nation states during times of war and peace.
- CO2** Provide a framework to understand the features of International relations and their practical application.
- CO3** Insight to international, regional, and national jurisdictions, the impact of non-legal systems such as politics and economics, and the consequences of fragmentation of international law into specialized sub-fields.

**CO4** Make learners aware of the major concepts and principles of International system.

**CO5** Will enable students to understand the importance of International Law.

**Course Content**

Unit 1	Laws of Air and Outer Space; Settlement of International Disputes- Role of UN and International Court of Justice
Unit 2	Laws of War- Meaning, features and Declaration of War; Belligerents; Combatants and Non-Combatants; Effects of the outbreak of War
Unit 3	Laws of Land Warfare; Laws of Maritime Warfare; Laws of Ariel Warfare
Unit 4	War Crimes; Genocide; Prize Courts Termination of War
Unit 5	Laws of Neutrality-Concept; Rights and Duties of Neutrals; Right of Angary; Contrabands; Blockade; Un neutral Service

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**Course Outcome: Upon completion of this course, students will be able to:**

CO1 Prepare for careers which require expertise on the function of the international system and its impact and relevance to the national system.

CO2: Apply the knowledge of Law to resolve contemporary problems of the world.

CO3To understand the basic concepts of International Studies, a foundational comprehension of the rudiments of International Law.

CO4. To identify the relationship between Law and Politics

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		H							M		
CO2		H						M	L		
CO3			H					M	L		
CO4	H							M	L		
CO5								H	M		

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H		M		L
CO2	H	M			L
CO3	H	M	L		
CO4	M		H		L
CO5	H	M			

  
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### **Essential Readings:**

Kapur, S.K. (2017), *International Law and Human Rights*, Allahabad, Central Law Agency  
Tandon, M.P. & Tandon, R., (2014), *Public International Law*, Allahabad, Allahabad Law Agency  
Patel, B.N. (Ed) (2005), *India and International Law* Leiden, Netherlands, Brill Academic Publishers,  
Verma S. K (2012), *Introduction to Public International Law*, New Delhi, Satyam Law International  
Agarwal, H.O., (2016), *International Law and Human Rights*, New Delhi, Central Law Publications

### **Reference Books:**

Carter, B.E., Allen, W., (2013), *International Law: Selected Documents*, Wolters Kluwer Law & Business  
Janis, M.W., (2012), *International Law (sixth edition)*, Alphen aan den Rijn, the Netherlands  
Shaw, M.N., (2017), *International Law*, New York, Cambridge University Press  
United Nations, (1997), *International Law on the Eve of the 21<sup>st</sup> Century: Views From the International Law Commission*, The United Nations Press, New York  
Crawford, J. (2019), *Brownlie's Principles of Public International Law*, New York, Oxford University Press  
Dixon, M. (2013), *Textbook on International Law*, UK, Oxford University Press  
Dixon, M., McCorquodale, R., Williams, S. (2016) *Cases & Materials on International Law*, New York, Oxford University Press  
Fassbender, B., Peters, A., Peter, S., Högger, D., (2012), *The Oxford Handbook of the History of International Law*, Oxford, Oxford University Press  
Lowe, V. (2015), *International Law: A Very Short Introduction*, Oxford, OUP  
Solis, G.D. (2016), *The Law of Armed Conflict: International Humanitarian Law in War*, New York, Cambridge University Press  
Orakhelashvili, A. (2018), *Akehurst's Modern Introduction to International Law*, Abingdon, United Kingdom, Routledge  
Henriksen, A. (2019), *International Law*, UK, Oxford University Press

### **Semester III (Open Elective)**

#### **DPO001A: Governance Issues and Challenges (Credit-**

##### **3) Course Objectives:**

**CO1.** Students will be able to understand the concepts and different dimensions of governance.

**CO2** This will acquaint the students in highlighting the major debates in the contemporary times.

**CO3** It will help the students to understand the importance of the concept of governance in the context of a globalizing world,

environment, administration, development.

**CO4** Enables the student to explore the essence of Governance through the various good governance initiatives introduced in India.

**CO5.** This will introduce the students with the issues & challenges faced by the government.

**Course Content**

Unit 1	GOVERNMENT AND GOVERNANCE: CONCEPTS Role of State In The Era Of Globalization State, Market and Civil Society
Unit 2	GOVERNANCE AND DEVELOPMENT Changing Dimensions of Development Strengthening Democracy through Good Governance
Unit 3	ENVIRONMENTAL GOVERNANCE Human-Environment Interaction Green Governance: Sustainable Human Development
Unit 4	LOCAL GOVERNANCE Democratic Decentralization People's Participation In Governance
Unit 5	GOOD GOVERNANCE INITIATIVES IN INDIA: BEST PRACTICES Public Service Delivery Electronic Governance Citizens Charter & Right to Information Corporate Social Responsibility

**Course Outcome: Upon completion of this course, students will be able to:**

CO1. Critically evaluate the concept of Governance.

CO2. Acquaint the students with the functioning and structure of local government in

India. CO3. Analyze the concept and importance of Environmental Governance.

CO4. Comprehend the various Good Governance Initiatives in India.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H							M	L		
CO2								H	M		
CO3							H	M			L
CO4		H							M		
CO5		M						L			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M			L
CO2		M	L	H	
CO3		L	M	H	
CO4		M	L		H
CO5	M		L		H

### **Essential Readings:**

GOVERNMENT AND GOVERNANCE: CONCEPTS B. Chakrabarty and M. Bhattacharya, (eds.) The Governance Discourse. New Delhi: Oxford University Press, 1998

Surendra Munshi and Biju Paul Abraham [eds.] , Good Governance, Democratic Societies And Globalisation, Sage Publishers, 2004

United Nation Development Programme , Reconceptualising Governance, New York, 1997

Carlos Santiso, Good Governance and Aid Effectiveness: The World Bank and Conditionality Johns Hopkins University, The Georgetown Public Policy Review , Volume VII, No.1, 2001 Vasudha Chotray and Gery Stroker , Governance Theory: A Cross Disciplinary Approach , Palgrave Macmillan ,2008

GOVERNANCE AND DEVELOPMENT B. C. Smith, Good Governance and

  
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Development, Palgrave, 2007

World Bank Report, Governance And Development, 1992

P. Bardhan, 'Epilogue on the Political Economy of Reform in India', in The Political Economy of Development in India. 6th edition, Delhi: Oxford University Press, 2005

J. Dreze and A. Sen, India: Economic Development and Social Opportunity. New Delhi: Oxford University Press, 1995

Niraja Gopal Jayal[ed.], Democracy in India, Oxford University Press, 2007

ENVIRONMENTAL GOVERNANCE Ramachandra Guha, Environmentalism: A Global History, Longman Publishers, 1999

J.P. Evans, Environmental Governance, Routledge , 2012

Emilio F. Moran, Environmental Social Science: Human - Environment interactions and Sustainability, Wiley-Blackwell, 2010

Burns H Weston and David Bollier, Green Governance: Ecological Survival, Human Rights, and the Law of the Commons, Cambridge University Press, 2013

Bina Agarwal, Gender And Green Governance , Oxford University Press, Oxford, 2013 83

J. Volger, 'Environmental Issues', in J. Baylis, S. Smith and P. Owens (eds.) Globalization of World Politics, New York: Oxford University Press, 2011, pp. 348-362.

Heywood, Global Politics, New York: Palgrave, 2011, pp. 383-411. N. Carter, The Politics of Environment: Ideas, Activism, Policy, Cambridge: Cambridge University Press, 2007, pp. 13-81.

LOCAL GOVERNANCE Pranab Bardhan and Dilip Mookherjee, Decentralization And Local Governance In Developing Countries: A Comparative Perspective, MIT Press, 2006

T.R. Raghunandan, Decentralization And Local Governments: The Indian Experience, Readings On The Economy, Polity And Society, Orient Blackswan, 2013

Pardeep Sachdeva, Local Government In India, Pearson Publishers, 2011

P. de Souza, (2002) 'Decentralization and Local Government: The Second Wind of Democracy in India', in Z. Hasan, E. Sridharan and R. Sudarshan (eds.) India's Living Constitution: Ideas, Practices and Controversies, New Delhi: Permanent Black, 2002

Mary John, 'Women in Power? Gender, Caste and Politics of Local Urban Governance', in Economic and Political Weekly, Vol. 42(39), 2007

GOOD GOVERNANCE INITIATIVES IN INDIA: BEST PRACTICES Niraja Gopal Jayal , Democracy and the State: Welfare, Secularism, and Development in Contemporary India, Oxford University Press, 1999

Reetika Khera[ed.], The Battle for Employment Guarantee, Oxford University

Press,2011

Nalini Juneja, Primary Education for All in the City of Mumbai: The Challenge Set By Local Actors', International Institute For Educational Planning, UNESCO : Paris, 2001

Maxine Molyneux and Shahra Razavi , Gender, Justice, Development, and Rights , Oxford University Press, 2002

Jugal Kishore, National Health Programs of India: National Policies and Legislations, Century Publications, 2005

Jean Drèze and Amartya Sen, India, Economic Development and Social Opportunity, Oxford University Press, 1995

K. Lee and Mills, The Economic Of Health In Developing Countries, Oxford University Press,1983

### **Semester III (Open Elective)**

#### **DPO001A: Social and Political thought of Mahatma Gandhi**

##### **Course Objectives:**

**CO1** This will acquaint the students to elaborate Gandhian thought and examine its practical implications.

**CO2** Introduce students to key instances of Gandhi's continuing influence right up to the contemporary period

**CO3** Enable the students to critically evaluate Gandhi's legacy in Social and Political sphere.

**CO4** Acquaints the students to understand the thoughts Post-Gandhi.

**CO5.**To familiarize the students with importance of Non- violence and Truth.

##### **Course Content**

Unit 1	Influences on Gandhi's Thought a) Hinduism, Jainism, Islam and Christianity b) John Ruskin, Henry David Thoreau, Leo Tolstoy c) Gopala Krishna Gokhale.
Unit 2	Basic Concepts a) Hindu social structure: caste, untouchability, women b) Truth, non-violence, satyagraha c) Religion and politics.
Unit 3	Political, Social and Economic Ideals a) Critique of modern civilization, swadeshi. b) Democratic decentralization c) Gram Swaraj, Ram Rajya, Sarvodaya.

Unit 4	Post-Gandhi Thought a) Bhoodan movement (Vinoba Bhave) b) Civil rights movement (Martin Luther King)
Unit 5	Non-violent action against apartheid- Truth and Reconciliation Commission

**Course Outcome: Upon completion of this course, students will be able to:**

CO1 Critically understand the Influences of Gandhian Thoughts

CO2: Describe the various concepts of caste system, untouchability and non

violence. CO3 Describe and acquaint students with the Post Gandhi Thoughts.

CO4 Understand the concepts of Swaraj and Swadeshi movements.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1								H	M		
CO2								H	M		
CO3		L						M	H		
CO4								H	M		
CO5		M						L			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	L		
CO2		H	M		L
CO3		M	H	L	
CO4	H	M	L		

  
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CO5	H		H		
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### Essential Readings

Allen, Douglas (Ed.), The Philosophy of Mahatma Gandhi for the Twenty-first Century, Oxford University Press, New Delhi, 2009.

Bilgrami, Akeel, "Gandhi, the Philosopher", <http://www.gandhi foundation.net/articles/philgandhi.htm>.

Chakrabarty, Bidyut, Social and Political Thought of Mahatma Gandhi, Routledge, Abingdon, 1996.

Dalton, Dennis, Gandhi's Power Nonviolence in Action, Oxford University Press, New Delhi, 1998.

Hardiman, David, Gandhi: In His Time and Ours, Permanent Black, Delhi, 2003.

Iyer, Raghavan, The Moral and Political Thought of Mahatma Gandhi, Oxford University Press, Oxford, 1973.

King, Mary, Mahatma Gandhi and Martin Luther King Jr.: The Power of Nonviolent Action, United Nations Educational, Scientific and Cultural Organization, Paris, 1999.

Mishra, Anil Dutta, Challenges of 21st Century: Gandhian Alternative, Mittal, New Delhi, 2003.

Nanda, B.R., In Search of Gandhi Essays and Reflections, Oxford University Press, New Delhi, 2004.

Parekh, Bhikhu, Colonialism, Tradition and Reform, Sage, Delhi, 1989

Parel, Anthony J. (Ed.), Hindu Swaraj and other Writings, Cambridge University Press, Cambridge, 1997.

Parel, Anthony J., Gandhi's Philosophy and the Quest for Harmony, Cambridge University, Cambridge, 2006.

Prasad, Nand Kishore, Economic Vision of Mahatma Gandhi, ABD Publications, Jaipur, 2010.

Fourth Semester						
Course Code	Course Name	COURSE CATEGORY	L	T	P	C
BPO009 A	Modern Political Theory	CORE	4	1	0	5
BPO010 A	Introduction to Public Administration	CORE	4	1	0	5
(DSE) ANY ONE						
BPO015 A	India's Foreign Policy in a globalizing World	DSE	4	1	0	5
	OR					
BPO015 A	Major Constitutions	DSE	4	1	0	5
DCA005A	Python Programming	FUNDAMENTAL	2	0	0	2

  
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DCA006A	Python Programming Lab	FUNDAMENTAL	0	0	2	2
DMA011A	Life Skills 2(Aptitude)	FOUNDATION	1	0	1	2
DIN004A	Value Education-2	FOUNDATION	1	0	0	1
	Research Methodology	FOUNDATION	2	1	0	3

### **Core Course BPO009A: Modern Political Theory (Credit-5)**

#### **Course Objectives:**

**CO1** This will acquaint the students with the in-depth understanding of the nature of the discipline.

**CO2** Enables students to understand major concepts useful for analyzing political process and phenomena.

**CO3** It will encourage awareness of the various processes and principles of Political Science.

**CO4** Acquaint the students with understand existing, contemporary and emerging trends in Politics.

**CO5** Learn the use of Inter- disciplinary approach.

#### **Course Content**

Unit 1	Classical Political Theory, Reasons of its decline and Resurgence of Political Theory
Unit 2	Group Theory( Bentley) –History, characteristics and Criticisms Distributive Approach (Harold Lasswell), Basis of theory, Conceptual structure, ideas, criticisms.
Unit 3	Communications Theory; Decision- Making Theory
Unit 4	Political Development – Meaning; characteristics; Models: Welfare Model, Market model and Gandhian Model
Unit 5	Political Socialization – Meaning, nature, critical analysis Political Modernization – Meaning, nature, factors affecting Political Modernization.

**Course Outcome: Upon completion of this course, students will be able to:**

CO1. Critically interprets political systems and processes.


CO2. Understand and recognize the major concepts which are useful for analyzing political process and phenomena.

CO3. Evaluate and compare different schools and authors of political theory. CO4 Analyze the various aspects of Political Socialization and Modernization.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1								H	M	L	
CO2		H						M	L		
CO3		L						H	M		
CO4			H					L	M		
CO5		L						M			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	L		
CO2		H	M	L	
CO3		M	L		H
CO4		H	M		L
CO5	H	M	L		

  
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### **Books Recommended:**

### **Essential Readings:**

Gauba, O.P., (2018), *An Introduction to Political Theory*, New Delhi, Mc Millan India Ltd  
Hoffman, J and Graham, P (2015), *Introduction to Political Theory*, New York, Routledge  
Bhargava, R , Acharya, A (2008), *Political Theory- An Introduction* , Pearson  
Agarwal, R.C., (2012), *Political Theory*, New Delhi, S. Chand & Co

### **Reference Books:**

Rathod, P.B , (2004), *Modern Political Theory*, New Delhi, Commonwealth Publishers Ray, S.N, (2003), *Modern Comparative Politics: Approaches, Methods, Issues*, New Delhi, Asoke K Ghosh  
Almond, G.A and Coleman, J.S, (1960), *The Politics of the Developing Areas*, Princeton, Princeton University Press  
Apter, D.E., (1965), *The Politics of Modernization*, Chicago, University of Chicago Press  
Bell, D, (1960), *The End of Ideology*, New York, The Free Press  
Blondel, J, (1981), *The Discipline of Politics*, London, Butterworths  
Johri, J.C., (1997), *Contemporary Political Theory*, Delhi, Sterling Publishers Pvt. Ltd  
Bebler and J. Seroke, (1990), *Contemporary Political System : Classifications and Typologies*, Boulder Colorado, Lynne Reinner Publishers  
Brinton, (1952), *The Anatomy of Revolution*, New York, Vintage Books  
Gauba, O.P., (2018), *An Introduction to Political Theory*, New Delhi, Mayur Paperback  
Johari, J.C, (1987), *Comparative Political Theory : New Dimensions, Basic Concepts and Major Trends*, New Delhi, Sterling  
Krishna, D, (1979), *Political Development : A Critical Perspective*, Delhi, Oxford University Press  
Mehran, Kamrava, (1993), *Politics and Society in the third world*, London, Routledge.  
Powell, G.B. Jr. (1996), *Comparative Politics : A Development Approach*, Boston, Little Brown

### **Semester IV**

#### **Core Course BPO010A: Introduction to Public Administration (Credit-5)**

#### **Course Objectives:**

- CO1** This will enable students to learn the basic conceptual, foundational and theoretical orientation of Public Administration.
- CO2** Acquaint the students with the integral mechanism of Public administration.
- CO3** It will encourage the critical thinking and analysis of the administrative set up.

  
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JECRC University, JAIPUR

- CO4. Make students examine the recent issues in public administration.  
CO5. Teach the students difference between Public and Private Administration.

**Course Content**

Unit 1	Meaning, Nature and Scope of Public Administration; Approaches to the study of Public Administration
Unit 2	Public and Private Administration; New Public Administration; Importance and Relevance of Public Administration
Unit 3	Administrative Thinkers- Classical (W.Wilson, H.Fayol, Mooney, Fredrick Taylor, Mary .P. Follet) Modern (Elton Mayo, Herbert Simon, Fredrick Riggs, Weidner)
Unit 4	Structures of Organization – Line, Staff and Auxiliary; Agencies of Administration- Public Corporations, Independent Regulatory Commissions
Unit 5	Principles of Organization- Hierarchy; Span of Control; Delegation; Coordination; Supervision; Unity of Command

**Course Outcome: Upon completion of this course, students will be able to:**

- CO1. Analyze the basic concepts of Public Administration.  
CO2. Identify different administrative theories and co- relate them with recent times.  
CO3. Critically engages in various disciplinary perspectives and theoretical approaches of Public Administration.  
CO4. Have a practical view of the theories of Public Administration.



**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H							L	M		
CO2		H						M			
CO3	H							L	M		
CO4	H							L	M		

  
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CO5		H						M				1
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Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	L		
CO2		H	M		L
CO3	M	H			L
CO4	H	L	M		
CO5		H		M	

### **Books Recommended:**

### **Essential Readings:**

Awasthi,A.,&Maheshwari,S.R.,(2018), *Public Administration: Theory and Practice*, Agra,Lakshmi Narain Agarwal  
 Bhattacharya M.,(2008), *New Horizon of Public Administration*,New Delhi , Jawahar Publishers  
 Goel,R., (2012), *Public Administratio: Theories And Concepts*, New Delhi, Sonali Publications  
 Naidu, S.P., (2014), *Public Administration: Concepts and Theories*, Hyderabad,New Age International Publishers  
 Kumar,A., (2011),*Issues and Concepts In Public Administration*, New Delhi, Ancient Publishing House  
 Laxmikanth, M., (2017), *Public Administration*, New Delhi Tata Mcgraw Hill Publishing Co.  
 Fadia, B.L. and Fadia, K(2017)*Public Administration: Administrative Theory and Concepts*. New Delhi: Sahitya Bhawan

### **Reference Books:**

Basu,R.,(1990), *Public Administration, Concepts and Theories (2nd Ed.)*, New Delhi, Sterling  
 Buck, S.J., & Morgan,B.N.,(2005), *Public Administration in Theory and Practice*, New Delhi ,Pearson Education  
 Golembewski,R.T.,(1977), *Public Administration as a Developing Discipline*, New York, Marcel Dekker,  
 Nicholas,H.,(2004), *Public Administration and Public Affairs*, New

Delhi, Prentice-Hall India  
 Shafrin, J.M., & Hyde, A.C., (1987), *Classics of Public Administration*, Chicago, The Dorsey Press  
 Goel, S.L., (2003), *Public Administration: Theory and Practice*, New Delhi, Deep and Deep Publication

#### Semester IV DSE (Any One)

##### **BPO015A: India's Foreign Policy in a globalizing world**

##### **(Credit-5) Course Objectives:**

**CO1.** Teach students the domestic sources and the structural constraints on the genesis, evolution and practice of India's foreign policy.

**CO2.** This will endeavor students to highlight integral linkages between the 'domestic' and the 'international' aspects of India's foreign policy by stressing on the shifts in its domestic identity and the corresponding changes at the international level.

**CO3.** Will give an insight into the foreign policies of India with the Western Powers and neighboring countries.

**CO4** Acquaint the students to analyze the theoretical framework of India's Foreign Policy.

**CO5.** Student will learn the effects of globalization on Indian foreign policy.

##### **Course Content**

Unit 1	India's Foreign Policy: From a Postcolonial State to an Aspiring Global Power, India in the Contemporary Multi-polar World
Unit 2	India's Relations with the USA and USSR/Russia
Unit 3	India's Engagements with China and Pakistan
Unit 4	India in South Asia: Debating Regional Strategies
Unit 5	India's Negotiating Style and Strategies: Trade, Environment and Security Regimes

##### **Course Outcome: Upon completion of this course, students will be able to:**

**CO1.** Learn about India's shifting identity as a postcolonial state to the contemporary dynamics of India attempting to carve its identity as an 'aspiring power'

**CO2.** India's evolving relations with the superpowers during the Cold War and its

  
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neighbors bargaining strategy and positioning in international climate.

CO3. Critically evaluate India's role in exchange negotiations, international economic governance, international terrorism and the United Nations..

CO4. Facilitate an understanding of the changing positions and development of India's role as a global player since independence.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		H						L	M		

CO2								H	M			1
CO3		H						L	M			
CO4		H						M	L			
CO5		M						H	L			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M			L
CO2		H	M		L
CO3	H	M	L		
CO4	H	L	M		
CO5	H	M	L		

### **Books Recommended:**

### **Essential Readings:**

Dobson, A.P., Marsh, S., (2000), *US Foreign Policy Since 1945*, New York, Routledge  
Dutt, V.P, (2011), *India's Foreign Policy*, New Delhi, Vikas  
Goldstein, J.S. and Pevehouse, J.C., (2011), *International Relations (VIII Edn)*, New Delhi, Pearson  
Ghai, U.R., & Ghai, K.K. (2017), *International Politics: Theory and Practice*, Jalandhar, New Academic Publishing Company  
Khanna, V.N., (2015), *Foreign Policy of India*, New Delhi, Vikas Publishing House  
N. Jayapalan., (2001), *Foreign Policy of India*, New Delhi, Atlantic Publishers

### **Reference Books:**

Arora, P., (2013), *International Politics*, New Delhi, Cosmos Bookhive Pvt. Ltd.  
Appadorai, A., & Rajan, M.S. (1985), *India's Foreign Policy and Relations*, New Delhi, South Asian Publishers  
Abraham, I. (1998), *The Making of the Indian Atomic Bomb : Science, Secrecy and the Postcolonial State*, New York, Zed Books  
Akbar, M.J., (1998), *Nehru : The Making of India*, London, Penguin  
Bradnock, R.W. (1990), *India's Foreign Policy Since 1971*, London, Pinter Publishers  
Dixit, J.N. (2001), *Indian Foreign Policy and its Neighbours*, New Delhi, Gyan Books  
Dixit, J.N., (1998), *Across Borders : Fifty Years of India's Foreign*

  
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JECRC University, JAIPUR

*Policy*, New Delhi, Picus Books

- Johri, J. C. (1996), *International Relations and Politics*, Sterling Publishers  
Kapur, H., (1994), *India's Foreign Policy, 1947-1992: Shadows and Substance*, New Delhi, Sage Publications  
Kumar, M., (2017), *Theoretical Aspects of International Politics*, Agra, Shiva Lal Agrawala and Co  
LaFeber, W.F., (1994), *The American Age: United States Foreign Policy at Home and Abroad 1970 to the Present*, New York, W W Norton & company  
Mansingh, S. (1984), *India's Search for Power, Indira Gandhi's Foreign Policy, 1966-1982*, Delhi, Sage Publications  
Mohan, C.R. (2004), *Crossing the Rubicon : The Shaping of India's Foreign Policy*, Palgrave, Macmillan  
Palmer & Perkins, (2004), *International Relations*, Delhi, AITBS Publishers and Distributors  
Khanna, V.N., & Kumar, L.K., (2018), *Foreign Policy of India*, New Delhi, Paperback  
J. Bandhopadhyaya, (1970) *The Making Of India's Foreign Policy*, New Delhi: Allied Publishers.  
A. Singh, (1995) 'India's Relations with Russia and Central Asia', in *International Affairs*, Vol. 71 (1): 69-81  
S. Muni, (2003) 'Problem Areas in India's Neighbourhood Policy', in *South Asian Survey*, Vol. 10 (2), pp. 185-196.

OR

**Semester IV (DSE)**

**BPO015A: Major Constitutions (Credit-5)**

**Course Objectives:**

**CO1.** This will acquaint students with the major constitutions.

**CO2.** Students will gain an understanding of Historical background of the constitutions.

**CO3.** Acquaint the students with the evolution of these countries political system and their position in the present time.

**CO4.** Students will have an understanding of the dynamics of actual politics and policy making.

**CO5.** Enable a student to understand the approaches to study different constitutions.

**Course Content**

Unit 1	Constitution of United Kingdom
Unit 2	Constitution of United States of America
Unit 3	Constitution of Switzerland
Unit 4	Constitution of France
Unit 5	Constitution of Japan

**Course Outcome: Upon completion of this course, students will be able to:**

CO1. Critically understand the diverse political systems and constitutions of major countries

CO2. Explain the historical background of major constitution and will be able to understand their evolution.

CO3 Relate the changing domestic and global contexts within which they operate.

CO4 Understand and cover the approaches and forms of political systems, along with Constitution and Constitutionalism

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	M							L		
CO2		L						H	M		
CO3		H						L	M		
CO4	H							L	M		
CO5		H						L			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M		
CO2		H	M		L
CO3		M	L		H
CO4	H	M	L		
CO5	H	M	L		

**Books Recommended:**

**Essential Readings:**

Bhagwan, V. & Bhushan, V., (2017), *World Constitutions*, New Delhi, Sterling Publishers

Mahajan, V.D, (2017), *Select Modern Governments*, New Delhi, S. Chand & Co

Kapur, A .C.& Mishra, K.K., (2010), *Select Constitutions*, New Delhi, S Chand

**Reference Books:**

Bryce, J., (1921), *Modern Democracies*, New York, The Macmillan Company, New York, 1921

Dicey, A.V. (1885), *The Law of the Constitution*, Oxford, Oxford University Press

Finer, H., (1932), *The Theory and Practice of Modern Government*, New York, The Dial Press

Finer, H., (1956), *Government of Greater European Powers*, Holt, University of Michigan

**Semester IV**

**Research Methodology:**

**Course Objectives:**

**CO1.** To acquaint the students with research methodology

**CO2.** To give an orientation to the students to the techniques of documentation.

**CO3.** Enable students to carry out investigation of various political issues through primary and secondary sources.

**CO4.** Establish links between theory and methods within their field of study

**CO5.** Learn to apply techniques of research to their study.



## Course Content

Unit 1	Social Science Research- Meaning, nature, objectives, importance and problems; Research process; Types of Research- Historical, Descriptive, Exploratory and Scientific .
Unit 2	Research problems- Selection and formulation, defining a research problem; Research design- meaning, features, types and construction of Research Design, Concept and Hypothesis
Unit 3	Sampling Design- Meaning, Steps, Characteristics, Types- Probability and Non Probability sampling techniques .
Unit 4	Sources of data – primary, secondary; Data collection- Interview, Observations, Questionnaire, Schedules
Unit 5	Data analysis- Classification, Tabulation, Descriptive analysis, Bibliography; Report Writing, The use of computers in Research, Ethics in Research

**Course Outcome: Upon completion of this course, students will be able**

**to:** **CO1.** Apply research techniques through field visits and preparation of

reports. **CO2:** Present the findings of their project in a written report.

**CO3** To assist the students to get the feeling of approaches and tools they might use in their own research

**CO4** Student is capable of choosing research methods appropriate for resolving the professional tasks.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		H	M			L					
CO2		M				M					

  
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CO3		L	H			M						
CO4		H	M									1
CO5			M			H						

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M		
CO2	M	L		H	
CO3	H	M	L		
CO4	H	M	L		
CO5	H	M	L		

### **Essential Readings:**

Kothari, C. R. (2019). *Research Methodology: Methods and Techniques*. Bangalore: Wiley Eastern

Acharya, R. and Bhattacharya, N., (2019) *Research Methodology for Social Sciences*, India, Routledge

Krishnaswami, O.R., (2016), *Methodology of Research in Social Sciences*, New Delhi, Himalaya Publishing

Thamilarasan, M., (2015), *Research Methodology for Social Sciences*, Tamilnadu, Ingram short title

Imam, E., (2015), *Basics Of Research Methodology*, New Delhi, New India Publishing

Vijay, U., (2010), *Research Methodology*, New Delhi, S.Chand

Guthrie, G., (2010), *Basic Research Methods : An Entry To Social Science Research*, New Delhi, Sage Publication

### **Reference Books:**

Thakur, D., (2009), *Research Methodology in Social Sciences*, New Delhi, Deep and Deep

Prasad, A., (2008), *Social Research Methodologies in Social Sciences*, Ranchi, Xavier Institute of Social Sciences

Ahuja, R. (2006). *Research Methods*. Jaipur, Rawat Publications

Blake, N. (1973): *Approaches to Social Enquiry*, Cambridge, Policy Press

Bose, Pradip Kumar, (1995): *Research Methodology*, New Delhi: ICSSR

Bryman, Alan, (1988)*Quality and Quantity in Social Research*, London, Unwin  
 Shipman Martin, (1988)*The Limitations of Social Research*, London, Longman.  
 Young, P. V., (1988)*Scientific Social Surveys and Research*, New Delhi, Prentice  
 Hall Kurtz, Norman R, (1983)*Introduction to Social Statistics*, Paris: MC Graw  
 Hill

Levin Jack, (1983)*Elementary Statistics in Social Research*, New York: Harper &  
 Row Publishers.

May, Tim, (1977)*Social Research: Issues, Methods and Process*, Buckingham,  
 Open University Press.

<b>Fifth Semester</b>						
<b>Course Code</b>	<b>Course Name</b>	<b>Course Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
BPO011 A	Contemporary Political Thinkers(From Marx to Present Day)	CORE	4	1	0	5
BPO 012A	Working of Indian Political System	CORE	4	1	0	5
<b>(DSE)</b>						
BPO016 A	Local Government in India	DSE	4	1	0	5
BPO017 A	Personnel and Financial Administration	DSE	4	1	0	5
<b>Open Elective</b>						
DPO002 A	Human Rights	OE	2	1	0	3
	Project					

**Core Course BPO011A: Contemporary Western Political Thinkers  
(From Marx to Present day)(Credit-5)**

**Course Objectives:**

**CO1.** The students will study and understand the Political Thought from Marx to Present day.

**CO2.** This will intend to generate a critical awareness about the traditions of political thought in the West.

**CO3.** Acquire knowledge about western political thinkers and theirs view on state craft.

**CO4.** Understand political thought processes and theory making in the West.

**CO5.** Learn different theories of the State.

**Course Content**

Unit 1	Socialism from Marx : (a) Orthodox Marxian -Lenin, Trotsky, Stalin and Mao (b) Non-Marxian Fabianism, Democratic Socialism, Syndicalism, guild Socialism. (c) Revisionism - Edward Barnsteen, Karl Kautsky
Unit 2	Anarchism : Revolutionary and Philosophical, Revolt against Reason -William Mc Dougal, Harold Lasswell, Emile Durkheim, Wilfredo Pareto, Pluralism and State Sovereignty - Harold Laski)
Unit 3	Liberalism : (1) Libertarianism- Robert Nozick, Hayek, Berlin, (2) Social Egalitarianism - John Rawls (3) Communitarianism - Michael Walzer, MacIntyre, Hannah Arendt, Michael Sandel, Charles Taylor (4) Possessive Individualism - C.B. Macpherson.
Unit 4	Neo Marxism : (1) Instrumentalism : Paul Sweezy, Ralph Miliband (2) Theory of Alienations : Erich Fromm, Herbert Marcuse, Juen Habermas, George Lucas (3) Dependency Theories: A.G. Franc, Samir Amin, Wallerstein, Laclau (4) Structuralism : Louis Althusser, Nicolas Poulantzas (5) Creative Marxism : Gramsci
Unit 5	Theories of Democracy: (i) Elitism: Mosca, Pareto and Michels, (ii) Sartori,
	(iii) C Wright Mill, (iv) Robert Dahl : Poliarchy, (v) David Held : Models of Democracy 2. Main Streams of Contemporary Political Thought : Oakshott, Nisbet, Eric Voegelin; Existentialists: J.P. Sartre;

**Course Outcome: Upon completion of this course, students will be able to:**

CO1: Identify the rudimentary context and central arguments and aims of the concerned thinker.

CO2: Understand different perspectives and approaches to state, politics, government, sovereignty, citizenship.

CO3 Facilitate a holistic and integrated comprehension of the important perspectives and approaches to state and politics.

CO4. Comparative analysis of different political thinkers.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H							M	L		
CO2	H							M	L		
CO3								H	M		
CO4								H	M		
CO5	H							M			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L			M
CO2	M	L			H
CO3	H	M		L	
CO4	M	H			L

  
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CO5	H	M		L	
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### **Books Recommended:**

### **Essential Readings:**

Sharma, U., & Sharma, S.K.,(2021), Western Political Thought: From Plato to Burke, New Delhi , Atlantic Publishers  
 Wayper, C.L.,(2018),Political Thought, India, Aitbs Publishers  
 Gauba, O.P., (2017), Western Political Thought, New Delhi, Mayur Paperbacks  
 Suda, J.P., ( 2017),History of Political Thought: (Vol. I&II), Merrut, K. Nath & Co  
 Mukherjee S. (2011), History of Political Thought: Plato to Marx, New Delhi,Prentice Hall of India

### **Reference Books:**

Sabine,G.H.,(2019),History of Political Theory,New Delhi, Oxford and IBH Publishing Co. Pvt. Ltd.  
 Adam, I., & Dyson, R.W.,(2007),Fifty Great Political Thinkers, London, Routledge Skoble,A.J., (2007), Political Philosophy: Essential Selections, New Delhi, Pearson Education  
 Boucher, D.,& Kelly, P., (2003), Political Thinkers:From Socrates to the Present,, London,Oxford University Press  
 Jones, W.T.,( 1963), Masters of Political Thought, (Vols.2 & 3), London, George Harrap & Co

### **Core Course: BPO012A: Working of the Indian Political System (Credit-5)**

### **Course Objectives:**

**CO1**The student will have an insight on the political processes and the actual functioning of the Indian Political System.  
**CO2**It simultaneously studies the political structure both constitutional and administrative. **CO3** Student will have knowledge about contemporary issues in Indian democracy.  
**CO4** Acquaint the students with the working of Indian political system and the way it shapes institutions India.  
**CO5** Student will have the knowledge of the actual functioning of the organs of the government particularly Rajasthan.

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Unit 1	The Union Executive- the President (with special reference to His Emergency Powers) Prime Minister and the Council of Ministers;
Unit 2	The Union Legislature- the Parliament, Parliamentary Committees, Law making process, Parliamentary Procedures
Unit 3	Working of Indian Judicial System Structure, functions and role of Supreme court, High courts and Subordinate courts
Unit 4	Nature of Indian Party System  Major issues facing Indian Democracy- Regionalism and Communalism
Unit 5	Governance and Politics of States: The State Executive- Governor; Chief Minister and Council of Ministers; The State Legislature (with special reference to the Politics of Rajasthan

**Course Outcome: Upon completion of this course, students will be able to:**

CO1: Identify the actual problems faced by the government.

CO2: Understand different perspectives and approaches to study the relationship between Centre and the State.

CO3 Facilitate a holistic and integrated approach to study Union Judiciary.

CO4. Critically analyze the political dynamics.



**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		H							L		
CO2	L							M			
CO3								L			
CO4		L									
CO5		M									

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M			L
CO2	M	L	H		
CO3	L	M	H		
CO4	H	M			L
CO5	H	M	L		

**Books**

**Recommended:**

**Essential Readings:**

Agarwal ,R.C.(2018) *Constitutional Development and National Movement of India*,New Delhi, Sultan Chand & Sons,  
Laxmikanth,M ,(2019), *Indian Polity*,Noida,Mc Graw Hill Education

Basu,D.D. , (2017), *Constitution of India*,New Delhi, Prentice Hall of India  
Chandra,B ,(2017), *In the Name of Democracy*, New Delhi,Penguin Books  
Fadia,B.L(2019),*Indian Government and Politics*, Agra,Sahitya Bhawan  
Joyal, N.G.,Mehta, P.B.(2011),(ed.), *The Oxford companion to Politics in*

  
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*India (edited)* ,London, Oxford  
 Rudolph,L.I., & Rudolph,S.H., (2008), *In Pursuit of Lakshmi : The Political Economy of the Indian State*, Delhi,Orient Longman  
 Johari,J.C.(2012), *Indian Government and Politics (Vol. I& II)*, New Delhi,Vishal Publications  
 Jaffrelot,C .,(2010), *Religion, Caste and Politics in India*, New Delhi, Primus Books

### **Reference Books:**

Austin,G, (2003), *Working of a Democratic Constitution*, New Delhi,OUP  
 Brass,P ,(2009),*Politics of India since Independence*, Hyderabad,Orient Longman  
 Pylee,M.V.,(1998), *An Introduction to the Constitution of India*,New Delhi,Vikas Publication

### **Semester V (DSE)**

#### **BPO016A: Local Government in India (Credit-5)**

#### **Course Objectives:**

**CO1.** Student will have a focus on the conceptualization and working of urban local government in India.

**CO2** This will intend to generate familiarity with the issues of politics involved in managing socio-economic development through urban local institutions.

**CO3** Learn the 74th Constitutional Amendment as an important milestone in the movement towards greater urban local autonomy.

**CO4** Familiarize with emergence and significance of decentralization in Indian political system.

**CO5** Student will have an insight of the Personnel administration of India.

#### **Course Content**

Unit 1	The concept of Local Government in a welfare state Patterns of Urban Local Government -Composition, Structures & Powers
Unit 2	74 <sup>th</sup> Amendment and Urban Local Government
Unit 3	Urban Local Finances

Unit 4	Personnel Administration
Unit 5	State Control over Local bodies

**Course Outcome: Upon completion of this course, students will be able to:**

CO1. Analyze and understand the historical evolution of the Urban Local Government system in India.

CO2. Analyze complex administrative set up in municipal areas of India

CO3. Evaluate the requirement and significance of Constitutional Provisions

CO4. Apply independent judgment for analyzing the problems in Local Government set-ups.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H							M			
CO2		H							L		
CO3		H						L	M		
CO4								H			
CO5		H						L			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M		L		H
CO2		H	M		L
CO3	H	M			L
CO4	L		M	H	
CO5	H	L	M		

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**Books Recommended:**

**Essential Readings:**

Awasthi and Maheshwari,(2017), *Public Administration: Theory and Practice*,  
Agra,Lakshmi Narain Agarwal  
Bhagwan,V., & Bhushan ,V.,(2010) ,*Public Administration* ,New Delhi,S Chand  
Maheshwari,S.R.,(2017), *Local Government in India*,Agra, Lakshmi Narayan  
Agarwal

**Reference Books:**

Edwin,B.F., (1984), *Principles of Personnel Management*, 6th  
edition,Singapore, McGraw Hill  
Goel,S.L,(2002), *Financial Administration*, NewDelhi,Deep and Deep  
publications. Goel,S.L,(2002), *Public Personnel Administration*,New Delhi,  
Deep and Deep publications  
Mourice,W.C.,(1968),*Theory and Practice of Personnel  
Management*, London,Heinemann  
Daiv E.K., *Public Personnel Management*, IPMA, Englewood Cliffs, Prentice  
Hall, New Jersy,1986.  
Gautum,P.N.,(1993), *Financial Administration in India*,Chandigarh, Vitt  
Prashan, Haryana Sahitya Academy, Chandigarh

**Semester V (DSE)**

**BPO017A: Personnel and Financial Administration(Credit-**

**5) Course Objectives:**

**CO1** This will acquaint students with the understanding of the key  
concepts and the sub-systems of Public Administration  
like Personnel and Financial.

**CO2** Enables the students to understand the importance of legislative and judicial  
control over administration.

**CO3** Acquaint the students with administrative set up,  
personnel administration and other related issues.

**CO4** Comprehend the continuity and change within the administrative working of  
different systems.

**CO5** The student will understand the technicalities involved in making a Budget.

**Course Content**

Unit 1	Recruitment and Training of Personnel
Unit 2	Control over Administration – Legislative, Judicial, and Popular

Unit 3	Budget- Concept and significance; Performance Budget and Zero-Base Budget
Unit 4	Formation and Execution of budget in India
Unit 5	Deficit Financing- Public Debt, Accounts and Audits; Administrative Reforms in India

**Course Outcome: Upon completion of this course, students will be able to:**

CO1 Acquaint with the various aspects of Personnel administration.

CO2: Understand the basic principles in public finance, accounting, and auditing that relate to public budgeting and the budgetary process.

CO3 Understand the way in which the public power is exercised and public resources are managed and expanded.

CO4 Identify the varying methods of performance assessment of public institutions.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H							M			
CO2		H				L					
CO3		M						H			
CO4		H							M		
CO5		H				L					

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H		M		L
CO2	L	H		M	
CO3	L	M		H	
CO4	L	M			H
CO5	H	L		M	

### **Books Recommended:**

### **Essential Readings:**

Awasthi,A.,&Maheshwari,S.R., (2018), *Public Administration: Theory and Practice*, Agra,Lakshmi Narain Agarwal

Basiya,K.N.,(1986), *Financial Administration in India*, Mumbai,Himalya Publishing House, Mumbai

Bhattacharya, M.,(2012), *New Horizon of Public Administration*,New Delhi , Jawahar Publishers

Chopra, D., (2012),*Public Administration in India*, New Delhi, Sonali Publications

Goel,S.L.,(2003), *Public Administration*, New Delhi, Deep and Deep Publications

Maheshwari, S.R., (2006),*Public Administration in India*, New Delhi, Oxford University Press

Naidu, S.P., (2005), *Public Administration: Concepts and Theories*, Hyderabad,New Age International Publishers

Fadia, B.L. and Fadia, K(2017)*Public Administration: Administrative Theory and Concepts*. New Delhi: Sahitya Bhawan.

Laxmikanth, M., (2017), *Public Administration*, New DelhiTata Mcgraw Hill Publishing Co.

### **Reference Books:**

Fillipo, E.B.,(2000), *Principles of Personnel Management*, 6th edition, Singapore,McGraw Hill, Singapore, 1984

Procter, A.W.,(2009), *Principles of Personnel Administration*, South Carolina, Bibliol Life

Mourice, W.C.,(2005),*Theory and Practice of Personnel Management*,London, Heinemann

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**Paper Title: Project****Course Objectives:**

- To acquaint the students with research methodology
- To orient the students to the techniques of documentation

This paper requires two hours of self study outside the class so as to acquaint them with the techniques of Data/ Information collection and Data/Information analysis so as to arrive at valid conclusions.

**The outcome of this course is to:**

1. Understand the basic concept of research and its methodologies
2. Identify, explain, and apply the basic concepts of research, such as variables, sampling, reliability, and validity
3. Identify the overall process of designing a research study from its inception to its report.

**Semester V (Open Elective)****DPO002A: Human Rights (Credit-3)****Course Objectives:**

**CO1.** This will acquaint students to build an understanding of human rights.

**CO2.** The student will have thorough study of specific issues in a comparative perspective.

**CO3.** Makes student understand the state response to issues related to structural violence questions.

**CO4.** Seeks to anchor all issues in the Indian context, and pulls out another country to form a broader comparative frame.

**CO5.** Student can apply and understand the different theories related to Human Rights.

**Course Content**

Unit 1	Human Rights: Theory and Institutionalization
Unit 2	Understanding Human Rights: Three Generations of Rights
Unit 3	Institutionalization: Universal Declaration of Human Rights
Unit 4	Structural Violence Gender and Violence: India and Pakistan
Unit 5	Terrorism and Insecurity of Minorities: USA and India



**Course Outcome: Upon completion of this course, students will be able to:**

CO1 Critically analyzes the issues related to Human Rights.

CO2: Identify role of the State in dealing with issues related to Human Rights.

CO3. Develop a comparative perspective.

CO4. Create awareness about Human Rights.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H							M	L		
CO2		H						L			
CO3		M						H			
CO4		L						H			
CO5		M						L			

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M		

CO2		H	L		M
CO3	M	L			H
CO4		M		L	H
CO5	H	M		L	

### **Essential Readings**

J. Hoffman and P. Graham, (2006) 'Human Rights', Introduction to Political Theory, Delhi, Pearson, pp. 436-458.

SAHRDC (2006) 'Introduction to Human Rights'; 'Classification of Human Rights: An Overview of the First, Second, and Third Generational Rights', in Introducing Human Rights, New Delhi: Oxford University Press

The Constitution of India, Chapter 3: Fundamental Rights

M. Ahmad, (2002) 'Homeland Insecurities: Racial Violence the Day after September 11', Social Text, 72, Vol. 20(3), pp. 101-116.

M. Ahmad, (2002) 'Homeland Insecurities: Racial Violence the Day after September 11', Social Text, 72, Vol. 20(3), pp. 101-116.

<b>Sixth Semester</b>						
<b>Course Code</b>	<b>Course Name</b>	<b>Course Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
BPO 013A	Electoral Politics In India	CORE	4	1	0	5
BPO01 8A	<b>Public Policy in India</b>	DSE	4	1	0	5
	Dissertation		0	0	10	10
<b>Open Elective</b>						
DPO00 3A	Understanding Ambedkar	OE	2	1	0	3

**Semester:IV**

**Course:BPO013A:Electoral Politics in India(Credit-5)**

#### **Course Objectives:**

**CO1.** Student will study the various political parties of India.

The various regional and national parties are to be studied in order to gain understanding of its evolution.

**CO2.** Furthermore the regional political parties, pressure groups, and the election commission are to be studied in the light of political process to gain an understanding of the dynamics of actual politics.

  
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 JECRC University, JAIPUR

**CO3.** Studies on elections and voting behavior constitute a major area of political science teaching and research all over the world.

**CO4.** This will enable students to relate the various theories, election machinery and behavior of both voters and candidates

**CO5** The student will understand the role of Election Commission and its working.

### **Course Content**

Unit 1	Party System in India, Features and Nature of Party System in India
Unit 2	National Political Parties- Congress, BJP, BSP, CPM. Origin, Programme, Structure, Organization
Unit 3	Regional Political Parties and its linkages with National Parties and the Federal Setup; Pressure Groups-Meaning, kinds, Role,
Unit 4	Election Commission; Role and Functions, Electoral Reforms. Public Opinion, Role of Media.
Unit 5	Politics of Defection, Coalition Politics; Crime and Politics

### **Course Outcome: Upon completion of this course, students will be able to:**

CO1: Assess with our Electoral System and the reason as to why India has chosen this system.

CO2: Develop an appreciation of citizen's increased participation in electoral politics. CO3: Recognize the significance of Election Commission.

CO4 Sensitize the students to the existing malpractices in our Electoral System.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcom e	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11

  
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CO1	H										
CO2		H						M	L		
CO3	H	M									
CO4		H							M		
CO5		L									

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	L		
CO2		H	M	L	
CO3	L	H			L
CO4		M	H	L	
CO5	H	M			

### **Books Recommended:**

### **Essential Readings:**

Agarwal, R.C., (2009) *Indian Political System*, New Delhi, Sultan Chand & Sons  
 Fadia, B.L. (2017), *Indian Government and Politics*, Agra, Sahitya  
 Bhawan Johri, J.C., (2012), *Indian Government and Politics* (vol. I & II), Delhi, Vishal Publications  
 Jones, W.H. Morris, 1987, *The Government and Politics of India*, New Delhi, Universal Book Stall

### **Reference Books:**

Suez, L., (2002), *Federalism Without Center : The Impact of Political Economic Reform on Indian System*, Sage, New Delhi  
 Smith, G., (1995), *Federalism : The Multi Ethnic Challenge*, Harlow Longman  
 B, Fadia, *State Politics in India*, 1984 Vol. II  
 H.A. Gani, (1990), *Centre State Relation and Sarkaria Commission : Issues and Challenges*, New Delhi, Deep and Deep Publication  
 Arora, B., and Verney, D.V. (1995), *Multiple Identities in a Single State : Indian Federalism in a Cooperative Perspective*, Delhi Konark  
 Austin, G. (2003), *Working a Democratic Constitution: The Indian Experience*, Delhi, Oxford University Press  
 Chatterjee, P. (1997), *State and Politics in India*, Delhi, Oxford University Press  
 Chatterjee, P. (2001), *State and Politics in India, The State-Society Interface*, New

  
 Head  
 Department of Political Science  
 JECRC University, JAIPUR

Delhi, South Asian Publishers

B,Fadia , *State Politics in India*, 1984 Vol.II

Gani,H.A.,(1990), *Center State Relation and Sarkaria Commission : Issues and Challenges*, New Delhi,Deep and Deep Publication

Hasan ,Z,(2000),*Politics and State in India*, New Delhi ,Sage

Khan, R,(1997),*Rethinking Indian Federalism*, Shimla Indian Institution of Advanced Studies

Pai, S,(2000),*State Politics: New Dimensions Party System Liberalization and Politics of Identity*, Delhi

Phadke Y.D,(1975), *Politics and Language*, Bombay

### **DSE BPO018A Public Policy in India (Credit-5)**

#### **Course Objectives:**

**CO1** This will acquaint students with a theoretical and practical understanding of the concepts and methods that can be employed in the analysis of public policy

**CO2** Enable students to understand policy as well as understand politics as it is shaped by economic changes.

**CO3** Provide students an integrative link to their understanding of political science, economic theory and the practical world of development and social change.

**CO4** Discuss about the ideology and policy of the Nehruvian Era. **CO5** Students will learn the Models of Policy Decision-Making.

#### **Course Content**

Unit 1	Introduction to Policy Analysis
Unit 2	The Analysis of Policy in the Context of Theories of State
Unit 3	Political Economy and Policy: Interest Groups and Social Movements
Unit 4	Models of Policy Decision-Making
Unit 5	Ideology and Policy: Nehruvian Vision, Economic Liberalization and recent developments

**Course Outcome: Upon completion of this course, students will be able to:**

CO1 Critically analyze the Models of Policy Decision-Making.

CO2: Identify the issues of Political Economy and Policy:

CO3 Have a deep insight about the Interest Groups and Social Movements.

CO4 Information about Economic Liberalization and recent developments.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	M						L			
CO2		M	L								
CO3								H	M		
CO4		H							L		
CO5			L								

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H		M		L
CO2	M	H			L
CO3		M	H	L	
CO4	H	M			L
CO5	M	L			

**Books Recommended**

Introduction to Policy Analysis Jenkins, B. (1997) 'Policy Analysis: Models and Approaches' in Hill, M. (1997) The Policy Process: A Reader (2nd Edition). London: Prentice Hall, pp. 30-40.

Dye, T.R. (2002) Understanding Public Policy. Tenth Edition. Delhi: Pearson, pp.1-9, 32-56 and 312-329.

Sapru, R.K.(1996) Public Policy : Formulation, Implementation and Evaluation. New Delhi: Sterling Publishers, pp. 26-46.

IGNOU. Public Policy Analysis. MPA-015. New Delhi: IGNOU, pp. 15-26 and 55-64

. Wildavsky, A.(2004), ‘ Rescuing Policy Analysis from PPBS’ in Shafritz, J.M. & Hyde, A.C. (eds.) Classics of Public Administration. 5th Edition. Belmont: Wadsworth, pp.271-284

IGNOU. Public Policy Analysis. MPA-015, New Delhi: IGNOU, pp. 38-54

Self, P. (1993) Government by the Market? The Politics of Public Choice. Basingstoke: MacMillan, pp. 1-20,70-105,113-146,198-231 and 262-277.

Girden,E.J.(1987) ‘Economic Liberalisation in India: The New Electronics Policy’ in Asian Survey. California University Press. Volume 27, No.11. Available at - [www.jstor.org/stable/2644722](http://www.jstor.org/stable/2644722).

## Semester VI (Open Elective)

### **DPO003A: Understanding Ambedkar (Credit-3) Course Objectives:**

- CO1.** Student will be broadly introduced to Ambedkar’s ideas and their relevance in contemporary India, by looking beyond caste.
- CO2.** It acquaints students to understand Ambedkar’s philosophical contributions towards Indian economy
- CO3.** Enable students to engage themselves with the existing social concerns, state and economic structures and other institutional mechanisms
- CO4.** Helps in understanding class question, sociological interpretations on religion, gender, caste and cultural issues;
- CO5.** Student will have an understanding of idea of constitutionalism.

### **Course Content**

Unit 1	Introducing Ambedkar Approach to Study Polity, History, Economy, Religion and Society
Unit 2	Caste and Religion Caste, Untouchability and Critique of Hindu Social Order b. Religion and Conversion
Unit 3	Women’s Question Rise and Fall of Hindu Women b. Hindu Code Bill
Unit 4	Political Vision Nation and Nationalism Democracy and Citizenship
Unit 5	Constitutionalism Rights and Representations Constitution as an Instrument of Social Transformation
Unit6	Economy and Class Question a. Planning and Development b. Land and Labor



**Course Outcome: Upon completion of this course, students will be able to:**

CO1 Critically evaluate the philosophy of Ambedkar.

CO2: Identify different Political Vision.

CO3. Describe and acquaint students with the ideas on politics such as concepts of nation, state, democracy, law and constitutionalism are to be pedagogically interrogated and interpreted.

CO4 Strengthen their creative thinking with a collective approach to understand ongoing social, political, cultural and economic phenomena of the society.

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

Course Outcome	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	
CO1	H							M				
CO2		H						L	M			
CO3	M							H				
CO4	L							M				
CO5	M											

Course Outcome	Program Specific Outcome				
	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	M	L	
CO2		M	L		H
CO3	H	L	M		

CO4	L	M			H
CO5	L			H	

### **Books Recommended:**

### **Essential Readings:**

- G. Omvedt, (2008) 'Phule-Remembering The Kingdom of Bali', Seeking Begumpura Navyana, pp. 159-184.
- M. Gore, (1993) The Social Context of an Ideology: Ambedkar's Political and Social Thought, Delhi: Sage Publication, pp. 73-122 ; 196-225.
- B. Ambedkar, (1987) 'The Hindu Social Order: Its Essential Principles', in Dr. Babasaheb Ambedkar Writings and Speeches: Vol. 3, Education Deptt., Government of Maharashtra, 1989, pp. 95-129.
- S. Rege, (2013) 'Against the Madness of Manu', in B. R. Ambedkar's Writings on Brahmanical Patriarchy, Navyana Publication, pp. 13-59 ; 191-232.
- B. Ambedkar, (2003) 'The Rise and Fall of Hindu Woman: Who was Responsible for It?', in Dr. Babasaheb Ambedkar Writings and Speeches Vol. 17- II, Education Deptt., Government of Maharashtra, Mumbai, pp. 109-129.
- B. Ambedkar, (1991) 'What Gandhi and Congress have done to the Untouchables', in Dr. Babasaheb Ambedkar Writings and Speeches, Education Deptt, Government of Maharashtra, Vol.9, pp. 40-102; 181-198; 274-297.
- B. Ambedkar, (2003) 'Conditions Precedent for the successful working of Democracy', in Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III, Education Deptt, Government of Maharashtra, Mumbai, pp. 472-486

### **Semester: VI**

### **Paper Title: Dissertation (Credit-10)**

#### **Course Objectives:**

- CO1.** To create awareness regarding current trends, issues and research as related to various aspects of Political Science..
- CO2.** Inculcating an interdisciplinary comparative approach to research
- CO3.** Updating knowledge in pertinent areas of research
- CO4.** To acquaint the students with research methodology
- CO5.** Prepare the student for higher research through the use of research methodology.

**Course Outcome: Upon completion of this course, students will be able to:**

CO1. Have a deeper knowledge of methods in the major subject/field of study.

CO2. To contribute to research and development work.

CO3. To plan and use adequate methods to conduct qualified tasks in given framework.

CO4. Carry out investigation of various political issues through primary and secondary sources.

# Semester I

## LEGAL ENGLISH

**Subject Code:** BAL092A/BSL092A/BBL092A

**Maximum Marks:** 100

### **Course Outcomes:**

After completion of this course, the student will:

- CO1: Be able to understand the importance of poems and short stories and historical background of English literature.
- CO2: Be able to explore grammar for purpose reading and writing legal texts.
- CO3: Be able to improve their legal vocabulary, writing skills such as application, letter, etc and presentation skills.
- CO4: Be able to demonstrate their well supported communications skills and essays using different patterns of development taking into consideration purpose and audience.
- CO5: Be able to help students overcome their legal English problems and expend their general legal problems.

### **Module I: INTRODUCTION OF LEGAL ENGLISH**

History & Characteristics of Legal English, meaning of Language, Importance of language, Relation of Language with law, Meaning of Legal Language, Importance of legal language, Scope of Legal Language, Legal and ordinary meaning of words, Hints for effective Legal Writing, Constitutional Provisions relating to language, Problems of legal language.

### **Module II: LEGAL TERMS**

Usage of Latin words, expressions and **Legal Latin words and phrases – Legal Terminology:** *ab initio, ad valorem, ad idem, affidavit, alibi, amicus curiae, a priori, a posteriori, bonafide, malafide, caveat emptor, caveat venditor, corpus juri, casus belli, compos mentis, de jure, de facto, de nova, ex parte, ipso facto, ex-gratia, ejusdemgenieris, in limine, nolo contendere, per se, prima facie, suomotu, and other similar terms*

### **Module III: LEGAL MAXIMS**

Maxims in Civil and Criminal law:

*Audi alteram partem, actus non facit reum nisi mens sit rea, bonafides non patitur ut bis idem exigatur, damnum sine injuria esse potest, commodum ex injuria sua non habere debet, delegatus non potest delegare, extra territorium jus dicenti impune non paretur, Ex Turpi Causa Non Oritur Actio, de minimis non curat lex, Dolo Malo Pactum Se Non Servaturum, and other similar maxims.*

### **Module IV: FUNDAMENTALS OF LEGAL WRITING**

- Brief writing and drafting of legal issues
- Case commentary, review
- Legislation and literature review
- Legal review: Newspaper

- Passages & Paragraphs from leading cases
- Essay Writing on topics of legal interest
- Translation: Hindi to English and English to Hindi
- Legal correspondence
- Judgment Drafting

## Module V: MANIFESTATIONS OF LEGAL LANGUAGE

Significance of Legal language by way of:

- Legal Transcripts & Texts
- Landmark Judgments
- Legislations, Statutes and Treaties

### Text & References:

- *Black's Law dictionary* (Universal: New Delhi, 2000)
- B. Garner, *Garner's Dictionary of legal usage* (London: OUP, 2011)
- E Mertz, *The Language of Law school* (London: OUP, 2007)
- F.W. Maitland, *The Constitutional History of England* (New Delhi: Vikas, 1987)
- Glanville Williams, *Language and the law* (Universal Law: New Delhi, 2004)
- R.P. Bhatnagar, *Law and Language*, Rajiv Beri for Macmillan India Ltd.
- Gandhi, B.M., *Legal Language, Legal Writing & General English*; Eastern Book Company
- S.C. Tripathi, *Legal Language, Legal Writing & General English*, Central Law Publications
- K.L. Bhatia, *Legal Language and Legal Writing*, Universal Law Publishers
- Prasad, Anirudh; *Outline of Legal Language and Legal Writing in India*; Central Law Publications
- *Legal Glossary*; Ministry of Law, Justice and Company Affairs; Government of India
- *Broom's Legal Maxim*; Universal Publication
- Sharma, G.S.; *Legal Language, Legal Writing and General English*; University Book House
- Julius Stone, *Legal System and Lawyers' Reasoning*, Universal Law Publishing Co.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	1	2	1	3	3	2	1	3
CO2	3	3	2	2	1	1	3	3	2	3	3
CO3	2	3	3	2	1	2	3	3	2	2	3
CO4	3	3	3	2	2	1	3	3	3	2	3
CO5	3	3	3	2	2	1	3	3	3	2	3



## COMPUTER SCIENCE- I

**Subject Code:** BAL002A/ BSL002A/ BBL002A

**Maximum Marks: 70**

### **Course Outcomes:**

After completion of this course, the student will:

CO1: Be able to understand fundamentals of computers such as anatomy, classification, operating system etc.

CO2: Be able to explore evolution, definition of operating systems and be able to operate the computers.

CO3: Be able acquainted with the usage of MS Word, Excel and Power Point Presentations.

CO4: Have knowledge of Definition, Scope, History, Applications, services internet and networking system.

CO5: Have ability to apply knowledge of computing and ability to identify formulae and develop solutions to computational challenges.

### **Module I: INTRODUCTION OF COMPUTER**

Computer and its components; Characteristics of Computer, Generation of Computer, Software, Hardware and firmware, Types of Computer, Language data processing. Storage devices: RAM, DRAM, SRAM, ROM, PROM, EPROM, Secondary Memory, Magnetic disk, Compact disk, Pen drive, and Hard disk.

### **Module II: TEXT PROCESSING**

Introduction to Word Processing, Advantage of Word Processing, Creating, Saving and Editing a document, Selecting, Deleting, Replacing Text, Copying text to another file, Formatting Text and Paragraph, Using the font Dialog Box, Paragraph formatting using Bullets and Numbering in Paragraphs, Checking Spelling, Line spacing, Margins, Space before and after paragraph. Basic Editing, Formatting, Copying and Moving Text and Object, Editing features, Paragraph Formatting, Tables, Lists, Page Formatting, Inserting Graphics, Pictures and Table of Contents, Advanced Tools.

### **Module III: DATA PROCESSING**

Numbers, formula, Editing Data in a cell, Excel functions, Using a Range with Sum, Moving and copying data, Inserting and deleting Row and Columns in the worksheet. Highlights and Main functions: creating and Using Templates, Working with Data: Manipulating Data Names and Ranges, filters and sort and validation Lists, Data from External Sources, Using and formatting tables, Basic formulas and use of functions, Data Analysis Using charts and Graph, Using the format cells Dialog box, Using charts wizard to create a chart, Validation to sheet. Splitting worksheet window into two four panes, freezing columns and rows on screen for worksheet title, Attaching comments to cell, finding and replacing data in the worksheet. Protecting worksheet.

#### **Module IV: PRESENTATION E-SOURCES**

Introduction of slide presentation, Slide show, Formatting, Creating a Presentation, Inserting clip Arts, Adding Objects, Applying Transitions, Animation effects, formatting and checking text. Database: Introduction to database, functions of database, creating and manipulating database. E-Sources and Legal Research: Use of Internet Explorer and search Engine for Legal Information, International Legal service Providers, National Legal Service Providers, and Referencing Plagiarism.

#### **Module V: HTML**

Tags layout of HTML document, Creating HTML Document, Adding comment, Heading, color settings, inserting an image, hyper link, listings, tables, frames and forms.

#### **Text & References:**

- Introduction to computers, Peter Norton, TMH
- Computer Fundamentals, P. K. Sinha, BPB
- MS-Word 2003 completes reference.
- MS-Excel 2003 completes reference.
- MS-Access 2003 completes reference.
- Internet-An Introduction, CISTems- TMH series.
- Computer Sciences, D. P. Nagpal, PHI
- Internet- Every Thing You Need To Know, D.E. Comer, PHI
- Comdex Computer Course Kit, Vikas Gupta, Dream tech, N. Delhi

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1			3	3		1		3			
CO2			1			2		3			2
CO3		3					3		1		
CO4					2					2	
CO5		1			2		1		2		3



## PSYCHOLOGY-I

**Subject Code:** BAL003A

**Maximum Marks:** 100

### **Course Outcomes:**

At the end of the course, students will be able to:

- CO1. Understand the basic principles, introduction and methods of Psychology
- CO2. Gain knowledge of attention and perception to understand human Psychology
- CO3. Understand individual's approach to cognitive learning.
- CO4. Discuss memory and forgetting to observe the human brain.
- CO5. Analyze types of thinking and theories of language in legal practice.

### **Module I: INTRODUCTION TO PSYCHOLOGY**

Definition and Goals of Psychology. Leadership: Definition and Functions of Leaders; Characteristics of A Leader, Theories of Leadership, Effective Leadership.

### **Module II: MOTIVATION**

Types of Motives: Biogenic and Sociogenic Motives. The Need Hierarchy Model; Techniques of Assessing Motivation; Emotions: Nature, Types And Physiology Of Emotions. Theories of Emotions: James- Lange, Canon-Bard and Schachter-Singer Theory.

### **Module III: LEARNING**

Meaning and Definition of Learning; Operant Conditioning, Classical Conditioning, Cognitive Learning; Reinforcement and Punishment; Escape and Avoidance Learning and Social Learning.

Adjustment, Stress and Coping: Definition & Nature of Adjustment and Stress; Types and Sources of Stress; Coping and Stress Management Techniques.

### **Module IV: PERSONALITY AND ATTITUDES**

Trait and Type Approaches; Biological and Socio-Cultural Determinants; Techniques of Assessment; Psychometric and Projective. Nature and Function of Attitudes; Theories, Formation. Human Intelligence: Meaning and Nature of Intelligence – Theories of Intelligence. Determinants of Intelligence, Genetic and Environmental Influences; Measurement of Intelligence. Different Tests of Intelligence.

### **Module V: MEMORY AND FORGETTING**

Basic Processes: Encoding, Storage, Retrieval; Stages of Memory: Sensory Memory, Short Term Memory & LTM; Models of Memory, Levels of Processing. Measurement of Memory; Causes Of Forgetting.

### Text & References:

- J.E.Alcock,D.W.Carment,S.W.Sadava,J.E.Collins&J.M.Green,1997,AtextbookofSocialPsychology.Scarborough,Ontario:PrenticeHall/Allyn and Bacon.
- Baron& Byrne, 1998, Social Psychology, New Delhi, Prentice Hall.
- R.S.Feldman, 1985, Social Psychology: theories, research and application, New York, Mc Graw Hill.
- O. David Myers,1994, Exploring Social Psychology, New York, Mc Graw hill
- O. R. Semin & K. Fiedler (eds.), 1996, Applied Social Psychology, London, Sage. Butcher, J.N., Mineka, S., &Hooley, J.M., (2004).Abnormal Psychology, 12<sup>th</sup> Edition. Allyn & Bacon.
- Sarason, I. G., & Sarason, B.R.(2002). *Abnormal Psychology: The problem of mal-adaptive behavior*, Tenth Edition, Prentice Hall.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1			3	3		1		3			
CO2			1			2		3			2
CO3		3					3		1		
CO4					2					2	
CO5		1			2		1		2		3

## **ECONOMICS-I**

**Subject Code:** BAL004A/BBL003A

**Maximum Marks:** 100

### **Course Outcomes:**

After completion of this course, the student will:

CO1: Analyze the performance and functioning of markets and institutions in the context of social and economic problems.

CO2: Learn economic models in domestic and global contexts to analyze individual decision making.

CO3: Understand economic principles and how they apply to a wide range of real-world issues.

CO4: Learn master the theoretical and applied tools necessary to critique and create economic research and how to articulate pragmatic, principles-based policies to enhance economic well-being and promote social justice.

CO5: Emphasizes the importance of making choices between desirable alternatives.

### **Module I: INTRODUCTION TO ECONOMICS**

- Basic concept of Economics: Definition, Scope, Basic problems.
- Form of economic analysis: Macro V/S Microeconomics, Normative V/S Positive economics, Static V/S Dynamic, Partial V/S General and Long-run V/S Short-run.
- Free Enterprise: Capitalism, Socialism, Mixed Economy and Economic Planning.
- Economics offences and economic legislation.

### **Module II: INTRODUCTION TO MICROECONOMICS & THEORY OF SUPPLY AND CONSUMER BEHAVIOUR**

- Theory of consumer behavior
- Theories of Demand- Demand function, Law of Demand.
- Concept of Utility and Utility theory-Utility Approach, Indifference Curve Approach.
- Law of Diminishing Marginal Utility and Equi-Marginal Utility.
- Law of Supply, Supply Function.
- Price determination, Shift of Demand and Supply.
- Elasticity of Demand and Supply.
- Applications of Demand and Supply- Tax floor and ceilings, Applications of Indifference curves-Tax, Labor and Work.
- Law of Consumer Surplus.

### **Module III: REVENUE & MARKET STRUCTURE**

- Revenue Concepts
- Classification of Markets- Pure and Perfect Competition, Monopolistic, Imperfect Competition, Monopoly (Anti- Monopoly Law), Duopoly, Oligopoly and Cartels, Types of Horizontal Cartels, Market allocating Cartels and Price Fixing Cartels
- Concept of Dumping- to be substantiated with the cases of International Court of Justice,



Competition Law.

#### **Module IV: INTRODUCTION TO MACRO ECONOMICS & THEORY OF MONEY**

- Interdependence of Micro and Macro Economics.
- Basic Concepts-Stock and Flows, National Products, Domestic Product, Aggregate Consumption
- Circular Flow of Income.
- National Income, Real and Nominal GNP.
- Inflation-Demand Pull and Cost Push, Inflation and Rate of Interest.
- Function of Money, Classification, Supply and Demand for Money.
- Effects of Money on Output and Prices.
- Money Markets and Capital Markets.
- Inflation and Deflation
- Concepts of Banking Sector: Bank Rate, Cash Reserve Ratio(CRR), Statutory Liquidity Ratio(SLR)

#### **Module V: INTRODUCTION TO INDIAN ECONOMY**

- Indian Economy: Structure and condition
- Trends of Population growth
- Post-Independence economic policy in India (1991).
- Unemployment and Employment Generation Schemes in India.
- Poverty and Special study of Rural Poverty in India.

#### **Texts & References:**

1. H.L. Ahuja, Micro Economic Theory, S. Chand & Company, New Delhi. (Module I to IV).
2. Koutsoyiannis, A. (1999), Modern Microeconomics, Macmillan.(Module I to IV)
3. Vaish, M.C., Macro Economics, Wishwa Prakashan.(Module V)
4. Ahuja, H.L., Macro Economic Analysis, S. Chand.(Module V).
5. M.Y.Khan, Indian Financial System, Tata McGraw Hill, 7th edition, 2011.(Module VI)
6. Various latest issues of R.B.I. Bulletins, Annual Reports, Reports on Currency and Finance and Reports of the Working Group, IMF Staff Papers (Module VI)
7. Misra and Puri, Indian Economy, Himalaya publication. (Module VII)
8. Rudra Dutt and Sundram, Indian Economy, S. Chand.(Module VII)
9. Dornbusch, R., Fischer, S., & Startz, R. (2015). Macroeconomics. (11th Ed.). McGraw Hill Education. Froyen, R. (2014).
10. Pulapre Balakrishnan, 2007, "The Recovery of India: Economic Growth in the Nehru Era", *Economic and Political Weekly*, November.(Module VII)
11. Rakesh Mohan, 2010, "India's Financial Sector and Monetary Policy Reforms", in Shankar Acharya and Rakesh Mohan, editors, *India's Economy: Performances and Challenges: Development and Participation*, Oxford University Press. (Module VI)

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1			3	3		1		3			
CO2			1			2		3			2
CO3		3					3		1		
CO4					2					2	
CO5		1			2		1		2		3

## **LAW OF TORTS (ACCIDENTIAL CLAIMS) AND CONSUMER PROTECTION ACT**

**Subject Code:** BAL006A/BSL006A/BBL006A

**Maximum Marks:** 100

### **Course Outcomes:**

After completion of this course, the student will:

CO1: Be able to explore the evolution, meaning and nature of the Law of Torts

CO2: Be able to understand principle of tortious liability and general defenses available against tortious actions.

CO3: Be able to analyze specific torts against property, human body, freedom and reputation and gain a new and unique perspective of the world through spotting tort issues in everyday conduct.

CO4: Be able to understand the logistics of bringing and resolving torts cases including the role of judge and jury, burden of proof issues and the difference between bright-line rules and factor-based tests.

CO5: To introduce students to fundamental principles of tort law.

### **Module I: INTRODUCTION TO TORT**

Nature and Definition of Torts; Tort distinguished from Contract, Quasi-Contract, Crime, Mental element in torts, Motive, Intention, Malice and its kinds, General Condition of Liability in Torts: Wrongful act, Legal damage, Legal remedy: *Ubi jus ibi remedium*; Maxims: *Damnum sine injuria*, *Injuria sine damnum*, Malfeasance, Misfeasance and non-feasance, Joint tort feasons, Vicarious liability, Rule of strict liability, Rule of absolute liability, Liability for animals.

### **Module II: SPECIFIC TORTS, GENERAL DEFENSES AND DAMAGES**

**Specific Torts:** Negligence and contributory negligence, Assault, Battery, False imprisonment and abuses, Malicious prosecution, Nuisance, Trespass and its kinds, Defamation, General remedies in torts.

**General Defenses:** *Volenti non fit injuria*, Act of God, Inevitable accidents, Plaintiff's default, Private defense, Judicial and *quasi*-judicial act.

**Damages:** Damages and its kinds, Remoteness of damage, Judicial and extra judicial remedies, Cyber Tort.

### **Module III: CONSUMER PROTECTION**

The concept of a Consumer and Consumer Dispute, Shift from Caveat Emptor to Caveat Venditor, Brief overview of Consumer Protection Act, 2019; Consumer Protection Act, 2019: The Aims and Objectives of the Consumer Protection Act, 2019, Definition of 'Consumer', Rights of Consumers, Enforcement of Consumer Rights, Unfair Trade Practices, Defect In Goods, Product Liability & Penal Consequences, Unfair Contracts, Deficiency In



Service: Medical, Legal, Electricity, Housing, Postal Services, Banking, Education, Telecom.

#### **Module IV: E-FILING AND REDRESSAL MECHANISM**

E-Filing of Complaints; Consumer Protection Councils under the Consumer Protection Act, Redressal mechanism under the Consumer Protection Act, 2019: Jurisdiction, Powers And Functions, Appeal, Judicial Review ; Administrative Remedies; Consumer Courts; Provision For Alternate Dispute Resolution; Central Consumer Protection Authority; Penalties For Misleading Advertisement.

#### **Module V: ACCIDENTAL CLAIMS UNDER MOTOR VEHICLES ACT**

##### **Motor Vehicles Act, 1988:**

Salient features, Settlement of claims, Motor accidental claims tribunals, Insurance, Insurer's liability for third party risk.

##### **The Motor Vehicles (Amendment) Act 2019:**

Key features & Penalties

##### **Text & References:**

- Winfield and Jolowicz, Tort
- Law of Torts, Universal law Publishing Company, Dr. S.P. Singh
- The Law of Torts: Ratanlal & Dhiraj Lal,
- Winfield, Law of Torts,
- Dr. D.N. Saraf, Law of Consumer Protection in India,
- Avatar and Kaur, Harpreet; *Introduction to the Law of Torts and Consumer Protection*, LexisNexis
- Dr. Gurjeet Singh, The law of Consumer Protection in India.
- Motor Vehicle Laws, Universal Law Publishing Company.
- Basu, Durga Das; The Law of Torts; Kamal Law House
- Salmond and Heuston; The Law of Torts; Universal Publication
- Lakshminath, A. and Sridhar, M.; Ramaswamy Iyer's the Law of Torts; LexisNexis
- Rosser, William L; Cases and Materials on Torts; University Case Book Series
- Kamman, K; *Accident and Compensation Laws*; LexisNexis
- Janak Raj Jai, Motor Accident Claims - Law & Procedure (2016) 6th Edition Universal Law Publishing Lexis Nexis Delhi.
- M.R. Sreenath and Lalitha Sreenath, Law Relating to Compensation under the Motor Vehicles Act (2001) Eastern Book Company Lucknow
- M.L Bhargawa, Law of Motor Accidents Claims & Compensation Along With Model Forms (2019) 2nd Edition Law mann Kolkata.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3	1	2	3	3	2	3
CO2	3	3	1	2	2	2	3	3	2	3	2
CO3	3	2	2	2	2	3	3	2	1	3	2
CO4	3	3	3	3	2	3	2	3	3	2	3
CO5	3	2	1	1	2	3	1	3	2	2	3



## COMPUTER SCIENCE (COMPUTER LAB – I)

**Subject Code:** BAL015A/BSL015A/BBL015A

**Maximum Marks:** 30

### LIST OF EXPERIMENTS

#### **POWERPOINT:**

Introduction to the IDE of Power Point, Introduction to various toolbars like – Quick access, Placeholders, creating title slides, slide shows, Introduction to layouts, themes, Clipboard, font paragraph, Drawing & Editing, Animations, Transitions, Spell Check, Outline, Tab, slides tabs, Sorter view and Printing

#### **MS WORD:**

Introduction to IDE of Microsoft Word, Functionality of various tool bars – Quick Access, Title, Ribbon, Ruler, and Status Bars. Understanding document Views, Formatting, Editing and Understanding non printing characters, Using AutoText, Using Indentation & Alignment, and Style set Page breaks, Page numbers and Setting Page Layouts and Printing Documents

#### **MS EXCEL:**

Introduction to Electronic Spreadsheet, Worksheet, Cells, Quick Access Toolbar, Formula Bar, Status Bar, Clipboard, Font, Alignment, Number, Cells, Styles, Editing, Perform Mathematical Calculations, Working with Headers & Footers, Perform Automatic Calculations, Perform Advanced Mathematical Calculations, Work with Long Text, format Numbers, Excel Functions, Using Reference Operators and Printing Charts: Creating and applying chart layout, Adding Labels, Switching Data, Changing the Chart Style, Size and Position, Chart Type

## **LAW OF CONTRACT-I**

**Subject Code:** BAL022A/BSL022A/BBL022A

**Maximum Marks:** 100

### **Course Outcomes:**

After the completion of this course, the student will:

CO1: Be able to explore fundamental concepts and terminology of contracts and the procedure involved in the formation of contracts.

CO2: Be able to identify relevant legal issues on given set of facts in the area of contract law and explain the basic elements of forming an enforceable contract and agreement.

CO3: Be able to understand the modes of discharge of contract and the performance of quasi-contract.

CO4: Be able to examine a range of approaches to written communication, and apply the critical thinking required to find out most appropriate solutions to complex legal problems in the area of contract law.

CO5: Provide the detailed knowledge of the legal principles and rules used to determine the existence of an enforceable agreement.

### **Module I: FORMATION OF CONTRACT**

Meaning and nature of contract, Offer/Proposal (Definition, Communication, Revocation, General/Specific offer, Invitation to treat), Acceptance (Definition, Communication, Revocation, Tenders / Auctions), E-Contract.

### **Module II: CONSIDERATION AND CAPACITY**

Consideration (Definition, Essentials, Privity of Contract), Capacity to enter into a contract (Minor's position, Nature / effect of minor's agreements).

### **Module III: VALIDITY OF CONTRACT**

Unlawful consideration and object, Free Consent, Coercion, undue influence, Misrepresentation, Fraud, Mistake, Contingent contract, Quasi contracts, Effect of void, voidable, valid, illegal, unlawful and uncertain agreements contracts.

### **Module IV: DISCHARGE AND PERFORMANCE OF CONTRACT, REMEDIES**

Discharge of Contracts, Performance, Time and Place of performance, Impossibility of performance and frustration, Breach – Anticipatory & Present, Special power of Indian Judiciary to award fair and just damages and not liquidated damages.

**Remedies:** Damages, Remoteness etc., Injunction, Specific performance, Quantum Merit.

### **Module V: SPECIFIC RELIEF ACT, 1963**

Recovery of property, Specific performance of contracts, Rescission of Contract, Declaratory Decree, Injunctions: Temporary and Perpetual, Mandatory.

**Text & References:**

- Anson - Law of Contract, Oxford University Press
- Chitty on Contract, Sweet and Maxwell
- Pollock and Mulla - Indian Contract Act
- Avtar Singh - Indian Contract Act
- Bangia - Law of Contract and Specific Relief
- Cheshire and Fifoot - Law of Contract.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	3	3	3	2	1	2	3	2	2	2
CO2	2	2	1	2	3	2	3	3	3	3	2
CO3	2	3	3	2	3	2	3	2	1	3	3
CO4	3	3	2	3	2	3	3	2	3	2	3
CO5	2	1	3	3	2	3	1	3	2	3	3

# SEMESTER II

## INDIAN LEGAL HISTORY

**Subject Code:** BAL005A/BSL005A/BBL005A

**Maximum Marks: 100**

### Course Outcomes:

After the completion of this course, the student will:

CO1: Be able to explore the history of intellectual developments in law-making during British Period.

CO2: Have knowledge about emergence of Adalat System in India.

CO3: Be able to understand the kinds of crime committed in the society at that time.

CO4: Be able to understand English legal system with Indian legal system that existed at that time.

CO5: Study the development of legal system.

### Module I

- Emergence of East India Company : Development of authority under charters
- Administration of Justice in Madras 1639-1726
- Administration of Justice in Bombay 1668-1726
- Administration of Justice in Calcutta before 1726
- The mayor's Courts and the Genesis of the Charter of 1726, Provisions of the Charter, Charter of 1753, and Defects of judicial system.

### Module II

- Adalat System
- Grant of Diwani
- Execution of Diwani Functions
- Judicial Plan of 1772
- Defects of the Plan
- New Plan of 1774
- Reorganization of Adalats in 1780
- Reforms of 1781
- The Regulating Act of 1773
- The Charter of 1774 and Establishment of Supreme Court at Calcutta
- Defects of the Supreme Court

### Module III

- Act of Settlement, 1781
- Major Defects
- Supreme Court of Calcutta, Bombay and Madras
- Judicial Reforms of Lord Cornwallis
- Reforms in Administration of Criminal Justice



## **Module IV**

- The Charter Act of 1833
- The Charter Act of 1853: Main Provisions and Defects
- Main Provisions of the Indian Council Act, 1861
- The Indian Council Act of 1892

## **Module V**

- The Govt. of India Act, 1909
- Minto-Morley Reforms
- Defects of the Act
- Montague-Chelmsford Reforms 1919
- Dual System
- The Govt. of India Act, 1935 (Background)
  - i. Federalism
  - ii. Provisional Autonomy
- Indian Independence Act, 1947

### **Some Landmark Cases-**

- (a) Issue of Raja Nand Kumar (1775): Whether A Judicial Murder?
- (b) The Patna Case (1777-79)
- (c) The Cossijurah Case
- (d) The Case Of Kamaludin

### **Text & References:**

- M. P. Jain, Outlines of India Legal History
- M. Rama Jois, Legal and Constitutional History of India
- A. B. Keith, Constitutional History of India
- Rankin G. C. Back ground to Indian Law
- V. D. Kulshrestha, Landmarks in Indian Legal History

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	3	2	1	2	3	2	2	2
CO2	2	3	1	2	3	2	3	3	3	3	2
CO3	2	3	2	3	3	2	3	2	1	2	3
CO4	3	2	3	3	2	3	2	2	3	2	2
CO5	3	1	3	2	2	3	1	3	2	3	3

## **GENERAL ENGLISH**

**Subject Code:** BAL093A/BSL093A/BBL093A

**Maximum Marks:** 100

### **Course Outcomes:**

After the completion of the course, the student will:

CO1: Be able to understand the importance of poems and short stories and historical background of English literature.

CO2: Be able to explore grammar for purpose of reading and writing legal texts.

CO3: Be able to improve their legal vocabulary, writing skills such as application, letter, etc and presentation skills.

CO4: Be able to demonstrate their well supported communications skills and essays using different patterns of development taking into consideration purpose and audience.

CO5: To develop interest in and appreciation of literature.

### **Module I: POEMS**

- My Last Duchess-Robert Browning
- The Dance of the Eunuchs : Kamala Das

### **Module II: ESSAYS**

- On the Rule of the Road- A. G. Gadiner
- Of Revenge - Francis Bacon

### **Module III: GRAMMAR& VOCABULARY**

- Tenses
- Passive Voice
- Narration
- Idioms and Phrases
- One Word Substitution

### **Module IV: WRITING SKILLS**

- CV and Resume
- Paragraph
- Précis

### **Module V: PRESENTATION SKILLS & READING COMPREHENSION**

- Power Point Presentation
- Translation
- Train to Pakistan - Khushwant Singh



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1			3	3		1		3			
CO2			1			2		3			2
CO3		3					3		1		
CO4					2					2	
CO5		1			2		1		2		3

## COMPUTER SCIENCE-II

**Subject Code:** BAL009A/BSL009A/BBL009A

**Maximum Marks:** 70

### **Course Outcomes:**

After the completion of the course, the student will:

CO1: Be able to understand history and features of computer operating software such as DOS and UNIX.

CO2: Be able to explore Identify problems and formulate solutions for systems and organizations while reconciling conflicting objectives and finding computer based solution.

CO3: Be able to develop abilities to learn about electronic spreadsheet, charts and editing.

CO4: Be able to explore about multimedia, database, topology, concept of networking and computer networking.

CO5: To Understand the basics of python programming, Features, history, data types and variables.

### **Module I**

Basics of Python Programming: Features of Python, History of Python, The Future of Python, Installing Python, Running Python program, Writing and Executing First Python Program.

### **Module II**

Literal Constants, Numbers, Strings, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved Words, Indentation.

### **Module III**

Operators and Expressions, Expressions in Python, Operations on Strings, Concatenation, Multiplication (or String Repetition), Other Data Types, Tuples, Lists, Dictionary, Type Conversion.

### **Module IV**

Decision Control, Function and Modules: Introduction to Decision Control Statements, Selection/Conditional Branching Statements, Basic Loop Structures/ Iterative Statements, while loop, Nested Loops, the break Statement, The continue Statement, The pass Statement, The else Statement used with Loops.

### **Module V**

Function: Function Definition, Function Call, Variable Scope and Lifetime, return statement, Lambda. Functions or Anonymous Functions, Documentation Strings, Recursive Functions.

**Text & References:**

- Introduction to computers, Peter Norton, TMH
- Computer Fundamentals, P. K. Sinha, BPB
- MS-Word 2003 complete reference.
- MS-Excel 2003 complete reference.
- MS-Access 2003 complete reference.
- Internet-An Introduction, CISTems- TMH series.
- Computer Sciences, D.P. Nagpal, PHI
- Internet- Every Thing You Need To Know, D.E. Comer, PHI
- Comdex Computer Course Kit, Vikas Gupta, Dream tech, N.Delhi

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1			3	3		1		3			
CO2			1			2		3			2
CO3		3					3		1		
CO4					2					2	
CO5		1			2		1		2		3

## PSYCHOLOGY-II

**Subject Code:** BAL010A

**Maximum Marks:** 100

### **Course Outcomes:**

After completion of this course, the student will:

CO1: To study the intersection two critical relationships: one between brain function and behavior and other between the environment and behavior.

CO2: Understand science that seeks to understand behavior and mental processes.

CO3: Learn major perspectives of psychology: behavioral, biological, cognitive, humanistic, evolutionary, psychodynamic, and socio cultural

CO4: Understanding agoraphobia, specific phobias, social phobia, obsessive compulsive disorder, generalized anxiety disorders.

CO5: Students will be able to demonstrate skills in communication ethical behavior, complex cognitive possesses relevant to the field of psychology

### **Module I: HUMAN INTELLIGENCE**

Meaning and Nature of Intelligence-Theories of Intelligence.

### **Module II: DETERMINANTS OF INTELLIGENCE**

Genetics and Environmental Influences; Measurement of Intelligence. Different Tests of Intelligence.

### **Module III: MEMORY AND FORGETTING**

Basic Processes: Encoding, Storage, Retrieval; Stages of Memory: Sensory Memory, Short Term Memory & LTM; Models of Memory, Levels of Processing. Measurement of Memory; Causes Of Forgetting.

### **Module IV: PREJUDICE AND DISCRIMINATION**

Nature and Components of Prejudice; Acquisition of Prejudice; Reduction of Prejudice. Communication: Communication Models; Verbal and Non-Verbal Communication; Language and Social Inter Action; Barriers in Communication.

### **MODULE V: DISORDERS**

Anxiety Disorder Panic Disorder and Agoraphobia, Specific Phobias, Social Phobia, Obsessive Compulsive Disorder, Generalized Anxiety Disorder.

Mood Disorder, Schizophrenia: Delusional Disorder, Brief Psychotic Disorder.

### **Text & References:**

- J.E. Alcock, D.W. Carment, S.W. Sadava, J.E. Collins & J.M. Green, 1997, A textbook of social psychology. Scarborough, Ontario: Prentice Hall/Allyn and Bacon.

- Baron & Byrne, 1998, Social Psychology, New Delhi, Prentice Hall.
- R.S. Feldman, 1985, Social Psychology: theories, research and application, New York, McGraw Hill

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1			3	3		1		3			
CO2			1			2		3			2
CO3		3					3		1		
CO4					2					2	
CO5		1			2		1		2		3



## **ECONOMICS-II**

**Subject Code:** BAL011A/BBL011A

**Maximum Marks:** 100

### **Course Outcomes:**

After completion of this course, the student will:

CO1: Analyze the performance and functioning of markets and institutions in the context of social and economic problems.

CO2: Learn economic models in domestic and global contexts to analyze individual decision making.

CO3: Understand economic principles and how they apply to a wide range of real-world issues.

CO4: Learn master the theoretical and applied tools necessary to critique and create economic research and how to articulate pragmatic, principles-based policies to enhance economic well-being and promote social justice.

CO5: Students study the principle economic objective of stable prices economic growth, full employment and the balance of the payment.

### **Module I: MONEY AND BANKING**

- Indian Banking Structure
- The Central Bank of India (RBI)- functions and credit control policy (CRR, SLR, Repo Rate, reverse repo rate)
- Commercial Banking- functions, organization and operation
- Banks v/s NBFIs, meaning and role of NBFIs
- Unorganized money market

### **Module II: MACRO ECONOMICS & PRINCIPLES OF PUBLIC FINANCE**

- Problems in estimation of National Income
- Inflation-meaning and types of inflation
- Effects of inflation on the economy, measures to control inflation
- Deficit Financing- meaning and role in economic development
- Business cycle-meaning, phrases and its features
- Concept of Consumer protection and unfair trade practices
- Concept of public finance, public finance v/s private finance
- Tax system-meaning of taxation, canons of taxation
- Classification of taxes
- Fiscal policy -concept, objectives and instruments

### **Module III: INTERNATIONAL TRADE**

- Meaning of free trade, arguments for and against free trade

- Protection-arguments for and against protection
- Foreign exchange-meaning and determination of foreign exchange rate
- Concept of Forward and spot exchange rate, hedging
- Fixed and flexible exchange rate

#### **Module IV: ECONOMIC REFORMS (A) & ECONOMIC REFORMS (B)**

- New economic policy of 1991- key features
- Globalization in India- Concept and growth, Advantages and disadvantages of globalization for a developing economy
- Foreign Aid – types and need for foreign aid
- Concept of FDI and FII , Advantages and disadvantages of FDI inflow
- Reforms to strengthen Indian money market
- Reforms to strengthen Indian banking sector
- The role of public and private sector in the economy
- Concept of SMEs and their contribution in the economy

#### **Module V: INDIAN ECONOMY**

- Concept of Financial inclusion and Micro-financing
- Concept of poverty and poverty alleviation programmes in India
- Land reforms in India and commercialization of agriculture.

#### **Texts & References:**

- F. S. Mishkin and S. G. Eakins, Financial Markets and Institutions, Pearson Education, 6th edition, 2009.(Module-1)
- F. J. Fabozzi, F. Modigliani, F. J. Jones, M. G. Ferri, Foundations of Financial Markets and Institutions, Pearson Education, 3rd edition, 2009.(Module-1)
- Dornbusch, R., Fischer, S., & Startz, R. (2015). Macroeconomics. (11th ed.). McGraw Hill Education. Froyen, R. (2014). (Module-2)
- R.A. Musgrave and P.B. Musgrave, Public Finance in Theory & Practice, McGraw Hill Publications, 5th edition, 1989. Bagchi, Amaresh (ed) Readings in Public Finance, OUP.(Module-3)
- Mithani, D.M., Money, Banking, International Trade & Public Finance, Himalaya Publisher.(Module-3&4)
- Salvatore, D.L., 1997, International Economics, Prentice Hall, Upper Saddle River, N.J.(Module-4)
- Rudra Dutt and Sundram, Indian Economy, S. Chand.(Module-5 to 7)

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1			3	3		1		3			
CO2			1			2		3			2
CO3		3					3		1		
CO4					2					2	
CO5		1			2		1		2		3



## COMPUTER SCIENCE-II (COMPUTER LAB-II)

**Subject Code:** BAL018A/BSL018A/BBL018A

**Maximum Marks:** 30

### Course Outcomes:

The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem-solving skills after implementation of all the given experiments.

1. Write a program to demonstrate different number data types in python.
2. Write a program to perform different arithmetic operations on numbers in python.
3. Write a program to create, concatenate and print a string and accessing sub- string from a given string.
4. Write a python script to print the current date in following format "Sun May 29 02:26:23 IST 2017"
5. Write a python program to create, append and remove lists in python.
6. Write a program to demonstrate working with tuples in python
7. Write a program to demonstrate working with dictionaries in python
8. Write a python program to find largest of three numbers
9. Write a python program to convert temperature to and from Celsius to fahrenheit.
10. Write a python program to construct the following pattern using nested for loop
11. Write a python program to print prim numbers less than 20:
12. Write a python program to find factorial of a number using recursion:
13. Write a python program to that accepts length of three sides of a triangle as inputs. The program should indicate whether or not the triangle is a right-angled triangle (use Pythagorean theorem):
14. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
15. Write a python program to define a module and import a specific function in that module to another program.
16. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first the second file.
17. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order
18. Write a Python class to convert an integer to a roman numeral.
19. Write a Python class to implement pow (x, n)
20. Write a Python class to reverse a string word by word.

## **LAW OF CONTRACT – II**

**Subject Code:** BAL032A/BSL032A/BBL032A

**Maximum Marks:** 100

### **Course Outcomes:**

After completion of this course, the student will:

CO1: Be able to explore contract of indemnity, guarantee, pledge and bailment.

CO2: Be acquainted with the knowledge of special contracts such as concept of sale and agreement.

CO3: Be able to understand the definition and nature of partnership and have knowledge process of registration of firm & responsibilities of partners.

CO4: Be able to appreciate the legal services required in corporate offices that can enhance his relevance as a lawyer in society.

CO5: enable the student to better appreciate the law governing special contracts like indemnity, guarantee, agency, etc. which are more relevant in contemporary society.

### **Module I: INDEMNITY AND GUARANTEE/BAILMENT AND PLEDGE**

Meaning, Distinction between Indemnity and Guarantee, Right / Duties of Indemnifier, Indemnified and Surety, Discharge of Surety, Kinds of Guarantee, Bailment and Pledge: Meaning and Distinction, Rights and Duties of Bailor / Bailee, Pawnor/Pawnee, Lien, Termination of Bailment.

### **Module II: AGENCY**

Definitions of Agent and Principal, Appointment of an Agent, Authority of an Agent, Creation of agency: by, agreement, Ratification and law, Relation of principal / agent, subagent and substituted agent, Ratification of Agents, Authority, Revocation of Agency Authority, Effects of Agency on Contracts with third person, Personal Liability of, agents, Termination of agency.

### **Module III: SALE OF GOODS ACT 1930**

Contract of Sale: Nature and definition, Conditions and Warranties, Transfer of Property and Title, Performance of, the contracts, rights of unpaid seller, suit for breach of contract.

### **Module IV: THE INDIAN PARTNERSHIP ACT, 1932**

Nature of partnership firm, Relations of partners to one another and outsiders, Rights /Duties of partners *inter se*, Partnership Property: Relations of Partners to third parties, Liability for holding out, Minor as a partner; Incoming, and outgoing partners, Dissolution of Partnership Firm, Modes of Dissolution, Consequences of dissolution, Registration of firms and effects of non-registration.

### **Module V: THE COMMERCIAL COURTS ACT, 2015**

Definitions, Constitution of Commercial Courts, Commercial Divisions and Commercial Appellate Divisions, Specified Value, Pre-Institution Mediation and Settlement, Appeals, Transfer of Pending Suits, Amendments to The Provisions Of The Code Of Civil Procedure, 1908.

**Texts & References:**

- Pollock and Mulla, Indian Contract Act
- Avtar Singh, Indian Contracts Act
- Mulla, D. F., Indian Partnership Act
- Desai, T.R., Law of Contracts and Partnership sale of good Act
- R.K. Bangia, Sales of Goods Act, 1930
- Avtar Singh, Sales of Good Act
- Avtar Singh, Indian Partnership Act.
- K. Sukumaran, Pollock & Mulls - The Indian Partnership Act
- Scott J. Burnham, Drafting and analyzing Contracts: A Guide to the Practical Application of the Principles of Contract Law.
- Namrata Shuklha, E-Contracts, Tenders and Agreements
- George Kuney, The Elements of Contract Drafting

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	3	3	3	1	2	3	2	3	3
CO2	1	3	1	2	3	2	3	3	2	3	2
CO3	1	3	3	3	2	3	3	2	1	2	3
CO4	2	2	2	3	2	3	2	2	3	2	2
CO5	3	1	2	2	2	2	1	3	2	3	3

# SEMESTER III



<b>BAL/BBL/BCL/BSL013A</b>	<b>CONSTITUTIONAL LAW- I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore the meaning, nature and features of Indian Constitution and historical background of making of the constitution.

CO2: be able understand emerging complex issues related to equality and social justice.

CO3: be able to analyze fundamental rights of citizens including legal persons and their scopes and limitations.

CO4: be able to examine various theories of secularism, directive principles of state policy and methods of constitutional amendments.

**SYLLABUS:**

<b>Module-I</b>	<ul style="list-style-type: none"> <li>a. Indian Constitution in the making</li> <li>b. Nature and Special features of the Constitution.</li> <li>c. Citizenship of India</li> </ul>
<b>Module-II</b>	<b>Equality and Social Justice</b> <ul style="list-style-type: none"> <li>a. Equality before the law and equal protection of laws</li> <li>b. Classification for differential treatment: constitutional validity</li> <li>c. Justice to the weaker sections of society: scheduled castes, scheduled tribes and other backwards class, women and children.</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>(a)Speech and expression               <ul style="list-style-type: none"> <li>ii. Media, press and information</li> </ul> </li> <li>(b)               <ul style="list-style-type: none"> <li>i. Freedom of speech and contempt of court</li> <li>ii. Freedom of assembly</li> </ul> </li> </ul>
<b>Module-IV</b>	<ul style="list-style-type: none"> <li>(a) Right to life and personal liberty: meaning, scope and limitations</li> <li>(b)               <ul style="list-style-type: none"> <li>i. Rights of an accused-double jeopardy, self-incrimination and retroactive punishment</li> <li>ii. Preventive detention-constitutional policy</li> </ul> </li> </ul>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>(a)               <ul style="list-style-type: none"> <li>i. Concept of Secularism : historical perspective</li> <li>ii. Indian constitutional provisions relating Secularism</li> </ul> </li> <li>(b)               <ul style="list-style-type: none"> <li>i. Freedom of religion and its scope</li> </ul> </li> </ul>

	ii. Religion and the State : its limitations and minority rights
<b>Module-VI</b>	(a) i. Directive Principles-directions for social change-A new social order. ii. Fundamental Rights and Directive Principles, inter-relationship-judicial Balancing. (b) i. Constitutional amendments-to strengthen Directive Principles. ii. Reading Directive Principles into Fundamental Rights.
<b>Module-VII</b>	(a) i. Methods of Constitutional amendments ii. Limitations upon constitutional power of amendments (b) i. Development of the basic Structure : Doctrine ii. Judicial activism and its Restraint

#### REFERENCES:

1. Narinder Kumar 2006
2. Dr. J.N. Pandey 2006
3. Dr. D.D. Basu, Shorter Constitution of India
4. Dr. Seervai Constitution of India (1992) Vol. I/II/III
5. Dr. M.P. Singh (ed) V.N. Shukla

#### Judgments

1. S.R. Bommai v. UOI, AIR 1994 SC 1918
2. S.P. Gupta v. UOI, AIR 1982 SC 1991
3. Sunil Batra v. Delhi Administration
4. Keshvanand Bharti v. State of Kerala, AIR 1995 SC 2299
5. Minerva Mills Ltd. v. UOI, Air 1980 SC 1789
6. Hasinara Khatoon v. Home Secretary State of Bihar, 1979 SC 136
7. A.K. Gopalan State of Madras, AIR 1950 SC 27
8. Sachidanand v. State of West Bengal, AIR 1987 SC 1109
9. Rural Litigation and Entitlement Kendra v. State of UP
10. T.M.A. Pai Foundation v. State of Karnataka
11. M.C. Mehta v. UOI(1987) ISCC 395 AIR 1987 1086
12. Rudul Shah v. State of Bihar, AIR 1983 SC 1086

13. *Bikunthnath v. C.D.M.O.*, AIR 1992 SC 1368
14. *Indra Gandhi v. Raj Narain*, AIR 1995 SC 2299
15. *P&O Stream Navigation Co. v. UOI*, AIR (1997) ISCC
16. *People Union Civil Liberties v. UOI*, AIR (1997)ISCC
17. *Air India v. Nargesh Mirza*, AIR 1981 SC 1829
18. *Unnikrishnan v. State of A.P.*, AIR 1993 SC 2178
19. *Indira Sawheny v. UOI*, AIR 1993 SC 2178
20. *Maneka Gandhi v. UOI*, AIR 1978 SC 1789
21. *I.R. Coolho (Dead) Through L.R.S. v. State of Tamil Naidu &ors.* 2007 SC 137
22. *Raja Ram Pal v. The Hon'ble Speaker Loksabha and Ors.*
23. *Kehar Singh v. State* (1989)
24. *DhanjayaChaterjee v. State West Bengal*, AIR 2004.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMNET OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	3	3	2	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	3	2	2	3
CO 3	3	3	3	2	2	2	3	3	3	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3

<b>BAL021A</b>	<b>POLITICAL SCIENCE- I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand and analyze the structure of Indian Government with a focus on Indian Constitution including the theories of States.

CO2: be able to examine Fundamental Rights and Duties with focus on UN declaration of Human Rights.

CO3: be able to understand fundamental Concepts of Liberty, Equality, Justice and Property.

CO4: be able to explore theories of Democracy and Sovereignty with special reference to power, authority and legitimacy.

**SYLLABUS:**

<b>Module-I</b>	<ul style="list-style-type: none"> <li>a. Political Science: Meaning, Nature and Scope, Traditional and Modern perspectives.</li> <li>b. Behavioralism and post behavioralism.</li> </ul>
<b>Module-II</b>	<ul style="list-style-type: none"> <li>a. State: (i) Meaning and elements (ii) Distinction between State and Government.</li> <li>b. Theories and functions of State: Liberal Democratic, Authoritarian and Welfare State</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>a. Rights and Duties: Meaning and types of Rights and Duties</li> <li>b. UN Declaration of human rights</li> </ul>
<b>Module-IV</b>	<ul style="list-style-type: none"> <li>a. Liberty (i) Meaning and definition, Negative and Positive concept of Liberty. (ii) Safeguards of liberty.</li> <li>b. Property: Concept, Liberal and Marxian theory of Property.</li> </ul>
<b>Module-V</b>	<p>Concepts:</p> <ul style="list-style-type: none"> <li>a. Justice: Concept, legal political and socio-economic dimensions.</li> <li>b. Equality: Meaning and definition, legal, political and socio-economic dimensions.</li> </ul>
<b>Module-VI</b>	<ul style="list-style-type: none"> <li>a. Law meaning, nature and liability and law:</li> <li>b. Democracy: Concept, Features and types.</li> <li>c. Sovereignty: Concept Attributes.</li> </ul>



<b>Module-VII</b>	a. Power, Authority and Legitimacy b. The Erite Theory/Political Parties and Pressure Groups.
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#### REFERENCES:

1. M.P. Jain, Political theory liberal and Marxian.
2. L. Asirvatham, Political theory Lucknow House.
3. William Ebenstein, Modern Political though (New Delhi Oxford and IBH).
4. V.D. Mahajan, Political theory 5. R.C. Aggarwal, Political theory.
5. J.C. Johari, Political Science.
6. O.P. Gaba, Political Science.
7. Prof. S.P. Verma, Modern Political Theory.
8. Prof. S.L. Verma, Modern Political Theory.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMNET OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	3	2	2	3	3	3	1	3	3
CO 2	3	3	2	3	3	2	3	3	2	1	3
CO 3	3	3	2	3	2	2	3	3	1	2	3
CO 4	3	3	2	3	2	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL023A</b>	<b>FRENCH LANGUAGE -I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understanding of Identity through Language and Construct simple sentences in French using accurate rudiments of syntax and grammar.

CO2: be able to express him/herself effectively and accurately in simple French about him/herself and his/her surroundings

CO3: be able to pronounce French reasonably well and demonstrate an elementary knowledge of French sentence structure through speaking and writing

CO4: develop understanding short dialogue in french.

**SYLLABUS:**

<b>Module-I</b>	<ul style="list-style-type: none"> <li>a. The alphabet</li> <li>b. The accents</li> <li>c. Elision</li> <li>d. Liason</li> <li>e. To spell one's name</li> <li>f. Numbers 1-10</li> <li>g. subject Pronouns</li> <li>h. verbs: être and s'appeler</li> <li>i. To present oneself</li> <li>j. Greet someone</li> <li>k. To take leave</li> <li>l. Understand a short dialogue [salutation]</li> </ul>
<b>Module-II</b>	<ul style="list-style-type: none"> <li>a. Definite articles</li> <li>b. Nationalities and Professions</li> <li>c. Numbers 11 – 69</li> <li>d. verbs : avoir, habiter, apprendre</li> <li>e. Understand short dialogues in which one talks about oneself [2]</li> <li>f. Filling up an official form</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>a. Indefinite articles</li> <li>b. Interrogation using “est-ceque..?” [oui / non ]</li> <li>c. Negation</li> <li>d. Interrogation using “quel, où?</li> <li>e. Numbers after 70</li> <li>f. Understand short dialogues in which one present oneself [3]</li> <li>g. To ask someone to present himself</li> </ul>

<b>Module-IV</b>	a. Possessive Adjectives [1] b. Verbs : aimer, adorer, préférer, detester [verbs ending –er] c. Hobbies [faire du / de la] d. Understand a short dialogues in which one talks about ones' likes and dislikes e. To speak about ones likes and dislikes
<b>Module-V</b>	a. Interrogation using “Qui, Qu’est-ce que? [C’est..]” b. On = Nous c. Writing a short letter : starting and ending a letter d. Understanding a short letter giving information about oneself e. To write a short letter informing about oneself
<b>Module-VI</b>	a. Months of the year, seasons, expressions with “avoir” b. Interrogation using “Quand” c. Verbs :aller, pouvoir, vouloir d. Making polite requests e. Activities during vacations f. Recent past g. Near future h. Nouns [plurals] i. Understand / write a short letter talking about one’s vacation
<b>Module-VII</b>	a. Pronom Tonique b. Telling / asking the time c. Making an appointment d. Verbs : venire, sortir, connaître, savoir e. Inviting a friend f. Accepting / refusing an invitation

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	3	2	3	3		1	3
CO 2	3	3	2	1	2	2	3	3	1		3
CO 3	3	3	1	2	3	2	3	3	1	1	3
CO 4	3	3	2	3	2	2	3	3	2	2	3

<b>BAL/BBL/BCL/BSL049A</b>	<b>CODE OF CRIMINAL PROCEDURE-I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: have understanding of important definitions provided in Code of Criminal Procedure and constitution of courts.

CO2: be able to examine the stages in investigation and procedure of trial in criminal cases.

CO3: be able to explain the power, functions and duties of police officer and criminal courts

CO4: be able to employ and promote adoption of just and humane practices in criminal justice system.

**SYLLABUS:**

<b>Module-I</b>	Constitution of Criminal Courts and their Powers.
<b>Module-II</b>	Arrest of Persons and the Rights of Arrested Persons, Information to the Police and their Powers to Investigate.
<b>Module-III</b>	Cognizance of Offences by the Magistrate and Court of Sessions, Complaints to Magistrates Commencement of Proceedings before Magistrates.
<b>Module-IV</b>	The Charges:(a)Forms of Charges(b) Joinders of Charges
<b>Module-V</b>	Trials of the Cases: Sessions Trial
<b>Module-VI</b>	Trials of the Cases Warrant Trial (i) Cases Instituted upon a Police Report (ii) Cases Instituted Otherwise than on a Police Report (iii) Conclusion of Trial.
<b>Module-VII</b>	Trials of the Cases Summons Trial by Magistrates, Summary Trial

**REFERENCES:**

1. Rattan Lal &Dhirajlal – The Code of CriminalProcedure
2. R.V. Kelkar – Code of CriminalProcedure
3. S.N. Mishra – Code of Criminal Procedure,1973
4. Ganguly – Criminal Court Practice andProcedures

5. D D Basu, Criminal Procedure Code, 1973

6. Batuk Lal's Commentary on the Code of Criminal Procedure, 1973

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2	1	3	2	3	3	3	1	3
CO 2	3	3	3	2	2	3	3	3	3	3	3
CO 3	3	2	3	2	3	1	3	3	2	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3



<b>BAL/BBL/BCL/BSL050A</b>	<b>LAW OF CRIMES- I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand substantive criminal law as distinguished from procedural law.

CO2: be able to identify the key elements of crimes in given factual situations and stages of crimes.

CO3: be familiar with the provisions of general exceptions, the abetments and the conspiracy provided in Indian penal code.

CO4: acquire the research skills in areas of laws including the theories of punishment and punishment provided under IPC and be able to use full range of legal sources to identify the controversial issues in it.

**SYLLABUS:**

<b>Module-I</b>	Introduction to Substantive Criminal Law: Extent and operation of the Indian Penal Code.
<b>Module-II</b>	Definition of crime, Fundamental elements of crime.
<b>Module-III</b>	Stage of a crime; Intention, Preparation, Attempt, Commission. Essentials of the attempt, impossible attempt, attempt and preparation distinguished
<b>Module-IV</b>	General Explanations and Exceptions (Sec.76-106): (i) Definition (ii) Constructive joint liability (iii) Mistake (iv) Judicial and Executive acts (v), Accident (vi) Necessity (vii) Infancy (viii) Insanity (ix) Intoxication (x) Consent (xi) Good faith,

	(xii) Private defense.
<b>Module-V</b>	Abetment (Sec.107 to 114).
<b>Module-VI</b>	Criminal Conspiracy (Sec 120-A and B).
<b>Module-VII</b>	Punishment Theories: Deterrent, Retributive, Preventive, Expiatory and Reformatory Theory. Punishment under the IPC: Fine, Life-Imprisonment, Death Sentence

#### REFERENCES:

Gour, Hari Singh, Commentaries on Penal Law of India. In 4 vol. XI Ed. Law Publishers Allahabad.2014.

Ratan Lal & Dhiraj Lal, Indian Penal Code. XXXII ed. Lexis Nexis.2013.

Nelson. Indian Penal Code. 4 Vol. X Ed. Lexis Nexis.2008.

Bhattacharyya, Prof. T. The Indian Penal Code. Central Law Agency Allahabad. 2014

Basu, D.D., Indian Penal Code 1860, Asoke K. Ghosh, Prentice-Hall of India Private Limited, 1997.

Misra, S.N. The Indian Penal Code. Eastern Book Company, Lucknow, 2012.

Pillai, P.S.A. Criminal Law. 12<sup>th</sup> Ed. Lexis Nexis, 2014

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	3	2	1	2	3	3	3	2	1	3
CO 3	3	2	3	3	2	3	3	3	3	3	3
CO 4	3	3	2	3	2	2	3	3	3	2	3

<b>BAL/BBL/BCL/BSL085A</b>	<b>WOMAN, CHILD AND SOCIETY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand the position of women and children in society.

CO2: be able identify and discuss issues related to domestic violence and crimes related to dowry and be able to discuss the laws which eliminate such crimes from society.

CO3: be able to analyze the laws which deal with indecent advertisement, distribution, and representation of women.

CO4: be able to critically analyze legal provision for protection of children from sexual offences using the child for pornographic purposes and offences relating to Pre-conception and pre-natal diagnostic techniques.

**SYLLABUS:**

<b>Module-I</b>	Position of women and children in society, Study of various laws made for the welfare of them, Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal Act, 2013: Definition-aggrieved woman, domestic worker, employee, employer, sexual harassment, workplace, constitution of internal complaints committee, constitution of local complaints committee, complaint, inquiry into complaint, duties of employer, duties and powers of district officer.
<b>Module-II</b>	Domestic Violence Act, 2005: Definitions, Powers and duties Of Protection Officers, Service Providers, Procedure for Obtaining Orders of Reliefs.
<b>Module-III</b>	Dowry Prohibition Act, 1961: Definition of 'dowry', Penalty for giving or taking dowry, Penalty for demanding dowry, Agreement for giving or taking dowry to be void, Dowry to be for the benefit of the wife or heirs, Cognisance of offences, Offences to be cognizable for certain purposes and to be bailable and non-compoundable, Dowry Prohibition Officers
<b>Module-IV</b>	Indecent Representation of Women (Prohibition) Act, 1986: Definition-advertisement, distribution, indecent representation of women, Prohibition of advertisements containing indecent representation of women, Prohibition of publication or sending by post of books, pamphlets, etc., containing indecent representation of women, Powers to enter and search, Penalty, Protection of action taken in good faiths.
<b>Module-V</b>	Protection of Children from Sexual Offences Act (POCSO), 2012: sexual offences against children, using child for pornographic purposes and punishment, abetment of, and attempt to commit an offence, procedure for



	reporting of cases, procedures for recording statement of the child, special courts, procedure and powers of special courts and recording of evidence.
<b>Module-VI</b>	Pre-conception and pre-natal diagnostic techniques (Prohibition of Sex Selection) Act, 1994.
<b>Module-VII</b>	Child Marriage Restraint Act, 2017

#### REFERENCES:

1. SC Tripathi and Vibha Arora, Law relating to Women and Children, Central Law Publication, 2006
2. DK Tiwari & Mahmood Zaidi, Commentaries on Family Courts Act, 1984, Allahabad Law Agency, 1997
3. BN Chattoraj, Crime against Women: A Search for Peaceful Solution, LNJNNICFS, 2007
4. Nomita Agarwal, Women and Law, New Century Publishing House, 2005
5. Manjula Batra, Women and Law & Law Relating to Children in India, Allahabad Law Agency, 2001

#### Text Books:

1. Mamta Rao, Law Relating to Women and Children, Eastern Book Company, 3rd Edition, 2012.
2. Lalita Dhar Parihar, Women and Law, Eastern Book Company, 2011.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	2	1	2	1	3	3	3	1		3
CO 3	3	2	3	2	3	3	3	3	2	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3

# SEMESTER IV

<b>BAL/BBL/BCL/BSL028A</b>	<b>CONSTITUTIONAL LAW - II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand the power of Government to have trade and business and to proclaim emergency.

CO2: be familiarize the form of Government whether it is Parliamentary or presidential.

CO3: be able to explore relations between Centre and State such as Legislative, Administrative & Financial and effect of emergency on Centre-State relations.

CO4: be able examine the hierarchy of Courts in India, principle of judicial review and principles of judicial independence.

**SYLLABUS:**

<b>Module-I</b>	(a) i. Freedom of Trade/business ii. Emergency, meaning and scope (b) i. Proclamation of emergency-conditions and effect of emergency on Centre-state relations. ii. Emergency and suspension of fundamental rights
<b>Module-II</b>	(a) i. President of India ii. Election, qualification, salary and impeachment (b) i. Power: legislative, executive and discretionary powers ii. Council of Ministers in union and states
<b>Module-III</b>	(a) Prime Minister cabinet system-Collective Responsibility, individual responsibility. (b) i. Federalism-principles: comparative study ii. Indian Federalism: identification of federal features
<b>Module-IV</b>	(a) Legislative relation between union and states (b) i. Administrative Relations ii. Financial relations
<b>Module-V</b>	(a) i. Governor and its role in States ii. Centers powers over the state-emergency (b) Challenges to Indian federalism

<b>Module-VI</b>	(a) i. The Supreme Court ii. High Courts (b) i. Judges: appointment, removal, transfer and condition of service: judicial independence ii. Judicial review: nature and scope
<b>Module-VII</b>	(a) i. Freedom of Property: from fundamental right to constitutional right ii. Doctrine of pleasure (Art.310) of the constitution (b) i. Protection against arbitrary dismissal, removal, or reduction in rank (Art. 311) of the constitutional ii. Exceptions to Art. 311 of the constitution.

#### REFERENCES:

##### Judgments

1. S.R. Bommai v. UOI, AIR 1994 SC 1918
2. S.P. Gupta v. UOI, AIR 1982 SC 1991
3. Sunil Batra v. Delhi Administration
4. Keshvanand Bharti v. State of Kerala, AIR 1995 SC 2299
5. Minerva Mills Ltd v. UOI, AIR 1980 SC 1789
6. Hasinara Khatoon v. Home Secretary State of Bihar, 1979 SC 136
7. A.K. Gopalan State of Madras, AIR 1950 SC 27
8. Sachidanand v. State of West Bangal, AIR 1987 SC 1109
9. Rural Litigatino and Entitlement Kendra v. State of U.P.
10. T.M.A. Pai Foundation v. State of Karnataka
11. M.C. Mehta v. UOI (1987) ISCC 395 AIR 1987 1086
12. Rudul Shah v. State of Bihar, AIR 1983 SC 1086
13. Bikunthnath v. C.D.M.O., AIR 1992 SC 1368
14. Indra Gandhi v. Raj Narain, AIR 1995 SC 2299
15. P & O Stream navigation Co v. Secy of State (1861) 5 HCR
16. People Union Civil Liberties v. UOI, AIR (1997) ISCC
17. Air India v. Nargesh Mirza, AIR 1981 SC 1829
18. Unnikrishnan v. UOI, AIR 1993 SC 2178

19. Indira Sawheny v. UOI Air 1993 SC 1789
20. Maneka Gandhi v. UOI, AIR 1978 SC 1789
21. I.R. Coolho (Dead) Through L.R.S. v. State of Tamil Naidu &ors, 2007 SC 137
22. Raja Ram Pal v. The Hon'ble Speaker Loksabha and Ors
23. Kehar Singh v. State (1989)
24. DhanjayaChaterjee v. State West Bengal, AIR 2004

#### Recommended Books

1. Dr. Narender Kumar 2006
2. Dr. J.N. Pandey 2006
3. Dr. D.D. Basu, Shorter Constitution of Indian
4. Dr. Seervai Constitution of India (1992) Vol. I/II/III
5. Dr. M.P. Singh (ed) V.N. Shukla

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMNET OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	2	3	3	2	3	3	3	2	3
CO 2	3	2	3	2	3	3	3	3	2	3	3
CO 3	3	2	3	2	3	3	3	3	2	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3



<b>BAL031A</b>	<b>POLITICAL SCIENCE- II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand scope and subject International Relations and emerging trends in International Relations.

CO2: be able to examine international theory of balance of power and the role of diplomacy in foreign policy.

CO3: be able to describe cold war phase and its impact on International Relations.

CO4: be able to evaluate Indian Foreign Policy and relationship of India with US and Russia

**SYLLABUS:**

<b>Module-I</b>	a. International Relations: Meaning, Nature and Scope b. Emerging trends in International Relations
<b>Module-II</b>	a. National Power: Meaning, Elements and limitations. b. Theory of balance of Power, Collective Security system.
<b>Module-III</b>	a. Foreign Policy: Meaning, determinants and significance. b. Diplomacy: (i) Meaning and Nature (ii) Relationship between Foreign policy and Diplomacy
<b>Module-IV</b>	a. Cold War: Meaning, Causes and impact on International Relations. b. Détente, New Cold war and new détente, implications of the collapse of USSR
<b>Module-V</b>	Decolonization: a. Causes, rise of third world and its impact on International Relations. b. International Power structure: Bi-Polarity, Uni-Polarity, Multy-Polarity and steps towards MultyCentralism.
<b>Module-VI</b>	a. Neo-colonialism: meaning and causes of its emergence. b. Multi-national Corporations: meaning and role of MNCs in International Relations.
<b>Module-VII</b>	a. Relationship of India with US and Russia. b. Relationship of India with China and Pakistan.

**REFERENCES:**

1. Norman D. Palmer and Howard C. Perkins – International Relations the world community in transition 1985
2. Raymond Aron– Peace and war a theory of International Relations
3. H.J. Morgenthau– Politics among Nations
4. J.C. Johari – International Politics 5. Prem Arora – International Relations and foreign policy.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	2	2	3	3	2	3	3	2		3
CO 3	3	3	2	3	2	2	3	3	3	2	3
CO 4	3	3	2	3	2	3	3	3	2	3	3

<b>BAL033A/BBL033A/BSL033A/BCL033A</b>	<b>FRENCH LANGUAGE –II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to write short paragraphs on simple topics, e.g., (food, vacations, daily routine, shopping, etc.

CO2: be able to differentiate between formal and informal speech in French and Read French at an elementary level.

CO3: be able to build vocabulary about different common daily topics so that you can express yourself better.

CO4: Express basic feelings in French. For example, offering help, agreeing and disagreeing with what people say, arguing about a topic, explaining feelings to a doctor, reporting an emergency or accident and expressing surprise.

**SYLLABUS:**

<b>Module-I</b>	<ol style="list-style-type: none"> <li>1. Alimentation</li> <li>2. Interrogation using “Combien?”</li> <li>3. Expression of quantity [countable, uncountable]</li> <li>4. Article partitif</li> <li>5. Verbs : manger, prendre, boire</li> <li>6. Direct object pronouns</li> <li>7. “en” [replacing quantity]</li> <li>8. Understand a conversation in a shop / restaurant</li> <li>9. To order a meal in a restaurant / to make purchases in shop</li> </ol>
<b>Module-II</b>	<ol style="list-style-type: none"> <li>1. Imperative</li> <li>2. Places in a city and genders of countries</li> <li>3. L'article contracté</li> <li>4. Locational prepositions</li> <li>5. Pronoun y</li> <li>6. Verbs :plaire, offrir, voir</li> </ol>



	<ul style="list-style-type: none"> <li>7. To ask for / to give directions</li> <li>8. To describe a place / city</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>1. Rooms of a house,</li> <li>2. Adjectives of colour</li> <li>3. Adjectives of possession [2]</li> <li>4. quelq'un, quelque chose, personne, rien</li> <li>5. Expression of obligation and necessity [verbs :falloir, devoir]</li> <li>6. Demonstrative adjectives</li> <li>7. Describe a residence</li> </ul>
<b>Module-IV</b>	<ul style="list-style-type: none"> <li>1. Past tense</li> <li>2. il y a ,avant [marquerstemporels]</li> <li>3. Indirect Pronouns</li> <li>4. Ne...que</li> <li>5. Understand / describe an event in the past</li> </ul>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>1. Comparisons</li> <li>2. Relative pronouns [qui, que, où]</li> <li>3. Members of the family</li> <li>4. Pronominal verbes</li> <li>5. Depuis, Pendant... other marquerstemporels</li> <li>6. Pourquoi? pour / Parceque</li> <li>7. Describing daily activities</li> </ul>
<b>Module-VI</b>	<ul style="list-style-type: none"> <li>1. Interrogation using inversion</li> <li>2. Adjectives [of character/ physique]</li> <li>3. Describe a person</li> <li>4. ne plus, jamais</li> <li>5. Expression of one's opinion</li> <li>6. Express ones' opinion on a subject</li> </ul>
<b>Module-VII</b>	<ul style="list-style-type: none"> <li>1. Future tense</li> <li>2. Understanding / talking about the future [eg weather forecast]</li> <li>3. Subjunctive present</li> <li>4. Expressing one's wishes</li> </ul>

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	2	3	2	1		3	3	2		3
CO 3	3	3	3	2	3	1	3	3		2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3

<b>BAL/BBL/BCL/BSL055A</b>	<b>CODE OF CRIMINAL PROCEDURE-II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore process of trial from pre to post stage and jurisdiction of criminal courts to make the administration of justice effective.

CO2: be able to understand preventive and welfare concept in code of Criminal Procedure.

CO3: be able to examine criminal justice system and probation of offenders act.

CO4: be able to examine the various dimensions of criminal justice system and achieving the social goals through the social legislations on important issues.

**SYLLABUS:**

<b>Module-I</b>	<p>Pre- Trial Procedure</p> <ul style="list-style-type: none"> <li>• Arrest of Persons (Ss. 41-60)</li> <li>• Processes to Compel Appearance (Ss. 61-90)</li> <li>• Jurisdiction of the Criminal Courts in Inquiries and Trials (Ss. 177-189)</li> <li>• Conditions Requisite for Initiation of Proceeding (Ss. 190-199)</li> <li>• Complaints to Magistrates (Ss. 200-203)</li> </ul>
<b>Module-II</b>	<p>Trial Procedure</p> <p>Commencement of Proceedings before Magistrates (Ss. 204-210)</p> <p>The Charge (Ss. 211-224)</p> <p>Trial before a Court of Session (Ss. 225-237)</p> <p>Trial of Warrant Cases by Magistrates (Ss. 238-250)</p> <p>Trial of Summons Cases by Magistrates (Ss. 251-259)</p> <p>Summary Trials (Ss. 260-265)</p> <p>Evidence in Inquiries and Trials (Ss. 272-299)</p> <p>General Provisions as to Inquiries and Trials (Ss. 300-327)</p> <p>Provisions as to Accused Persons of Unsound Mind (Ss. 328-339)</p> <p>Provisions as to Offences Affecting the Administration of Justice (Ss.</p>

	340-352) Transfer of Criminal Cases (Ss. 406-412) Attendance of Persons Confined or Detained in Prisons (Ss. 266-271) Provisions as to Bail and Bonds (Ss. 436-450) Irregular Proceedings (Ss. 460-466) Plea Bargaining Limitation for taking Cognizance of certain Offences (Ss. 461-484)
<b>Module-III</b>	Post Trial Procedure The Judgment (Ss. 353-365) Submission of Death Sentences for Confirmation (Ss. 366-371) Appeals (Ss. 372-394) Reference and Revision (Ss. 395- 405) Execution, Suspension, Remission and Commutation of Sentences (Ss. 413-435)
<b>Module-IV</b>	Preventive Concept in Criminal Procedure Code a. Security for Keeping the Peace and for Good Behaviour (Ss. 106-124) b. Maintenance of Public Order and its Tranquility (Ss. 129-148)
<b>Module-V</b>	Welfare Concept in Criminal Procedure Code Order for Maintenance of Wives, Children and Parents (Ss. 125-128)
<b>Module-VI</b>	Attachment, Forfeiture and Disposal of Property a. Processes to Compel the Production of Things (Ss. 91-105) b. Procedure for Attachment and Forfeiture of Property c. Disposal of Property (Ss. 451-459)
<b>Module-VII</b>	Juvenile Justice System and Probation of Offenders a. Probation of Offenders Act, 1958 b. Juvenile Justice (Care and Protection of Children) Act

#### REFERENCES:

1. Ratanlal&Dhirajlal, B.M. Prasad & Manish Mohan, *The Code of Criminal Procedure (Cr. PC)* (21<sup>st</sup>edn., JBA Publishers 2013)

2. S. C. Sarkar, revised by Sudipto Sarkar & V. R. Manohar, *The Code of Criminal Procedure (in 2 Vols.)* (10<sup>th</sup>edn., JBA Publishers 2012)
3. Prof. S.N. Misra, *The Code of Criminal Procedure (Cr. PC), with Probation of Offenders Act & Juvenile Justice Act* (18<sup>th</sup>edn., JBA Publishers, 2012)
4. Choudhary, R. N., *Law Relating to Juvenile Justice in India* (3<sup>rd</sup>edn., Orient Publishing Company 2005)
5. Prof. N.V. Paranjape, *The Law Relating to Probation of Offenders in India* (D.K. Publishers, 1988).

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	3	1	2	2	3	3	3	2	3	3
CO 3	3	2	3	2	3	3	3	3	2	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3



<b>BAL/BBL/BCL/BSL056A</b>	<b>LAW OF CRIMES- II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand and describe the offences against human body and property.

CO2: be able to illustrate offences against property and women to redress the social issues.

CO3: be able identify Offences against Criminal Intimidation, Insult and Annoyance and Offences against State, Public peace, Tranquility and Religion

CO4: be acquainted with Offences relating to Public servants, False Evidence, Public Justice and Offences relating to Elections

**SYLLABUS:**

<b>Module-I</b>	Offences against Human Body a. Culpable Homicide b. Murder c. Causing death by negligence d. Abetment of suicide e. Attempt to commit the above three offences f. Causing miscarriage, exposure by children g. Hurt (Simple and grievous) h. Wrongful restraint and wrongful confinement i. Criminal force and assault j. Kidnapping, Abduction, Trafficking of person and Prostitution k. Unnatural Offences
<b>Module-II</b>	Offences against Property a. Theft b. Extortion c. Robbery d. Dacoity e. Criminal Misappropriation of Property f. Criminal Breach of Trust g. Receiving Stolen Property h. Cheating i. Fraudulent Deeds and Disposition of Property j. Mischief
<b>Module-III</b>	Offences against Property rights and documents a. Criminal Trespass b. House Trespass

	<ul style="list-style-type: none"> <li>c. Lurking House Trespass</li> <li>d. House breaking</li> <li>e. Forgery</li> <li>f. Making a false document</li> <li>g. Forged document</li> <li>h. Falsification of accounts</li> </ul>
<b>Module-IV</b>	<p>Offences against Women</p> <ul style="list-style-type: none"> <li>a. Dowry death</li> <li>b. Cruelty</li> <li>c. Outraging the modesty of a woman</li> <li>d. Sexual harassment</li> <li>e. Assault or use of criminal force to woman with intent to disrobe</li> <li>f. Voyeurism</li> <li>g. Stalking</li> <li>h. Rape</li> </ul>
<b>Module-V</b>	<p>Offences against Marriage</p> <ul style="list-style-type: none"> <li>a. False Marriages</li> <li>b. Bigamy</li> <li>c. Criminal elopement</li> </ul>
<b>Module-VI</b>	<p>Offences against Criminal Intimidation, Insult and Annoyance, Offences against State, Public peace, Tranquillity and Religion</p> <ul style="list-style-type: none"> <li>a. Criminal Intimidation</li> <li>b. Insult</li> <li>c. Misconduct in public by drunken person</li> <li>d. Waging war</li> <li>e. Sedition</li> <li>f. Suffering escape of or harbouring a State prisoner or prisoner of war</li> <li>g. Unlawful assembly</li> <li>h. Rioting</li> <li>i. Affray</li> <li>j. Injuring or defiling place of worship with intent to insult the religion of any class</li> <li>k. Deliberate and malicious acts, intended to outrage religious feelings of any class by insulting its religion or religious beliefs</li> </ul>
<b>Module-VII</b>	<p>Offences relating to Public servants, False Evidence and Public Justice, Offences relating to Elections</p> <ul style="list-style-type: none"> <li>a. Offences relating to Public Servants</li> <li>b. Contempt of the Lawful Authority of Public Servants</li> <li>c. False Evidence and Offences against Public Justice</li> </ul>

	d. Bribery, Undue influence at elections and Personation e. False statement in connection with an election f. Illegal payments in connection with an election g. Failure to keep election accounts
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#### REFERENCES:

1. K.D. Gaur, Textbook on The Indian Penal Code
2. Dr K I Vibhute, PSA Pillai's Criminal Law
3. Prof. S.N. Misra, Indian Penal Code
4. Dr. R. Prakash, O.P. Srivastava's Principles of Criminal Law
5. Ratanlal&Dhirajlal, The Indian Penal Code
6. K.D. Gaur, Criminal Law: Cases and Materials

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	3	3	2	3	3	3	3	2	3	3
CO 3	3	3	3	2	3	3	3	3	2	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3



<b>BAL/BBL/BCL/BSL082A</b>	<b>RESEARCH METHODOLOGY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand and develop various research skills, especially scientific research in legal field.

CO2: be able to develop designing skills of the research including formulation of research problem and research questions related to problem.

CO3: acquire skills for data collection, Data Analysis, Interpretation & Generalization.

CO4: be able to explore various theories of research and be able to conduct documentation and presentation of report & thesis.

**SYLLABUS:**

<b>Module-I</b>	<b>Scientific research: characteristics, types and methods</b> <ol style="list-style-type: none"> <li>Scientific Research and Scientific Methods in conduction research</li> <li>Aims and steps in scientific research</li> <li>Scientific and normative research</li> <li>Value and value free research</li> </ol> <b>Developing Research Skills</b> <ol style="list-style-type: none"> <li>Writing research proposal—Steps</li> <li>Review of Literature -- Guidelines for evaluating Review of Literature</li> <li>Writing Bibliography and citation of case laws</li> </ol>
<b>Module-II</b>	<b>Formulation of research problem and Developing Research Questions</b> <ol style="list-style-type: none"> <li> <ol style="list-style-type: none"> <li>Components in research and selection of research topic</li> <li>Sources of selecting research problem</li> <li>Precaution in selecting research problem</li> </ol> </li> <li> <ol style="list-style-type: none"> <li>formulation of research questions or hypothesis</li> <li>Nature and criteria of a hypothesis</li> <li>Sources and Types of hypothesis</li> <li>Importance of hypothesis in research</li> </ol> </li> </ol>
<b>Module-III</b>	<b>Designing of research</b>

	<p>(a) i. Meaning and functions of research design ii. Types of research design: descriptive, explanatory and exploratory</p> <p>(b) i. meaning and purposes of sampling ii. Criteria of good sample and key terms iii. Types of sampling - Probability and Non probability</p>
<b>Module-IV</b>	<p><b>Skills and Methods of Collecting Data</b></p> <p>(a) i. Meaning and definition of scientific data ii. Types and sources and data--primary and secondary data</p> <p>(b) i. Methods of data collection: Questionnaire, Interview, Observation and, Case study method</p>
<b>Module-V</b>	<p><b>Data Analysis and Interpretation and Generalization</b></p> <p>(a) i Use and Significance of Computers in Sociological Research ii. Measurement of central tendency-- Mean, Mode and Median</p> <p>(b) i. Data Interpretation and inferencing ii. Generalization</p>
<b>Module-VI</b>	<p>(a) Co relationship of theory and research---Merton, Karl Marx and Durkhiem</p> <p>(b) Formulation of new principle</p>
<b>Module-VII</b>	<p>(a) Documentation i. Bibliography ii. Citation of Case Laws</p> <p>(b) Presentation of report/thesis</p>

#### REFERENCES:

1. Andrews Richard: Research Questions, Continuum, UK, 2005.
2. Bell J.: Doing Your Research Project, Open University Press, Buckingham, 1999.
3. Bryman Alan: Social Research Methods, Oxford 2001
4. Babbie Earl: The Practice of Social Research, Wordsworth, 2001..

5. Levin, Jack: Elementary Statistics in Social Research, New York, Harper and Row Publishers.
6. Kothari, C.R.: Research Methodology-Methods and Techniques, New Delhi: WishwaPrakashan
7. Bailey, Kenneth D.: Methods in Social Research, New York: MacMillan Publishing Co..
8. Nachmias David & Nachmias Chava: Research Methods in the Social Sciences, New York, St. Martin's Press, 1981.
9. Sanders, Willam, B. & Pinhey Thomas K.: The Conduct of Social Research, New York, CBS College Publishing

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
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CO 2	3	2		1	2	1	3		1		1
CO 3	3		3	2		1	3	2		1	
CO 4	3	3	2	3	3	2	3	3	3	2	3

# SEMESTER V

<b>BAL/BBL/BCL/BSL036A</b>	<b>JURISPRUDENCE-I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be acquainted with the understanding of Jurisprudence and its meaning definitions, nature and scope.

CO2: be able to appreciate different schools of jurisprudence and analyze critical evaluation of legal theory and its implications in policy.

CO3: be able to demonstrate an advanced and integrated understanding of the political, social, historical, philosophical, and economic context of law

CO4: be able to explore the evolving trends and influencing factors on shaping and developing the jurisprudential aspects about the law and legal regime.

**SYLLABUS:**

<b>Module-I</b>	i. Meaning, Definition, Nature and Scope of Jurisprudence. ii. Legal Theory and Jurisprudence
<b>Module-II</b>	Natural School of Law (Greek, Medieval, Modern Classical era, Reaction against positivism)
<b>Module-III</b>	Analytical School of Jurisprudence. (Bentham, Austin, H L A Hart)
<b>Module-IV</b>	Kelson's Pure Theory of Law and its criticism
<b>Module-V</b>	Historical School of Jurisprudence (Savigny, Puchta, Henry Maine)
<b>Module-VI</b>	Sociological School of Jurisprudence (Roscoe Pound, Ihering, Duguit)
<b>Module-VII</b>	Realist School of Jurisprudence (Lewellyn, Karl, J N Frank, Oliveronna, Alf Ross)

**REFERENCES:**

- 1) Bodenheimer, Edgar Jurisprudence 'The Philosophy and Method of the Law', (Revised Edition) 1996 Universal Book Traders, New Delhi
- 2) Wayne Morrison - Jurisprudence from the Greek to Post - Modernism (1997).



- 3) Holland Sir R.W.M. - Thomas Erskine Holland the Elements of Jurisprudence 2001, Universal Law Publishing Co Pvt. Ltd.
- 4) Freeman M.D.A. Lloyd's, Introduction to Jurisprudence, Sweet and Maxwell Jurisprudence (7th Edition).
- 5) Dias Jurisprudence (Fifth Edition), Aditya Books, Butterworths.
- 6) P.J. Fitzgerald, Salmond on Jurisprudence (12th Edition) Universal Law Publishers
- 7) Friedman W. -Legal Theory. (Fifth Edition), Universal Law Publishing Co-Pvt. Ltd.
- 8) H.L.A. Hart, The Concept of Law, (2nd Edn.), Oxford University Press, (2007) 9) John Austin, Lectures on Jurisprudence, (5th Edn.), R. Campbell (ed.)

#### CASE LAWS :

1. Maneka Gandhi v. U.O.I., AIR 1978 SC 597
2. Keshawananda Bharti v. State of Kerala, AIR 1973 SC 1461
3. Hussainarra Khatoon v. State of Bihar, AIR 1979 SC 1360
4. OlegaTellis v. Bombay Municipal Corporation, AIR 1986 SC 180
5. Ram Jawaya Kapoor v. State of Punjab, AIR 1955 SC 549
6. Mohd. Ahmed Khan v. Shah Bano Begum, AIR 1985 SC 945
7. People's Union for Democratic Rights v. U.O.I., AIR 1982 SC 1473
8. Parmanand Katata v. U.O.I., AIR 1989 SC 2039
9. Bachan Singh v. State of Punjab, AIR 1980 SC 898
10. State of Madras v. ChampakamDorajan, AIR 1951 SC 228

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMNET OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	2	1	2	3	3	3	3	3	3	3
CO 3	3	3	3	3	2	2	3	3	3	2	3
CO 4	3	2	2	3	2	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL038A</b>	<b>FAMILY LAW -I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand meaning of certain concepts, sapinda relationship and degree of prohibited relationships

CO2: be able to analyze the theories of marriage, grounds of divorce and other matrimonial relief.

CO3: be able to understand muslim law of marriage and essentials definitions related to muslim marriages.

CO4: be able to demonstrate knowledge and understanding of a wide range of legal concepts, values, principles and rules of Marriage laws.

**SYLLABUS:**

<b>Module-I</b>	(a) Application of Hindu Law i. Who are Hindus ii. Followers of Jainism, Sikhism and Buddhism iii. Hindus by declaration, Birth iv. Converts and reconverts to Hinduism (b) i. when one or both parents are Hindus ii. Persons who are not Muslims, Christians, Parsis or Jews by Religion Schedule Tribe
<b>Module-II</b>	(a) Concept of Marriage i. Hindu Marriage a Sacrament or Contract ii. Marriage under Hindu Marriage Act, 1955 iii. Forms of Marriage (b) i. Capacity to Marry : Mental Capacity : Age ii. Ceremonies off Marriage iii. Guardianship in Marriage iv. Intercaste & Inter religious Marriages v. Marriages between Hindus and Non Hindus
<b>Module-III</b>	(a) i. Sapinda Relationship and Degree of Prohibited Relationship

	<ul style="list-style-type: none"> <li>ii. Bigamy : should bigamy be permitted in some limited cases</li> </ul> <p>(b)</p> <ul style="list-style-type: none"> <li>i. Matrimonial Remedies</li> <li>ii. nullity of Marriages</li> <li>iii. Option of Puberty</li> <li>iv. Restitution of Conjugal Rights</li> <li>v. Judicial Separation</li> </ul>
<b>Module-IV</b>	<p>Divorce: Desertion, Cruelty, Adultery &amp; other grounds for Matrimonial Relief</p> <ul style="list-style-type: none"> <li>a. Wife's Special grounds for Divorce</li> <li>b. Divorce by Mutual Consent</li> </ul> <p>Theories of Divorce : Guilt Theory, Consent Theory, Irretrievable Breakdown of Marriage Theory of Divorce</p>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>a. Bars to Matrimonial Relief</li> <li>b. Doctrine of Strict Proof <ul style="list-style-type: none"> <li>a. Taking Advantage of one's own wrong</li> <li>b. Accessory</li> <li>c. Connivance</li> <li>d. Condonation</li> <li>e. Collusion</li> <li>f. Delay</li> <li>g. Other legal Grounds, Reconciliation</li> </ul> </li> </ul>
<b>Module-VI</b>	<p>Muslim Marriage</p> <p>(a)</p> <ul style="list-style-type: none"> <li>i. Concept of Marriage</li> <li>ii. Capacity to Marry</li> <li>iii. Kinds of Marriage</li> </ul> <p>(b)</p> <ul style="list-style-type: none"> <li>i. Classification of Marriages</li> <li>ii. Shahih Marriage</li> <li>iii. Batil Marriage</li> <li>iv. Fasid Marriage</li> <li>v. Guardianship in Marriage</li> <li>vi. Essential Validity</li> </ul>



Module-VII	(a)	i.	Mahr
		ii.	Specified & Proper
		iii.	Dower as Debt : Its nature and enforcement
	(b)	i.	Divorce
		ii.	Express Talaq
		iii.	Implied & Contingent Talaq
		iv.	Delegated Talaq
		v.	Formalities of Talaq
		vi.	alaq at the Instance of Wife

#### REFERENCES:

1. Paras Diwan, Hindu Law (1985)
2. Paras Diwan, Muslim Law
3. Mulla, Muslim Law
4. Fyzee, Outlines of Muslim Law
5. Tahir Mahmood, Hindu Law
6. jaspal Singh, Law of Marriage and Divorce in India
7. N.D. Basu, Law of Succession

#### Case Laws:

1. Bhaurao v. State of Maharashtra, AIR 1965 SC 1564
2. Mahendra v. Sushila, AIR 1965 SC 364
3. Shamim Ara v. State of U.P., 2002(4) RCR Civil 340
4. Kailashwati v. Ayodhia Prakash, 1977 PLR 216
5. M.M. Malhotra v. UOI & others, AIR 2006 SC 80
6. Seema v. Ashwani Kumar, AIR 2006 SC 1159
7. Vinita Saxena v. Pankaj Pandit, AIR 2006 SC 1662
8. Naveen Kohli v. Neelu Kohli, AIR 2006 SC 1676
9. Mohd. Ahmed Khan v. Shah Bano Begum, AIR 1985 SC 945
10. DaielLatifi v. UOI, 2001 (7) SC 40

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	3	2	2	3	3		1	3
CO 2	3	3	2	2	3	3	3	3	3		3
CO 3	3	3	3	2	2	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL040A</b>	<b>COMPANY LAW I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore the important definitions and nature of company

CO2: be able to understand process of registration & incorporation and the basic documents of company.

CO3: be able to examine foundational principles such as doctrine of ultra-vires, indoor management, etc. and prospectus of company.

CO4: be able to demonstrate a sound and generally accurate knowledge and understanding of the law and its context in relation to most areas of law which have been studied.

**SYLLABUS:**

<b>Module-I</b>	Definition Evolution and Nature of company (i)Advantages of Incorporation. (ii)Disadvantages of Incorporation
<b>Module-II</b>	(a) Registration and Incorporation (i) Pre-incorporation Contracts. (ii) Kinds of Companies (b) Conversion of private company into public company and public company into private company.
<b>Module-III</b>	(a) Memorandum of Association (b) Name clause (c) Registered office clause (d) Object clause – necessity
<b>Module-IV</b>	(a)Doctrine of Ultravires (b)Consequences of Ultravires Transactions (c)Articles of Association and relationship between Article of Association and Memorandum of Association
<b>Module-V</b>	(a) Binding force of Articles of Association (b) Alternation of Article of Association.

	(c) Constructive notice of memorandum of Association and Articles of Association
<b>Module-VI</b>	(a) Doctrine of Indoor Management (b) Exception to Doctrine of Indoor Management
<b>Module-VII</b>	(a) Prospectus – Definition (b) Statement in lieu of Prospectus (c) Remedies for misrepresentation in prospectus

## REFERENCES:

### Judgments

1. Corporation of India v. Escorts Ltd. (1986) comp. cas. 548
2. New horizons ltd another v. Union of India (1995) comp.L.J. 100(SC)
3. LakshmanaswamiMudaliar v. HC, AIR 1963 SC 1185
4. Raymonds synthetics ltd. v. Union of India (1992) 73 comp. cas. 762 (SC)
5. ICICI ltd v. Srinivas agencies (1996) (2) SCALE 774 (SC)
6. Union of India v. Shalimar works ltd. (1987) comp.cas. 664
7. Bajaj Auto ltd. v. N.K. Firodia&ors, AIR 1971 SC 321
8. Unity company v. Diamond suger mills, AIR 1971
9. M/s. Madhusudan Goverdhan Das and Company v. Madhav Wollen Industries Ltd., AIR 1971 SC 2600
10. Shanti Prasad Jain v. Kalinga Tubes LTD, AIR 1965 SC 1535

### Suggested Readings

1. S.M. Shan : Lectures on Company Law, N.M. Tripathi, Mumbai
2. Avtar Singh : Company Law, Eastern Book Co., Lucknow
3. Taxmans : Company Law and Practice.
4. A.Ramaiya : Guide to Companies at, Wedhwa
5. S.M. Shaw : Lectures on Company Law, Tripathi, Mumbai
6. Topham and Lvamy: Company Law, Butterworth
7. L.C.B. Gower : Principles of Modern Company Law, Sweet and Maxwell, London
8. Palmer : Plmers Company Law, Stevans London

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	3	3	2	3	3	3	3	3	2	3
CO 3	3	2	2	3	2	3	3	3	2	2	3
CO 4	3	3	3	2	2	3	3	3	3	2	3

<b>BAL/BBL/BCL/BSL041A</b>	<b>FORENSIC SCIENCE AND CRIMINAL INVESTIGATION</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to analyze role of forensic science in civil and criminal cases for collection of evidences such as discovery of traces of physical evidences.

CO2: be able explore the concepts of establishment of identity of individual, physical object by shape & and by physical and chemical analysis

CO3: be able to examine questioned documents and identification of handwritings.

CO4: have understanding of injuries to persons and various methods of forensic science.

**SYLLABUS:**

<b>Module-I</b>	<b>The Role of Forensic Sciences in Criminal and Civil Cases:</b> a. The basic question in investigation – Qui Bono; the scene of crime; discovery of traces of physical evidence; classification and reference to classified record. b. Systematization and classification of physical evidence and comparison with suspected; material; the principles of exchange; the principles of heredity , Taxonomy, etc
<b>Module-II</b>	(a) <b>The Establishment of Identity of Individuals :</b> Branding, tattooing, Mutilating, Scars, and Moles Bartill on system : photography; fingerprints; ridge characteristics; proscopy. (b) <b>The Establishment of Partial Identity of Individuals :</b> Footprints: hair, skin; blood grouping; physical peculiarities
<b>Module-III</b>	(a) <b>The Establishment of the Identity of Physical Objects by Shape and Size:</b> Identifying marks and impressions made by physical objects; shoe prints; type and tread marks; die and tool marks; upure or fracture marks. (b) <b>The Establishment of the Identity of Physical Objects by Physical and Chemical Analysis:</b> Paints; coloured objects; metals; alloys; Chain and the earthen wares;



	cements; plaster; bricks; dusts; soil; minerals; plastics.
<b>Module-IV</b>	<b>Questioned Documents and the Identification of Handwriting:</b> (a) Paper, its types and identification; inks; pencils and writing tools; handwriting habit and flow; disguised writing; comparison and points of identity; sample; (b) Various type of forgery and their detection; additions; erasures alterations; seals; rubberstamps; type-writing; printing; blocks.
<b>Module-V</b>	<b>The Identification of Fire-Arms and Cartridges and Related Problems:</b> (a) Types of fire-arms and their use; time and range of firing; (b) Identification of a fire-arm with a cartridge case and bullet;
<b>Module-VI</b>	<b>Injuries to Persons:</b> (a) Evidentiary value of details of injuries; traces left by the weapon used; its range and direction; danger to clothing worn by the victim and related problems. (b) The flow of blood from injuries; the shape and directions of blood drops and their evidentiary value, the discovery of blood and semen stains on various objects; accidental deaths and suicides.
<b>Module-VII</b>	(a) <b>Miscellaneous Forensic Science Methods:</b> Restoration of numbers; examination of the walking picture of footprints; clothing; cooper wire; prices of wood etc. (b) <b>Evidentiary value of Physical Evidence as Evaluated a Forensic Sciences Laboratory viz. Evidence:</b> Findings of scientific methods of investigation; DNA, Narco analysis Brain mapping and lie Detector Tests

#### REFERENCES:

1. Gour, A.N, : Fire Arms, Forensic BCLlistics, Forensic Chemistry and Criminal Jurisprudence.
2. Lucas A, : Forensic Chemistry and Scientific Criminal Investigation.
3. Lund quist, F, : Methods of Forensic Science (Vol. 1)

4. Moreland, N : Science in Crime detection illustrated.
5. Kaul; Narco Analysis, Brain Mapping and Lie Detector Tests.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	2	3	2	3	3	3	3	3	2	3
CO 3	3	2	2	3	2	3	3	3	2	3	3
CO 4	3	3	2	2	3	3	3	3	2	2	3



<b>BAL/BBL/BCL/BSL048A</b>	<b>LAW OF EVIDENCE</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore the concept and general nature of evidence, and illustrate the different types of evidence and court procedures relating to evidence.

CO2: be able to understand the rules relating to relevancy of evidences and admissibility of evidence before the court with reference to opinion of third persons and judicial notice.

CO3: be able to Determine and analyze the standard of proof and burden of proof in civil and criminal cases, and specify types of presumptions.

CO4: be able to analyze the examination of witness and privileges.

**SYLLABUS:**

<b>Module-I</b>	Fact In- Issue; Relevant Facts; Document, Evidence: Proved; Disproved; Not proved.
<b>Module-II</b>	May Presume, Shall Presume, and Conclusive Proof, Circumstantial Evidence
<b>Module-III</b>	Relevancy and Admissibility; Res Gestae, Admission; Confession, Dying Declaration, Relevancy of Judgments
<b>Module-IV</b>	Opinion of Experts; Opinion of Third Persons, Conduct and Character of Parties, Judicial Notice, Estoppel, Means of Proof: Oral Evidence; Documents - Public Document, Private Document
<b>Module-V</b>	Primary and Secondary Evidence, Exclusion of Oral by Documentary Evidence
<b>Module-VI</b>	Burden of Proof, Witnesses: Competency and Compel ability of Witnesses.
<b>Module-VII</b>	Examination of Witnesses; Privileges: State Privilege and Private Privilege.

**REFERENCES:**

1. Ratan Lal & Dhiraj Lal, Law of Evidence, 25<sup>th</sup> Edition, Lexis Nexis, 2016.
2. Myneni, S.R., Law of Evidence, 2<sup>nd</sup> Edition, Asia Book House, 2015.
3. Monir, Law of Evidence, 10<sup>th</sup> Edition, Universal Law House, 2016.
4. Thakkar, Justice C K, Law of Evidence, 2<sup>nd</sup> Edition, 2 Vols., Whytes & Co., 2016.
5. Batuklal: Law of Evidence, 21<sup>st</sup> Edition, Central Law Agency, 2015.

6. Singh, Avtar, Law of Evidence, Eastern Book Co., 2015.

7. Bare Act

Bare Act

1. The Indian Evidence Act, 1872

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	3	2	3	3	2	3	3	3	2	3
CO 3	3	3	2	3	3	2	3	3	3	2	3
CO 4	3	2	3	2	3	3	3	3	2	2	3

<b>BAL/BBL/BCL/BSL051A</b>	<b>CODE OF CIVIL PROCEDURE-I (CPC-I)</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore nature, scope and important definitions provided in Code of Civil Procedure.

CO2: be able to identify the jurisdiction of civil and revenue courts and be able to understand the essentials forms and procedure for institution of suits.

CO3: be able to explore definition, essentials and pronouncement of judgment and decree.

CO4: have good grounding in the subject including contents and alteration of decree.

**SYLLABUS:**

<b>Module-I</b>	Introduction of the Code: Nature, Scope and Definitions.
<b>Module-II</b>	Jurisdiction of the Civil Courts, Revenue Courts, Courts to try all civil suits unless barred.
<b>Module-III</b>	Stay of suit and Res judicata. Bar to further suit and Foreign Judgment, Court in which suits to be instituted, Transfer of suits
<b>Module-IV</b>	Parties to a suit. Frame of Suit. Institution of suits; Pleading: Meaning, Object, General Rules, and Amendment of Pleading, Plaint. Issue and Service of Summons
<b>Module-V</b>	Written Statement. Appearance and Non-Appearance of Parties. Examination of Parties by the Court, Discovery and Inspection. Admissions. Production, Impounding and return of Documents. First Hearing. Summoning and Attendance of Witnesses, Affidavits.
<b>Module-VI</b>	Judgment and Decree-Judgment: Definition, Essentials, Pronouncement.
<b>Module-VII</b>	Contents and Alteration Decree: Definition, Essentials, Types, Drawing up of a Decree, Contents and Decree in particular cases Interest, Costs

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CO 1	3	3	2	2	3	3	3	3	1	2	3
CO 2	3	3	1	3	3	3	3	3	2	2	3
CO 3	3	2	3	3	2	3	3	3	2	2	3
CO 4	3	2	3	3	2	2	3	3	3	2	3

# SEMESTER VI

<b>BAL/BBL/BCL/BSL030A</b>	<b>INTERPRETATION OF STATUTES &amp; PRINCIPLES OF LEGISLATION</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: have knowledge of fundamental principles of interpretation of statutes

CO2: be able to understand the technique adopted by courts in construing statutes.

CO3: be able to analyze the internal and external aids of construction and judicial interpretation and construction of words used in statutes.

CO4: be able to acquire knowledge of principle of legislation and its objectives.

**SYLLABUS:**

<b>Module-I</b>	<ul style="list-style-type: none"> <li>a. Different Parts of Statutes</li> <li>b. Classification of Statutes</li> <li>c. Interpretation and Construction</li> <li>d. Literal Interpretation</li> <li>e. Mischief Rule of Interpretation</li> <li>f. The Golden Rule of Interpretation</li> <li>g. Harmonious Construction</li> </ul>
<b>Module-II</b>	<ul style="list-style-type: none"> <li>b. The Statute should be read as a hole</li> <li>c. Construction ut res magis valeat quam pereat</li> <li>d. Identical expressions to have same meaning</li> <li>e. Construction noscitur a sociis</li> <li>f. Construction ejusdem generis</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>a. Construction expressio unius est exclusio alterius</li> <li>b. Construction contemporanea expositio est fortissima in lege</li> <li>c. Beneficial construction</li> <li>d. Strict construction of penal statutes</li> <li>e. Strict constructions of taxing (fiscal) statutes</li> </ul>
<b>Module-IV</b>	<ul style="list-style-type: none"> <li>a. Interpretation of statutes in parimateria</li> <li>b. Interpretation of amending statutes</li> <li>c. Interpretation of consolidating statutes</li> </ul>



	<ul style="list-style-type: none"> <li>d. Interpretation of codifying statutes</li> <li>e. Mandatory and directory enactments</li> <li>f. Conjunctive and disjunctive enactments</li> </ul>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>a. Internal aids to interpretation</li> <li>b. External aids to interpretation</li> <li>c. Presumptions regarding jurisdiction</li> <li>d. Commencement of legislation</li> <li>e. Repeal of legislation</li> <li>f. Revival of legislation</li> <li>g. Retrospective operation statutes</li> </ul>
<b>Module-VI</b>	<p><b>Interpretation of the Constitution</b></p> <ul style="list-style-type: none"> <li>a. Principle of implied powers</li> <li>b. Principle of incidental and ancillary powers</li> <li>c. Principle of implied prohibition</li> <li>d. Principle of occupied field</li> <li>e. Principle of pith and substance</li> <li>f. Principle of colourable legislation</li> <li>g. Principle of territorial nexus</li> <li>h. Principle of severability</li> <li>i. Principle of prospective over ruling</li> <li>j. Principle of eclipse</li> </ul>
<b>Module-VII</b>	<p><b>Principles of legislation</b></p> <ul style="list-style-type: none"> <li>a. Principle of utility (Chapter-I)</li> <li>b. The Ascetic Principle (Chapter-II)</li> <li>c. The Arbitrary Principle (or the principle of sympathy and antipathy) (Chapter-III)</li> <li>d. Different kinds of Pleasures and Pains (Chapter-VI)</li> </ul> <p><b>Principles of the Civil Code – Objects of the Civil Law</b></p> <ul style="list-style-type: none"> <li>a. Rights and obligations (chapter-I)</li> <li>b. Ends of Civil Law (Chapter-II)</li> </ul>

	<b>Principles of the Penal Code</b> a. Classification of offences : subdivision of offences and some other divisions (Chapter-II &II) b. Punishments which ought not to be inflicted (Chapter-I) c. Proportion between offences and punishments (Chapter-II) d. The kinds of punishments (Chapter-VII)
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MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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CO 2	3	3	3	3	3	3	3	3	3	2	3
CO 3	3	3	3	2	2	3	3	3	3	2	3
CO 4	3	3	2	2	3	3	3	3	2	3	3



<b>BAL/BBL/BCL/BSL042A</b>	<b>JURISPRUDENCE-II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand different sources of laws such as customs, precedent, etc.

CO2: be able to think critically about the correlation of legal rights & duties and concepts of ownership & possession.

CO3: acquire knowledge of jurisprudential explanation of legal personality and liability.

CO4: be able to explain the significance of administration of justice.

**SYLLABUS:**

<b>Module-I</b>	a) Sources of Law, Custom as a source of Law b) Precedent as a source of Law
<b>Module-II</b>	a. Legislation as a source of Law b. Other sources of Law
<b>Module-III</b>	a) Legal Rights and Duties
<b>Module-IV</b>	a) Ownership b) Possession
<b>Module-V</b>	a. Legal Personality b. Property
<b>Module-VI</b>	a. Liability b. Title
<b>Module-VII</b>	a. Obligation b. The Administration of Justice – Theories and forms of Punishment

**REFERENCES:**

1. Dias, Jurisprudence, Aditya Books (ND)
2. Dhyani, S.N., Fundamentals of Jurisprudence
3. Mahajan, V.D., Jurisprudence and Legal Theory
4. Paranjape, Dr. N.V., Studies in Jurisprudence and Legal Theory

**Case Laws:**

1. Hussainara Khatoon v. State of Bihar [AIR 1979 SC 360]

2. Keshavanand Bharti v. State of Kerala [AIR 1973 SC 1461]
3. Maneka Gandhi v. Union of India [AIR 1978 SC 597]

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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CO 2	3	3	1	3	3	3	3	3	1	2	3
CO 3	3	2	3	2	2	3	3	3	3	2	3
CO 4	3	3	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL044A</b>	<b>FAMILY LAW –II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand principle of child welfare and legal norms relating to legitimacy and adoption of child.

CO2: acquire a broad view of the laws relating to testamentary and intestate succession in India.

CO3: be able to develop problem oriented thinking and analytical approach about joint family and coparceners in different schools

CO4: be able to critically evaluate the implementation of law relating to maintenance of wives, husbands, parents and children.

**SYLLABUS:**

<b>Module-I</b>	Child and the Family (a) i. Legitimacy ii. Adoption (b) i. Custody, Maintenance and Education ii. Guardianship and Parental rights. Welfare of the child principle
<b>Module-II</b>	Inheritance a. Succession to Property of a Hindu male dying intestate under the provisions of HAS 1956 b. Succession to property of Hindu Female dying intestate Disqualification relating to succession c. General rules of Succession & exclusion from Succession d. Heirs and their shares and distribution of Property
<b>Module-III</b>	Joint Family & Coparcenary a. Mitakshara Joint family b. Mitakshara Coparcenary – formation & incidents c. Property under Mitakshara law-Separate Property and Coparcenary property d. Dayabhava Coparcenary –Formation & incidents

	e. Property under Daybhaga law
<b>Module-IV</b>	a. Partition and reunion b. Property Jointly Acquired by Coparceners c. Income of hereditary Profession d. Property thrown into Common stock and blended property e. Karta of Joint Family-his position, powers, privilege and obligations
<b>Module-V</b>	a. Alienation of Property b. Separate Property c. Coparcenary Property d. Debts-Doctrines of Pious Obligations e. Antecedent debt
<b>Module-VI</b>	a. Alimony & Maintenance b. Maintenance as a Personal obligation c. Neglected Wives, Divorced Wives d. Quantum of Maintenance e. Arrears of Maintenance f. Maintenance as a charge on property g. Alternation of the amount of Maintenance h. Alimony & Maintenance as an Ancillary relief
<b>Module-VII</b>	a. Maintenance of neglected wives, divorced wives, minor children, disabled children and parents who are unable to support themselves under the code of Criminal Procedure 1973 b. Special Marriage Act: Who and how a person can marry under the Act. c. Right to Property to people who marry under special Marriage Act

#### REFERENCES:

1. Paras Diwan, Hindu Law (1985)
2. Paras Diwan, Muslim Law
3. Mulla, Muslim Law
4. Fyzee, Outlines of Muslim Law
5. Tahir Mahood, Hindu Law

6. Jaspal Singh, Law of Marriage and Divorce in India

7. N.D. Basu, Law of Succession

#### Case Laws

1. K.V. Narayana v. K.V. Ranganathan, AIR 1976 SC 1715

2. Commissioner of Wealth Tax v. Chandersen, AIR 1986 SC 1754

3. Raghavamma v. Chanchamma, AIR 1964 SC 136

4. BCLmukund v. Kamlawati, AIR 2006 SC 3282

5. Anar Devi & others v. Parmeshwari Devi & others, AIR 2006 SC 3332

6. M/s Bay Berry Apartments Pvt. Ltd. &Anr v. Shobha &ors, AIR 2007 SC 226

7. Gurupad v. Hirabai, AIR 1978 SC 1239

8. Ritu Dutta &Anr v. Subhendu Dutta, AIR 2006 SC 189

9. Sharad Subramanyam v. Saumi Mazumdar &Ors, AIR 2006 SC 1993

10. BhogadiKannababu&Ors v. VugginaPydamma, AIR 2006 SC 2403

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	2	2	3	3	3	3	3
CO 2	3	2	2	3	3	3	3	3	3	2	3
CO 3	3	3	3	2	2	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3



<b>BAL/BBL/BCL/BSL046A</b>	<b>COMPANY LAW II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: acquire knowledge of basic concepts of company law.

CO2: be able to understand procedure for appointment of directors and their powers and functions.

CO3: be acquainted with legal norms relating to mandate of meetings of a company and rights of minorities shareholders.

CO4: be able to interpret liquidation process of company and leading judgment related to winding up of companies.

**SYLLABUS:**

<b>Module-I</b>	Shares: a. Allotment of Shares b. Transfer of shares c. Call, forfeiture, surrender of shares
<b>Module-II</b>	a. Debentures b. Kinds of debentures
<b>Module-III</b>	Directors: a. Position b. Appointment c. Removal
<b>Module-IV</b>	a. Powers of Directors b. Duties of Directors
<b>Module-V</b>	Meetings: a. Statutory meeting b. Annual General meeting c. Extraordinary General meeting d. Procedure and requisite of a valid meeting Majority powers and Minority Rights:

	a. Fule in Foss v. Harbotile b. Exceptions
<b>Module-VI</b>	a. Prevention of oppression b. Prevention of Micromanagement
<b>Module-VII</b>	Winding up of companies a. By Court b. Voluntary Winding up - Members' voluntary winding of - Creditors voluntary winding of

## REFERENCES:

### Judgments

1. Corporation of India v. Escorts Ltd. (1986) comp. cas. 548
2. New horizons ltd another v. Union of India (1995) comp.L.J. 100(SC)
3. LakshmanaswamiMudaliar v. HC, AIR 1963 SC 1185
4. Raymonds synthetics ltd. v. Union of India (1992) 73 comp. cas. 762 (SC)
5. ICICI ltd v. Srinivas agencies (1996) (2) SCALE 774 (SC)
6. Union of India v. Shalimar works ltd. (1987) comp.cas. 664
7. Bajaj Auto ltd. v. N.K. Firodia&ors, AIR 1971 SC 321
8. Unity company v. Diamond suger mills, AIR 1971
9. M/s. Madhusudan Goverdhan Das and Company v. Madhav Wollen Industries Ltd., AIR 1971 SC 2600
10. Shanti Prasad Jain v. Kalinga Tubes LTD, AIR 1965 SC 1535

### Suggested Readings

1. S.M. Shan : Lectures on Company Law, N.M. Tripathi, Mumbai
2. Avtar Singh : Company Law, Eastern Book Co., Lucknow
3. Taxmans : Company Law and Practice.
4. A.Ramaiya : Guide to Companies at, Wedhwa
5. S.M. Shaw : Lectures on Company Law, Tripathi, Mumbai
6. Topham and Lvamy: Company Law, Butterworth
7. L.C.B. Gower : Principles of Modern Company Law, Sweet and Maxwell, London

8. Palmer : Plmers Company Law, Stevans London

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMNET OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	2	3	3	3		1	3
CO 2	3	3	2	3	3	2	3	3	1	2	3
CO 3	3	3	1	1	2	3	3	3	3	3	3
CO 4	3	2	2	2	3	3	3	3	2	3	3



<b>BAL/BBL/BCL/BSL047A</b>	<b>HEALTH LAW (MEDICAL JURISPRUDENCE)</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand fundamental legislative principles for implementation of Health Law.

CO2: be able to understand medico-legal aspects of post mortem examination and its aims & objectives.

CO3: be aware of relevant legal and court proceedings essential for collection of medical evidences.

CO4: be able to understand laws in relation to medico-legal work such as reasons of deaths, Exhumation, etc medical practice and be acquainted with related judgments passed by constitutional courts.

**SYLLABUS:**

<b>Module-I</b>	1. Definition and scope of Medical Jurisprudence, medical ethics. 2. Examination of body fluid- blood, semen, saliva, sweats etc.
<b>Module-II</b>	1. Parts of human body, 2. Human injuries – (i) mechanical- blunt, sharp-edged, pointed sharp edged, firearm, (ii) thermal- heat, (iii) Regional Injuries (iv) physical- electric, lightening, radiation (v) legal- simple, grievous,
<b>Module-III</b>	1. Death and its modes, Medico-legal aspects, 2. Post mortem examination – aims and objectives
<b>Module-IV</b>	Post mortem changes- 1. Earliest changes, Post mortem staining, rigor mortis, 2. Cadaveric spasm, putrefaction, mummification, adipocere formation,
<b>Module-V</b>	Death due to asphyxia- 1. Hanging, strangulation, 2. Suffocation, drowning,
<b>Module-VI</b>	Toxicology- classification of poisons,

	1. Corrosives- strong acids and alkalies, 2. Irritant – Inorganic, Organic, Mechanical, 3. Systemic-cerebral, spinal cord, cardio-vascular system, 4. Miscellaneous,
<b>Module-VII</b>	1. Decomposed bodies and other legal aspects, 2. Exhumation and governing rules,

#### REFERENCES:

1. Modi's Medical Jurisprudence and toxicology
2. Dr. B. V. Subrahmanayam's Medical Jurisprudence and toxicology
3. Dr. R.M. Jhala and V.B. Raju's Medical Jurisprudence
4. Principles of Forensic medicine including toxicology by Dr. Apurba Nandy
5. Parikh's textbook of medical jurisprudence , forensic medicine and toxicology
6. Forensic science in criminal investigation and trials by Dr. B.R. Sharma

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	2	3	3	2	3	3
CO 2	3	2	2	3	3	3	3	3	3	2	3
CO 3	3	2	3	2	2	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL057A</b>	<b>CODE OF CIVIL PROCEDURE-II (CPC-II)&amp; LIMITATION ACT</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand the provisions relating to execution of decree and order passed by the courts.

CO2: be able to understand the procedure of attachment, sale, delivery and distribution of property in execution of a decree.

CO3: be able to explain the reference, review, revisions, interim order and other remedies available for civil rights.

CO4: be able to incorporate the substantive civil law doctrines into practical aspects in mock trials and practice sessions.

**SYLLABUS:**

<b>Module-I</b>	Execution General s 37-45,O XXI,
<b>Module-II</b>	Modes of Execution s1 ,s54 ,s145,O XXI,
<b>Module-III</b>	Question Determination s47, Arrest & Detention s51-59,O XXI,
<b>Module-IV</b>	Attachment s60-64,O XXI, Adjudication of Claims O XXI, Sale & Delivery of Property s65-74 O XXI, Distribution of Assets s73
<b>Module-V</b>	First Appeal s96-99, s107,O XLI, Second & Other Appeals s100-112,O XLII-XLV,
<b>Module-VI</b>	Reference, Review, Revision, Interim Orders OXXIV-XVI, O XXXVII-XXXIX, s75-78, Withdrawals & Compromise O XXIII, Incidental Proceedings O XXII, s75-78, Special Suits s79-93,O XXVII-XXXVII, Restitution s144, Caveat s148 A, Inherent Powers s148-153 A,
<b>Module-VII</b>	The Limitation Act 1963.

**REFERENCES:**

1. Ray,Sukumar,TextbookontheCodeofCivilProcedure,3rdedn.,UniversalPublication,2015
2. Jain,MP.,TheCodeofCivilProcedure,4thedn.,LexisNexis,2016
3. Mulla,TheCodeofCivilProcedurein3vols.,18thedn.,LexisNexis,2016
4. Mulla,TheKeytoIndianPractice(ASummaryoftheCodeofCivilProcedure)11thedn.,Lexi

sNexis, 2016

5. C.K.Takwani, Code of Civil Procedure and Limitation Act, Universal Publication, 2016

**Bare Act**

The Code of Civil Procedure, 1908

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2	3	3	2	3	3	2	1	3
CO 2	3	3	1	1	2	3	3	3	1	2	3
CO 3	3	2	3	2	1	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

# SEMESTER VII



<b>BAL/BBL/BCL/BSL039A</b>	<b>LABOUR LAW - I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore meaning, object scope and historical Development of Industrial Disputes and reasons for labour legislation in India.

CO2: be able to understand various modes of settlement of industrial disputes through arbitration.

CO3: be able to acknowledge the social and economic rights of workers, forced labour, child labour, bonded labour, slavery, trade union, social security, right to health, standard of living, protection of families etc. under the purview of different labour welfare legislation such as Trade Union, Minimum Wages, Payment of Bonus and Maternity Benefits Acts.

CO4: acquire skills to demonstrate an intellectual for solving industrial disputes.

**SYLLABUS:**

<b>Module-I</b>	The Industrial Disputes Act, 1947 a. Historical Development of Industrial Disputes, Legislation in India. b. Object, scope and reasons c. Definition of important terms.
<b>Module-II</b>	a. Various modes of Settlement of disputes under I.D. Act, 1947 b. Voluntary Arbitration and compulsory Adjudication
<b>Module-III</b>	a. Strike and Lock-out b. Lay off and Retrenchment
<b>Module-IV</b>	The Trade Union Act, 1926 (a) (i) Definitions (ii) Registration of Trade Unions (b) (i) Rights and Liabilities of Registered Trade Unions. (ii) Recognition of Trade Unions
<b>Module-V</b>	The Minimum Wages Act, 1948 (a) (i) Concept of Wage. (ii) Minimum, Fair and Living Wages

	(b) Fixation and revision of minimum wages
<b>Module-VI</b>	Maternity Benefits Act, 1961 a. Nature of benefits, eligibility, other privileges available b. Portraiture, Role of Inspectors
<b>Module-VII</b>	The Payment of Bonus Act, 1965 (a) Concept and basis for the Calculation of Bonus (b) Eligibility and disqualification for Bonus

#### REFERENCES:

1. Vaid K.N. : Labour Welfare in India
2. Kothari G.L. : Wages Dearness Allowances and Bonus
3. Chopra D.S. : Payment of Bonus Act, 1965
4. Misra S.N. Labour and Industrial Laws
5. Srivastava K.D. : Commentary on Industrial Disputes Act, 1947
6. Srivastava K.D. : Commentary on Minimum Wages Act, 1948
7. Srivastava K.D. : Commentary on Trade Union Act, 1926
8. Seth D.D. : Commentary on Industrial Disputes Act, 1948
9. O.P. Malhotra : The Law of Industrial Disputes
10. O.P. Malhotra : Law of Industrial Disputes
11. Bagri – Industrial Disputes Act.
12. Pair :labour Law in India.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	1	3	2	3	3	1	1	3
CO 2	3	2	3	2	1	2	3	3		3	3
CO 3	3	3	3	3	2	3	3	3	2	1	3
CO 4	3	2	3	2	3	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL052A</b>	<b>INTELLECTUAL PROPERTY RIGHTS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore theories, Origin and Genesis of intellectual property right and the relevance of IPR globally.

CO2: be able to demonstrate knowledge and understanding of a wide range of legal concepts, values, principles of various IPR legislations such as Copyrights, Trademarks, etc.

CO3: be able to learn to address the contemporary trends of intellectual property and arguing from competing perspectives and identify the possibility of new concepts within existing knowledge frameworks and approaches.

CO4: be able to identify new insights of geographical indication and design as an IPR.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction</b> Origin and Genesis of IPR, Theories of IPR – Locke’s, Hegel and Marxian Ethical, moral and human rights perspectives of IPR
<b>Module-II</b>	<b>Intellectual Property Rights: International Relevance</b> a. Internationalization of IP protection – Paris Convention, Berne Convention, TRIPS b. Agreement – basic principles and minimum standards – limits of one-size-fit for all c. flexibilities under TRIPS.
<b>Module-III</b>	Copyright Act, 1952 Copyright protection with reference to performers rights and Artist rights
<b>Module-IV</b>	Trade Marks Act: Legal recognition, Comparative analysis in India, EU and USA Trade secrets : Legal recognition, Comparative analysis in India, EU and USA.
<b>Module-V</b>	Patent Act,



	Global governance towards Patents Patent Filing and procedure
<b>Module-VI</b>	<b>Intellectual Property: Contemporary Trends</b> Benefit sharing and contractual agreements– International Treaty on Plant Genetic Resources for Food and Agriculture, issues on patent policy and farmers’ rights-CBD, Nagoya Protocol and Indian law
<b>Module-VII</b>	Geographical Indicators, Design as an IPR, UNESCO – protection of folklore/cultural expressions, Developments in WIPO on traditional knowledge and traditional cultural expressions

#### REFERENCES:

1. Cornish, W. & Llewelyn – Intellectual Property: Patent, Copyrights, Trade Marks & Allied Rights”, 8th Edition, London Sweet & Maxwell, 2013.
2. Singh R., Law relating to intellectual property (A complete comprehensive material on intellectual property covering acts, rules, conventions, treaties, agreements, case-Law and much more), Vol. 1. New Delhi: Universal Law Publishing Co. Pvt. Ltd; 2004.
3. Sama, Rama, Commentary on Intellectual Property Laws, Volume 2, Lexis Nexis, 2009.
4. Carlos m Correa-  
Oxford commentaries on GATT/WTO Agreement trade related aspects of Intellectual Property Rights, Oxford University Press, 2007

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	2	2	3	3	2	1	3
CO 2	3	3	2	1	3	3	3	3	1	2	3
CO 3	3	2	3	2	2	3	3	3	3	2	3
CO 4	3	3	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL063A</b>	<b>TAXATION LAW-I (INCOME TAX ACT, 1961)</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: have fundamental understanding of basic concept of income, importance of income tax and annual finance act, exempted income, person and policy and philosophy of taxation.

CO2: be able to examine computation of total income from different sources and aggregation and clubbing of income.

CO3: be able to analyze exemption and deduction in total income under different types of taxation norms and procedure for assessment.

CO4: acquire skills to explore the various functional theories, doctrine and principles working in the backdrop of taxation structure in India.

**SYLLABUS:**

<b>Module-I</b>	Concepts and Definition:- a. Certain Important Definition b. Basis of Charge c. Residence of Assessee
<b>Module-II</b>	Computation of Total Income (Part-A) a. Salaries b. Income from House Property c. Income from other Source
<b>Module-III</b>	Computation of Total Income (Part – B) a. Profits & gains from Business or Profession b. Capital Gain
<b>Module-IV</b>	Clubbing & Aggregation of Income
<b>Module-V</b>	Set off or Carry forward and set off
<b>Module-VI</b>	Exemption / Deductions: a. Exempted Income b. Deduction from total income c. Deduction in respect of payments d. Deduction in respect of certain income

<b>Module-VII</b>	Procedure for assessment: a. Filing of return b. Assessment and Re-assessment c. Rectification of mistake d. Appeals and Revision
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## REFERENCES:

### Case Law

1. Travanco Tea estate co. Ltd. v. Commissioner of income tax ITR 154 (1985)
2. Sutlej Cotton Mills Ltd appellant Commissioner of income tax (vc) to ITR 1991
3. Hindustan Steel Ltd. v. State of Orisa 25 S T C 211 (SC)
4. Income tax appeal 585 of 2005 (O.M.) Ashok Kumar Gupta v. Commissioner of income tax
5. Income tax act (2006) 31 Rep 166 ITAT Amritsar Chitty Co. operative society Pathankot income tax officers ward I Pathankot
6. ITA/185/2006 DATED 18.8.2006 Commissioner of Income Tax v. Glocom Incomplete Ltd.

### Books

1. Gupta, RR- Income Tax and Practice
2. Kanga & Palkiwala – The Law and Practice of Income Tax
3. Income Tax Act – A.K. Saxena (English & Hindi)

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	1	2	2	3	3	1	3	3
CO 2	3	2	2	3	1	3	3	3	3	2	3
CO 3	3	3	3	2	3	3	3	3	3	2	3
CO 4	3	3	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL058A</b>	<b>PATENT RIGHT CREATION, DRAFTING AND SPECIFIC REGISTRATION</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to explore the evolution and growth of Patent rights in India, the The International Patent System and Foreign Impact upon National System.

CO2: be able to understand the aim, objective and principles of patent act 1970 and procedure for grant of patent.

CO3: be able to analyze the Monopolistic approaches to Patents under Indian Legal system and liability of patents.

CO4: be able to anticipate analytical arguments relating to the development and reform of patent law and their likely impact on creativity and innovation.

**SYLLABUS:**

<b>Module-I</b>	EVOLUTION AND GROWTH a) History of Patent b) The International Patent System c) Foreign Impact upon National System
<b>Module-II</b>	THE PATENT ACT 1970 a. Introduction, Aim Objective b. Features And Principle c. Invention and Invention not patentable
<b>Module-III</b>	a. Rights of patents b. Terms of Patent c. Patent of Addition d. Surrender and Revocation e. Compulsory Licenses f. Infringement
<b>Module-IV</b>	PATENTABILITY AND PROCEDURES FOR GRANT OF PATENTS a. Pre-requisites – Novelty, Inventive Step, Industrial Application b. Prior Art, Anticipation, & Person Skilled in the Art c. Procedures for Filling Application



	<ul style="list-style-type: none"> <li>d. Specifications – Provisional and Complete Specifications</li> <li>e. Priority dates</li> <li>f. Pre-Grant and Post Grant Opposition</li> <li>g. Grant and sealing of Patents <ul style="list-style-type: none"> <li>a) Rights of Patentee</li> <li>b) Power of Controller</li> </ul> </li> </ul>
<b>Module-V</b>	<b>LIMITATIONS, EXCEPTIONS &amp; INFRINGEMENTS</b> <ul style="list-style-type: none"> <li>a. Licensing: Voluntary &amp; Non –Voluntary</li> <li>b. Assignment</li> <li>c. Fair Use</li> <li>d. Use and acquisition of inventions by Central Government</li> <li>e. Parallel Imports</li> <li>f. Claim Interpretations and Constructions</li> <li>g. Infringements &amp; Remedies</li> </ul>
<b>Module-VI</b>	<b>PATENT AUTHORITIES, PATENT AGENTS &amp; EMERGING ISSUES</b> <ul style="list-style-type: none"> <li>a. Controller General of Patents</li> <li>b. Patent Examiners</li> <li>c. Patent Agents</li> <li>d. Intellectual Property Appellant Board</li> <li>e. Emerging Issues</li> <li>f. Patents &amp; Computer Programs</li> </ul>
<b>Module-VII</b>	Business Methods & Utility Patents Bio-Informatics Patents Patent and Human Right Issues

#### REFERENCES:

1. Prof. A.K.A Avasthi(ed.) Spotlight on Intellectual Property Right
2. Nagrajun, Intellectual Property Right
3. Menu Paul, Intellectual Property Right
4. W R Cornish, Intellectual Property: Patents Copyright Trademarks and allied rights, Sweet & Maxwell, London, 2010.

5. Ananth Padmanabhan, Intellectual Property Rights Infringement and Remedies, Lexis Nexis, 2012

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	3	3	3	3		2	3
CO 2	3	2	2	1	2	2	3	3	3	1	3
CO 3	3	3	2	3	2	2	3	3		3	3
CO 4	3	2	3	2	1	3	3	3	3	2	3

<b>BAL/BBL/BCL/BSL059A</b>	<b>COMPETITION LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: have knowledge of fundamental concepts and features of competition Law, requirement of competition law for healthy competition in the market and reasons for revocation of MRTP act.

CO2: be able to identify and interpret the economic concept of anti-competitive conducts which have adverse impact on competition in India.

CO3: be able to compare the competition Laws of India, UK and USA and critically analyze the law for better application.

CO4: be able to demonstrate the regulators of competition such as SEBI, ED, & CCI and their functions.

**SYLLABUS:**

<b>Module-I</b>	The Competition Law Meaning and nature Competition law Need for Competition law Growth and Development of Competition law
<b>Module-II</b>	MRTP Act and its need Limitations of MRTP Act Background of Competition Act. Salient features of Competition Act.
<b>Module-III</b>	Anti-Competitive Agreements, Vertical and Horizontal Agreements, Predatory Pricing Abuse of Dominance Combinations and its Regulations
<b>Module-IV</b>	Competition Commission of India (CCI) Power and functions of CCI Jurisdiction of CCI Landmark judgments of CCI and their analysis FDI and Policy analysis
<b>Module-V</b>	Brief concept of the Development of Competition Laws in USA and UK

	Comparative Analysis Foreign Case studies Enforcement Mechanisms under the Competition Act. 2002
<b>Module-VI</b>	Role of other regulators SEBI, Functions and Powers ED Functions and Powers Competition Commission and other Regulators
<b>Module-VII</b>	Case Studies

#### REFERENCES:

1. V.A. Avdhani, *Investment and Securities Market in India*, Himalaya Publishing House, 2011 (9<sup>th</sup> Edn)
2. Vinod Dhall, *Competition Law Today*, Oxford University Press, 2007
3. Taxmann's *Competition Act*, 2002

#### Text Books:

1. Richard Whish & David Bailey, *Competition Law*, Oxford University Press, 2012 (7<sup>th</sup> Edn)
2. Avtar Singh, *Competition Law*, Eastern Book Company, 2012
3. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	2	3	3	3	3	2	2	3
CO 2	3	2	2	3	3	2	3	3	3	3	3
CO 3	3	3	2	3	2	2	3	3	2	3	3
CO 4	3	2	3	2	3	3	3	3	3	2	3



<b>BAL/BBL/BCL/BSL086A</b>	<b>CRIMINOLOGY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO 1: Achieve in-depth study and knowledge of the scope and importance and various concepts relating to Crime and Criminology.

CO 2: Understand that how various schools of Criminology have evolved in response to the shifting panorama of strategies in the changing world.

CO 3: Understand how due to changing social economic scenarios criminal Law has to be adapted to changing environment, home and community influence

CO 4: Understand and analyze the difference between Criminology, Penology and Victimology. And compare with common wealth countries.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction of Criminology</b> Definition, Nature, Scope and Importance of Criminology, Relation with other social sciences' The concept of crime (Sin, tort and crime) and characteristic of criminal law, Whether criminology is a science? Criminology and public policy
<b>Module-II</b>	<b>Schools of Criminology</b> Pre classical school (Demonology), Classical school (Ideas of Bentham and Beccaria), Neo-classical, Positivist school Morphological theories: ➤ Cesare Lombroso, ➤ Enrico Ferri, ➤ Rafael Garafalo.
<b>Module-III</b>	<b>Identification of the causes of crime</b>

	<p>Theories,</p> <p>Mental disorder and criminality,</p> <p>Sociological Theories (Sellin, Differential Association Theory– EH Sutherland),</p> <p>Psychopathic approach,</p> <p>Biological approach</p>
<b>Module-IV</b>	<p><b>Factor Responsible for Causation of Crime</b></p> <p>Environment,</p> <p>home and community influences,</p> <p>Urban and rural crimes,</p> <p>The ghetto, broken homes,</p> <p>effect of TV, Video, Press, Narcotics and Alcohol,</p> <p>Wars and Communal riots-their causes and demoralizing effects,</p>
<b>Module-V</b>	<p><b>Responses to Crime</b></p> <p>Comparative Introduction: In focus examining responses to Crime in India and UK and in other Jurisdiction,</p> <p>Criminal Justice Responses, and other Critical Issues in Criminal Justice.</p>

#### REFERENCES:

1. Siddique, A. (2017). Ahmad Siddique's Criminology, Penology and Victimology. India: Eastern Book Company.
2. Lectures on Criminology, Penology and Victimology Paperback– 1 January 2016 by Prof. Dr. Rega Surya Rao.
3. Criminology, Penology and Victimology- Central Law Agency- Sixth edition
4. Ahuja, R. (2001). Criminology. India: Rawat Publications.
5. Hunter, R. D., Dantzker, M. L. (2006). Research Methods for Criminology and Criminal Justice: A Primer. United States: Jones and Bartlett.
6. Joyce, P. (2014). Criminology and Criminal Justice: A Study Guide. United Kingdom: Taylor & Francis.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	1	2	1	2	1	3	2	3	1	1
CO 2	3	1	3	2	1	1	3	1	2	1	2
CO 3	3	2	3	3	3	2	3	3	1	2	3
CO 4	3	2	1	2	1	1	3	2	1	2	2

# SEMESTER VIII

<b>BAL/BBL/BCL/BSL045A</b>	<b>LABOUR LAW – II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand the philosophy and concept of labour welfare and laws related to child labour prohibition.

CO2: be able to outline important factors for implementation of Factories Act and have extensive knowledge of provisions relating to health, safety and labour welfare specially protection of women and child.

CO3: be able to explain the important provisions of Wage Legislations, in reference to Payment of Wages Act 1936, Minimum Wages Act 1948 & Payment of Bonus Act 1965

CO4: be able to understand objectives behind the establishment of International Labour Organization and reasons for non-ratification of ILO conventions by India.

**SYLLABUS:**

<b>Module-I</b>	Concept and Philosophy of Labour Welfare a. Theories of Labour Welfare b. Role of Labour Welfare Officers and Trade Unions
<b>Module-II</b>	The Child Labour Prohibition and Registration Act, 1986 a. Definitions b. Prohibition of Employment of Children in certain occupations and processes.
<b>Module-III</b>	The Factories Act, 1948 a. Definition and concept of factory b. Manufacturing process c. Provisions relating to health, safety and labour welfare
<b>Module-IV</b>	a. Working hour's leaves and Holidays under F.A., 1948 b. Protection to Women and Children
<b>Module-V</b>	The Payment of Wages Act, 1936 a. Definitions b. Payment of Wages and deductions from wages.

<b>Module-VI</b>	International Labour Organisation a. Aims, Objectives, origin and development b. Constitution and organs
<b>Module-VII</b>	Ratification of I.L.O. Convention by India, reasons of non ratification

#### REFERENCES:

1. Misra S.N. : Labour and Industrial Law
2. Srivastava K.D. : Commentary on Factories Act, 1948
3. Dhyani S.N. : I.L.O. and India.
4. Chopra D.S. : Payment of Wages Act
5. Report of National Commission Labour
6. K.A. Vaid : Labour Welfare in India
7. Moorthy : Principles of Labour Welfare.
8. Johnson : I.L.O.

#### 9. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	2	1	3	3	3	1	2	3
CO 2	3	3	2	3	3	2	3	3	3		3
CO 3	3	3	2	1	2	2	3	3	2	3	3
CO 4	3	2	3	2	3	3	3	3	3	2	3



<b>BAL/BBL/BCL/BSL054A</b>	<b>PUBLIC INTERNATIONAL LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: acquire knowledge of the nature of public international law and the structure of the international legal system and Define and apply the basic elements of public international law - its sources and subjects, the recognition and jurisdiction of States in international law and principles of State responsibility

CO2: able to understand how international law influences the development and adaptation of Australian domestic law through legislative, executive and judicial action

CO3: able to critically examine the operation and application of international law in practical contexts

CO4: develop effective skills, in the construction of legal argument and the independent and self directed analysis on disputes of international law and International Law of Cooperation Settlement of International Disputes.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction and Sources of International Law</b> <ol style="list-style-type: none"> <li>International Legal System</li> <li>The problem of defining 'International Law'</li> <li>Nature, Scope, Characteristics of International Law</li> <li>International Law as 'Law'</li> <li>Binding Character of International Law. Enforcement and compliance.               <ul style="list-style-type: none"> <li>o International Law and International Political System</li> </ul> </li> <li>Foundational movement From Westphalia to Versailles</li> <li>From Versailles onwards</li> <li>Changing scope of International Law</li> <li>Role of Charter of United Nations and Statue of International Court of Justice               <ul style="list-style-type: none"> <li>o Article 38 of Statue of International Court of Justice (Nature and Scope)</li> </ul> </li> <li>Treaties-Law making treaties/normative treaties v. Contract treaties</li> </ol>
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	<p>k. Custom- Custom v. Usage, Objective element + Subjective element (<i>opinion juris sive necessitates</i>), Persistent objector rule</p> <p>i. Relationship between Treaties and International Custom</p> <p>ii. Conflict between rule of treaty and rule of customary law: <i>the lex specialis derogate</i></p> <p>iii. <i>Lex generalis; the lex superior derogate lex inferiori; the lex posteriori derogate lex priori</i></p> <p>l. Special rules of Customary International Law: <i>Jus Cogens</i> and Rules creating <i>Erga Omnes</i> Obligations</p> <p>m. General Principles of Law-The problem of <i>non-liquet</i>, General Principles as Principles of National law or General Principles as Principles of International Law</p> <p>n. Application of General Principles in International disputes: Equity (Article 38(2) of ICJ Statue; <i>ex aequo et bono</i>); Doctrine of Good faith; Res Judicata; Estoppel; Indemnity; Admissibility of Evidence etc.</p> <p>o. Judicial decisions (subsidiary source)-Article 59 of Statue of ICJ, Judicial precedent and Statue of ICJ, Evidentiary value of national decisions</p> <p>p. Writing of Publicists (subsidiary source)</p> <p>q. Modern sources of International Law-Secondary law of International Governmental Organizations (IGOs), Modern sources of International Law, Soft sources of International Law: <i>Resolutions and declarations of UN General Assembly</i></p>
<b>Module-II</b>	<p><b>International Law and Municipal Law</b></p> <p>a. Whether International Law prevail over domestic law?</p> <p>b. Theories on relationship between International Law and Municipal Law</p> <p>c. Municipal law in International Law and International Tribunal</p> <p>d. International Law in Municipal Law- Practice of states (Special emphasis on Indian Practice)</p> <p>e. Customary International Law</p> <p>f. Constitutional provisions and restrictions on Treaty power.</p>



	<ul style="list-style-type: none"> <li>g. Constitutional authority to make international agreements.</li> <li>h. Breach of International Agreements and Judicial remedies</li> </ul>
<b>Module-III</b>	<p><b>Subjects of International Law</b></p> <ul style="list-style-type: none"> <li>a. International Legal Personality</li> <li>b. Recognition of State: <i>Determination of Statehood.</i>, <i>Article 1 of 1933 Montevideo Convention on rights and duties of States, Constitutive and declaratory views.</i></li> <li>c. Recognition of Government-<i>Criteria for recognition, Is recognition necessary? –The Estrada Doctrine , De jure and de facto recognition, Retroactivity and Withdrawal of Recognition, Belligerency and Government-in-exile, Stimson doctrine of non-recognition, Dependent territories other than ‘States’ having International Status</i></li> <li>d. Dependent entities, associated states and <i>Sui Generis</i> Entities, International status of ‘people’ and their right of self determination, ‘International Organizations’ as International persons, Individuals, Companies and groups</li> </ul>
<b>Module-IV</b>	<p><b>State Territory and State Succession &amp; Law of The Sea</b></p> <ul style="list-style-type: none"> <li>a. State Territory and Sovereignty: <i>Territorial rights and other lesser rights- Acquisition of Territorial Sovereignty, Loss of Territorial Sovereignty Legal consequence of changes of sovereignty over territory (State Succession)</i></li> <li>b. Introduction and basic concepts of Law of Sea</li> </ul>
<b>Module-V</b>	<p><b>Jurisdiction in International Law</b></p> <ul style="list-style-type: none"> <li>a. Jurisdiction- Prescribe, Adjudicate And Enforce</li> <li>b. Territorial and Extra-territorial Jurisdiction</li> <li>c. Territorial Jurisdiction :<i>Objective and Subjective</i></li> <li>d. Extra-territorial Jurisdiction: <i>nationality based, passive personality, protective and universal</i></li> <li>e. Concept of Nationality, Extradition, Asylum.</li> <li>f. Conflicts of Jurisdiction</li> <li>g. Immunity From Jurisdiction</li> </ul>

	<ul style="list-style-type: none"> <li>h. Sovereign immunity (<i>Absolute and restrictive state immunity</i>). Diplomatic immunity. Consular immunity.</li> <li>i. Immunity of international organizations. Wavier of Immunity</li> </ul>
<b>Module-VI</b>	<p><b>Law of International Obligations</b></p> <ul style="list-style-type: none"> <li>a. ILC Draft Articles on Responsibility of States for Internationally Wrongful Acts of 2001</li> <li>b. General Principles Of International Responsibility</li> <li>c. Theories on State responsibility: <i>Objective theory v. Subjective theory; Damage Theory and Faulty Theory; Absolute Liability and risk theory.</i></li> <li>d. Wrongful act and Rules of Attribution-Direct and Indirect wrongs</li> <li>e. Circumstances precluding wrongfulness</li> <li>f. Consequences of Internationally wrongful act and Enforcement of International Responsibility</li> </ul> <p><b>Law of Treaties-</b></p> <ul style="list-style-type: none"> <li>a. Article 38 (1) of ICJ Statue and principle, '<i>pacta sunt servanda</i>'</li> <li>b. Vienna Convention on the Law of Treaties, 1969: <i>Treaty making process, Application, Effects, Invalidity, Termination, Suspension.</i></li> <li>c. Reservation to the Treaties</li> <li>d. Article 53 of Vienna Convention, 1969 and <i>Jus Cogens</i></li> <li>e. Article 62 of Vienna Convention, 1969 and <i>Rebus sic stantibus</i></li> <li>f. Interpretation of Treaties: <i>Objective, Subjective and Teleological Approach; General rules and supplementary means for interpretation.</i></li> <li>g. State Practice- India, Interpretations of treaties by Indian Courts</li> </ul>
<b>Module-VII</b>	<p><b>International Disputes and International Law of Cooperation</b></p> <p><b>Settlement of International Disputes</b></p> <ul style="list-style-type: none"> <li>a. Modes of Settlement- Peaceful/Amicable and Forcible/Coercive.</li> <li>b. Diplomatic methods v. Legal methods</li> <li>c. Article 2(3), 2(4) and 33 of UN Charter.</li> <li>d. International Arbitration and International Court of Justice (Procedure; Process; Adjudication- <i>Contentious Jurisdiction and Advisory Jurisdiction</i>)</li> </ul>

	<p><b>International Organizations</b></p> <p>c. Functions, Constitution and role in International Law in- For maintenance of international peace and use of force, For trade and development, Technical, social and cultural cooperation, Regional economic communities</p> <p><b>Diplomatic and Consular Relations</b></p> <p>a. Diplomatic and consular agents: <i>immunities, privileges and rights</i></p> <p>b. Special missions</p> <p>c. Protection of UN and associated personnel Representatives to International organizations</p>
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## REFERENCES:

### Text/ Reference Books:

1. Singh, Gurdip, International Law, 3<sup>rd</sup> Edition (EBC, 2015)
2. Scott, Shirley, International Law in World Politics – 2010 Edition (Rienner)
3. Akehurst. M, Modern Introduction to International Law (Routledge, 2002)
4. Crawford, James, Brownlie's Principles of Public International Law, 8<sup>th</sup> edition (Oxford, 2013)
5. Harris, D.J, Cases and Materials on International Law, 7<sup>th</sup> rev edition (Routledge, 2010)
6. Kapoor, S.K., International Law and Human Rights: Nutshell, 14<sup>th</sup> edition (Central Law Agency, 2008)
7. Shaw, Malcolm, International Law, 7<sup>th</sup> edition (Cambridge, 2014)
8. Starke J.G, Introduction to International Law, 10<sup>th</sup> edition (Butterworths, 1989)

### Legal Instruments

1. Charter of United Nations
2. Statue of International Court of Justice
3. Responsibility of States for internationally wrongful acts (A/RES/56/83, 12 December 2001)
4. Responsibility of international organizations (A/RES/66/100, 9 December 2011)
5. Convention on Diplomatic relations (Vienna, 18 April 1961)

6. Convention on Law of Treaties (Vienna, 23 May 1969)
7. United Nations Convention on Jurisdictional Immunities of States and Their Property (New York, 17 January 2005)

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	2	3	3	3	3	1	2	3
CO 2	3	3	2	3	3	3	3	3	3	3	3
CO 3	3	3	2	2	2	2	3	3	2	3	3
CO 4	3	2	3	3	3	3	3	3	3	2	3



<b>BAL/BBL/BCL/BSL060A</b>	<b>COPYRIGHT LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: have fundamental knowledge of and insight in national Copyright Law and International Conventions & treaties.

CO2: be able to understand the subject matter of copyright and the neighboring rights.

CO3: be able to deal with the process and issues arising in acquisition, ownership and transfer of copyrights.

CO4: acquire the enhanced skills for the protection of copyright and be able to handle cases of infringement of copyrights.

**SYLLABUS:**

<b>Module-I</b>	<b>INTRODUCTION TO COPYRIGHT</b> a) History of Copyright protection, b) Originality, c) Idea- expression dichotomy, d) Copyright and its relationship with other IPRs e) Worker protected under copyright,
<b>Module-II</b>	<b>INTERNATIONAL CONVENTIONS AND TREATIES</b> a) Berne Convention for the Protection of Literary and Artistic Works, 1883 b) Universal Copyright Convention, 1952 c) TRIPS Agreement, 1994 d) WIPO Copyright Treaty, 1996 e) International Copyright Order, 1999
<b>Module-III</b>	<b>SUBJECT MATTERS OF COPYRIGHT</b> a) Work in which Copyright Subsists b) Authorship vis- a vis Ownership c) Copyrights: Economic and Moral Rights d) Duration of Copyright e) Copyright Issues in Digital Environment

	f) Assignment and Licensing
<b>Module-IV</b>	Neighboring Rights a) Origin and Development b) Rationale for Protection c) Copyright vis-a vis Neighboring rights d) Performers Rights e) Broadcasting organizations rights f) Rights of the Producers of Phonograms g) Economic and Moral Rights h) Exceptions i) Infringement and Remedies
<b>Module-V</b>	ACQUISITION OF COPYRIGHT a) Meaning of copyright b) Procedure for registration of copyright; c) Different statutory agencies under the Copyright Act and their roles
<b>Module-VI</b>	OWNERSHIP AND TRANSFER a) Assignment and licensing of rights; b) Drafting of agreement to transfer copyright and related rights; c) Collecting societies and administration of rights; d) Compulsory and statutory licensing
<b>Module-VII</b>	INFRINGEMENT AND REMEDIES a) Fair dealing/ fair use- comparison of US, UK and India; b) ISP Liability, c) Digital Right Management, d) Remedies for infringement

#### REFERENCES:

1. Sterling, J. L. A., World copyright law, (2008) 3rd ed, London, Sweet & Maxwell.
2. Ahuja, V. K. , Law of Copyright and Neighbouring Rights, (2007), New Delhi, Lexis Nexis
3. Prasad, Akhil, Copyright Law Desk Knowledge, Access and Development, (2009), Delhi.

4. Mendis, Dinusha Kishani, Universities and Copyright Collecting Societies, (2009), Hague, T.M.C. Asser press
5. David Nimmer, Nimmer on Copyright, Lexis Nexis, 2010
6. W R Cornish, Intellectual Property: Patents Copyright Trademarks and allied rights, Sweet & Maxwell, London, 2010.
7. S. Sivakumar & Lisa P. Lukose, Broadcasting Reproduction Right in India: Copyright and Neighbouring Right Issues, ILI, New Delhi, 2013
8. Ananth Padmanabhan, Intellectual Property Rights Infringement and Remedies, Lexis Nexis, 2012
9. Mira SundaraRajan, Moral Rights: Principles, Practice, and New Technology, Oxford University Press, 2011
10. Neil Weinstock Netanel, Copyright's Paradox, Oxford University Press, 2008.
11. Robert A Gorman, Jane C. Ginsburg, Copyright Cases and Materials, Foundation Press, 2011
12. Paul Goldstein, International Copyright: Principles, Law, and Practice, Oxford University Press, 2012

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcomes</b>	<b>Program Outcomes</b>							<b>Program Specific Outcomes</b>			
	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO6</b>	<b>PO 7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>
CO 1	3	2	1	2	3	3	3	3	1	2	3
CO 2	3	3	2	1	3	2	3	3	3	1	3
CO 3	3	3	2	3	2	2	3	3	1	3	3
CO 4	3	2	3	2	3	3	3	3	3	2	3

<b>BAL/BBL/BCL/BSL061A</b>	<b>INSOLVENCY AND BANKRUPTCY CODE</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand the concept of corporate insolvency and bankruptcy, regulatory framework, prominent features and application of bankruptcy code.

CO2: be able to examine various concepts such as debt, default, financial information, etc and the process of initiation of insolvency process.

CO3: acquire knowledge of administration and distribution of assets of bankrupt and versatility of Indian laws as per international standards.

CO4: have practical and industrial exposure in cases related to I & B.

**SYLLABUS:**

<b>Module-I</b>	Insolvency and Bankruptcy defined. Earlier legal framework related to Insolvency and Bankruptcy Salient features of Insolvency and Bankruptcy Code 2016 Application of Insolvency and Bankruptcy Code to Companies Act, LLP and other entities.
<b>Module-II</b>	Debt, default, financial information and financial institution, financial service etc defined Procedure for Insolvency resolution against corporate persons. Legal provisions related to financial and operational creditor Insolvency resolution and moratorium, Interim resolution professional-Appointment, duties, functions and powers. Liquidation process, Appointment of liquidator functions and duties Claims, consolidation, verification, admission, rejection and determination of claims Distribution of assets and Dissolution of Corporate debtors
<b>Module-III</b>	Fast track corporate insolvency resolution process. Voluntary liquidation of corporate persons Adjudicating Authority for corporate persons-appeals and malicious initiation of proceedings



	Offences and penalties
<b>Module-IV</b>	Insolvency Procedure for Individuals and Partnership firms Fresh start process and its procedure Provisions relating to Resolution Professional Discharge process and order Insolvency resolution process- application and procedure consequently
<b>Module-V</b>	Administration and distribution of assets of Bankrupt Bankruptcy Trustee- Functions, Rights, Duties and powers. Delivery of property and restrictions on disposition Settling of claims of all and procedure thereof. Other miscellaneous provisions.
<b>Module-VI</b>	Miscellaneous provisions under IBC Insolvency and conflict of jurisdictions Insolvency and Bankruptcy law in other jurisdictions Comparative analysis of Indian law and laws of UK and USA Adaptability of Indian laws as per international standards
<b>Module-VII</b>	Case Studies on insolvency and bankruptcy Expert Session on IBC Practical and Industrial exposure (Clinical visit)

#### REFERENCES:

1. VS Vahi, Treatise on Bankruptcy and Insolvency Code, Bharat Law House Pvt Ltd.
2. VS Datey, Guide to Insolvency and Bankruptcy Code, 8<sup>th</sup>Edn, Taxman Publications.Act, LexisNexis Butterworths, Wadhwa Nagpur.
3. Ravinder Agarwal, Insolvency and Bankruptcy Practice Material, (2018) Taxman Publications. Bhandari MC (2016) Guide to Company Law Procedure, LexisNexis Butterworths Wadhwa Nagpur
4. Wadhwa Brothers, Shorter Insolvency and Bankruptcy Code with procedures by Wadhwa Law Chambers, 1<sup>st</sup>Edn, 2020.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2		2	3	3	3	3		2	3
CO 2	3	2	3	3		2	3	3	3		3
CO 3	3	3	2		2	2	3	3	2	3	3
CO 4	3	3	3	2	3	3	3	3	3	1	3

<b>BAL/BBL/BCL/BSL071A</b>	<b>TAXATION LAW-II (GOODS AND SERVICE TAX)</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: able to understand the various terms related to indirect tax and Good & Service Act and its objectives.

CO2: able to understand the structure of GST Council and registration under GST.

CO3: acquire knowledge and skills related to accounts and records in GST and tax collection& tax deduction at source.

CO4: be able to find out issues in implementation of GST and reforms in GST.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction</b> <ul style="list-style-type: none"> <li>• What is tax?</li> <li>• Source of power to tax</li> <li>• Stages of Taxation</li> <li>• Structure of Indirect taxation</li> <li>• Disadvantage of earlier Indirect taxation system</li> </ul>
<b>Module-II</b>	<b>Introduction to GST</b> <ul style="list-style-type: none"> <li>• What is GST?</li> <li>• Historical developments leading to GST</li> <li>• Constitutional amendment and need for it</li> <li>• What are the objectives of GST regime?</li> <li>• What all taxes are subsumed by GST?</li> <li>• What all taxes are not subsumed by GST?</li> <li>• Which items GST does not cover at present and its effect?</li> <li>• Is GST same as VAT? Or How does present VAT and GST differ?</li> <li>• What is meant by 'cascading effect' in taxation?</li> <li>• How will GST address cascading effect or 'tax on tax'?</li> <li>• What is CGST/ SGST/ IGST/ UTGST?</li> <li>• At What point GST will be levied?</li> </ul>

	<ul style="list-style-type: none"> <li>• What are likely benefits of GST?</li> <li>• What are likely disadvantages of GST?</li> <li>• Global perspective on GST</li> </ul>
<b>Module-III</b>	<b>GST Council</b> <ul style="list-style-type: none"> <li>• Introduction to GST Council</li> <li>• Role of GST Council</li> <li>• How will decisions be taken by the GST Council?</li> <li>• Migration to GST</li> </ul>
<b>Module-IV</b>	<b>Registration</b> <ul style="list-style-type: none"> <li>• Registration under GST - An introduction</li> <li>• Who is liable to register under GST laws?</li> <li>• Who is exempted from registration?</li> <li>• What is an aggregate turnover?</li> <li>• New registration</li> <li>• About GSTN</li> <li>• Cancellation of registration</li> <li>• What are implications of cancellation of registration?</li> <li>• Amendment of registration</li> </ul>
<b>Module-V</b>	<b>Supply under GST</b> <ul style="list-style-type: none"> <li>• Concept of supply under GST</li> <li>• Composition levy</li> <li>• Compensation cess</li> <li>• Actionable claims</li> <li>• Composite/ Mixed supply</li> <li>• Concept of reverse charge</li> <li>• Rate slabs</li> <li>• Exempt service</li> </ul>
<b>Module-VI</b>	<ul style="list-style-type: none"> <li>• Accounts and records in GST</li> <li>• GST practitioners</li> <li>• TDS under GST</li> </ul>

	<ul style="list-style-type: none"> <li>• Tax collection at source</li> <li>• Job work</li> <li>• Transition provisions under GST</li> <li>• Imports under GST</li> <li>• Returns</li> </ul>
<b>Module-VII</b>	<ul style="list-style-type: none"> <li>• Miscellaneous Provisions</li> <li>• GST Implementation issue</li> <li>• GST and federalism</li> <li>• Reforms in GST</li> </ul>

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2			2	3	3		2	3
CO 2	3	3	2	3	3	3	3	3	3	3	3
CO 3	3	3	3	2	3	3	3	3	1	2	3
CO 4	3	2	3	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL083A</b>	<b>LAND LAWS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of the course, student will:**

CO1: be able to understand state tenancy reforms and its objects & reason.

CO2: be able to analyze revenue act, power and functions of the Boards of Revenue, revenue courts and officers.

CO3: be able to recognize the legal issues relating to land acquisition law.

CO4: be trained as a researcher to conduct legal research on different land laws such as tenancy, revenue, rent control and land acquisition laws.

**SYLLABUS:**

<b>Module-I</b>	<b>Rajasthan Tenancy Act, 1955</b> Preliminary: object and reason, Definition- Agriculture year, Agriculture, Agriculturalist, Crops, Estate, Estate holder, Grove-land, Holding, Improvement, Khudkasht, land, land cultivated personally, Land holder, Pasture land, Rent, Revenue, Sayar, Tenant, Nalbat. Classes of Tenants, Primary Right of Tenant, Surrender, Abandonment and Extinction
<b>Module-II</b>	<b>Rajasthan Tenancy Act, 1955</b> Determination and modification of Rent, Payment and recovery of rent, Ejectment of Tenants, Remedies for Wrongful Ejectment of tenants. Question of proprietary rights in Revenue court, Question of tenancy Right in civil court
<b>Module-III</b>	<b>Rajasthan Revenue Act, 1956</b> The Board of Revenue, Revenue Courts and Officers, Appeal, Reference, Revision and Review, Survey, records of right, Maintenance of maps and record, annual register
<b>Module-IV</b>	<b>Rajasthan Revenue Act, 1956</b> Settlement operation, rent rates, collection of revenue
<b>Module-V</b>	<b>Rajasthan Rent Control Act, 2001</b> Preliminary: object and reasons, Definition-Amenities, Landlord, Premises,



	Tenant. Revision of rent, limited period tenancy, eviction of tenants, right of landlord to recover immediate possession in certain cases, restoration of possession of illegally evicted tenant and procedure there of.
<b>Module-VI</b>	<b>Rajasthan Rent Control Act, 2001</b> Constitution of tribunals, procedure for revision of rent and eviction, Appeal and Execution Amenities.
<b>Module-VII</b>	<b>Land Acquisition Law</b> Preliminary: object and reason, Definition: affected family, agriculture land, cost of acquisition, displaced family, infrastructure project, marginal farmer, market value, person interested, public purpose, and resettlement area. Determination of social impact and public purpose, special provision to safeguard food security, Notification and Acquisition, Rehabilitation and Resettlement Award and procedure relating to it. Procedure relating to land acquisition, rehabilitation and resettlement authority, apportionment and payment of compensation.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	3	2	2	3	3	3	1	3
CO 2	3	3	2		3	3	3	3	2	3	3
CO 3	3	3	3	2	2	1	3	3	3	2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL087A</b>	<b>PENOLOGY AND VICTIMOLOGY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO 1: Understand the philosophy of punishment and its basic purpose in what manner it can prevent the crime and its repetition by a criminal.

CO 2: Understand the impact of professional lawyering skills in societal and environmental contexts, and demonstrate the knowledge of, and need for reforms in the Prison system;

CO 3: Understanding Criminology in context of victims perspectives;

CO 4: Equip with knowledge, passion and drive to excel as leaders in the legal profession, judiciary, public service, non-profit & non-governmental organizations, entrepreneurship, and corporate entities;

CO5: Explore and understand specific issues relating to re-socialization and rehabilitation of prisoners back to the society.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction to penal system–</b> Theory of punishments, Modes of punishment, Capital punishment
<b>Module-II</b>	<b>Police</b> Police, Role and function of police, National Police Commission (recommendations), Mali math committee report
<b>Module-III</b>	<b>Prison system</b> Prison system, History of Prisons, Aims, objectives and conditions of prison, Types of prisons, Prison work, Education, Prison reform (schools and reformations),



	Rights of prisoners (contribution of the Supreme Court)
<b>Module-IV</b>	<b>Re-socialization Process–</b> Probation and Parole, Definitions, Nature of probation and parole, Duties of Probation Officers, Difference between Parole and Probation, Authority for granting Parole, Supervisor of Parole, Problems of the released offender, Attitude of the community towards released offender.
<b>Module-V</b>	<b>Victimology and Compensation–</b> State of Jail Reform - Classification of prisoners Rights of prisoners - open prison.

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6. A Siddique Criminology [1984], Eastern Lucknow
7. Justice N. K. Chakraborti Probation system in the Administration of Criminal Justice
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MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	3	1	3	3	2	1	3	2
CO 2	2	1	2	2	1	2	2	2	2	1	2
CO 3	3	3	2	3	2	1	3	1	1	1	3
CO 4	3	3	3	3	3	3	3	3	2	2	3
CO 5	3	2	3	3	3	2	3	3	2	3	3

# SEMESTER IX

<b>BAL/BBL/BCL/BSL064A</b>	<b>CYBER LAWS &amp; AI</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be familiarized with various types of Cyber-Attacks, Cyber-Crimes & Artificial Intelligence.

CO2: acquire skills in research, discussions and deliberations on issues related to cyber space and cyber laws.

CO3: be able to understand the duties of subscriber, penalty & adjudication and also the liabilities of network service providers.

CO4: be able to understand different types of AI agents, various AI search algorithms, fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation, reasoning.

**SYLLABUS:**

<b>Module-I</b>	Genesis object and scope of IT Act Definitions E Commerce and Digital Signature E Governance
<b>Module-II</b>	Dispatch and Receipt of Electronic Records Security and Receipt under IT Act Regulation of Certifying Authorities Digital Signature Certificate
<b>Module-III</b>	Duties of Subscriber Penalties and Adjudication Cyber Regulation Appellate Tribunal
<b>Module-IV</b>	Offences under IT Act Tampering with Computer Source documents Hacking with Computer System Publishing of form obscene Information in electronic
<b>Module-V</b>	Breach of confidentiality and privacy Offences related to digital signature certificate Computer Forensic and Process of confirmation Liability of network service providers
<b>Module-VI</b>	Power of Police Officer Miscellaneous provisions under IT Act Amendment to IPC 1860

	Amendment to Evidence Act 1872 Amendment to Banker's Books Evidence Act 1891 Amendment to Reserve Bank of India Act 1934 Issue of jurisdiction of Cyber Space Issue of Online defamation Copyright issue in digital medium Trade Mark in online medium
<b>Module-VII</b>	Law relating to Artificial Intelligence.

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1. Computer Law: Reed Cherish, Eastern Book Company, New Delhi
2. Information Technology and Cyber Law : S.R. Bhansali
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4. Information Technology Law and Practice : Vakul Sharma

#### Cases referred

1. United States v. Simpson 152 F. 3d 1241(10<sup>th</sup> cir. 1998) USA
2. United States v. 1992 U.S. App. LEXIS 9562 (4<sup>th</sup> cir. May 4, 1992)
3. Miller v. California 413 U.S.1524 (1973)
4. Ranjit D. Udeshi v. State of Maharashtra, AIR 1965 SC 881
5. United States v. Moris, 928 F. 2d 504, 505 (2<sup>nd</sup> cir 1991)
6. Director of Public Prosecutions v. Murdoch (1993) IVR 406

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	3	2	3	1	2	3	3	3		3
CO 3	3	3	1	2	2	3	3	3		2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3



<b>BAL/BBL/BCL/BSL065A</b>	<b>ADMINISTRATIVE LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore the evolution, nature, scope and fundamental doctrines of Administrative Law

CO2: be able to understand the reasons for growth and developments delegated legislation and to distinguish between sovereign and delegated legislation.

CO3: be able to analyze the judicial control of administrative discretionary powers and judicial review of administrative action and administrative adjudications.

CO4: be able to develop the enquiry of understanding the latent aspects of administrative process that imbibe in a powers, liabilities, and its inculcation in the judicial review of the administration action

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction: Evolution, Nature and Scope of Administrative Law</b> <ol style="list-style-type: none"> <li>Evolution, Nature and Scope of Administrative Law</li> <li>Laissez-faire State, Social Welfare State, and Modern State</li> <li>Comparative evolution</li> <li>French Administrative Law-<i>Droit Administratif</i> and Administrative Courts of Canada, Switzerland and Germany</li> <li>Definition, Nature and Scope Administrative Law</li> <li>Relationship between Administrative Law and Constitutional Law</li> </ol>
<b>Module-II</b>	<b>Fundamental Doctrines of Administrative Law</b> <ol style="list-style-type: none"> <li>Classification of Functions</li> <li>Doctrine of rule of Law</li> <li>Doctrine of Separation of Powers</li> <li>How these doctrines influence Administrative Law?</li> </ol>
<b>Module-III</b>	<b>Delegated Legislation</b>

	<ul style="list-style-type: none"> <li>a. Concept of Delegated Legislation</li> <li>b. Reasons for the Growth and Development</li> <li>c. Classification- Title based and Purpose based</li> <li>d. Comparative position –UK; USA; India</li> <li>e. Constitutionality of Delegated Legislation</li> <li>f. Excessive Delegation- Constitutional Limits</li> <li>g. Control of Delegated Legislation- Parliamentary, Procedural and Judicial Controls</li> </ul>
<b>Module-IV</b>	<p><b>Natural Justice</b></p> <ul style="list-style-type: none"> <li>a. Concept and Applicability- Administrative Action or Quasi-Judicial Action?</li> <li>b. <i>nemo judex in causa sua</i> -Rule against bias</li> <li>c. Exception in Doctrine of Necessity and Doctrine of Absolute Necessity</li> <li>d. <i>audi alteram partem</i>- Right to be heard</li> <li>e. Requirements of Natural Justice</li> <li>f. Reasoned decision &amp; Right to legal Representation</li> <li>g. Expanding Horizon of Natural Justice</li> <li>h. Duty to Act Fairly</li> <li>i. Exclusion of Natural Justice.</li> <li>j. Exceptions to Principles of Audi Alteram Partem</li> <li>k. Effect of failure to Comply with Principles of Natural Justice- void or voidable</li> <li>l. Post decisional Hearing</li> </ul>
<b>Module-V</b>	<p><b>Administrative Discretionary Powers</b></p> <ul style="list-style-type: none"> <li>a. Discretionary powers</li> <li>b. When an authority can exercise discretion?</li> <li>c. Judicial Control over administrative discretion</li> <li>d. Abuse of discretion and Non exercise of discretion</li> <li>e. Fundamental Right violation and exercise of administrative discretion</li> <li>f. Reasonable Exercise of Power and Wednesbury Principle</li> </ul>
<b>Module-VI</b>	<b>Judicial Review of Administrative Action and Administrative</b>

	<b>Adjudications</b> <ul style="list-style-type: none"> <li>a. Grounds of Judicial Review of Administrative Action</li> <li>b. Writ Jurisdiction</li> <li>c. Doctrine of Legitimate expectation</li> <li>d. Doctrine of public accountability</li> <li>e. Doctrine of proportionality</li> <li>f. Laches</li> <li>g. Concept of administration adjudication</li> <li>h. Article 323 (A) and Article 323(B) of Constitution of India</li> <li>i. Reason for the growth of Tribunals</li> <li>j. Administrative Tribunals</li> <li>k. Powers and Functions of Administrative Tribunals</li> </ul>
<b>Module-VII</b>	<b>Maladministration &amp; Alternative Remedies and Government as a Litigant</b> <ul style="list-style-type: none"> <li>a. Concept and Need</li> <li>b. Ombudsmen in India-Lakpal</li> <li>c. Lakayukta in States</li> <li>d. Central Vigilance Commission</li> <li>e. Ombudsman</li> <li>f. Right to Information</li> <li>g. Development of the concept of state liability</li> <li>h. Privileges of Government</li> <li>i. Doctrine of Estoppels and Waivers</li> <li>j. Tortious liability</li> <li>k. Contractual liability</li> </ul>

#### REFERENCES:

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MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	3	2	3	3	3	3	3	3	1	3
CO 3	3	2	3	2	2	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL066A</b>	<b>TRADEMARK AND DESIGN</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand framework of trademark and design.

CO2: be able to acquire comprehensive knowledge of various principles of trademark and design.

CO3: be acquainted with the registration process of trade mark and design.

CO4: be trained as an expert in different areas of Intellectual Property Rights violations such as Trade Mark, Design, Geographical indication, etc.

**SYLLABUS:**

<b>Module-I</b>	Evolution of Design Protection, Salient features of the Design Act, 2000, important definitions
<b>Module-II</b>	Registration: Requirements and procedure, Design Piracy, Design and Copyright overlap,
<b>Module-III</b>	Infringement and remedies, International Instruments
<b>Module-IV</b>	Principle of Trademark- Economic Justification, Quality Justification, Advertising Justification - What is a Trademark- Definition - Spectrum of Distinctiveness - Grounds of Refusal of Registration.
<b>Module-V</b>	Rights of the Owner of Trademark- Rights of a Trademark Owner, Transfer of Trademarks- Assignment and License of Trademarks, Assignment of Trademarks- Licensing of Trademark.
<b>Module-VI</b>	Infringement of Trademark and Action for Passing off -Infringement of Trademark- Essentials- Dilution of Trademark, Blurring and Tarnishment, Comparative-Advertising Law- Passing Off- General Principles, Essential elements of passing off, Difference between Infringement and Passing Off, Passing-off and protection of well-known trademarks, Reverse passing off, Defences in Trademark Infringement, Remedies.

<b>Module-VII</b>	Protection of Geographical Indication-Justification for protection- International Position- Lisbon Agreement, TRIPs Agreement, Bilateral agreements, Regional Developments EU-Geographical indication protection in India, Criteria- Procedure for Registration in India, Duration- Rights- Overlap between trademark and GI, Remedies, Case study: Darjeeling tea case- Case Study: Rasgulla case.
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MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	3	1	3	3	2	3	3	1	3	3
CO 3	3	3	3	2	2	1	3	3	2	2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL067A</b>	<b>MERGERS AND ACQUISITIONS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this subject, the student will:**

CO1: be able to understand the process and economic rationale for M&As

CO2: Be able to understand typical valuation techniques in M&As.

CO3: Be able to apply the valuation techniques to M&A assessment and decision making.

CO4: Have acquired analytical skills in analyzing real-world cases in M&As.

**SYLLABUS:**

<b>Module-I</b>	<ul style="list-style-type: none"> <li>• Meaning of Mergers and Acquisitions</li> <li>• Corporate Reconstruction &amp; Corporate Restructuring</li> <li>• Types and Mergers and Acquisitions</li> <li>• Planning and Strategies for Corporate Restructuring in MnA</li> </ul>
<b>Module-II</b>	<ul style="list-style-type: none"> <li>• Meaning of Merger and Amalgamation</li> <li>• Procedural aspect of Merger and Amalgamation</li> <li>• Jurisdiction of Courts: Filling of various forms</li> <li>• Merger aspects under Constitutional law</li> <li>• Amalgamation of Banking Companies and Foreign Companies</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>• Concept of Demerger</li> <li>• Modes of Demerger- Agreement, scheme of arrangement</li> <li>• Demerger and Voluntary winding up</li> <li>• Legal and procedural aspects</li> <li>• Tax aspects and reliefs</li> <li>• Reverse mergers- Procedural aspects</li> </ul>
<b>Module-IV</b>	<ul style="list-style-type: none"> <li>• Meaning and types of takeovers</li> <li>• Legal aspects- SEBI takeover regulations</li> <li>• Disclosure and open offer requirements</li> <li>• Control, Valuation and timing of open offers</li> <li>• Takeover and Delisting</li> <li>• Bailout takeovers and takeover of sick undertakings</li> <li>• Takeover Defenses</li> <li>• Cross border takeover</li> </ul>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>• Reduction of capital</li> <li>• Reorganization of share capital</li> <li>• Buy back of Shares: Concept and necessity</li> </ul>



	<ul style="list-style-type: none"> <li>• Procedure of buyback of shares.</li> </ul>
<b>Module-VI</b>	<ul style="list-style-type: none"> <li>• Objects and reasons of the Competition Act, 2002</li> <li>• Anti-competitive agreements</li> <li>• Abuse of dominant position</li> <li>• Regulation of combination</li> </ul>
<b>Module-VII</b>	<ul style="list-style-type: none"> <li>• Case Studies on M&amp;A</li> <li>• Drafting of Merger Agreement</li> <li>• Drafting and Take over compliances</li> </ul>

#### REFERENCES:

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2. Ramiyah A. (2016) Guide to Companies Act, LexisNexis Butterworths, Wadhwa Nagpur.
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#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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CO 3	3	3	3	2	1	3	3	3	1	2	3
CO 4	3	3	2	3	2	2	3	3	2	3	3

<b>BAI/BBL/BCL/BSL068A</b>	<b>LAW OF TRADE SECRETS AND TECHNOLOGY TRANSFER</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this subject, the student will:**

CO1: be able to understand the various issues pertaining to trade secret as an IPR.

CO2: be able to identify the problems and challenges related to technology transfer of intellectual properties.

CO3: be able to analyze legal provisions to address the interface between trade secret and technology transfer.

CO4: have acquired skills of technology transfer and licensing, drafting a technology transfer agreement.

**SYLLABUS:**

<b>Module-I</b>	Trade Secret: Conceptual analysis, International Protection regime
<b>Module-II</b>	Trade Secret Protection in India, Need for statutory framework for protection of Trade Secrets in India
<b>Module-III</b>	Introduction to Technology and Innovations- Meaning, nature and definitions, technology, research and development and innovations, technology vis-à-vis economic development, Commercialization of technology and inventions , Technology and IPR Diffusion, Technology integration with the business, Need for protection of technology, Theories of protection of inventions, Balancing between private interests and public interests.
<b>Module-IV</b>	International IPR instruments and technology protection- Berne Convention, Paris Convention, TRIPs etc., Technology protection in US, European, Japan and Indian IPR law.
<b>Module-V</b>	Technology Protection and Indian IPR Regime- Technology innovations and protection: Copyright Law, Law of Patents, Law of Trademarks, Law of

	Designs, Circuit layout designs,
<b>Module-VI</b>	Technology Transfer and Licensing- Technology Transfer: meaning and nature, need for technology transfer from research centers to industry, Phases in technology transfer, IP due diligence, Planning for technology transfer, Economic consideration of technology transfer,
<b>Module-VII</b>	Technology transfer and licensing, drafting a technology transfer licensing agreement: Scope, royalty, format and contents of the agreement.

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CO 2	3	2	2	1	3	2	3	3	2	3	3
CO 3	3	3	3	2	2	3	3	3	2	2	3
CO 4	3	3	2	3	2	2	3	3	3	3	3

<b>BAL/BBL/BCL/BSL069A</b>	<b>INSURANCE LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this subject, the student will:**

CO1: Have a systematic understanding of the knowledge of insurance law and its inter-relationship with other fields of study and will demonstrate current understanding of some specialist areas in depth

CO2: Demonstrate knowledge and understanding of a wide range of legal concepts, values, principles and rules of Indian Insurance law and able to explain the relationships between them in a number of particular areas.

CO3: Work with ideas at a level of abstraction, arguing from competing perspectives and identify the possibility of new concepts within existing knowledge frameworks and approaches.

CO4: be able to use a full range of legal sources to identify the principal controversial issues in a topic.

**SYLLABUS:**

<b>Module-I</b>	<p>Introduction to Insurance Law</p> <ul style="list-style-type: none"> <li>a) Introduction To Concept Of Insurance</li> <li>b) Nature Of Insurance</li> <li>c) Principles Of Torts And Its Relation With Insurance Laws</li> <li>d) History And Development Of Insurance Industry &amp; Law</li> <li>e) Insurance Industry In India, The Insurance Act, 1938- (Main Sections), The Insurance Regulatory Authority Act, 1999, IRDA's Role And Functions, Insurance Industry And Market, Insurance Management.</li> </ul>
<b>Module-II</b>	<p>Concepts and Principles of Insurance law</p> <ul style="list-style-type: none"> <li>a) Insurance Law: Essential Tenets</li> <li>b) Formation, Performance And Discharge of Contract</li> <li>c) Proposal And Policy, Rules Of Interpretation of Insurance Policy, Logics Behind Providing Exclusion Clauses</li> <li>d) Classification, Commencement, Duration And Revival of Policy</li> <li>e) Utmost Good Faith</li> <li>f) Insurable Interest</li> </ul>



	<ul style="list-style-type: none"> <li>g) Indemnity, Subrogation And Contribution</li> <li>h) Special Features Of Insurance Contract – Aleatory Contract, Contract of Adhesion Etc.</li> <li>i) The Risk, Premium, Proximate Cause</li> <li>j) Re-Insurance</li> </ul>
<b>Module-III</b>	<p>Life Insurance Contracts</p> <ul style="list-style-type: none"> <li>a) Nature And Formation of Life Insurance Contract, The L.I.C. Act, 1956, The Insurance Act, 1938(Relevant Provisions), The IRDA Act, 1999(Relevant Provisions)</li> <li>b) Insurable Interest</li> <li>c) Proposal And Acceptance</li> <li>d) Non-Disclosure And Misrepresentation (Section-45)</li> <li>e) Representations And Warranties</li> <li>f) Policy As A Property-Assignment &amp; Nomination</li> <li>g) Claims And Disputes, Suicide Clause, Non-Forfeiture Clause With Emphasis On Surrender Value, Paid-Up Value And Claim Concession</li> <li>h) Health Insurance-Concept, Policy And Claim Procedures</li> </ul>
<b>Module-IV</b>	<p>Marine Insurance</p> <ul style="list-style-type: none"> <li>a) Origin, Development And Nature Of Marine Insurance, The Marine Insurance Act, 1906, The Marine Insurance Act, 1963</li> <li>b) Marine Insurance Contracts-Essential Tenets</li> <li>c) Insurable Interest</li> <li>d) Disclosure And Representation</li> <li>e) The Marine Policy And Various Types Of Policies</li> <li>f) Warranties</li> <li>g) The Voyage</li> <li>h) Loss And Abandonment</li> <li>i) Partial Losses And Constructive Total Loss</li> <li>j) Measure Of Indemnity And Claims</li> <li>k) Institute Cargo Clauses</li> <li>l) Inco Terms</li> </ul>

<b>Module-V</b>	<p>Fire Insurance</p> <ul style="list-style-type: none"> <li>a) Nature Of Fire Insurance Contract</li> <li>b) Non-Disclosure And Misrepresentation</li> <li>c) Standard Fire Policy</li> <li>d) Proximate Cause, Fire Claims And Amount Recoverable</li> <li>e) Subrogation, Double Insurance, Contribution And Average</li> </ul>
<b>Module-VI</b>	<p>Motor Vehicle Insurance</p> <ul style="list-style-type: none"> <li>a) The Motor Vehicles Act, 1988 (Secs.140-176), Nature And Scope</li> <li>b) Types Of Policies</li> <li>c) Absolute Or No Fault Liabilities, Principles Of Torts And Motor Vehicles Insurance, Workmen Compensation Act And Motor Vehicles Act</li> <li>d) Third Party Or Compulsory Insurance Of Motors Vehicles, Compensation In Hit And Run Cases</li> <li>e) Computation Of Compensation According To Structured Formula Basis, Judicial Approaches Towards Computation Of Compensation</li> <li>f) Motor Vehicles Accident Claims Tribunals-Powers And Procedures</li> <li>g) Alternate Forum For Settlement Of Motor Accident Claims</li> </ul>
<b>Module-VII</b>	<p>Miscellaneous Insurance</p> <ul style="list-style-type: none"> <li>a) Liability Insurance-Public Liability Policy, Products Liability Policy, Professional Indemnity Policy, Directors And Officers Liability Policy, Lift (Third Party) Insurance, Employers' Liability Policy, Carrier's Liability Insurance, Liability Insurance Act Policy, Golfers Indemnity Insurance</li> <li>b) Aviation Insurance</li> <li>c) Agricultural Insurance</li> <li>d) Theft And Burglary Insurance</li> <li>e) Insurance For Nuclear Activities</li> <li>f) Travel Insurance</li> <li>g) Property Insurance</li> <li>h) Social Insurance</li> <li>i) Sports And Entertainment Insurance</li> </ul>

**REFERENCES:**

- 1) John Birds & Norma J. Hird, Bird's Modern Insurance law, (6th ed., London; Sweet & Maxwell, 2004).
- 2) K.S.N Murthy & Dr. KVS Sharma, Modern Law of Insurance in India, (4th ed., Lexis Nexis Butterworths, 2002)
- 3) M N Srinivasan's, Principles of Insurance law, (7th ed., Wadhwa & Co, 2002).
- 4) Malcolm A. Clarke, The Law of Insurance Contracts (Lloyd's of London Press Ltd., 1989).
- 5) E.R. Hardy Ivamy, General Principles of Insurance Laws, (6th ed., Butterworth's, 1993)

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	3	3	3	3	2	3
CO 2	3	3	1	3	3	2	3	3		3	3
CO 3	3	3	3	2	2	3	3	3	2	1	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL070A</b>	<b>HUMAN RIGHTS, INTERNATIONAL HUMANITARIAN AND REFUGEE LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this subject, the student will be able to:

CO1: grasp the fundamentals of philosophical and analytical skills including close reading and logical analysis in the area of human rights.

CO2: understand the concept of human rights as a political and legal ideal and appreciate the different motivations and assumptions behind key conceptions of human rights.

CO3: identify and analyze problems of human rights violations addressed by NHRC and SHRC within and beyond national communities with a special emphasis on the distinction between national and international rights of human being; and

CO4: appreciate the institutional and practical dimensions of securing rights of an individual in society.

**SYLLABUS:**

<b>Module-I</b>	Human Rights in their Historical perspective -At International Level -At National Level Concept, Meaning and various Theories of Human Rights, i.e. Human Rights Jurisprudence
<b>Module-II</b>	Human Rights under the Constitution of India- Fundamental Rights Human Rights vis-à-vis Directive Principles under the Constitution of India
<b>Module-III</b>	Meaning of Human Rights under the (Indian) Protection of Human Rights Act, 1993 Human Rights Courts in India
<b>Module-IV</b>	National Human Rights Commission in India – Its composition, powers and Functions State Human Rights Commissions – Its composition, powers and functions
<b>Module-V</b>	Judicial Response for the Protection and Enforcement of Human Rights defined in the Constitution of India. Judicial Response for the protection and enforcement of Human Rights as

	<p>defined in the Protection of Human Rights</p> <p>Protection of Human Rights relating to Scheduled Castes and Scheduled Tribes under the various Laws in India (Protection of Civil Rights Act, 1955 and the Prevention of Atrocities Act, 1986)</p> <p>National Commission for Scheduled Castes and Scheduled Tribes, National Commission for Women in India, National Commission for Child Rights in India</p>
<b>Module-VI</b>	<p>International Humanitarian Law: An Overview</p> <p>History Scope Conceptual Background</p> <p>Conduct of Hostilities</p> <p>Treatment of Victims, Prisoners of War</p> <p>International Institutions</p> <p>State and Individual Accountability</p> <p>Enforcement of Humanitarian Law</p> <p>Human Rights and Humanitarian Law</p>
<b>Module-VII</b>	Refugee Law, UN Convention on Refugees

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	2	3	3	1	2	3
CO 2	3	2		3	3	2	3	3	3	3	3
CO 3	3	1	3	2	1	3	3	3	1	2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3



<b>BAL/BBL/BCL/BSL080A</b>	<b>DRAFTING AND PLEADINGS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this subject, the student will:**

CO1: be able to appreciate the functions and objects of pleadings.

CO2: be able to explore own way of legislative drafting.

CO3: be trained to participate in litigation.

CO4: have acquired expert legal skills of drafting, pleading and advocacy at a proficient level.

**SYLLABUS:**

<b>Module-I</b>	<p>Drafting</p> <ol style="list-style-type: none"> <li>1. General principles of drafting</li> <li>2. What are deeds and its kinds?</li> <li>3. Components of deeds</li> <li>4. Kinds of writs</li> </ol>
<b>Module-II</b>	<p>Pleadings</p> <ol style="list-style-type: none"> <li>1. What are pleadings?</li> <li>2. Functions of Pleadings.</li> <li>3. When Pleadings will be Dispensed with?</li> <li>4. Forms of modern pleadings</li> <li>5. Cardinal rules of pleadings</li> <li>6. Material facts.</li> </ol> <p>Civil Suits:</p> <ol style="list-style-type: none"> <li>1. Suits in contracts</li> <li>2. Suits in Torts</li> </ol>
<b>Module-III</b>	<p>Suits for others; i.r.t. civil: miscellaneous</p> <ol style="list-style-type: none"> <li>1. Written statements for contracts</li> <li>2. Written statement for torts</li> <li>3. Written statement for others (miscellaneous)</li> <li>4. Interlocutory Application</li> <li>5. Petition for the Winding up of the company</li> </ol>

<b>Module-IV</b>	<ol style="list-style-type: none"> <li>1. Affidavit</li> <li>2. Execution application for final decree</li> <li>3. Memo of appeal               <ol style="list-style-type: none"> <li>1) Memorandum of revision</li> <li>2) Writ of Certiorari</li> <li>3) Writ of Habeus Corpus.</li> </ol> </li> </ol>
<b>Module-V</b>	<p>Criminal</p> <ol style="list-style-type: none"> <li>1) complaints</li> <li>2) Application for exemption from appearance               <ol style="list-style-type: none"> <li>1. Bail Application</li> <li>2. Memo of appeal</li> <li>3. Memo of revision</li> </ol> </li> </ol>
<b>Module-VI</b>	<p>Conveyancing</p> <ol style="list-style-type: none"> <li>a. What is conveyancing ?</li> <li>b. Things to be considered while conveyancing</li> <li>c. Sale deed.</li> <li>d. Mortgages deed</li> <li>e. Lease deed</li> <li>f. Gift deed</li> </ol>
<b>Module-VII</b>	<p>Promisory Note</p> <ol style="list-style-type: none"> <li>1. Power of Attorney</li> <li>2. Will               <ol style="list-style-type: none"> <li>1) Separation deed</li> <li>2) Service contracts</li> <li>3) Hire-Purchase Agreements</li> <li>4) Patents</li> </ol> </li> </ol>

**REFERENCES:**

1. Pleading, Drafting and Conveyancing by R.N. Chaturvedi
2. The law of Pleadings, drafting and conveyancing by R.D. Srivastava law of pleadings in India by Mogha
3. Indian Conveyance by Mogha

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	3	3	2	2	3	3	3	2	3
CO 2	3	2	2	3	3	2	3	3	3	3	3
CO 3	3	3	3	2	3	3	3	3	3	3	3
CO 4	3	2	2	3	2	2	3	3	3	3	3



<b>BAL/BBL/BCL/BSL088A</b>	<b>LAW AND ORGANIZED CRIME</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO 1: Understand the development of law and organized crimes in context of Crime Cartels - Mumbai Underworld Cartels, International Cartels, State sponsored Crimes and International Crime syndicate

CO 2: Understand the menace of Drug Trafficking and narcotics substances IPC provisions - Narcotic Substances Act 1985

CO 3: Familiarize with the current problems prevailing in present times to keep students updated with the developments in the criminal field.

CO 4: Identify and analyze the challenges faced and lessons learned in these situations and how Investigating Bodies dealt with these scenarios

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction To Organised Crimes</b> Conception - reasons for Organized Crimes - Crime Cartels - Mumbai Underworld Cartels - International Cartels - State sponsored Crimes - International Crime syndicate
<b>Module-II</b>	<b>Drug Addiction</b> Drug Addiction - trafficking - narcotics substances - National and International Approaches to Drug Abuse - IPC provisions - Narcotic Substances Act 1985
<b>Module-III</b>	<b>Prostitution</b> Prostitution - Causes and concerns - International responses Prevention of Immoral Activities Act - IPC - Cyber prostitution - Internationalization of flesh trade
<b>Module-IV</b>	<b>Naxalite Activities</b> Collective Violence - Naxal problems - causes and concerns- tribal rebellion Dalit struggle - Atrocities - Telangana struggle

<b>Module-V</b>	<b>Violence Against Women</b> <ul style="list-style-type: none"> <li>➤ Domestic violence</li> <li>➤ Workplace violence - male dominated atrocities,</li> <li>➤ Communal violence in India,</li> </ul> background, reasons, solutions, problems in the Legal system-role of police and operation of criminal justice system - Godhra - finding of various commission
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#### REFERENCES:

1. U Baxi Dissent, Development and Violence' in R Meagher [Ed.]

Law and Social Change: Indo American Reflection 92 [1988]

2. U. Baxi [ed.] Law and Poverty: Critical Essays [1988]

3. R Desai [ed.] Peasant Struggles in India, [1979]

4. R Desai Agrarian Struggles in India: After Independence [1986]

5. R Desai Violation of Democratic Rights in India [1986]

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	2	2	2	3	2	3	3	3
CO 2	3	2	2	2	2	2	3	3	2	3	3
CO 3	3	3	3	2	2	3	3	3	2	3	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL089A</b>	<b>WHITE COLLOR CRIMES</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO1: Develop their ability to see the practical effects and make comparative analyses of White Collor Crimes.

CO2: Understand and critically examine growth of white collar crime in India and western countries.

CO3: Understand different types of White collar crimes prevalent in the society by way of different Statues.

CO4: Understanding the importance of Mens Rea and how it is different as regards to White Collor Crimes and Strict Liability in White Collor Crimes.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction to White Collor Crimes</b> Nature and Definition, Genesis of White Collar Crime, Nature and Scope of White Collar Crime
<b>Module-II</b>	<b>Development of White Collor Crime</b> Growth of White Collar Crime in India and Western Countries,
<b>Module-III</b>	<b>Requirement for White Collor Crime</b> Men-rea and White Collar Crime, Vicarious liability in White Collar Crime, Strict liability in White Collar Crime.
<b>Module-IV</b>	<b>Types of Organized Crimes</b> Statues dealing with White Collar Offences. ➤ The Essential Commodities Act, 1955: ➤ The Food Safety and Standards Act, 2006: Provisions relating to Food Articles.

	Implementation of the Act by Food Safety Officers. Food Safety and Standards Authority of India. Breach of Foreign Exchange Regulations(FEMA.)
<b>Module-V</b>	<b>Indian Scenario and Cyber Crimes</b> Indian Scenario, White Collar Crimes in Indian scenario, Corruption in government and politics, Black Money, Judicial response to white collar crimes in India, Cyber Crimes.

#### REFERENCES:

1. Gandhirajan, C K 2004, Organized crime, A P H Publishing Corporation
2. Nair, P M 2002, Combating Organized crime, Konark Publishers
3. Karan Raj, 2002, Dictionary of Terrorism and Bioterrorism, IVY Publishing House, Delhi.
4. V Grover, 2002, Encyclopedia of International Terrorism, Vol. 1,2 &3, Deep & Deep Publications, New Delhi.
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6. Holmes, Ronald M, 2001, Murder in America, Sage Publications, New Delhi.
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8. Kelly, Robert J, 2000, Encyclopedia of Organized Crime in the United States from Capone's Chicago to the New Urban Underworld, Greenwood Press, Westport. London.
9. Viano, Emilio C 2000 Global Organized Crime and International Security, Ashgate Publishing Limited
10. Situ, Yingyi, 2000, Environmental Crime: The Criminal Justice System, Role in Protecting the Environment, Sage Publications, New

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	3	2	3	3	2	2	3
CO 2	3	3	2	2	3	3	3	3	3	2	2
CO 3	3	2	2	2	3	3	3	3	2	3	3
CO 4	3	3	3	2	2	3	3	2	3	2	2

# SEMESTER X



<b>BAL/BBL/BCL/BSL043A</b>	<b>ALTERNATIVE DISPUTE RESOLUTION</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore meaning of disputes, kinds of arbitration, necessity of disputes resolution Alternatives to Judicial Process and history of Arbitration in India.

CO2: develop skills and styles of drafting arbitration clauses in an agreement.

CO3: be able to analyze foreign arbitral award and Conciliation proceedings such as appointment, Communication and Role of Conciliator.

CO4: be able to critically analyze the leading case-law pertaining to the Civil Procedure Code, 1908 [Section 89], Arbitration and Conciliation Act, 1996 and the Legal Services Authorities Act, 1987.

**SYLLABUS:**

<b>Module-I</b>	Meaning of dispute, Necessity of Dispute Resolution Mechanism of Dispute Resolution, ADRs and their impotence Alternatives to Judicial Process, Negotiation, Mediation, Compromise, Conciliation Arbitration, Lok Adalats, Panchayats Distinction between ADR & Judicial Dispute Resolution
<b>Module-II</b>	Historical background of Arbitration in India The Arbitration Act, 1940 & its short comings UNCITRAL Model Law Historical Background of Arbitration & Conciliation Act, 1996 Aims and objects of Arbitration and Conciliation Act, 1996
<b>Module-III</b>	Concept of Arbitration, Kinds of Arbitration, International Commercial Arbitration Arbitration Agreement, Essentials, Validity, Reference to Arbitration, Interim Measure by Court Arbitration Tribunal – Composition, Jurisdiction, Appointment Challenge to appointment, Powers Procedures and Court Assistance

<b>Module-IV</b>	<p>Conduct of arbitral proceedings</p> <p>Arbitral award-forms and contents, ground of validity of award</p> <p>Corrections and Interpretations, nature and contents of award. Form of award. Grounds of setting aside an award</p> <p>Finality of arbitral award</p> <p>Enforcement of an award</p> <p>Appeals and Revision, costs.</p>
<b>Module-V</b>	<p>Foreign Arbitral Award</p> <p>Enforcement of Foreign Awards</p> <p>New York convention, 1958</p> <p>Geneva Convention, 1928</p>
<b>Module-VI</b>	<p>Conciliation-appointment, Communication, Role of Conciliator</p> <p>Termination of Conciliation Proceedings</p> <p>Nature of Awards Costs.</p> <p>Conciliation proceedings in CPC</p> <p>Conciliation proceedings under Industrial Dispute Act</p> <p>Conciliation in Family Disputes</p>
<b>Module-VII</b>	<p>Legal Services Authorities Act</p> <p>Formation of Lok Adalats, Enforcement of Awards</p> <p>Role of NGOs in Dispute Settlement</p> <p>Settlement of International Disputes by Peaceful means.</p>

## REFERENCES:

### Judgments

1. Bombay Gas Company v. Parmeshwar Mittal, AIR 1998 Bom. 118
2. Tamil Nadu Electricity Board v. Bridge Tunnel Construction, AIR 1997 SC 1376
3. M/s ITI limited Allahabad v. Distt. Allahabad AIR 1998 All. 318
4. Grid Corporation of Orissa ltd. v. Indian Charge Chrome ltd. AIR 1998 SC 1761
5. Kulbir Singh Rattan Singh v. New Delhi Municipal Council, AIR 1998 Del 230
6. M.M.T.C. Ltd v. Sterlite industries Ltd., AIR 1997 SC 605
7. K.K. Modhi v. K.N. Modhi, AIR 1998 SC 1297



8. Indian Oil Corporation Ltd. v. Kiran Construction Co., AIR 2003 Del. 282
9. Oil and Natural Gas Commission v. Saw Pipes, AIR 2002 SC 2629
10. NTPC v. Singer Company, AIR 1993 SC 998

#### **Books Referred**

1. Law of Arbitration and Conciliation – S.K. Roy Choudhary, H.K. Saharay
2. Arbitration & Conciliation – S.C. Tripathi
3. Alternative Dispute Redressal System – S.R. Maini
4. Law of Arbitration P.M. Bakshi
5. Arbitration & Conciliation - Avtar Singh
6. The Arbitration & Conciliation Act, 1996
7. The Legal Services Authorities Act, 1987

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 3	3	3	3	2	2	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL053A</b>	<b>LAW OF PROPERTY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: have an understanding of concept, meaning and kinds of property and legislative schemes of law of Property.

CO2: be able to understand the rules related to transfer of immovable property and analyze the different types of transfers

CO3: be able to analyze and evaluate the rules governing Mortgages, Leases, Exchanges, Gift and Actionable Claims rights and liabilities of transferor and transferee

CO4: be able to analyze Benami Transactions Act and latest Amendments.

**SYLLABUS:**

<b>Module-I</b>	Concept and Meaning of property Scope, Object and Scheme, Kinds of property: Movable, Immovable property, Tangible and Intangible, Intellectual Property: copyright, patents, designs and trademarks
<b>Module-II</b>	Law relating to registration of documents affecting property relations, Documents of which registration is compulsory.
<b>Module-III</b>	Transfer of Property Act 1882: Attestation, Notice, Actionable Claim, Transfer of Property, What may be transferred, Persons competent to transfer, Operation of transfer, Oral transfer, Conditions restraining Alienation, Enjoyment. Transfer for the benefit of unborn person, Direction for accumulation, Vested and Contingent interest, Conditional Transfers. Condition precedent, Condition subsequent and Collateral conditions.
<b>Module-IV</b>	Doctrine of Election, Doctrine of lis pendens, Fraudulent Transfer,

	<p>Doctrine of part performance.</p> <p>Sale: Definition, Rights and Duties of seller and buyer.</p>
<b>Module-V</b>	<p>Lease: Definition, Duration, lease making,</p> <p>Right and Liabilities of lessor and lessee,</p> <p>Determination of lease, Waiver of forfeiture, Waiver of notice to quit,</p> <p>Relief against forfeiture for non-payment of rent and in, certain other cases,</p> <p>Effect of holding over,</p> <p>Exemption of leases for agriculture purposes.</p>
<b>Module-VI</b>	<p>Mortgage: Kinds, Mortgage by assurance,</p> <p>Rights and liabilities of mortgagor and mortgagee,</p> <p>Marshalling,</p> <p>Contribution and Charge,</p> <p>Person who may sue for redemption,</p> <p>Subrogation,</p> <p>Gift: Definition, Suspension or Revocation, Onerous Gift.</p> <p>Easement: Definition, Types, Creation, Suspension,</p> <p>Revival. Licenses: Creation, Suspension, Transfer and Revocation</p>
<b>Module-VII</b>	Benami Transactions Act and latest Amendments.

#### REFERENCES:

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2. Mulla, Transfer of Property Act, 11<sup>th</sup> Ed., Universal, Delhi, 2013.
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4. Shukla, SN., Transfer of Property Act, 26<sup>th</sup> Ed., Allahabad Law Agency, Allahabad, 2015.
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MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	2	1	3	1	3	3	3	3	2	3
CO 3	3	3	3	2	3	3	3	3	3	1	3
CO 4	3	3	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL074A</b>	<b>ENVIRONMENTAL LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this subject, the student will:**

CO1: be able to develop understanding about the importance of environmental law throughout the world in recent times.

CO2: be able to address varieties of areas such as reducing air pollution and maintain air quality, water quality, waste management, etc.

CO3: be made aware of notable laws and conventions in environment law in recent times.

CO4: have a career as environmental lawyer in different sectors such as Governments, NGOs, International Organizations, consultant in environmental policy and law, etc.

**SYLLABUS:**

<b>Module-I</b>	Meaning and contents of environment Pollution: Meaning, Kinds and effects of pollution International regime
<b>Module-II</b>	Constitutional remedies : Fundamental rights, 42 <sup>nd</sup> amendment Polluter pays principles, precautionary principles, public trust doctrine, sustainable development Other Common law and statutory remedies
<b>Module-III</b>	<b>Environment Protection Act 1986:</b> -Object, section 1 to 10 -Section 10 to 26
<b>Module-IV</b>	<b>The Water (Prevention and Control of Pollution) Act, 1974:</b> Object, Definitions, constitution and functioning of boards under the Act, Prevention and Control of Water Pollution -Funds, Accounts -Penalties and Procedure -Central Water Laboratory -Power of Central Government and State Government to make rules
<b>Module-V</b>	<b>The Air (Prevention and Control of Pollution) Act 1981</b> Object, Definitions, constitution of Boards, powers and functions



	-Prevention and Control of Air Pollution, Air laboratory, penalties and procedure, power of central. -government and state government to make rules.
<b>Module-VI</b>	<b>The Wild Life Act 1972</b> -Need to conserve wild life -Definitions, constitution of National and state board for wild life -Grant of permits, protected area sanctuary
<b>Module-VII</b>	Advisory Committee, Reserve management committee, National park, Central Zoo authority -Offences and penalties under the Act -Noise Pollution

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1. Vellore Citizens' Welfare Forum v. Union of India (1996) 5 SCC 647
2. Municipal Council Ratlam v. Vardhichand, AIR 1980 SC 1622
3. M.C. Mehta v. Union of India & ors (1992) 1 SCC 358
4. U.P. Pollution Control Board v. Modi Distillery and ors., AIR 1988 SC 1128
5. Church of god (Full Gospel) v. K.K.R. Majestic Colony Welfare Association & ors., AIR 2000 SC 2773
6. D.D. Vyas & ors. v. Shriram Food and Fertilizers and Union of India, AIR 1987 SC 965
7. R. L&E. Kendra, Dehradun v. State of U.P., AIR 1985 SC 652
8. M.C. Mehta v. Kamal Nath, (1997) 1 SCC 599

### Suggested Readings:

1. Paras Diwan and Piyushi Diwan, Environmental Administration, Law and Judicial Attitude
2. P.S. Jaswal, Environmental Law
3. R.B. Singh & Suresh Mishra, Environmental Law in India
4. P. Leelakrishna, The Environmental Law in India
5. N.Maheshwari, Text Book on Environmental Law
6. S.C. Shastri, Environmental Law

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	3	2	3	3	3		2	3
CO2	3	3			3	3	3	3	1		3
CO3	3	3	1	2	3	3	3	3	3	2	3
CO4	3	3	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL076A</b>	<b>IPR IN PHARMA INDUSTRY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to grasp the important role of IPR in Pharma Industry.

CO 2: be able to understand the types of IPR which are involved in pharmaceutical companies.

CO 3: be able to apply legal framework in clinical trials and be able to protect the vulnerable people of Country.

CO 4: acquire skills to draft claims involved in IPR violation and in search of patent.

**SYLLABUS:**

<b>Module-I</b>	<b>MODULE 1-Introduction to IPR and Pharmaceutical Industry</b> a) Stages of drug development b) Economics of drugs development c) Patent d) Trademark e) Confidential Information f) Data Exclusivity g) Trade Secret
<b>Module-II</b>	<b>Pharmaceutical Innovation and Patent Protection,</b> a) Patenting pharmaceutical-International b) Patenting pharmaceutical-India
<b>Module-III</b>	<b>Clinical Trials- International</b> a) International guidelines b) Cross- Border clinical trails
<b>Module-IV</b>	<b>Clinical Trials- India</b> a) Indian Scenario b) Legal framework c) Role of Institutional Ethics Committee d) Prior Informed consent e) Protection of the vulnerable population
<b>Module-V</b>	<b>Access to Medicine</b>



	a) Historical view b) Public health needs and doha declaration c) TRIPS Plus
<b>Module-VI</b>	<b>Product Liability and Patent Search Analysis.</b> a) Mishaps in Pharmaceutical company b) Guidelines for examination of patent application
<b>Module-VII</b>	Search of patent Drafting claims

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	2	3	3	3	2	3
CO 2	3	2	2	1	3	2	3	3	1	3	3
CO 3	3	3	3	2	2	3	3	3	2	2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL077A</b>	<b>FOREIGN TRADE (INTERNATIONAL TRADE LAW)</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand structure of International Trade laws.

CO2: be able to grasp fundamentals of international sale contracts regulations.

CO3: be familiar with the major recent developments in the world trading system, and be able to critically analyze key issues raised both by the current round of WTO negotiations and by the spread of regional trading arrangements.

CO4: have acquired skills to analyze functions of International Financial Institutions and be able to explore Meaning, Characteristics and trends in Multi National Enterprises (MNEs) and Foreign Direct Investment.

**SYLLABUS:**

<b>Module-I</b>	<p>Introduction to International Trade Law</p> <ul style="list-style-type: none"> <li>a) International Law and International Economic Relations</li> <li>b) Development of International Trade law – Ancient, Medieval and Modern</li> <li>c) Structure &amp; characteristics of International Trade</li> <li>d) Legal Relationships in International Trade</li> <li>e) International Business and Globalization</li> <li>f) Free Trade and Fair Trade</li> <li>g) Codification and development of International Trade Law by the League of Nation and the United Nations.</li> </ul>
<b>Module-II</b>	<p>International Trade and Financial Institutions</p> <ul style="list-style-type: none"> <li>a) The Nature and Characteristics of International Institutions.</li> <li>b) The Bretton Woods Conference and Establishment of IMF and IBRD</li> <li>c) Promotion of Currency Stability: Role of IMF, Regional Financial Crisis &amp; the Contribution of the IMF to International Trade</li> <li>d) Mobilization of International Capital: The Role of the IBRD</li> <li>e) Structure and Functioning of IBRD</li> <li>f) Constituents of the IBRD</li> <li>g) International Finance Corporation (IFC)</li> </ul>

	<ul style="list-style-type: none"> <li>h) International Development Association (IDA)</li> <li>i) International centers for Settlement of Investment Disputes (ICSID)</li> <li>j) Multilateral Investment Guarantee Agency (MIGA)</li> </ul>
<b>Module-III</b>	<p>Institutional Environment</p> <ul style="list-style-type: none"> <li>a) Pre WTO Scenario, Difference between GATT and WTO</li> <li>b) GATT- WTO –Institutional Structure</li> <li>c) Trade Related Institutions- WTO and UNCTAD</li> <li>d) WTO- Basic Principles, various agreements, Functions and Areas of operations, Dispute Settlement Mechanism (rules and procedures)</li> <li>e) Pillars of GATT <ul style="list-style-type: none"> <li>i) Most Favored Nation Treatment</li> <li>ii) Tariff Bindings</li> <li>iii) National Treatment</li> <li>iv) Non- Tariff Barriers</li> </ul> </li> <li>f) GATT and Free Trade Agreements (FTA) and Referential Rules of Origin, Market Access, and Beyond.</li> <li>g) Anti- Dumping and Countervailing Laws, Dumping Margin Determination.</li> </ul>
<b>Module-IV</b>	<p>Multi National Enterprises (MNEs) and Foreign Direct Investment</p> <ul style="list-style-type: none"> <li>a) Meaning and Characteristics</li> <li>b) Role of MNEs in host economy</li> <li>c) Trends in GloBCL FDI</li> <li>d) Issues in MNEs- Taxation, Restrictive Trade Practices, Currency, Jurisdiction and Technology Transfer.</li> </ul>
<b>Module-V</b>	<p>International Sale Contract</p> <ul style="list-style-type: none"> <li>a) Historical Overview of the Regulation of International Sale Contract.</li> <li>b) United Nation Convention on Contracts for the International Sale of Goods (CISG).</li> <li>c) Definition and Nature of International Sale Contract.</li> <li>d) International Commercial trade terms-INCOTERMS</li> <li>e) UNIDROIT principles of International commercial contracts</li> </ul>

<b>Module-VI</b>	International Carriage of Goods a) Carriage of Goods by Sea b) Carriage of Goods by Air c) Carriage of Goods by Road d) Combined Transport
<b>Module-VII</b>	Payment in International Transactions a) Documentary Credits. b) Uniform Customs and Practice of Documentary Credits. c) Doctrine of Strict Compliance and the Independence principle in Documentary Credits.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	2	3	3	1	2	3
CO 2	3	2	2	3	3	2	3	3	3	2	3
CO 3	3	3	3	2	2	3	3	3	1	2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL078A</b>	<b>IPR AND BIO DIVERSITY PROTECTION</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to explore salient features, scope, and general overview of biological diversity.

CO2: be able to analyze bio privacy, regulatory regime of access to biological diversity and international conventions on biotechnology and intellectual property rights.

CO3: be able to examine technology transfer on IPR and Comparative approaches to the IPR biodiversity linkage, Current Ideas, Approaches and Activities.

CO4: be able to explore the current regime for Access to Genetic Resources, 1992 Report

**SYLLABUS:**

<b>Module-I</b>	Introduction and overview of Biological Diversity; Meaning and scope of Biological Diversity; Biological resources and traditional knowledge; Salient features of Biological Diversity Act; Biological Diversity concerns and issues;
<b>Module-II</b>	Bio piracy; Regulation of access to Biological Diversity; National Biodiversity Authority; Functions and powers of Biodiversity Authority; State Biodiversity Board; Biodiversity Management Committee and its functions
<b>Module-III</b>	Analysis of the biodiversity convention: biotechnology and intellectual property rights, History and General Scope of the Biodiversity Convention, The provisions concerning intellectual property right, Intellectual property rights on life form, From common heritage to national sovereignty and common concern, IPR- technology transfer and access to genetic resources
<b>Module-IV</b>	IPRs and technology transfer: Article 16(5), the recorded views of participant



	countries, Conclusions on the Convention and Intellectual Property Protection, Indigenous and local community knowledge and IPRs
<b>Module-V</b>	Related activity within the Biodiversity Convention and Secretariat since 1992
<b>Module-VI</b>	Comparative approaches to the IPR/ biodiversity linkage, Current Ideas, Approaches and Activities, Proposed Block of Access, Proposed Amendments to the Patent Act
<b>Module-VII</b>	Current Regime for Access to Genetic Resources, 1992 Report ,

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	3	2	2	3	3	1	2	3
CO 2	3	3	2	1	3	2	3	3	2	3	3
CO 3	3	3	3	2	1	3	3	3	1	2	3
CO 4	3	3	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL079A</b>	<b>INVESTMENT LAWS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student should:**

CO1: be able to explore the evolution, nature and growth of investment law and multi regulation of Foreign Investment.

CO2: be able to understand complete overview of bilateral investment treaties.

CO3: be able to address the issues arising in international investment law and analyze disputes settlement mechanism and Regulatory Regime for Investments in India

CO4: be able to develop skills related to drafting and case study in area of investment law.

**SYLLABUS:**

<b>Module-I</b>	Introduction to Investment Law a) Nature b) Sources c) Evolution
<b>Module-II</b>	Multilateral Regulation of Foreign Investment a) Investment regime – International and Regional b) MNCs as a regulatory challenge
<b>Module-III</b>	Bilateral Investment Treaties a) Rationale b) Structure c) Merits and Demerits
<b>Module-IV</b>	Dispute Settlement in International Investment Law a) Fair & equitable standard of Treatment b) Most Favoured Nation (MFN) c) National Treatment d) Full protection & security e) Expropriation f) Exhaustion of local remedies
<b>Module-V</b>	Investment Law and Human Rights a) Human rights b) Labour c) Environment d) Socially Responsible Investment (SRI)
<b>Module-VI</b>	Regulatory Regime for Investments in India

	a) Regulatory Phases b) From regulation to management of FOREX c) FDI d) Tax e) Human Rights f) Labour g) Environment h) Transfer of Technology
<b>Module-VII</b>	Case Studies Drafting of agreements

#### REFERENCES:

1. Agrawal S and Baby RJ, *SEBI Act* (Taxmann 2011)
2. Kannan S and Geetha V, *FDI in India: Law, Policy and Procedure* (Thomson Reuters 2014)
3. Kaushik L, *Unfair Trade Practices in Securities Market* (Taxmann 2013)
4. Mishra B, *Law Relating to Insider Trading* (Taxmann 2015)
5. Sornarajah M, *The International Law on Foreign Investment* (Cambridge University Press 2010)
6. Subedi SP, *International Investment Law: Reconciling Policy and Principle* (Hart Publishing 2016)
7. Taneja R, *Foreign Direct Investment and Globalisation* (Eastern Book Company 2014)

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	2	3	3	3	2	3
CO 2	3	3	2	3	3	2	3	3	3	1	3
CO 3	3	3	3	1	2	3	3	3	2	2	3
CO 4	3	2	2	3	2	2	3	3	1	3	3



<b>BAL/BBL/BCL/BSL081A</b>	<b>PROFESSIONAL ETHICS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student should:**

CO1: be able to understand importance of professional ethics in order to promote the respect for lawyers in the society.

CO2: have developed skill of attracting clients and a sense of professional responsibility towards their clients.

CO3: be able to handle future problems of advocacy.

CO4: be able to apply new information technology in legal profession.

**SYLLABUS:**

<b>Module-I</b>	Professional conduct of a lawyer Professional conduct Professional misconduct
<b>Module-II</b>	Professional responsibility of advocates Conduct of advocate in general Arguments in appeals and revisions
<b>Module-III</b>	Skill of attracting clients Persuasion through arguments
<b>Module-IV</b>	Preparation of brief Future problems of advocacy
<b>Module-V</b>	Fee structure Maintaining accounts of clients fee
<b>Module-VI</b>	Contempt of courts and lawyers Strikes, protests and demonstrations by legal professions
<b>Module-VII</b>	Information technology and legal profession Advocates and political activities

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	2	3	3	3	2	3
CO 2	3	3	2	3	2	3	3	3	1	3	3
CO 3	3	3	3	2	2	3	3	3	2	2	3
CO 4	3	2	1	3	2	2	3	3	2	1	3

<b>BAL/BBL/BCL/BSL090A</b>	<b>INTERNATIONAL CRIMINAL LAW AND TRANSNATIONAL CRIME</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO1: Identify the philosophical and sociological reasoning behind the International Criminal.

CO2: Critically evaluate the different categories of Crimes and treaties relating to transnational crimes in the global arena.

CO3: Identify the lacunae and problems existing in the present and proposed legislative framework.

CO4: Respond to factual and legal issues relating to Drug trafficking, Counterfeiting, Money Laundering and environmental crimes etc.

**SYLLABUS:**

<b>Module-I</b>	<b>International criminal law Development</b> i. The substantive international law a. The concept of an international crime b. Crimes under general international law (i): general c. Crimes under general international law (ii): imposing responsibility d. Crimes under general international law (iii): excluding responsibility e. Treaty crimes (i): general f. Treaty crimes (ii): focus on treaty-based responses to terrorism
<b>Module-II</b>	<b>Role of ICC and Jurisdiction</b> ii. The role of the International Criminal Court and jurisdiction –The Rome Statute a. The crime of aggression b. Genocide c. Crimes against humanity d. War crimes e. Terrorism and transnational crimes iii. The objectives and policies of international criminal law; including issues of amnesty, truth and justice iv. Various International criminal tribunals v. Emerging issues in international criminal law
<b>Module-III</b>	<b>Transnational Crimes</b> i. Definition and Scope ii. Characteristics of Transnational crime iii. Types of Transnational crime

	iv. Causes of Transnational crime a. Criminal Intent and mens-rea in such crimes b. Modus operandi of Transnational crime 2. Classification of Transnational Crimes A. International Perspective i. Drug Trafficking as Transnational Crime ii. Trafficking of Weapons iii. Counterfeit of Goods iv. Trafficking of Persons and Smuggling of Migrants v. Money Laundering vi. Terrorism vii. Environmental Crimes
<b>Module-IV</b>	<b>Laws relating to Transnational Crime</b> i. Organised crime and United Nations, ii. The UN Convention on transnational and organised crime iii. Naples Declaration and Global Action Plan 24 Dec. 1994 iv. United Nations Conventions Against Organized Crime, 2000
<b>Module-V</b>	<b>Prevention, control and correctional strategies</b> i. Extradition Act 1962 (Relevant Provisions) and Extradition Treaty ii. International investigative agencies (Interpol etc), Adjudication authorities (including ad hoc and permanent criminal tribunals), iii. Role of Police in Investigation of organized crime iv. Role of Judiciary, Trial and Sentencing in organized crime v. Profiles of Criminal Gang / Investigation and Prosecution.

#### REFERENCES:

1. The International Criminal Court: Challenges to Achieving Justice and Accountability in the 21st Century by Mark S. Ellis; Richard J. Goldstone. International Debate Education Association, 2008
2. An Introduction to International Criminal Law and Procedure Paperback –June 28, 2010 by Robert Cryer, Hakan Friman, Darryl Robinson
3. International Criminal Law: Cases and Commentary (Paperback) By (author) Antonio Cassese, By (author) Guido Acquaviva, By Mary De Ming Fan, Alex Whiting
4. An Introduction to Transnational Criminal Law (Paperback) by Neil Boister
5. The International Criminal Court: A Commentary on the Rome Statute (Oxford Commentaries on International Law) By William A. Schabas
6. An Introduction to the International Criminal Court By William A. Schabas

7. International and Transnational Criminal Law by David Luban , Julie R. O'Sullivan, David P. Stewart
8. From Nuremberg to the Hague: The Future of International Criminal Justice, Philippe Sands., Cambridge University Press, 2003
9. Transnational Organized Crime-An Overview from Six Continents by Jay Albanese, Philip Reichel
10. Transnational Organized Crime: A Commentary on the United Nations Convention and its Protocols (Oxford Commentaries on International Law) Hardcover –May 17, 2007 by David McClean, Oxford University Press (May 17, 2007)
11. Handbook of Transnational Crime and Justice by Jay Albanese, Philip Reichel, Sage Publication

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	3	2	3	3	2	3	3
CO 2	3	3	3	3	2	3	3	2	3	3	3
CO 3	3	3	3	2	2	2	3	3	2	3	3
CO 4	3	2	2	3	3	3	3	2	2	3	2



<b>BAL/BBL/BCL/BSL091A</b>	<b>COMPARATIVE CRIMINAL LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO1: Develop their ability to see the practical effects and make comparative analyses of different sets of regulations within the complex field of comparative criminal law.

CO2: Understand basic principles of different types of crimes in the international jurisdictions.

CO3: Critically examine and analyze different legal institutions and hierarchy of criminal courts and their jurisdiction power and functions of police and judicial officers

CO4: Gain important skills in evaluating sources, researching, writing, normative analysis of text regarding accusatorial and inquisitorial systems prevailing in different countries.

**SYLLABUS:**

<b>Module-I</b>	<b>Principles of legality</b> Classification of offences – kinds of punishments – general defense (infancy, insanity consent, necessity and private defense) – abetment and attempt, recidivism and euthanasia.
<b>Module-II</b>	<b>Types of Offences</b> Culpable homicide and murder – rape and unnatural offences – theft and robbery – defamation – offences relating to marriage.
<b>Module-III</b>	<b>Courts and Police</b> Hierarchy of criminal courts and their jurisdiction – police: power and functions- judicial officer in investigation- prosecuting agencies- role of public prosecutor.
<b>Module-IV</b>	<b>Law of arrest and procedure</b> Rights of arrested and accused – evidentiary value of statements – bail procedure – sentencing process.
<b>Module-V</b>	<b>Accusatorial and inquisitorial system</b> presumption of innocence - types of trial – speedy justice – role of judge, prosecution and defense attorney during trial- victim's role in penal process –

	plea bargaining – appeal procedure – legal aid – public participation in criminal justice.
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#### REFERENCES:

1. Substantive Criminal Law
2. R.V. Kelkar – Criminal Procedure Code, 1973
3. Devlin – Criminal Prosecution in England
4. Esmein – History of Continental Procedure (Chapter I & II)
5. Coffey (Alam) – An Introduction to Criminal Justice System and Process
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7. 14th & 41st Report of the Law Commission of India
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MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	3	2	3	3	2	3	3
CO 2	3	3	3	2	2	3	3	3	2	3	2
CO 3	3	3	2	2	3	3	3	3	3	2	3
CO 4	3	3	2	3	2	2	3	3	2	3	3

# SEMESTER III



<b>BAL/BBL/BCL/BSL013A</b>	<b>CONSTITUTIONAL LAW- I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore the meaning, nature and features of Indian Constitution and historical background of making of the constitution.

CO2: be able understand emerging complex issues related to equality and social justice.

CO3: be able to analyze fundamental rights of citizens including legal persons and their scopes and limitations.

CO4: be able to examine various theories of secularism, directive principles of state policy and methods of constitutional amendments.

**SYLLABUS:**

<b>Module-I</b>	<ul style="list-style-type: none"> <li>a. Indian Constitution in the making</li> <li>b. Nature and Special features of the Constitution.</li> <li>c. Citizenship of India</li> </ul>
<b>Module-II</b>	<b>Equality and Social Justice</b> <ul style="list-style-type: none"> <li>a. Equality before the law and equal protection of laws</li> <li>b. Classification for differential treatment: constitutional validity</li> <li>c. Justice to the weaker sections of society: scheduled castes, scheduled tribes and other backwards class, women and children.</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>(a)Speech and expression               <ul style="list-style-type: none"> <li>ii. Media, press and information</li> </ul> </li> <li>(b)               <ul style="list-style-type: none"> <li>i. Freedom of speech and contempt of court</li> <li>ii. Freedom of assembly</li> </ul> </li> </ul>
<b>Module-IV</b>	<ul style="list-style-type: none"> <li>(a) Right to life and personal liberty: meaning, scope and limitations</li> <li>(b)               <ul style="list-style-type: none"> <li>i. Rights of an accused-double jeopardy, self-incrimination and retroactive punishment</li> <li>ii. Preventive detention-constitutional policy</li> </ul> </li> </ul>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>(a)               <ul style="list-style-type: none"> <li>i. Concept of Secularism : historical perspective</li> <li>ii. Indian constitutional provisions relating Secularism</li> </ul> </li> <li>(b)               <ul style="list-style-type: none"> <li>i. Freedom of religion and its scope</li> </ul> </li> </ul>

	ii. Religion and the State : its limitations and minority rights
<b>Module-VI</b>	(a) i. Directive Principles-directions for social change-A new social order. ii. Fundamental Rights and Directive Principles, inter-relationship-judicial Balancing. (b) i. Constitutional amendments-to strengthen Directive Principles. ii. Reading Directive Principles into Fundamental Rights.
<b>Module-VII</b>	(a) i. Methods of Constitutional amendments ii. Limitations upon constitutional power of amendments (b) i. Development of the basic Structure : Doctrine ii. Judicial activism and its Restraint

#### REFERENCES:

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2. Dr. J.N. Pandey 2006
3. Dr. D.D. Basu, Shorter Constitution of India
4. Dr. Seervai Constitution of India (1992) Vol. I/II/III
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#### Judgments

1. S.R. Bommai v. UOI, AIR 1994 SC 1918
2. S.P. Gupta v. UOI, AIR 1982 SC 1991
3. Sunil Batra v. Delhi Administration
4. Keshvanand Bharti v. State of Kerala, AIR 1995 SC 2299
5. Minerva Mills Ltd. v. UOI, Air 1980 SC 1789
6. Hasinara Khatoon v. Home Secretary State of Bihar, 1979 SC 136
7. A.K. Gopalan State of Madras, AIR 1950 SC 27
8. Sachidanand v. State of West Bengal, AIR 1987 SC 1109
9. Rural Litigation and Entitlement Kendra v. State of UP
10. T.M.A. Pai Foundation v. State of Karnataka
11. M.C. Mehta v. UOI(1987) ISCC 395 AIR 1987 1086
12. Rudul Shah v. State of Bihar, AIR 1983 SC 1086

13. *Bikunthnath v. C.D.M.O.*, AIR 1992 SC 1368
14. *Indra Gandhi v. Raj Narain*, AIR 1995 SC 2299
15. *P&O Stream Navigation Co. v. UOI*, AIR (1997) ISCC
16. *People Union Civil Liberties v. UOI*, AIR (1997)ISCC
17. *Air India v. Nargesh Mirza*, AIR 1981 SC 1829
18. *Ummikrishnan v. State of A.P.*, AIR 1993 SC 2178
19. *Indira Sawheny v. UOI*, AIR 1993 SC 2178
20. *Maneka Gandhi v. UOI*, AIR 1978 SC 1789
21. *I.R. Coolho (Dead) Through L.R.S. v. State of Tamil Naidu &ors.* 2007 SC 137
22. *Raja Ram Pal v. The Hon'ble Speaker Loksabha and Ors.*
23. *Kehar Singh v. State* (1989)
24. *DhanjayaChaterjee v. State West Bengal*, AIR 2004.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMNET OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	3	3	2	3	3	3	3	3
CO 2	3	3	2	3	2	3	3	3	2	2	3
CO 3	3	3	3	2	2	2	3	3	3	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3

<b>BCL021A</b>	<b>FINANCIAL ACCOUNTING</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: have knowledge of financial statements, depreciation, and its various techniques

CO2: be able to understand interrelationship of various fields with accounting.

CO3: be able to gain knowledge of Accounting standards, concepts and conventions.

**SYLLABUS:**

<b>Module-I</b>	Meaning and nature of accounting, Scope of financial accounting, Interrelationship of Accounting with other disciplines,
<b>Module-II</b>	Branches of Accounting, Accounting concepts and convention, accounting standards in India.
<b>Module-III</b>	Journal, Rules of Debit and Credit, Sub Division of Journal: Cash Journal, Petty Cash Book, Purchase Journal, Purchase Return, Sales Journal, Sales Return Journal, Ledger, Trial Balance
<b>Module-IV</b>	Preparation of Final Accounts, Profit & Loss Account, Balance Sheet- Without adjustments and with adjustments.
<b>Module-V</b>	Meaning of Inventory, Objectives of Inventory Valuation, Inventory Systems
<b>Module-VI</b>	Methods of Valuation of Inventories-FIFO, LIFO and Weighted Average Method, Concept of Deprecation
<b>Module-VII</b>	Causes of Depreciation, Meaning of Depreciation Accounting, Method of Recording depreciation, Methods of Providing Depreciation.

**REFERENCES:**

1. Maheshwari, S.N. and Maheshwari, S. K., (2009) An Introduction to Accountancy, Eighth Edition, Vikas Publishing House.
2. Tulsian, P.C., (2009) Financial Accountancy, 2nd edition, Pearson Education.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	2	2	3	3	3		1	3
CO 2	3	2	2	1		2	3	3	1	2	3
CO 3	3	3	2		2	2	3	3			3



<b>BAL/BBL/BCL/BSL023A</b>	<b>FRENCH LANGUAGE -I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understanding of Identity through Language and Construct simple sentences in French using accurate rudiments of syntax and grammar.

CO2: be able to express him/herself effectively and accurately in simple French about him/herself and his/her surroundings

CO3: be able to pronounce French reasonably well and demonstrate an elementary knowledge of French sentence structure through speaking and writing

CO4: develop understanding short dialogue in french.

**SYLLABUS:**

<b>Module-I</b>	<ul style="list-style-type: none"> <li>a. The alphabet</li> <li>b. The accents</li> <li>c. Elision</li> <li>d. Liason</li> <li>e. To spell one's name</li> <li>f. Numbers 1-10</li> <li>g. subject Pronouns</li> <li>h. verbs: être and s'appeler</li> <li>i. To present oneself</li> <li>j. Greet someone</li> <li>k. To take leave</li> <li>l. Understand a short dialogue [salutation]</li> </ul>
<b>Module-II</b>	<ul style="list-style-type: none"> <li>a. Definite articles</li> <li>b. Nationalities and Professions</li> <li>c. Numbers 11 – 69</li> <li>d. verbs : avoir, habiter, apprendre</li> <li>e. Understand short dialogues in which one talks about oneself [2]</li> <li>f. Filling up un official form</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>a. Indefinite articles</li> <li>b. Interrogation using “est-ceque..?” [oui / non ]</li> <li>c. Negation</li> <li>d. Interrogation using “quel, où?</li> <li>e. Numbers after 70</li> <li>f. Understand short dialogues in which one present oneself [3]</li> <li>g. To ask someone to present himself</li> </ul>

<b>Module-IV</b>	<ul style="list-style-type: none"> <li>a. Possessive Adjectives [1]</li> <li>b. Verbs : aimer, adorer, préférer, detester [verbs ending -er]</li> <li>c. Hobbies [faire du / de la]</li> <li>d. Understand a short dialogues in which one talks about ones' likes and dislikes</li> <li>e. To speak about ones likes and dislikes</li> </ul>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>a. Interrogation using "Qui, Qu'est-ce que? [C'est..]</li> <li>b. On = Nous</li> <li>c. Writing a short letter : starting and ending a letter</li> <li>d. Understanding a short letter giving information about oneself</li> <li>e. To write a short letter informing about oneself</li> </ul>
<b>Module-VI</b>	<ul style="list-style-type: none"> <li>a. Months of the year, seasons, expressions with "avoir"</li> <li>b. Interrogation using "Quand"</li> <li>c. Verbs :aller, pouvoir, vouloir</li> <li>d. Making polite requests</li> <li>e. Activities during vacations</li> <li>f. Recent past</li> <li>g. Near future</li> <li>h. Nouns [plurals]</li> <li>i. Understand / write a short letter talking about one's vacation</li> </ul>
<b>Module-VII</b>	<ul style="list-style-type: none"> <li>a. Pronom Tonique</li> <li>b. Telling / asking the time</li> <li>c. Making an appointment</li> <li>d. Verbs : venire, sortir, connaître, savoir</li> <li>e. Inviting a friend</li> <li>f. Accepting / refusing an invitation</li> </ul>

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	3	2	3	3		1	3
CO 2	3	3	2	1	2	2	3	3	1		3
CO 3	3	3	1	2	3	2	3	3	1	1	3
CO 4	3	3	2	3	2	2	3	3	2	2	3

<b>BAL/BBL/BCL/BSL049A</b>	<b>CODE OF CRIMINAL PROCEDURE- I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: have understanding of important definitions provided in Code of Criminal Procedure and constitution of courts.

CO2: be able to examine the stages in investigation and procedure of trial in criminal cases.

CO3: be able to explain the power, functions and duties of police officer and criminal courts

CO4: be able to employ and promote adoption of just and humane practices in criminal justice system.

**SYLLABUS:**

<b>Module-I</b>	Constitution of Criminal Courts and their Powers.
<b>Module-II</b>	Arrest of Persons and the Rights of Arrested Persons, Information to the Police and their Powers to Investigate.
<b>Module-III</b>	Cognizance of Offences by the Magistrate and Court of Sessions, Complaints to Magistrates Commencement of Proceedings before Magistrates.
<b>Module-IV</b>	The Charges:(a)Forms of Charges(b) Joinders of Charges
<b>Module-V</b>	Trials of the Cases: Sessions Trial
<b>Module-VI</b>	Trials of the Cases Warrant Trial (i) Cases Instituted upon a Police Report (ii) Cases Instituted Otherwise than on a Police Report (iii) Conclusion of Trial.
<b>Module-VII</b>	Trials of the Cases Summons Trial by Magistrates, Summary Trial

**REFERENCES:**

1. Rattan Lal &Dhirajlal – The Code of Criminal Procedure
2. R.V. Kelkar – Code of Criminal Procedure
3. S.N. Mishra – Code of Criminal Procedure, 1973
4. Ganguly – Criminal Court Practice and Procedures



5. D DBasu, Criminal Procedure Code, 1973

6. BatukLal's Commentary on the Code of Criminal Procedure, 1973

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2	1	3	2	3	3	3	1	3
CO 2	3	3	3	2	2	3	3	3	3	3	3
CO 3	3	2	3	2	3	1	3	3	2	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3

<b>BAL/BBL/BCL/BSL050A</b>	<b>LAW OF CRIMES- I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand substantive criminal law as distinguished from procedural law.

CO2: be able to identify the key elements of crimes in given factual situations and stages of crimes.

CO3: be familiar with the provisions of general exceptions, the abetments and the conspiracy provided in Indian penal code.

CO4: acquire the research skills in areas of laws including the theories of punishment and punishment provided under IPC and be able to use full range of legal sources to identify the controversial issues in it.

**SYLLABUS:**

<b>Module-I</b>	Introduction to Substantive Criminal Law: Extent and operation of the Indian Penal Code.
<b>Module-II</b>	Definition of crime, Fundamental elements of crime.
<b>Module-III</b>	Stage of a crime; Intention, Preparation, Attempt, Commission. Essentials of the attempt, impossible attempt, attempt and preparation distinguished
<b>Module-IV</b>	General Explanations and Exceptions (Sec.76-106): (i) Definition (ii) Constructive joint liability (iii) Mistake (iv) Judicial and Executive acts (v), Accident (vi) Necessity (vii) Infancy (viii) Insanity (ix) Intoxication (x) Consent (xi) Good faith,

	(xii) Private defense.
<b>Module-V</b>	Abetment (Sec.107 to 114).
<b>Module-VI</b>	Criminal Conspiracy (Sec 120-A and B).
<b>Module-VII</b>	Punishment Theories: Deterrent, Retributive, Preventive, Expiatory and Reformatory Theory. Punishment under the IPC: Fine, Life-Imprisonment, Death Sentence

#### REFERENCES:

Gour, Hari Singh, Commentaries on Penal Law of India. In 4 vol. XI Ed. Law Publishers Allahabad.2014.

Ratan Lal & Dhiraj Lal, Indian Penal Code. XXXII ed. Lexis Nexis.2013.

Nelson. Indian Penal Code. 4 Vol. X Ed. Lexis Nexis.2008.

Bhattacharyya, Prof. T. The Indian Penal Code. Central Law Agency Allahabad. 2014

Basu, D.D., Indian Penal Code 1860, Asoke K. Ghosh, Prentice-Hall of India Private Limited, 1997.

Misra, S.N. The Indian Penal Code. Eastern Book Company, Lucknow, 2012.

Pillai, P.S.A. Criminal Law. 12<sup>th</sup> Ed. Lexis Nexis, 2014

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	3	1	3	3	1	2	3
CO 2	3	3	2	1	2	3	3	3	2	1	3
CO 3	3	2	3	3	2	3	3	3	3	3	3
CO 4	3	3	2	3	2	2	3	3	3	2	3

<b>BAL/BBL/BCL/BSL085A</b>	<b>WOMAN, CHILD AND SOCIETY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand the position of women and children in society.

CO2: be able identify and discuss issues related to domestic violence and crimes related to dowry and be able to discuss the laws which eliminate such crimes from society.

CO3: be able to analyze the laws which deal with indecent advertisement, distribution, and representation of women.

CO4: be able to critically analyze legal provision for protection of children from sexual offences using the child for pornographic purposes and offences relating to Pre-conception and pre-natal diagnostic techniques.

**SYLLABUS:**

<b>Module-I</b>	Position of women and children in society, Study of various laws made for the welfare of them, Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal Act, 2013: Definition-aggrieved woman, domestic worker, employee, employer, sexual harassment, workplace, constitution of internal complaints committee, constitution of local complaints committee, complaint, inquiry into complaint, duties of employer, duties and powers of district officer.
<b>Module-II</b>	Domestic Violence Act, 2005: Definitions, Powers and duties Of Protection Officers, Service Providers, Procedure for Obtaining Orders of Reliefs.
<b>Module-III</b>	Dowry Prohibition Act, 1961: Definition of 'dowry', Penalty for giving or taking dowry, Penalty for demanding dowry, Agreement for giving or taking dowry to be void, Dowry to be for the benefit of the wife or heirs, Cognisance of offences, Offences to be cognizable for certain purposes and to be bailable and non-compoundable, Dowry Prohibition Officers
<b>Module-IV</b>	Indecent Representation of Women (Prohibition) Act, 1986: Definition-advertisement, distribution, indecent representation of women, Prohibition of advertisements containing indecent representation of women, Prohibition of publication or sending by post of books, pamphlets, etc., containing indecent representation of women, Powers to enter and search, Penalty, Protection of action taken in good faiths.
<b>Module-V</b>	Protection of Children from Sexual Offences Act (POCSO), 2012: sexual offences against children, using child for pornographic purposes and punishment, abetment of, and attempt to commit an offence, procedure for



	reporting of cases, procedures for recording statement of the child, special courts, procedure and powers of special courts and recording of evidence.
<b>Module-VI</b>	Pre-conception and pre-natal diagnostic techniques (Prohibition of Sex Selection) Act, 1994.
<b>Module-VII</b>	Child Marriage Restraint Act, 2017

#### REFERENCES:

1. SC Tripathi and Vibha Arora, Law relating to Women and Children, Central Law Publication, 2006
2. DK Tiwari & Mahmood Zaidi, Commentaries on Family Courts Act, 1984, Allahabad Law Agency, 1997
3. BN Chattoraj, Crime against Women: A Search for Peaceful Solution, LNJNNICFS, 2007
4. Nomita Agarwal, Women and Law, New Century Publishing House, 2005
5. Manjula Batra, Women and Law & Law Relating to Children in India, Allahabad Law Agency, 2001

#### Text Books:

1. Mamta Rao, Law Relating to Women and Children, Eastern Book Company, 3rd Edition, 2012.
2. Lalita Dhar Parihar, Women and Law, Eastern Book Company, 2011.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2	3	3	2	3	3	1	2	3
CO 2	3	2	1	2	1	3	3	3	1		3
CO 3	3	2	3	2	3	3	3	3	2	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3

# SEMESTER IV

<b>BAL/BBL/BCL/BSL028A</b>	<b>CONSTITUTIONAL LAW - II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand the power of Government to have trade and business and to proclaim emergency.

CO2: be familiarize the form of Government whether it is Parliamentary or presidential.

CO3: be able to explore relations between Centre and State such as Legislative, Administrative & Financial and effect of emergency on Centre-State relations.

CO4: be able examine the hierarchy of Courts in India, principle of judicial review and principles of judicial independence.

**SYLLABUS:**

<b>Module-I</b>	(a) i. Freedom of Trade/business ii. Emergency, meaning and scope (b) i. Proclamation of emergency-conditions and effect of emergency on Centre-state relations. ii. Emergency and suspension of fundamental rights
<b>Module-II</b>	(a) i. President of India ii. Election, qualification, salary and impeachment (b) i. Power: legislative, executive and discretionary powers ii. Council of Ministers in union and states
<b>Module-III</b>	(a) Prime Minister cabinate system-Collective Responsibility, individual responsibility. (b) i. Federalism-principles: comparative study ii. Indian Federalism: identification of federal features
<b>Module-IV</b>	(a) Legislative relation between union and states (b) i. Administrative Relations ii. Financial relations
<b>Module-V</b>	(a) i. Governor and its role in States ii. Centers powers over the state-emergency (b) Challenges to Indian federalism

<b>Module-VI</b>	(a) i. The Supreme Court ii. High Courts (b) i. Judges: appointment, removal, transfer and condition of service: judicial independence ii. Judicial review: nature and scope
<b>Module-VII</b>	(a) i. Freedom of Property: from fundamental right to constitutional right ii. Doctrine of pleasure (Art.310) of the constitution (b) i. Protection against arbitrary dismissal, removal, or reduction in rank (Art. 311) of the constitutional ii. Exceptions to Art. 311 of the constitution.

#### REFERENCES:

##### Judgments

1. S.R. Bommai v. UOI, AIR 1994 SC 1918
2. S.P. Gupta v. UOI, AIR 1982 SC 1991
3. Sunil Batra v. Delhi Administration
4. Keshvanand Bharti v. State of Kerala, AIR 1995 SC 2299
5. Minerva Mills Ltd v. UOI, AIR 1980 SC 1789
6. Hasinara Khatoon v. Home Secretary State of Bihar, 1979 SC 136
7. A.K. Gopalan State of Madras, AIR 1950 SC 27
8. Sachidanand v. State of West Bangal, AIR 1987 SC 1109
9. Rural Litigatino and Entitlement Kendra v. State of U.P.
10. T.M.A. Pai Foundation v. State of Karnataka
11. M.C. Mehta v. UOI (1987) ISCC 395 AIR 1987 1086
12. Rudul Shah v. State of Bihar, AIR 1983 SC 1086
13. Bikunthmath v. C.D.M.O., AIR 1992 SC 1368
14. Indra Gandhi v. Raj Narain, AIR 1995 SC 2299
15. P & O Stream navigation Co v. Secy of State (1861) 5 HCR
16. People Union Civil Liberties v. UOI, AIR (1997) ISCC
17. Air India v. Nargesh Mirza, AIR 1981 SC 1829
18. Unnikrishnan v. UOI, AIR 1993 SC 2178



19. Indira Sawheny v. UOI Air 1993 SC 1789
20. Maneka Gandhi v. UOI, AIR 1978 SC 1789
21. I.R. Coolho (Dead) Through L.R.S. v. State of Tamil Naidu &ors, 2007 SC 137
22. Raja Ram Pal v. The Hon'ble Speaker Loksabha and Ors
23. Kehar Singh v. State (1989)
24. DhanjayaChaterjee v. State West Bengal, AIR 2004

#### Recommended Books

1. Dr. Narender Kumar 2006
2. Dr. J.N. Pandey 2006
3. Dr. D.D. Basu, Shorter Constitution of Indian
4. Dr. Seervai Constitution of India (1992) Vol. I/II/III
5. Dr. M.P. Singh (ed) V.N. Shukla

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMNET OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	2	3	3	2	3	3	3	2	3
CO 2	3	2	3	2	3	3	3	3	2	3	3
CO 3	3	2	3	2	3	3	3	3	2	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3

<b>BCL031A</b>	<b>COST ACCOUNTING</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to make students familiar with cost and its concepts.

CO2: be able to make them acknowledge concepts of cost as cost control, cost audit etc.

CO3: be able to provide understanding of budgets, its techniques and cost ascertainment.

CO4: be able to acknowledge about formulas of various costing techniques.

**SYLLABUS:**

<b>Module-I</b>	Cost accounting :Meaning, nature, scope, objectives, elements of cost, concept of different costs, installation of costing system, methods & techniques of costing, meaning ,scope and limitation of management accounting
<b>Module-II</b>	Distinction between financial accounting, management accounting and cost accounting role of management accountant in decision making.
<b>Module-III</b>	Materials control: concept and techniques, labour control: labour turnover, idle time, methods of wages payment and incentive schemes
<b>Module-IV</b>	Cost ascertainment: single unit costing, contract costing, process costing including inter process profits and joint and by –product, operating costing
<b>Module-V</b>	Budget: meaning and types of budget
<b>Module-VI</b>	Budgetary control: meaning, characteristic, objectives and benefits of budgetary control.
<b>Module-VII</b>	Zero base budgeting, budgetary control v/s standard costing-material, labour and overhead variances, break even point analysis/ CVP analysis.

**REFERENCES:**

1. J.K. Pareek, Cost Accounting, Ramesh Book Depot, Jaipur
2. Agarwal N.K.Cost accounting asain books

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2		1	2	3	3	3		2	3
CO 2	3	3	2		1	2	3	3	1		3
CO 3	3	2		1	2	2	3	3		2	3
CO 4	3	3	2		2	3	3	3	2	3	3

<b>BAL033A/BBL033A/BSL033A/BCL033A</b>	<b>FRENCH LANGUAGE –II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to write short paragraphs on simple topics, e.g., (food, vacations, daily routine, shopping, etc.

CO2: be able to differentiate between formal and informal speech in French and Read French at an elementary level.

CO3: be able to build vocabulary about different common daily topics so that you can express yourself better.

CO4: Express basic feelings in French. For example, offering help, agreeing and disagreeing with what people say, arguing about a topic, explaining feelings to a doctor, reporting an emergency or accident and expressing surprise.

**SYLLABUS:**

<b>Module-I</b>	<ol style="list-style-type: none"> <li>1. Alimentation</li> <li>2. Interrogation using “Combien?”</li> <li>3. Expression of quantity [countable, uncountable]</li> <li>4. Article partitif</li> <li>5. Verbs : manger, prendre, boire</li> <li>6. Direct object pronouns</li> <li>7. “en” [replacing quantity]</li> <li>8. Understand a conversation in a shop / restaurant</li> <li>9. To order a meal in a restaurant / to make purchases in shop</li> </ol>
<b>Module-II</b>	<ol style="list-style-type: none"> <li>1. Imperative</li> <li>2. Places in a city and genders of countries</li> <li>3. L'article contracté</li> <li>4. Locational prepositions</li> <li>5. Pronoun y</li> <li>6. Verbs :plaire, offrir, voir</li> </ol>

	<ul style="list-style-type: none"> <li>7. To ask for / to give directions</li> <li>8. To describe a place / city</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>1. Rooms of a house,</li> <li>2. Adjectives of colour</li> <li>3. Adjectives of possession [2]</li> <li>4. quelq'un, quelque chose, personne, rien</li> <li>5. Expression of obligation and necessity [verbs :falloir, devoir]</li> <li>6. Demonstrative adjectives</li> <li>7. Describe a residence</li> </ul>
<b>Module-IV</b>	<ul style="list-style-type: none"> <li>1. Past tense</li> <li>2. il y a ,avant [marquerstemporels]</li> <li>3. Indirect Pronouns</li> <li>4. Ne...que</li> <li>5. Understand / describe an event in the past</li> </ul>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>1. Comparisons</li> <li>2. Relative pronouns [qui, que, où]</li> <li>3. Members of the family</li> <li>4. Pronominal verbs</li> <li>5. Depuis, Pendant... other marquerstemporels</li> <li>6. Pourquoi? pour / Parceque</li> <li>7. Describing daily activities</li> </ul>
<b>Module-VI</b>	<ul style="list-style-type: none"> <li>1. Interrogation using inversion</li> <li>2. Adjectives [of character/ physique]</li> <li>3. Describe a person</li> <li>4. ne plus, jamais</li> <li>5. Expression of one's opinion</li> <li>6. Express ones' opinion on a subject</li> </ul>
<b>Module-VII</b>	<ul style="list-style-type: none"> <li>1. Future tense</li> <li>2. Understanding / talking about the future [eg weather forecast]</li> <li>3. Subjunctive present</li> <li>4. Expressing one's wishes</li> </ul>

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2	3	1	2	3	3	1	2	3
CO 2	3	2	3	2	1		3	3	2		3
CO 3	3	3	3	2	3	1	3	3		2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3



<b>BAL/BBL/BCL/BSL055A</b>	<b>CODE OF CRIMINAL PROCEDURE-II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore process of trial from pre to post stage and jurisdiction of criminal courts to make the administration of justice effective.

CO2: be able to understand preventive and welfare concept in code of Criminal Procedure.

CO3: be able to examine criminal justice system and probation of offenders act.

CO4: be able to examine the various dimensions of criminal justice system and achieving the social goals through the social legislations on important issues.

**SYLLABUS:**

<b>Module-I</b>	<p>Pre- Trial Procedure</p> <ul style="list-style-type: none"> <li>• Arrest of Persons (Ss. 41-60)</li> <li>• Processes to Compel Appearance (Ss. 61-90)</li> <li>• Jurisdiction of the Criminal Courts in Inquiries and Trials (Ss. 177-189)</li> <li>• Conditions Requisite for Initiation of Proceeding (Ss. 190-199)</li> <li>• Complaints to Magistrates (Ss. 200-203)</li> </ul>
<b>Module-II</b>	<p>Trial Procedure</p> <p>Commencement of Proceedings before Magistrates (Ss. 204-210)</p> <p>The Charge (Ss. 211-224)</p> <p>Trial before a Court of Session (Ss. 225-237)</p> <p>Trial of Warrant Cases by Magistrates (Ss. 238-250)</p> <p>Trial of Summons Cases by Magistrates (Ss. 251-259)</p> <p>Summary Trials (Ss. 260-265)</p> <p>Evidence in Inquiries and Trials (Ss. 272-299)</p> <p>General Provisions as to Inquiries and Trials (Ss. 300-327)</p> <p>Provisions as to Accused Persons of Unsound Mind (Ss. 328-339)</p> <p>Provisions as to Offences Affecting the Administration of Justice (Ss.</p>

	340-352) Transfer of Criminal Cases (Ss. 406-412) Attendance of Persons Confined or Detained in Prisons (Ss. 266-271) Provisions as to Bail and Bonds (Ss. 436-450) Irregular Proceedings (Ss. 460-466) Plea Bargaining Limitation for taking Cognizance of certain Offences (Ss. 461-484)
<b>Module-III</b>	Post Trial Procedure The Judgment (Ss. 353-365) Submission of Death Sentences for Confirmation (Ss. 366-371) Appeals (Ss. 372-394) Reference and Revision (Ss. 395- 405) Execution, Suspension, Remission and Commutation of Sentences (Ss. 413-435)
<b>Module-IV</b>	Preventive Concept in Criminal Procedure Code a. Security for Keeping the Peace and for Good Behaviour (Ss. 106-124) b. Maintenance of Public Order and its Tranquility (Ss. 129-148)
<b>Module-V</b>	Welfare Concept in Criminal Procedure Code Order for Maintenance of Wives, Children and Parents (Ss. 125-128)
<b>Module-VI</b>	Attachment, Forfeiture and Disposal of Property a. Processes to Compel the Production of Things (Ss. 91-105) b. Procedure for Attachment and Forfeiture of Property c. Disposal of Property (Ss. 451-459)
<b>Module-VII</b>	Juvenile Justice System and Probation of Offenders a. Probation of Offenders Act, 1958 b. Juvenile Justice (Care and Protection of Children) Act

#### REFERENCES:

1. Ratanlal&Dhirajlal, B.M. Prasad & Manish Mohan, *The Code of Criminal Procedure (Cr. PC)* (21<sup>st</sup>edn., JBA Publishers 2013)



2. S. C. Sarkar, revised by Sudipto Sarkar & V. R. Manohar, *The Code of Criminal Procedure (in 2 Vols.)* (10<sup>th</sup>edn., JBA Publishers 2012)
3. Prof. S.N. Misra, *The Code of Criminal Procedure (Cr. PC), with Probation of Offenders Act & Juvenile Justice Act* (18<sup>th</sup>edn., JBA Publishers, 2012)
4. Choudhary, R. N., *Law Relating to Juvenile Justice in India* (3<sup>rd</sup>edn., Orient Publishing Company 2005)
5. Prof. N.V. Paranjape, *The Law Relating to Probation of Offenders in India* (D.K. Publishers, 1988).

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2	1	3	2	3	3	1	2	3
CO 2	3	3	1	2	2	3	3	3	2	3	3
CO 3	3	2	3	2	3	3	3	3	2	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3

<b>BAL/BBL/BCL/BSL056A</b>	<b>LAW OF CRIMES- II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand and describe the offences against human body and property.

CO2: be able to illustrate offences against property and women to redress the social issues.

CO3: be able identify Offences against Criminal Intimidation, Insult and Annoyance and Offences against State, Public peace, Tranquility and Religion

CO4: be acquainted with Offences relating to Public servants, False Evidence, Public Justice and Offences relating to Elections

**SYLLABUS:**

<b>Module-I</b>	Offences against Human Body a. Culpable Homicide b. Murder c. Causing death by negligence d. Abetment of suicide e. Attempt to commit the above three offences f. Causing miscarriage, exposure by children g. Hurt (Simple and grievous) h. Wrongful restraint and wrongful confinement i. Criminal force and assault j. Kidnapping, Abduction, Trafficking of person and Prostitution k. Unnatural Offences
<b>Module-II</b>	Offences against Property a. Theft b. Extortion c. Robbery d. Dacoity e. Criminal Misappropriation of Property f. Criminal Breach of Trust g. Receiving Stolen Property h. Cheating i. Fraudulent Deeds and Disposition of Property j. Mischief
<b>Module-III</b>	Offences against Property rights and documents a. Criminal Trespass b. House Trespass

	<ul style="list-style-type: none"> <li>c. Lurking House Trespass</li> <li>d. House breaking</li> <li>e. Forgery</li> <li>f. Making a false document</li> <li>g. Forged document</li> <li>h. Falsification of accounts</li> </ul>
<b>Module-IV</b>	<p>Offences against Women</p> <ul style="list-style-type: none"> <li>a. Dowry death</li> <li>b. Cruelty</li> <li>c. Outraging the modesty of a woman</li> <li>d. Sexual harassment</li> <li>e. Assault or use of criminal force to woman with intent to disrobe</li> <li>f. Voyeurism</li> <li>g. Stalking</li> <li>h. Rape</li> </ul>
<b>Module-V</b>	<p>Offences against Marriage</p> <ul style="list-style-type: none"> <li>a. False Marriages</li> <li>b. Bigamy</li> <li>c. Criminal elopement</li> </ul>
<b>Module-VI</b>	<p>Offences against Criminal Intimidation, Insult and Annoyance, Offences against State, Public peace, Tranquillity and Religion</p> <ul style="list-style-type: none"> <li>a. Criminal Intimidation</li> <li>b. Insult</li> <li>c. Misconduct in public by drunken person</li> <li>d. Waging war</li> <li>e. Sedition</li> <li>f. Suffering escape of or harbouring a State prisoner or prisoner of war</li> <li>g. Unlawful assembly</li> <li>h. Rioting</li> <li>i. Affray</li> <li>j. Injuring or defiling place of worship with intent to insult the religion of any class</li> <li>k. Deliberate and malicious acts, intended to outrage religious feelings of any class by insulting its religion or religious beliefs</li> </ul>
<b>Module-VII</b>	<p>Offences relating to Public servants, False Evidence and Public Justice, Offences relating to Elections</p> <ul style="list-style-type: none"> <li>a. Offences relating to Public Servants</li> <li>b. Contempt of the Lawful Authority of Public Servants</li> <li>c. False Evidence and Offences against Public Justice</li> </ul>

	d. Bribery, Undue influence at elections and Personation e. False statement in connection with an election f. Illegal payments in connection with an election g. Failure to keep election accounts
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#### REFERENCES:

1. K.D. Gaur, Textbook on The Indian Penal Code
2. Dr K I Vibhute, PSA Pillai's Criminal Law
3. Prof. S.N. Misra, Indian Penal Code
4. Dr. R. Prakash, O.P. Srivastava's Principles of Criminal Law
5. Ratanlal&Dhirajlal, The Indian Penal Code
6. K.D. Gaur, Criminal Law: Cases and Materials

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	3	3	2	3	3	3	3	2	3	3
CO 3	3	3	3	2	3	3	3	3	2	2	3
CO 4	3	3	2	3	3	2	3	3	3	2	3

<b>BAL/BBL/BCL/BSL082A</b>	<b>RESEARCH METHODOLOGY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand and develop various research skills, especially scientific research in legal field.

CO2: be able to develop designing skills of the research including formulation of research problem and research questions related to problem.

CO3: acquire skills for data collection, Data Analysis, Interpretation & Generalization.

CO4: be able to explore various theories of research and be able to conduct documentation and presentation of report & thesis.

**SYLLABUS:**

<b>Module-I</b>	<b>Scientific research: characteristics, types and methods</b> <ol style="list-style-type: none"> <li>Scientific Research and Scientific Methods in conduction research</li> <li>Aims and steps in scientific research</li> <li>Scientific and normative research</li> <li>Value and value free research</li> </ol> <b>Developing Research Skills</b> <ol style="list-style-type: none"> <li>Writing research proposal—Steps</li> <li>Review of Literature -- Guidelines for evaluating Review of Literature</li> <li>Writing Bibliography and citation of case laws</li> </ol>
<b>Module-II</b>	<b>Formulation of research problem and Developing Research Questions</b> <ol style="list-style-type: none"> <li> <ol style="list-style-type: none"> <li>Components in research and selection of research topic</li> <li>Sources of selecting research problem</li> <li>Precaution in selecting research problem</li> </ol> </li> <li> <ol style="list-style-type: none"> <li>formulation of research questions or hypothesis</li> <li>Nature and criteria of a hypothesis</li> <li>Sources and Types of hypothesis</li> <li>Importance of hypothesis in research</li> </ol> </li> </ol>
<b>Module-III</b>	<b>Designing of research</b>



	<ul style="list-style-type: none"> <li>(a) <ul style="list-style-type: none"> <li>i. Meaning and functions of research design</li> <li>ii. Types of research design: descriptive, explanatory and exploratory</li> </ul> </li> <li>(b) <ul style="list-style-type: none"> <li>i. meaning and purposes of sampling</li> <li>ii. Criteria of good sample and key terms</li> <li>iii. Types of sampling - Probability and Non probability</li> </ul> </li> </ul>
<b>Module-IV</b>	<b>Skills and Methods of Collecting Data</b> <ul style="list-style-type: none"> <li>(a) <ul style="list-style-type: none"> <li>i. Meaning and definition of scientific data</li> <li>ii. Types and sources and data--primary and secondary data</li> </ul> </li> <li>(b) <ul style="list-style-type: none"> <li>i. Methods of data collection: <ul style="list-style-type: none"> <li>Questionnaire,</li> <li>Interview,</li> <li>Observation and,</li> <li>Case study method</li> </ul> </li> </ul> </li> </ul>
<b>Module-V</b>	<b>Data Analysis and Interpretation and Generalization</b> <ul style="list-style-type: none"> <li>(a) <ul style="list-style-type: none"> <li>i Use and Significance of Computers in Sociological Research</li> <li>ii. Measurement of central tendency-- Mean, Mode and Median</li> </ul> </li> <li>(b) <ul style="list-style-type: none"> <li>i. Data Interpretation and inferencing</li> <li>ii. Generalization</li> </ul> </li> </ul>
<b>Module-VI</b>	<ul style="list-style-type: none"> <li>(a) Co relationship of theory and research---Merton, Karl Marx and Durkhiem</li> <li>(b) Formulation of new principle</li> </ul>
<b>Module-VII</b>	<ul style="list-style-type: none"> <li>(a) Documentation <ul style="list-style-type: none"> <li>i. Bibliography</li> <li>ii. Citation of Case Laws</li> </ul> </li> <li>(b) Presentation of report/thesis</li> </ul>

#### REFERENCES:

1. Andrews Richard: Research Questions, Continuum, UK, 2005.
2. Bell J.: Doing Your Research Project, Open University Press, Buckingham, 1999.
3. Bryman Alan: Social Research Methods, Oxford 2001
4. Babbie Earl: The Practice of Social Research, Wordsworth, 2001..

5. Levin, Jack: Elementary Statistics in Social Research, New York, Harper and Row Publishers.
6. Kothari, C.R.: Research Methodology-Methods and Techniques, New Delhi: WishwaPrakashan
7. Bailey, Kenneth D.: Methods in Social Research, New York: MacMillan Publishing Co..
8. Nachmias David & Nachmias Chava: Research Methods in the Social Sciences, New York, St. Martin's Press, 1981.
9. Sanders, Willam, B. & Pinhey Thomas K.: The Conduct of Social Research, New York, CBS College Publishing

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3		2		1	2	3	3	1	2	
CO 2	3	2		1	2	1	3		1		1
CO 3	3		3	2		1	3	2		1	
CO 4	3	3	2	3	3	2	3	3	3	2	3

# SEMESTER V



<b>BAL/BBL/BCL/BSL036A</b>	<b>JURISPRUDENCE-I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be acquainted with the understanding of Jurisprudence and its meaning definitions, nature and scope.

CO2: be able to appreciate different schools of jurisprudence and analyze critical evaluation of legal theory and its implications in policy.

CO3: be able to demonstrate an advanced and integrated understanding of the political, social, historical, philosophical, and economic context of law

CO4: be able to explore the evolving trends and influencing factors on shaping and developing the jurisprudential aspects about the law and legal regime.

**SYLLABUS:**

<b>Module-I</b>	i. Meaning, Definition, Nature and Scope of Jurisprudence. ii. Legal Theory and Jurisprudence
<b>Module-II</b>	Natural School of Law (Greek, Medieval, Modern Classical era, Reaction against positivism)
<b>Module-III</b>	Analytical School of Jurisprudence. (Bentham, Austin, H L A Hart)
<b>Module-IV</b>	Kelson's Pure Theory of Law and its criticism
<b>Module-V</b>	Historical School of Jurisprudence (Savigny, Puchta, Henry Maine)
<b>Module-VI</b>	Sociological School of Jurisprudence (Roscoe Pound, Ihering, Duguit)
<b>Module-VII</b>	Realist School of Jurisprudence (Lewellyn, Karl, J N Frank, Oliveronna, Alf Ross)

**REFERENCES:**

- 1) Bodenheimer, Edgar Jurisprudence 'The Philosophy and Method of the Law', (Revised Edition) 1996 Universal Book Traders, New Delhi
- 2) Wayne Morrison - Jurisprudence from the Greek to Post - Modernism (1997).

- 3) Holland Sir R.W.M. - Thomas Erskine Holland the Elements of Jurisprudence 2001, Universal Law Publishing Co Pvt. Ltd.
- 4) Freeman M.D.A. Lloyd's, Introduction to Jurisprudence, Sweet and Maxwell Jurisprudence (7th Edition).
- 5) Dias Jurisprudence (Fifth Edition), Aditya Books, Butterworths.
- 6) P.J. Fitzgerald, Salmond on Jurisprudence (12th Edition) Universal Law Publishers
- 7) Friedman W. -Legal Theory. (Fifth Edition), Universal Law Publishing Co-Pvt. Ltd.
- 8) H.L.A. Hart, The Concept of Law, (2nd Edn.), Oxford University Press, (2007)
- 9) John Austin, Lectures on Jurisprudence, (5th Edn.), R. Campbell (ed.)

#### CASE LAWS :

1. Maneka Gandhi v. U.O.I., AIR 1978 SC 597
2. Keshawananda Bharti v. State of Kerala, AIR 1973 SC 1461
3. Hussainarra Khatoon v. State of Bihar, AIR 1979 SC 1360
4. OlegaTellis v. Bombay Municipal Corporation, AIR 1986 SC 180
5. Ram Jawaya Kapoor v. State of Punjab, AIR 1955 SC 549
6. Mohd. Ahmed Khan v. Shah Bano Begum, AIR 1985 SC 945
7. People's Union for Democratic Rights v. U.O.I., AIR 1982 SC 1473
8. Parmanand Katata v. U.O.I., AIR 1989 SC 2039
9. Bachan Singh v. State of Punjab, AIR 1980 SC 898
10. State of Madras v. ChampakamDorajan, AIR 1951 SC 228

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2	2	3	3	3	3	1	1	3
CO 2	3	2	1	2	3	3	3	3	3	3	3
CO 3	3	3	3	3	2	2	3	3	3	2	3
CO 4	3	2	2	3	2	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL038A</b>	<b>FAMILY LAW -I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to understand meaning of certain concepts, sapinda relationship and degree of prohibited relationships

CO2: be able to analyze the theories of marriage, grounds of divorce and other matrimonial relief.

CO3: be able to understand muslim law of marriage and essentials definitions related to muslim marriages.

CO4: be able to demonstrate knowledge and understanding of a wide range of legal concepts, values, principles and rules of Marriage laws.

**SYLLABUS:**

<b>Module-I</b>	(a) Application of Hindu Law i. Who are Hindus ii. Followers of Jainism, Sikhism and Buddhism iii. Hindus by declaration, Birth iv. Converts and reconverts to Hinduism (b) i. when one or both parents are Hindus ii. Persons who are not Muslims, Christians, Parsis or Jews by Religion Schedule Tribe
<b>Module-II</b>	(a) Concept of Marriage i. Hindu Marriage a Sacrament or Contract ii. Marriage under Hindu Marriage Act, 1955 iii. Forms of Marriage (b) i. Capacity to Marry : Mental Capacity : Age ii. Ceremonies off Marriage iii. Guardianship in Marriage iv. Intercaste & Inter religious Marriages v. Marriages between Hindus and Non Hindus
<b>Module-III</b>	(a) i. Sapinda Relationship and Degree of Prohibited Relationship

	<ul style="list-style-type: none"> <li>ii. Bigamy : should bigamy be permitted in some limited cases</li> </ul> <p>(b)</p> <ul style="list-style-type: none"> <li>i. Matrimonial Remedies</li> <li>ii. nullity of Marriages</li> <li>iii. Option of Puberty</li> <li>iv. Restitution of Conjugal Rights</li> <li>v. Judicial Separation</li> </ul>
<b>Module-IV</b>	<p>Divorce: Desertion, Cruelty, Adultery &amp; other grounds for Matrimonial Relief</p> <ul style="list-style-type: none"> <li>a. Wife's Special grounds for Divorce</li> <li>b. Divorce by Mutual Consent</li> </ul> <p>Theories of Divorce : Guilt Theory, Consent Theory, Irretrievable Breakdown of Marriage Theory of Divorce</p>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>a. Bars to Matrimonial Relief</li> <li>b. Doctrine of Strict Proof             <ul style="list-style-type: none"> <li>a. Taking Advantage of one's own wrong</li> <li>b. Accessory</li> <li>c. Connivance</li> <li>d. Condonation</li> <li>e. Collusion</li> <li>f. Delay</li> <li>g. Other legal Grounds, Reconciliation</li> </ul> </li> </ul>
<b>Module-VI</b>	<p>Muslim Marriage</p> <p>(a)</p> <ul style="list-style-type: none"> <li>i. Concept of Marriage</li> <li>ii. Capacity to Marry</li> <li>iii. Kinds of Marriage</li> </ul> <p>(b)</p> <ul style="list-style-type: none"> <li>i. Classification of Marriages</li> <li>ii. Shahih Marriage</li> <li>iii. Batil Marriage</li> <li>iv. Fasid Marriage</li> <li>v. Guardianship in Marriage</li> <li>vi. Essential Validity</li> </ul>



<b>Module-VII</b>	(a)	i.	Mahr
		ii.	Specified & Proper
		iii.	Dower as Debt : Its nature and enforcement
	(b)	i.	Divorce
		ii.	Express Talaq
		iii.	Implied & Contingent Talaq
		iv.	Delegated Talaq
		v.	Formalities of Talaq
		vi.	Talaq at the Instance of Wife

#### REFERENCES:

1. Paras Diwan, Hindu Law (1985)
2. Paras Diwan, Muslim Law
3. Mulla, Muslim Law
4. Fyzee, Outlines of Muslim Law
5. Tahir Mahmood, Hindu Law
6. Jaspal Singh, Law of Marriage and Divorce in India
7. N.D. Basu, Law of Succession

#### Case Laws:

1. Bhaurao v. State of Maharashtra, AIR 1965 SC 1564
2. Mahendra v. Sushila, AIR 1965 SC 364
3. Shamim Ara v. State of U.P., 2002(4) RCR Civil 340
4. Kailashwati v. Ayodhia Prakash, 1977 PLR 216
5. M.M. Malhotra v. UOI & others, AIR 2006 SC 80
6. Seema v. Ashwani Kumar, AIR 2006 SC 1159
7. Vinita Saxena v. Pankaj Pandit, AIR 2006 SC 1662
8. Naveen Kohli v. Neehu Kohli, AIR 2006 SC 1676
9. Mohd. Ahmed Khan v. Shah Bano Begum, AIR 1985 SC 945
10. Daiy Latifi v. UOI, 2001 (7) SC 40

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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CO 2	3	3	2	2	3	3	3	3	3		3
CO 3	3	3	3	2	2	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL040A</b>	<b>COMPANY LAW I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore the important definitions and nature of company

CO2: be able to understand process of registration & incorporation and the basic documents of company.

CO3: be able to examine foundational principles such as doctrine of ultra-vires, indoor management, etc. and prospectus of company.

CO4: be able to demonstrate a sound and generally accurate knowledge and understanding of the law and its context in relation to most areas of law which have been studied.

**SYLLABUS:**

<b>Module-I</b>	Definition Evolution and Nature of company (i)Advantages of Incorporation. (ii)Disadvantages of Incorporation
<b>Module-II</b>	(a) Registration and Incorporation (i) Pre-incorporation Contracts, (ii) Kinds of Companies (b) Conversion of private company into public company and public company into private company.
<b>Module-III</b>	(a) Memorandum of Association (b) Name clause (c) Registered office clause (d) Object clause – necessity
<b>Module-IV</b>	(a)Doctrine of Ultravires (b)Consequences of Ultravires Transactions (c)Articles of Association and relationship between Article of Association and Memorandum of Association
<b>Module-V</b>	(a) Binding force of Articles of Association (b) Alteration of Article of Association.

	(c) Constructive notice of memorandum of Association and Articles of Association
<b>Module-VI</b>	(a) Doctrine of Indoor Management (b) Exception to Doctrine of Indoor Management
<b>Module-VII</b>	(a) Prospectus – Definition (b) Statement in lieu of Prospectus (c) Remedies for misrepresentation in prospectus

## REFERENCES:

### Judgments

1. Corporation of India v. Escorts Ltd. (1986) comp. cas. 548
2. New horizons ltd another v. Union of India (1995) comp.L.J. 100(SC)
3. LakshmanaswamiMudaliar v. HC, AIR 1963 SC 1185
4. Raymonds synthetics ltd. v. Union of India (1992) 73 comp. cas. 762 (SC)
5. ICICI ltd v. Srinivas agencies (1996) (2) SCALE 774 (SC)
6. Union of India v. Shalimar works ltd. (1987) comp.cas. 664
7. Bajaj Auto ltd. v. N.K. Firodia&ors, AIR 1971 SC 321
8. Unity company v. Diamond suger mills, AIR 1971
9. M/s. Madhusudan Goverdhan Das and Company v. Madhav Wollen Industries Ltd., AIR 1971 SC 2600
10. Shanti Prasad Jain v. Kalinga Tubes LTD, AIR 1965 SC 1535

### Suggested Readings

1. S.M. Shan : Lectures on Company Law, N.M. Tripathi, Mumbai
2. Avtar Singh : Company Law, Eastern Book Co., Lucknow
3. Taxmans : Company Law and Practice.
4. A.Ramaiya : Guide to Companies at, Wedhwa
5. S.M. Shaw : Lectures on Company Law, Tripathi, Mumbai
6. Topham and Lvamy: Company Law, Butterworth
7. L.C.B. Gower : Principles of Modern Company Law, Sweet and Maxwell, London
8. Palmer : Plmers Company Law, Stevans London



MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	3	2	2	3	3	2	3	3
CO 2	3	3	3	2	3	3	3	3	3	2	3
CO 3	3	2	2	3	2	3	3	3	2	2	3
CO 4	3	3	3	2	2	3	3	3	3	2	3

<b>BAL/BBL/BCL/BSL041A</b>	<b>FORENSIC SCIENCE AND CRIMINAL INVESTIGATION</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to analyze role of forensic science in civil and criminal cases for collection of evidences such as discovery of traces of physical evidences.

CO2: be able explore the concepts of establishment of identity of individual, physical object by shape & and by physical and chemical analysis

CO3: be able to examine questioned documents and identification of handwritings.

CO4: have understanding of injuries to persons and various methods of forensic science.

**SYLLABUS:**

<b>Module-I</b>	<b>The Role of Forensic Sciences in Criminal and Civil Cases:</b> a. The basic question in investigation – Qui Bono; the scene of crime; discovery of traces of physical evidence; classification and reference to classified record. b. Systematization and classification of physical evidence and comparison with suspected; material; the principles of exchange; the principles of heredity , Taxonomy, etc
<b>Module-II</b>	(a) <b>The Establishment of Identity of Individuals :</b> Branding, tattooing, Mutilating, Scars, and Moles Bartill on system : photography; fingerprints; ridge characteristics; proscopy. (b) <b>The Establishment of Partial Identity of Individuals :</b> Footprints: hair, skin; blood grouping; physical peculiarities
<b>Module-III</b>	(a) <b>The Establishment of the Identity of Physical Objects by Shape and Size:</b> Identifying marks and impressions made by physical objects; shoe prints; type and tread marks; die and tool marks; upure or fracture marks. (b) <b>The Establishment of the Identity of Physical Objects by Physical and Chemical Analysis:</b> Paints; coloured objects; metals; alloys; Chain and the earthen wares;

	cements; plaster; bricks; dusts; soil; minerals; plastics.
<b>Module-IV</b>	<b>Questioned Documents and the Identification of Handwriting:</b> (a) Paper, its types and identification; inks; pencils and writing tools; handwriting habit and flow; disguised writing; comparison and points of identity; sample; (b) Various type of forgery and their detection; additions; erasures alterations; seals; rubberstamps; type-writing; printing; blocks.
<b>Module-V</b>	<b>The Identification of Fire-Arms and Cartridges and Related Problems:</b> (a) Types of fire-arms and their use; time and range of firing; (b) Identification of a fire-arm with a cartridge case and bullet;
<b>Module-VI</b>	<b>Injuries to Persons:</b> (a) Evidentiary value of details of injuries; traces left by the weapon used; its range and direction; danger to clothing worn by the victim and related problems. (b) The flow of blood from injuries; the shape and directions of blood drops and their evidentiary value, the discovery of blood and semen stains on various objects; accidental deaths and suicides.
<b>Module-VII</b>	(a) <b>Miscellaneous Forensic Science Methods:</b> Restoration of numbers; examination of the walking picture of footprints; clothing; cooper wire; prices of wood etc. (b) <b>Evidentiary value of Physical Evidence as Evaluated a Forensic Sciences Laboratory viz. Evidence:</b> Findings of scientific methods of investigation; DNA, Narco analysis Brain mapping and lie Detector Tests

#### REFERENCES:

1. Gour, A.N, : Fire Arms, Forensic BCLlistics, Forensic Chemistry and Criminal Jurisprudence.
2. Lucas A, : Forensic Chemistry and Scientific Criminal Investigation.
3. Lund quist, F, : Methods of Forensic Science (Vol. 1)

4. Moreland, N : Science in Crime detection illustrated.
5. Kaul; Narco Analysis, Brain Mapping and Lie Detector Tests.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2	3	3	2	3	3	2	2	3
CO 2	3	2	3	2	3	3	3	3	3	2	3
CO 3	3	2	2	3	2	3	3	3	2	3	3
CO 4	3	3	2	2	3	3	3	3	2	2	3

<b>BAL/BBL/BCL/BSL048A</b>	<b>LAW OF EVIDENCE</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore the concept and general nature of evidence, and illustrate the different types of evidence and court procedures relating to evidence.

CO2: be able to understand the rules relating to relevancy of evidences and admissibility of evidence before the court with reference to opinion of third persons and judicial notice.

CO3: be able to Determine and analyze the standard of proof and burden of proof in civil and criminal cases, and specify types of presumptions.

CO4: be able to analyze the examination of witness and privileges.

**SYLLABUS:**

<b>Module-I</b>	Fact In- Issue; Relevant Facts; Document, Evidence: Proved; Disproved; Not proved.
<b>Module-II</b>	May Presume, Shall Presume, and Conclusive Proof, Circumstantial Evidence
<b>Module-III</b>	Relevancy and Admissibility; Res Gestae, Admission; Confession, Dying Declaration, Relevancy of Judgments
<b>Module-IV</b>	Opinion of Experts; Opinion of Third Persons, Conduct and Character of Parties, Judicial Notice, Estoppel, Means of Proof: Oral Evidence; Documents - Public Document, Private Document
<b>Module-V</b>	Primary and Secondary Evidence, Exclusion of Oral by Documentary Evidence
<b>Module-VI</b>	Burden of Proof, Witnesses: Competency and Compel ability of Witnesses.
<b>Module-VII</b>	Examination of Witnesses; Privileges: State Privilege and Private Privilege.

**REFERENCES:**

1. Ratan Lal & Dhiraj Lal, Law of Evidence, 25<sup>th</sup> Edition, Lexis Nexis, 2016.
2. Myneni, S.R., Law of Evidence, 2<sup>nd</sup> Edition, Asia Book House, 2015.
3. Monir, Law of Evidence, 10<sup>th</sup> Edition, Universal Law House, 2016.
4. Thakkar, Justice C K, Law of Evidence, 2<sup>nd</sup> Edition, 2 Vols., Whytes & Co., 2016.
5. Batuklal: Law of Evidence, 21<sup>st</sup> Edition, Central Law Agency, 2015.



6. Singh, Avtar, Law of Evidence, Eastern Book Co., 2015.

7. Bare Act

Bare Act

1. The Indian Evidence Act, 1872

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	3	3	3	2	3	3
CO 2	3	3	2	3	3	2	3	3	3	2	3
CO 3	3	3	2	3	3	2	3	3	3	2	3
CO 4	3	2	3	2	3	3	3	3	2	2	3

<b>BAL/BBL/BCL/BSL051A</b>	<b>CODE OF CIVIL PROCEDURE-I (CPC-I)</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore nature, scope and important definitions provided in Code of Civil Procedure.

CO2: be able to identify the jurisdiction of civil and revenue courts and be able to understand the essentials forms and procedure for institution of suits.

CO3: be able to explore definition, essentials and pronouncement of judgment and decree.

CO4: have good grounding in the subject including contents and alteration of decree.

**SYLLABUS:**

<b>Module-I</b>	Introduction of the Code: Nature, Scope and Definitions.
<b>Module-II</b>	Jurisdiction of the Civil Courts, Revenue Courts, Courts to try all civil suits unless barred.
<b>Module-III</b>	Stay of suit and Res judicata. Bar to further suit and Foreign Judgment, Court in which suits to be instituted, Transfer of suits
<b>Module-IV</b>	Parties to a suit. Frame of Suit. Institution of suits; Pleading: Meaning, Object, General Rules, and Amendment of Pleading, Plaint. Issue and Service of Summons
<b>Module-V</b>	Written Statement. Appearance and Non-Appearance of Parties. Examination of Parties by the Court, Discovery and Inspection. Admissions. Production, Impounding and return of Documents. First Hearing. Summoning and Attendance of Witnesses, Affidavits.
<b>Module-VI</b>	Judgment and Decree-Judgment: Definition, Essentials, Pronouncement.
<b>Module-VII</b>	Contents and Alteration Decree: Definition, Essentials, Types, Drawing up of a Decree, Contents and Decree in particular cases Interest, Costs

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2	2	3	3	3	3	1	2	3
CO 2	3	3	1	3	3	3	3	3	2	2	3
CO 3	3	2	3	3	2	3	3	3	2	2	3
CO 4	3	2	3	3	2	2	3	3	3	2	3



# SEMESTER VI

<b>BAL/BBL/BCL/BSL030A</b>	<b>INTERPRETATION OF STATUTES &amp; PRINCIPLES OF LEGISLATION</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: have knowledge of fundamental principles of interpretation of statutes

CO2: be able to understand the technique adopted by courts in construing statutes.

CO3: be able to analyze the internal and external aids of construction and judicial interpretation and construction of words used in statutes.

CO4: be able to acquire knowledge of principle of legislation and its objectives.

**SYLLABUS:**

<b>Module-I</b>	<ul style="list-style-type: none"> <li>a. Different Parts of Statutes</li> <li>b. Classification of Statutes</li> <li>c. Interpretation and Construction</li> <li>d. Literal Interpretation</li> <li>e. Mischief Rule of Interpretation</li> <li>f. The Golden Rule of Interpretation</li> <li>g. Harmonious Construction</li> </ul>
<b>Module-II</b>	<ul style="list-style-type: none"> <li>b. The Statute should be read as a whole</li> <li>c. Construction ut res magis valeat quam pereat</li> <li>d. Identical expressions to have same meaning</li> <li>e. Construction noscitur a sociis</li> <li>f. Construction ejusdem generis</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>a. Construction expressio unius est exclusio alterius</li> <li>b. Construction contemporanea expositio est fortissima in lege</li> <li>c. Beneficial construction</li> <li>d. Strict construction of penal statutes</li> <li>e. Strict constructions of taxing (fiscal) statutes</li> </ul>
<b>Module-IV</b>	<ul style="list-style-type: none"> <li>a. Interpretation of statutes in pari materia</li> <li>b. Interpretation of amending statutes</li> <li>c. Interpretation of consolidating statutes</li> </ul>

	<ul style="list-style-type: none"> <li>d. Interpretation of codifying statutes</li> <li>e. Mandatory and directory enactments</li> <li>f. Conjunctive and disjunctive enactments</li> </ul>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>a. Internal aids to interpretation</li> <li>b. External aids to interpretation</li> <li>c. Presumptions regarding jurisdiction</li> <li>d. Commencement of legislation</li> <li>e. Repeal of legislation</li> <li>f. Revival of legislation</li> <li>g. Retrospective operation statutes</li> </ul>
<b>Module-VI</b>	<p><b>Interpretation of the Constitution</b></p> <ul style="list-style-type: none"> <li>a. Principle of implied powers</li> <li>b. Principle of incidental and ancillary powers</li> <li>c. Principle of implied prohibition</li> <li>d. Principle of occupied field</li> <li>e. Principle of pith and substance</li> <li>f. Principle of colourable legislation</li> <li>g. Principle of territorial nexus</li> <li>h. Principle of severability</li> <li>i. Principle of prospective over ruling</li> <li>j. Principle of eclipse</li> </ul>
<b>Module-VII</b>	<p><b>Principles of legislation</b></p> <ul style="list-style-type: none"> <li>a. Principle of utility (Chapter-I)</li> <li>b. The Ascetic Principle (Chapter-II)</li> <li>c. The Arbitrary Principle (or the principle of sympathy and antipathy) (Chapter-III)</li> <li>d. Different kinds of Pleasures and Pains (Chapter-VI)</li> </ul> <p><b>Principles of the Civil Code – Objects of the Civil Law</b></p> <ul style="list-style-type: none"> <li>a. Rights and obligations (chapter-I)</li> <li>b. Ends of Civil Law (Chapter-II)</li> </ul>

	<b>Principles of the Penal Code</b> a. Classification of offences : subdivision of offences and some other divisions (Chapter-II &II) b. Punishments which ought not to be inflicted (Chapter-I) c. Proportion between offences and punishments (Chapter-II) d. The kinds of punishments (Chapter-VII)
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MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	3	3	2	2	3	3	3	3	3
CO 2	3	3	3	3	3	3	3	3	3	2	3
CO 3	3	3	3	2	2	3	3	3	3	2	3
CO 4	3	3	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL042A</b>	<b>JURISPRUDENCE-II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand different sources of laws such as customs, precedent, etc.

CO2: be able to think critically about the correlation of legal rights & duties and concepts of ownership & possession.

CO3: acquire knowledge of jurisprudential explanation of legal personality and liability.

CO4: be able to explain the significance of administration of justice.

**SYLLABUS:**

<b>Module-I</b>	a) Sources of Law, Custom as a source of Law b) Precedent as a source of Law
<b>Module-II</b>	a. Legislation as a source of Law b. Other sources of Law
<b>Module-III</b>	a) Legal Rights and Duties
<b>Module-IV</b>	a) Ownership b) Possession
<b>Module-V</b>	a. Legal Personality b. Property
<b>Module-VI</b>	a. Liability b. Title
<b>Module-VII</b>	a. Obligation b. The Administration of Justice – Theories and forms of Punishment

**REFERENCES:**

1. Dias, Jurisprudence, Aditya Books (ND)
2. Dhyani, S.N., Fundamentals of Jurisprudence
3. Mahajan, V.D., Jurisprudence and Legal Theory
4. Paranjape, Dr. N.V., Studies in Jurisprudence and Legal Theory

**Case Laws:**

1. Hussainara Khatoon v. State of Bihar [AIR 1979 SC 360]

2. Keshavanand Bharti v. State of Kerala [AIR 1973 SC 1461]
3. Maneka Gandhi v. Union of India [AIR 1978 SC 597]

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	2	2	3	3	1	1	3
CO 2	3	3	1	3	3	3	3	3	1	2	3
CO 3	3	2	3	2	2	3	3	3	3	2	3
CO 4	3	3	2	2	3	3	3	3	2	3	3



<b>BAL/BBL/BCL/BSL044A</b>	<b>FAMILY LAW –II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand principle of child welfare and legal norms relating to legitimacy and adoption of child.

CO2: acquire a broad view of the laws relating to testamentary and intestate succession in India.

CO3: be able to develop problem oriented thinking and analytical approach about joint family and coparceners in different schools

CO4: be able to critically evaluate the implementation of law relating to maintenance of wives, husbands, parents and children.

**SYLLABUS:**

<b>Module-I</b>	Child and the Family (a) i. Legitimacy ii. Adoption (b) i. Custody, Maintenance and Education ii. Guardianship and Parental rights. Welfare of the child principle
<b>Module-II</b>	Inheritance a. Succession to Property of a Hindu male dying intestate under the provisions of HAS 1956 b. Succession to property of Hindu Female dying intestate Disqualification relating to succession c. General rules of Succession & exclusion from Succession d. Heirs and their shares and distribution of Property
<b>Module-III</b>	Joint Family & Coparcenary a. Mitakshara Joint family b. Mitakshara Coparcenary – formation & incidents c. Property under Mitakshara law-Separate Property and Coparcenary property d. Dayabhava Coparcenary –Formation & incidents

	e. Property under Daybhaga law
<b>Module-IV</b>	a. Partition and reunion b. Property Jointly Acquired by Coparceners c. Income of hereditary Profession d. Property thrown into Common stock and blended property e. Karta of Joint Family-his position, powers, privilege and obligations
<b>Module-V</b>	a. Alienation of Property b. Separate Property c. Coparcenary Property d. Debts-Doctrines of Pious Obligations e. Antecedent debt
<b>Module-VI</b>	a. Alimony & Maintenance b. Maintenance as a Personal obligation c. Neglected Wives, Divorced Wives d. Quantum of Maintenance e. Arrears of Maintenance f. Maintenance as a charge on property g. Alteration of the amount of Maintenance h. Alimony & Maintenance as an Ancillary relief
<b>Module-VII</b>	a. Maintenance of neglected wives, divorced wives, minor children, disabled children and parents who are unable to support themselves under the code of Criminal Procedure 1973 b. Special Marriage Act: Who and how a person can marry under the Act. c. Right to Property to people who marry under special Marriage Act

#### REFERENCES:

1. Paras Diwan, Hindu Law (1985)
2. Paras Diwan, Muslim Law
3. Mulla, Muslim Law
4. Fyzee, Outlines of Muslim Law
5. Tahir Mahood, Hindu Law



6. Jaspal Singh, Law of Marriage and Divorce in India

7. N.D. Basu, Law of Succession

#### Case Laws

1. K.V. Narayana v. K.V. Ranganathan, AIR 1976 SC 1715

2. Commissioner of Wealth Tax v. Chandersen, AIR 1986 SC 1754

3. Raghavamma v. Chanchamma, AIR 1964 SC 136

4. BCLmukund v. Kamlawati, AIR 2006 SC 3282

5. Anar Devi & others v. Parmeshwari Devi & others, AIR 2006 SC 3332

6. M/s Bay Berry Apartments Pvt. Ltd. & Anr v. Shobha & ors, AIR 2007 SC 226

7. Gurupad v. Hirabai, AIR 1978 SC 1239

8. Ritu Dutta & Anr v. Subhendu Dutta, AIR 2006 SC 189

9. Sharad Subramanyam v. Saumi Mazumdar & Ors, AIR 2006 SC 1993

10. BhogadiKannababu&Ors v. VugginaPydamma, AIR 2006 SC 2403

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	2	2	3	3	3	3	3
CO 2	3	2	2	3	3	3	3	3	3	2	3
CO 3	3	3	3	2	2	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL046A</b>	<b>COMPANY LAW II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: acquire knowledge of basic concepts of company law.

CO2: be able to understand procedure for appointment of directors and their powers and functions.

CO3: be acquainted with legal norms relating to mandate of meetings of a company and rights of minorities shareholders.

CO4: be able to interpret liquidation process of company and leading judgment related to winding up of companies.

**SYLLABUS:**

<b>Module-I</b>	Shares: a. Allotment of Shares b. Transfer of shares c. Call, forfeiture, surrender of shares
<b>Module-II</b>	a. Debentures b. Kinds of debentures
<b>Module-III</b>	Directors: a. Position b. Appointment c. Removal
<b>Module-IV</b>	a. Powers of Directors b. Duties of Directors
<b>Module-V</b>	Meetings: a. Statutory meeting b. Annual General meeting c. Extraordinary General meeting d. Procedure and requisite of a valid meeting Majority powers and Minority Rights:

	a. Fule in Foss v. Harbotile b. Exceptions
<b>Module-VI</b>	a. Prevention of oppression b. Prevention of Micromanagement
<b>Module-VII</b>	Winding up of companies a. By Court b. Voluntary Winding up - Members' voluntary winding of - Creditors voluntary winding of

## REFERENCES:

### Judgments

1. Corporation of India v. Escorts Ltd. (1986) comp. cas. 548
2. New horizons ltd another v. Union of India (1995) comp.L.J. 100(SC)
3. LakshmanaswamiMudaliar v. HC, AIR 1963 SC 1185
4. Raymonds synthetics ltd. v. Union of India (1992) 73 comp. cas. 762 (SC)
5. ICICI ltd v. Srinivas agencies (1996) (2) SCALE 774 (SC)
6. Union of India v. Shalimar works ltd. (1987) comp.cas. 664
7. Bajaj Auto ltd. v. N.K. Firodia&ors, AIR 1971 SC 321
8. Unity company v. Diamond suger mills, AIR 1971
9. M/s. Madhusudan Goverdhan Das and Company v. Madhav Wollen Industries Ltd., AIR 1971 SC 2600
10. Shanti Prasad Jain v. Kalinga Tubes LTD, AIR 1965 SC 1535

### Suggested Readings

1. S.M. Shan : Lectures on Company Law, N.M. Tripathi, Mumbai
2. Avtar Singh : Company Law, Eastern Book Co., Lucknow
3. Taxmans : Company Law and Practice.
4. A.Ramaiya : Guide to Companies at, Wedhwa
5. S.M. Shaw : Lectures on Company Law, Tripathi, Mumbai
6. Topham and Lvamy: Company Law, Butterworth
7. L.C.B. Gower : Principles of Modern Company Law, Sweet and Maxwell, London

8. Palmer : Plmers Company Law, Stevans London

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMNET OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	2	3	3	3		1	3
CO 2	3	3	2	3	3	2	3	3	1	2	3
CO 3	3	3	1	1	2	3	3	3	3	3	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL047A</b>	<b>HEALTH LAW (MEDICAL JURISPRUDENCE)</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand fundamental legislative principles for implementation of Health Law.

CO2: be able to understand medico-legal aspects of post mortem examination and its aims & objectives.

CO3: be aware of relevant legal and court proceedings essential for collection of medical evidences.

CO4: be able to understand laws in relation to medico-legal work such as reasons of deaths, Exhumation, etc medical practice and be acquainted with related judgments passed by constitutional courts.

**SYLLABUS:**

<b>Module-I</b>	1. Definition and scope of Medical Jurisprudence, medical ethics. 2. Examination of body fluid- blood, semen, saliva, sweats etc.
<b>Module-II</b>	1. Parts of human body, 2. Human injuries – (i) mechanical- blunt, sharp-edged, pointed sharp edged, firearm, (ii) thermal- heat, (iii) Regional Injuries (iv) physical- electric, lightening, radiation (v) legal- simple, grievous,
<b>Module-III</b>	1. Death and its modes, Medico-legal aspects, 2. Post mortem examination – aims and objectives
<b>Module-IV</b>	Post mortem changes- 1. Earliest changes, Post mortem staining, rigor mortis, 2. Cadaveric spasm, putrefaction, mummification, adipocere formation,
<b>Module-V</b>	Death due to asphyxia- 1. Hanging, strangulation, 2. Suffocation, drowning,
<b>Module-VI</b>	Toxicology- classification of poisons,



	1. Corrosives- strong acids and alkalies, 2. Irritant – Inorganic, Organic, Mechanical, 3. Systemic-cerebral, spinal cord, cardio-vascular system, 4. Miscellaneous,
<b>Module-VII</b>	1. Decomposed bodies and other legal aspects, 2. Exhumation and governing rules,

#### REFERENCES:

1. Modi's Medical Jurisprudence and toxicology
2. Dr. B. V. Subrahmanayam's Medical Jurisprudence and toxicology
3. Dr. R.M. Jhala and V.B. Raju's Medical Jurisprudence
4. Principles of Forensic medicine including toxicology by Dr. Apurba Nandy
5. Parikh's textbook of medical jurisprudence , forensic medicine and toxicology
6. Forensic science in criminal investigation and trials by Dr. B.R. Sharma

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	2	3	3	2	3	3
CO 2	3	2	2	3	3	3	3	3	3	2	3
CO 3	3	2	3	2	2	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL057A</b>	<b>CODE OF CIVIL PROCEDURE-II (CPC-II)&amp; LIMITATION ACT</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand the provisions relating to execution of decree and order passed by the courts.

CO2: be able to understand the procedure of attachment, sale, delivery and distribution of property in execution of a decree.

CO3: be able to explain the reference, review, revisions, interim order and other remedies available for civil rights.

CO4: be able to incorporate the substantive civil law doctrines into practical aspects in mock trials and practice sessions.

**SYLLABUS:**

<b>Module-I</b>	Execution General s 37-45,O XXI,
<b>Module-II</b>	Modes of Execution s51 ,s54 ,s145,O XXI,
<b>Module-III</b>	Question Determination s47, Arrest & Detention s51-59,O XXI,
<b>Module-IV</b>	Attachment s60-64,O XXI, Adjudication of Claims O XXI, Sale & Delivery of Property s65-74 O XXI, Distribution of Assets s73
<b>Module-V</b>	First Appeal s96-99, s107,O XLI, Second & Other Appeals s100-112,O XLII-XLV,
<b>Module-VI</b>	Reference, Review, Revision, Interim Orders OXXIV-XVI, O XXXVII-XXXIX, s75-78, Withdrawals & Compromise O XXIII, Incidental Proceedings O XXII, s75-78, Special Suits s79-93,O XXVII-XXXVII, Restitution s144, Caveat s148 A, Inherent Powers s148-153 A,
<b>Module-VII</b>	The Limitation Act 1963.

**REFERENCES:**

1. Ray,Sukumar,TextbookontheCodeofCivilProcedure,3rdedn.,UniversalPublication,2015
2. Jain,MP.,TheCodeofCivilProcedure,4thedn.,LexisNexis,2016
3. Mulla,TheCodeofCivilProcedurein3vols.,18thedn.,LexisNexis,2016
4. Mulla,TheKeytoIndianPractice(ASummaryoftheCodeofCivilProcedure)11thedn.,Lexi

sNexis, 2016

5. C.K.Takwani, Code of Civil Procedure and Limitation Act, Universal Publication, 2016

**Bare Act**

The Code of Civil Procedure, 1908

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2	3	3	2	3	3	2	1	3
CO 2	3	3	1	1	2	3	3	3	1	2	3
CO 3	3	2	3	2	1	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3



# SEMESTER VII

<b>BAL/BBL/BCL/BSL039A</b>	<b>LABOUR LAW - I</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore meaning, object scope and historical Development of Industrial Disputes and reasons for labour legislation in India.

CO2: be able to understand various modes of settlement of industrial disputes through arbitration.

CO3: be able to acknowledge the social and economic rights of workers, forced labour, child labour, bonded labour, slavery, trade union, social security, right to health, standard of living, protection of families etc. under the purview of different labour welfare legislation such as Trade Union, Minimum Wages, Payment of Bonus and Maternity Benefits Acts.

CO4: acquire skills to demonstrate an intellectual for solving industrial disputes.

**SYLLABUS:**

<b>Module-I</b>	The Industrial Disputes Act, 1947 a. Historical Development of Industrial Disputes, Legislation in India. b. Object, scope and reasons c. Definition of important terms.
<b>Module-II</b>	a. Various modes of Settlement of disputes under I.D. Act, 1947 b. Voluntary Arbitration and compulsory Adjudication
<b>Module-III</b>	a. Strike and Lock-out b. Lay off and Retrenchment
<b>Module-IV</b>	The Trade Union Act, 1926 (a) (i) Definitions (ii) Registration of Trade Unions (b) (i) Rights and Liabilities of Registered Trade Unions. (ii) Recognition of Trade Unions
<b>Module-V</b>	The Minimum Wages Act, 1948 (a) (i) Concept of Wage. (ii) Minimum, Fair and Living Wages

	(b) Fixation and revision of minimum wages
<b>Module-VI</b>	Maternity Benefits Act, 1961 a. Nature of benefits, eligibility, other privileges available b. Portraiture, Role of Inspectors
<b>Module-VII</b>	The Payment of Bonus Act, 1965 (a) Concept and basis for the Calculation of Bonus (b) Eligibility and disqualification for Bonus

#### REFERENCES:

1. Vaid K.N. : Labour Welfare in India
2. Kothari G.L. : Wages Dearness Allowances and Bonus
3. Chopra D.S. : Payment of Bonus Act, 1965
4. Misra S.N. Labour and Industrial Laws
5. Srivastava K.D. : Commentary on Industrial Disputes Act, 1947
6. Srivastava K.D. : Commentary on Minimum Wages Act, 1948
7. Srivastava K.D. : Commentary on Trade Union Act, 1926
8. Seth D.D. : Commentary on Industrial Disputes Act, 1948
9. O.P. Malhotra : The Law of Industrial Disputes
10. O.P. Malhotra : Law of Industrial Disputes
11. Bagri – Industrial Disputes Act.
12. Pair :labour Law in India.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	1	3	2	3	3	1	1	3
CO 2	3	2	3	2	1	2	3	3		3	3
CO 3	3	3	3	3	2	3	3	3	2	1	3
CO 4	3	2	3	2	3	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL052A</b>	<b>INTELLECTUAL PROPERTY RIGHTS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore theories, Origin and Genesis of intellectual property right and the relevance of IPR globally.

CO2: be able to demonstrate knowledge and understanding of a wide range of legal concepts, values, principles of various IPR legislations such as Copyrights, Trademarks, etc.

CO3: be able to learn to address the contemporary trends of intellectual property and arguing from competing perspectives and identify the possibility of new concepts within existing knowledge frameworks and approaches.

CO4: be able to identify new insights of geographical indication and design as an IPR.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction</b> Origin and Genesis of IPR, Theories of IPR – Locke’s, Hegel and Marxian Ethical, moral and human rights perspectives of IPR
<b>Module-II</b>	<b>Intellectual Property Rights: International Relevance</b> a. Internationalization of IP protection – Paris Convention, Berne Convention, TRIPS b. Agreement – basic principles and minimum standards – limits of one-size-fit for all c. flexibilities under TRIPS.
<b>Module-III</b>	Copyright Act, 1952 Copyright protection with reference to performers rights and Artist rights
<b>Module-IV</b>	Trade Marks Act: Legal recognition, Comparative analysis in India, EU and USA Trade secrets : Legal recognition, Comparative analysis in India, EU and USA.
<b>Module-V</b>	Patent Act,

	Global governance towards Patents Patent Filing and procedure
<b>Module-VI</b>	<b>Intellectual Property: Contemporary Trends</b> Benefit sharing and contractual agreements– International Treaty on Plant Genetic Resources for Food and Agriculture, issues on patent policy and farmers’ rights-CBD, Nagoya Protocol and Indian law
<b>Module-VII</b>	Geographical Indicators, Design as an IPR, UNESCO – protection of folklore/cultural expressions, Developments in WIPO on traditional knowledge and traditional cultural expressions

#### REFERENCES:

1. Cornish, W. & Llewelyn – Intellectual Property: Patent, Copyrights, Trade Marks & Allied Rights”, 8th Edition, London Sweet & Maxwell, 2013.
2. Singh R., Law relating to intellectual property (A complete comprehensive material on intellectual property covering acts, rules, conventions, treaties, agreements, case-law and much more), Vol. 1. New Delhi: Universal Law Publishing Co. Pvt. Ltd; 2004.
3. Sarma, Rama, Commentary on Intellectual Property Laws, Volume 2, Lexis Nexis, 2009.
4. Carlos M. Correa-  
Oxford commentaries on GATT/WTO Agreement trade related aspects of Intellectual Property Rights, Oxford University Press, 2007

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	2	2	3	3	2	1	3
CO 2	3	3	2	1	3	3	3	3	1	2	3
CO 3	3	2	3	2	2	3	3	3	3	2	3
CO 4	3	3	2	2	3	3	3	3	2	3	3



<b>BAL/BBL/BCL/BSL063A</b>	<b>TAXATION LAW-I (INCOME TAX ACT, 1961)</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: have fundamental understanding of basic concept of income, importance of income tax and annual finance act, exempted income, person and policy and philosophy of taxation.

CO2: be able to examine computation of total income from different sources and aggregation and clubbing of income.

CO3: be able to analyze exemption and deduction in total income under different types of taxation norms and procedure for assessment.

CO4: acquire skills to explore the various functional theories, doctrine and principles working in the backdrop of taxation structure in India.

**SYLLABUS:**

<b>Module-I</b>	Concepts and Definition:- a. Certain Important Definition b. Basis of Charge c. Residence of Assessee
<b>Module-II</b>	Computation of Total Income (Part-A) a. Salaries b. Income from House Property c. Income from other Source
<b>Module-III</b>	Computation of Total Income (Part – B) a. Profits & gains from Business or Profession b. Capital Gain
<b>Module-IV</b>	Clubbing & Aggregation of Income
<b>Module-V</b>	Set off or Carry forward and set off
<b>Module-VI</b>	Exemption / Deductions: a. Exempted Income b. Deduction from total income c. Deduction in respect of payments d. Deduction in respect of certain income

<b>Module-VII</b>	Procedure for assessment: a. Filing of return b. Assessment and Re-assessment c. Rectification of mistake d. Appeals and Revision
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## REFERENCES:

### Case Law

1. Travanco Tea estate co. Ltd. v. Commissioner of income tax ITR 154 (1985)
2. Sutlej Cotton Mills Ltd appellant Commissioner of income tax (vc) to ITR 1991
3. Hindustan Steel Ltd. v. State of Orisa 25 S T C 211 (SC)
4. Income tax appeal 585 of 2005 (O.M.) Ashok Kumar Gupta v. Commissioner of income tax
5. Income tax act (2006) 31 Rep 166 ITAT Amritsar Chitty Co. operative society Pathankot income tax officers ward I Pathankot
6. ITA/185/2006 DATED 18.8.2006 Commissioner of Income Tax v. Glocom Incomplete Ltd.

### Books

1. Gupta, RR- Income Tax and Practice
2. Kanga & Palkiwala – The Law and Practice of Income Tax
3. Income Tax Act – A.K. Saxena (English & Hindi)

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	1	2	2	3	3	1	3	3
CO 2	3	2	2	3	1	3	3	3	3	2	3
CO 3	3	3	3	2	3	3	3	3	3	2	3
CO 4	3	3	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL058A</b>	<b>PATENT RIGHT CREATION, DRAFTING AND SPECIFIC REGISTRATION</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to explore the evolution and growth of Patent rights in India, the The International Patent System and Foreign Impact upon National System.

CO2: be able to understand the aim, objective and principles of patent act 1970 and procedure for grant of patent.

CO3: be able to analyze the Monopolistic approaches to Patents under Indian Legal system and liability of patents.

CO4: be able to anticipate analytical arguments relating to the development and reform of patent law and their likely impact on creativity and innovation.

**SYLLABUS:**

<b>Module-I</b>	EVOLUTION AND GROWTH a) History of Patent b) The International Patent System c) Foreign Impact upon National System
<b>Module-II</b>	THE PATENT ACT 1970 a. Introduction, Aim Objective b. Features And Principle c. Invention and Invention not patentable
<b>Module-III</b>	a. Rights of patents b. Terms of Patent c. Patent of Addition d. Surrender and Revocation e. Compulsory Licenses f. Infringement
<b>Module-IV</b>	PATENTABILITY AND PROCEDURES FOR GRANT OF PATENTS a. Pre-requisites – Novelty, Inventive Step, Industrial Application b. Prior Art, Anticipation, & Person Skilled in the Art c. Procedures for Filling Application



	<ul style="list-style-type: none"> <li>d. Specifications – Provisional and Complete Specifications</li> <li>e. Priority dates</li> <li>f. Pre-Grant and Post Grant Opposition</li> <li>g. Grant and sealing of Patents               <ul style="list-style-type: none"> <li>a) Rights of Patentee</li> <li>b) Power of Controller</li> </ul> </li> </ul>
<b>Module-V</b>	<b>LIMITATIONS, EXCEPTIONS &amp; INFRINGEMENTS</b> <ul style="list-style-type: none"> <li>a. Licensing: Voluntary &amp; Non –Voluntary</li> <li>b. Assignment</li> <li>c. Fair Use</li> <li>d. Use and acquisition of inventions by Central Government</li> <li>e. Parallel Imports</li> <li>f. Claim Interpretations and Constructions</li> <li>g. Infringements &amp; Remedies</li> </ul>
<b>Module-VI</b>	<b>PATENT AUTHORITIES, PATENT AGENTS &amp; EMERGING ISSUES</b> <ul style="list-style-type: none"> <li>a. Controller General of Patents</li> <li>b. Patent Examiners</li> <li>c. Patent Agents</li> <li>d. Intellectual Property Appellant Board</li> <li>e. Emerging Issues</li> <li>f. Patents &amp; Computer Programs</li> </ul>
<b>Module-VII</b>	Business Methods & Utility Patents Bio-Informatics Patents Patent and Human Right Issues

#### REFERENCES:

1. Prof. A.K.A Avasthi(ed.) Spotlight on Intellectual Property Right
2. Nagrajun, Intellectual Property Right
3. Menu Paul, Intellectual Property Right
4. W R Cornish, Intellectual Property: Patents Copyright Trademarks and allied rights, Sweet & Maxwell, London, 2010.

5. Ananth Padmanabhan, Intellectual Property Rights Infringement and Remedies, Lexis Nexis, 2012

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	3	3	3	3		2	3
CO 2	3	2	2	1	2	2	3	3	3	1	3
CO 3	3	3	2	3	2	2	3	3		3	3
CO 4	3	2	3	2	1	3	3	3	3	2	3

<b>BAL/BBL/BCL/BSL059A</b>	<b>COMPETITION LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: have knowledge of fundamental concepts and features of competition Law, requirement of competition law for healthy competition in the market and reasons for revocation of MRTP act.

CO2: be able to identify and interpret the economic concept of anti-competitive conducts which have adverse impact on competition in India.

CO3: be able to compare the competition Laws of India, UK and USA and critically analyze the law for better application.

CO4: be able to demonstrate the regulators of competition such as SEBI, ED, & CCI and their functions.

**SYLLABUS:**

<b>Module-I</b>	The Competition Law Meaning and nature Competition law Need for Competition law Growth and Development of Competition law
<b>Module-II</b>	MRTP Act and its need Limitations of MRTP Act Background of Competition Act. Salient features of Competition Act.
<b>Module-III</b>	Anti-Competitive Agreements, Vertical and Horizontal Agreements, Predatory Pricing Abuse of Dominance Combinations and its Regulations
<b>Module-IV</b>	Competition Commission of India (CCI) Power and functions of CCI Jurisdiction of CCI Landmark judgments of CCI and their analysis FDI and Policy analysis
<b>Module-V</b>	Brief concept of the Development of Competition Laws in USA and UK

	Comparative Analysis Foreign Case studies Enforcement Mechanisms under the Competition Act. 2002
<b>Module-VI</b>	Role of other regulators SEBI, Functions and Powers ED Functions and Powers Competition Commission and other Regulators
<b>Module-VII</b>	Case Studies

#### REFERENCES:

1. V.A. Avdhani, *Investment and Securities Market in India*, Himalaya Publishing House, 2011 (9<sup>th</sup> Edn)
2. Vinod Dhall, *Competition Law Today*, Oxford University Press, 2007
3. Taxmann's *Competition Act*, 2002

#### Text Books:

1. Richard Whish & David Bailey, *Competition Law*, Oxford University Press, 2012 (7<sup>th</sup> Edn)
2. Avtar Singh, *Competition Law*, Eastern Book Company, 2012
3. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	2	3	3	3	3	2	2	3
CO 2	3	2	2	3	3	2	3	3	3	3	3
CO 3	3	3	2	3	2	2	3	3	2	3	3
CO 4	3	2	3	2	3	3	3	3	3	2	3

<b>BAL/BBL/BCL/BSL086A</b>	<b>CRIMINOLOGY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO 1: Achieve in-depth study and knowledge of the scope and importance and various concepts relating to Crime and Criminology.

CO 2: Understand that how various schools of Criminology have evolved in response to the shifting panorama of strategies in the changing world.

CO 3: Understand how due to changing social economic scenarios criminal Law has to be adapted to changing environment, home and community influence

CO 4: Understand and analyze the difference between Criminology, Penology and Victimology. And compare with common wealth countries.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction of Criminology</b> Definition, Nature, Scope and Importance of Criminology, Relation with other social sciences' The concept of crime (Sin, tort and crime) and characteristic of criminal law, Whether criminology is a science? Criminology and public policy
<b>Module-II</b>	<b>Schools of Criminology</b> Pre classical school (Demonology), Classical school (Ideas of Bentham and Beccaria), Neo-classical, Positivist school Morphological theories: ➤ Cesare Lombroso, ➤ Enrico Ferri, ➤ Rafael Garafalo.
<b>Module-III</b>	<b>Identification of the causes of crime</b>



	<p>Theories,</p> <p>Mental disorder and criminality,</p> <p>Sociological Theories (Sellin, Differential Association Theory– EH Sutherland),</p> <p>Psychopathic approach,</p> <p>Biological approach</p>
<b>Module-IV</b>	<p><b>Factor Responsible for Causation of Crime</b></p> <p>Environment,</p> <p>home and community influences,</p> <p>Urban and rural crimes,</p> <p>The ghetto, broken homes,</p> <p>effect of TV, Video, Press, Narcotics and Alcohol,</p> <p>Wars and Communal riots-their causes and demoralizing effects,</p>
<b>Module-V</b>	<p><b>Responses to Crime</b></p> <p>Comparative Introduction: In focus examining responses to Crime in India and UK and in other Jurisdiction,</p> <p>Criminal Justice Responses, and other Critical Issues in Criminal Justice.</p>

#### REFERENCES:

1. Siddique, A. (2017). Ahmad Siddique's Criminology, Penology and Victimology. India: Eastern Book Company.
2. Lectures on Criminology, Penology and Victimology Paperback– 1 January 2016 by Prof. Dr. Rega Surya Rao.
3. Criminology, Penology and Victimology- Central Law Agency- Sixth edition
4. Ahuja, R. (2001). Criminology. India: Rawat Publications.
5. Hunter, R. D., Dantzker, M. L. (2006). Research Methods for Criminology and Criminal Justice: A Primer. United States: Jones and Bartlett.
6. Joyce, P. (2014). Criminology and Criminal Justice: A Study Guide. United Kingdom: Taylor & Francis.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO1	PO2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	1	2	1	2	1	3	2	3	1	1
CO 2	3	1	3	2	1	1	3	1	2	1	2
CO 3	3	2	3	3	3	2	3	3	1	2	3
CO 4	3	2	1	2	1	1	3	2	1	2	2

# SEMESTER VIII



<b>BAL/BBL/BCL/BSL045A</b>	<b>LABOUR LAW – II</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand the philosophy and concept of labour welfare and laws related to child labour prohibition.

CO2: be able to outline important factors for implementation of Factories Act and have extensive knowledge of provisions relating to health, safety and labour welfare specially protection of women and child.

CO3: be able to explain the important provisions of Wage Legislations, in reference to Payment of Wages Act 1936, Minimum Wages Act 1948 & Payment of Bonus Act 1965

CO4: be able to understand objectives behind the establishment of International Labour Organization and reasons for non-ratification of ILO conventions by India.

**SYLLABUS:**

<b>Module-I</b>	Concept and Philosophy of Labour Welfare a. Theories of Labour Welfare b. Role of Labour Welfare Officers and Trade Unions
<b>Module-II</b>	The Child Labour Prohibition and Registration Act, 1986 a. Definitions b. Prohibition of Employment of Children in certain occupations and processes.
<b>Module-III</b>	The Factories Act, 1948 a. Definition and concept of factory b. Manufacturing process c. Provisions relating to health, safety and labour welfare
<b>Module-IV</b>	a. Working hour's leaves and Holidays under F.A., 1948 b. Protection to Women and Children
<b>Module-V</b>	The Payment of Wages Act, 1936 a. Definitions b. Payment of Wages and deductions from wages.

<b>Module-VI</b>	International Labour Organisation a. Aims, Objectives, origin and development b. Constitution and organs
<b>Module-VII</b>	Ratification of I.L.O. Convention by India, reasons of non ratification

#### REFERENCES:

1. Misra S.N. : Labour and Industrial Law
2. Srivastava K.D. : Commentary on Factories Act, 1948
3. Dhyani S.N. : I.L.O. and India.
4. Chopra D.S. : Payment of Wages Act
5. Report of National Commission Labour
6. K.A. Vaid : Labour Welfare in India
7. Moorthy : Principles of Labour Welfare.
8. Johnson : I.L.O.
9. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	2	1	3	3	3	1	2	3
CO 2	3	3	2	3	3	2	3	3	3		3
CO 3	3	3	2	1	2	2	3	3	2	3	3
CO 4	3	2	3	2	3	3	3	3	3	2	3

<b>BAL/BBL/BCL/BSL054A</b>	<b>PUBLIC INTERNATIONAL LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: acquire knowledge of the nature of public international law and the structure of the international legal system and Define and apply the basic elements of public international law - its sources and subjects, the recognition and jurisdiction of States in international law and principles of State responsibility

CO2: able to understand how international law influences the development and adaptation of Australian domestic law through legislative, executive and judicial action

CO3: able to critically examine the operation and application of international law in practical contexts

CO4: develop effective skills, in the construction of legal argument and the independent and self directed analysis on disputes of international law and International Law of Cooperation Settlement of International Disputes.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction and Sources of International Law</b> <ol style="list-style-type: none"> <li>International Legal System</li> <li>The problem of defining 'International Law'</li> <li>Nature, Scope, Characteristics of International Law</li> <li>International Law as 'Law'</li> <li>Binding Character of International Law. Enforcement and compliance.               <ul style="list-style-type: none"> <li>o International Law and International Political System</li> </ul> </li> <li>Foundational movement From Westphalia to Versailles</li> <li>From Versailles onwards</li> <li>Changing scope of International Law</li> <li>Role of Charter of United Nations and Statue of International Court of Justice               <ul style="list-style-type: none"> <li>o Article 38 of Statue of International Court of Justice (Nature and Scope)</li> </ul> </li> <li>Treaties-Law making treaties/normative treaties v. Contract treaties</li> </ol>
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	<p>k. Custom- Custom v. Usage, Objective element + Subjective element (<i>opinion juris sive necessitates</i>), Persistent objector rule</p> <p>i. <i>Relationship between Treaties and International Custom</i></p> <p>ii. Conflict between rule of treaty and rule of customary law: <i>the lex specialis derogate</i></p> <p>iii. <i>Lex generalis; the lex superior derogate lex inferiori; the lex posteriori derogate lex priori</i></p> <p>l. Special rules of Customary International Law: <i>Jus Cogens</i> and Rules creating <i>Erga Omnes</i> Obligations</p> <p>m. General Principles of Law-The problem of <i>non-liquet</i>, General Principles as Principles of National law <i>or</i> General Principles as Principles of International Law</p> <p>n. Application of General Principles in International disputes: Equity (Article 38(2) of ICJ Statute; <i>ex aequo et bono</i>); Doctrine of Good faith; Res Judicata; Estoppel; Indemnity; Admissibility of Evidence etc.</p> <p>o. Judicial decisions (subsidiary source)-Article 59 of Statute of ICJ, Judicial precedent and Statute of ICJ, Evidentiary value of national decisions</p> <p>p. Writing of Publicists (subsidiary source)</p> <p>q. Modern sources of International Law-Secondary law of International Governmental Organizations (IGOs), Modern sources of International Law, Soft sources of International Law: <i>Resolutions and declarations of UN General Assembly</i></p>
<b>Module-II</b>	<p><b>International Law and Municipal Law</b></p> <p>a. Whether International Law prevail over domestic law?</p> <p>b. Theories on relationship between International Law and Municipal Law</p> <p>c. Municipal law in International Law and International Tribunal</p> <p>d. International Law in Municipal Law- Practice of states (Special emphasis on Indian Practice)</p> <p>e. Customary International Law</p> <p>f. Constitutional provisions and restrictions on Treaty power.</p>



	<ul style="list-style-type: none"> <li>g. Constitutional authority to make international agreements.</li> <li>h. Breach of International Agreements and Judicial remedies</li> </ul>
<b>Module-III</b>	<p><b>Subjects of International Law</b></p> <ul style="list-style-type: none"> <li>a. International Legal Personality</li> <li>b. Recognition of State: <i>Determination of Statehood</i>, <i>Article 1 of 1933 Montevideo Convention on rights and duties of States</i>, <i>Constitutive and declaratory views</i>.</li> <li>c. Recognition of Government-<i>Criteria for recognition</i>, <i>Is recognition necessary?</i> –<i>The Estrada Doctrine</i>, <i>De jure and de facto recognition</i>, <i>Retroactivity and Withdrawal of Recognition</i>, <i>Belligerency and Government-in-exile</i>, <i>Stimson doctrine of non-recognition</i>, <i>Dependent territories other than ‘States’ having International Status</i></li> <li>d. <i>Dependent entities, associated states and Sui Generis Entities</i>, <i>International status of ‘people’ and their right of self determination</i>, <i>‘International Organizations’ as International persons</i>, <i>Individuals, Companies and groups</i></li> </ul>
<b>Module-IV</b>	<p><b>State Territory and State Succession &amp; Law of The Sea</b></p> <ul style="list-style-type: none"> <li>a. State Territory and Sovereignty: <i>Territorial rights and other lesser rights</i>-<i>Acquisition of Territorial Sovereignty</i>, <i>Loss of Territorial Sovereignty</i> Legal consequence of changes of sovereignty over territory (State Succession)</li> <li>b. Introduction and basic concepts of Law of Sea</li> </ul>
<b>Module-V</b>	<p><b>Jurisdiction in International Law</b></p> <ul style="list-style-type: none"> <li>a. Jurisdiction- <i>Prescribe, Adjudicate And Enforce</i></li> <li>b. Territorial and Extra-territorial Jurisdiction</li> <li>c. Territorial Jurisdiction :<i>Objective and Subjective</i></li> <li>d. Extra-territorial Jurisdiction: <i>nationality based, passive personality, protective and universal</i></li> <li>e. Concept of Nationality, Extradition, Asylum.</li> <li>f. Conflicts of Jurisdiction</li> <li>g. Immunity From Jurisdiction</li> </ul>

	<ul style="list-style-type: none"> <li>h. Sovereign immunity (<i>Absolute and restrictive state immunity</i>). Diplomatic immunity. Consular immunity.</li> <li>i. Immunity of international organizations. Wavier of Immunity</li> </ul>
<b>Module-VI</b>	<p><b>Law of International Obligations</b></p> <ul style="list-style-type: none"> <li>a. ILC Draft Articles on Responsibility of States for Internationally Wrongful Act of 2001</li> <li>b. General Principles Of International Responsibility</li> <li>c. Theories on State responsibility: <i>Objective theory v. Subjective theory; Damage Theory and Faulty Theory; Absolute Liability and risk theory.</i></li> <li>d. Wrongful act and Rules of Attribution-Direct and Indirect wrongs</li> <li>e. Circumstances precluding wrongfulness</li> <li>f. Consequences of Internationally wrongful act and Enforcement of International Responsibility</li> </ul> <p><b>Law of Treaties-</b></p> <ul style="list-style-type: none"> <li>a. Article 38 (1) of ICJ Statue and principle, '<i>pacta sunt servanda</i>'</li> <li>b. Vienna Convention on the Law of Treaties, 1969: <i>Treaty making process, Application, Effects, Invalidity, Termination, Suspension.</i></li> <li>c. Reservation to the Treaties</li> <li>d. Article 53 of Vienna Convention, 1969 and <i>Jus Cogens</i></li> <li>e. Article 62 of Vienna Convention, 1969 and <i>Rebus sic stantibus</i></li> <li>f. Interpretation of Treaties: <i>Objective, Subjective and Teleological Approach; General rules and supplementary means for interpretation.</i></li> <li>g. State Practice- India, Interpretations of treaties by Indian Courts</li> </ul>
<b>Module-VII</b>	<p><b>International Disputes and International Law of Cooperation</b></p> <p><b>Settlement of International Disputes</b></p> <ul style="list-style-type: none"> <li>a. Modes of Settlement- Peaceful/Amicable and Forcible/Coercive.</li> <li>b. Diplomatic methods v. Legal methods</li> <li>c. Article 2(3), 2(4) and 33 of UN Charter.</li> <li>d. International Arbitration and International Court of Justice (Procedure; Process; Adjudication- <i>Contentious Jurisdiction and Advisory Jurisdiction</i>)</li> </ul>

	<p><b>International Organizations</b></p> <p>c. Functions, Constitution and role in International Law in- For maintenance of international peace and use of force, For trade and development, Technical, social and cultural cooperation, Regional economic communities</p> <p><b>Diplomatic and Consular Relations</b></p> <p>a. Diplomatic and consular agents: <i>immunities, privileges and rights</i></p> <p>b. Special missions</p> <p>c. Protection of UN and associated personnel Representatives to International organizations</p>
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## REFERENCES:

### Text/ Reference Books:

1. Singh, Gurdip, International Law, 3<sup>rd</sup> Edition (EBC, 2015)
2. Scott, Shirley, International Law in World Politics – 2010 Edition (Rienner)
3. Akehurst. M, Modern Introduction to International Law (Routledge, 2002)
4. Crawford, James, Brownlie's Principles of Public International Law, 8<sup>th</sup> edition (Oxford, 2013)
5. Harris, D.J, Cases and Materials on International Law, 7<sup>th</sup> rev edition (Routledge, 2010)
6. Kapoor, S.K., International Law and Human Rights: Nutshell, 14<sup>th</sup> edition (Central Law Agency, 2008)
7. Shaw, Malcolm, International Law, 7<sup>th</sup> edition (Cambridge, 2014)
8. Starke J.G, Introduction to International Law, 10<sup>th</sup> edition (Butterworths, 1989)

### Legal Instruments

1. Charter of United Nations
2. Statue of International Court of Justice
3. Responsibility of States for internationally wrongful acts (A/RES/56/83, 12 December 2001)
4. Responsibility of international organizations (A/RES/66/100, 9 December 2011)
5. Convention on Diplomatic relations (Vienna, 18 April 1961)

6. Convention on Law of Treaties (Vienna, 23 May 1969)
7. United Nations Convention on Jurisdictional Immunities of States and Their Property (New York, 17 January 2005)

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	2	3	3	3	3	1	2	3
CO 2	3	3	2	3	3	3	3	3	3	3	3
CO 3	3	3	2	2	2	2	3	3	2	3	3
CO 4	3	2	3	3	3	3	3	3	3	2	3



<b>BAL/BBL/BCL/BSL060A</b>	<b>COPYRIGHT LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: have fundamental knowledge of and insight in national Copyright Law and International Conventions & treaties.

CO2: be able to understand the subject matter of copyright and the neighboring rights.

CO3: be able to deal with the process and issues arising in acquisition, ownership and transfer of copyrights.

CO4: acquire the enhanced skills for the protection of copyright and be able to handle cases of infringement of copyrights.

**SYLLABUS:**

<b>Module-I</b>	<b>INTRODUCTION TO COPYRIGHT</b> a) History of Copyright protection, b) Originality, c) Idea- expression dichotomy, d) Copyright and its relationship with other IPRs e) Worker protected under copyright,
<b>Module-II</b>	<b>INTERNATIONAL CONVENTIONS AND TREATIES</b> a) Berne Convention for the Protection of Literary and Artistic Works, 1883 b) Universal Copyright Convention, 1952 c) TRIPS Agreement, 1994 d) WIPO Copyright Treaty, 1996 e) International Copyright Order, 1999
<b>Module-III</b>	<b>SUBJECT MATTERS OF COPYRIGHT</b> a) Work in which Copyright Subsists b) Authorship vis- a vis Ownership c) Copyrights: Economic and Moral Rights d) Duration of Copyright e) Copyright Issues in Digital Environment

	f) Assignment and Licensing
<b>Module-IV</b>	Neighboring Rights a) Origin and Development b) Rationale for Protection c) Copyright vis-a vis Neighboring rights d) Performers Rights e) Broadcasting organizations rights f) Rights of the Producers of Phonograms g) Economic and Moral Rights h) Exceptions i) Infringement and Remedies
<b>Module-V</b>	ACQUISITION OF COPYRIGHT a) Meaning of copyright b) Procedure for registration of copyright; c) Different statutory agencies under the Copyright Act and their roles
<b>Module-VI</b>	OWNERSHIP AND TRANSFER a) Assignment and licensing of rights; b) Drafting of agreement to transfer copyright and related rights; c) Collecting societies and administration of rights; d) Compulsory and statutory licensing
<b>Module-VII</b>	INFRINGEMENT AND REMEDIES a) Fair dealing/ fair use- comparison of US, UK and India; b) ISP Liability, c) Digital Right Management, d) Remedies for infringement

#### REFERENCES:

1. Sterling, J. L. A., World copyright law, (2008) 3rd ed, London, Sweet & Maxwell.
2. Ahuja, V. K. , Law of Copyright and Neighbouring Rights, (2007), New Delhi, Lexis Nexis
3. Prasad, Akhil, Copyright Law Desk Knowledge, Access and Development, (2009), Delhi.

4. Mendis, Dinusha Kishani, Universities and Copyright Collecting Societies, (2009), Hague, T.M.C. Asser press
5. David Nimmer, Nimmer on Copyright, Lexis Nexis, 2010
6. W R Cornish, Intellectual Property: Patents Copyright Trademarks and allied rights, Sweet & Maxwell, London, 2010.
7. S. Sivakumar & Lisa P. Lukose, Broadcasting Reproduction Right in India: Copyright and Neighbouring Right Issues, ILI, New Delhi, 2013
8. Ananth Padmanabhan, Intellectual Property Rights Infringement and Remedies, Lexis Nexis, 2012
9. Mira SundaraRajan, Moral Rights: Principles, Practice, and New Technology, Oxford University Press, 2011
10. Neil Weinstock Netanel, Copyright's Paradox, Oxford University Press, 2008.
11. Robert A Gorman, Jane C. Ginsburg, Copyright Cases and Materials, Foundation Press, 2011
12. Paul Goldstein, International Copyright: Principles, Law, and Practice, Oxford University Press, 2012

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcomes</b>	<b>Program Outcomes</b>							<b>Program Specific Outcomes</b>			
	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO6</b>	<b>PO 7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>
CO 1	3	2	1	2	3	3	3	3	1	2	3
CO 2	3	3	2	1	3	2	3	3	3	1	3
CO 3	3	3	2	3	2	2	3	3	1	3	3
CO 4	3	2	3	2	3	3	3	3	3	2	3

<b>BAL/BBL/BCL/BSL061A</b>	<b>INSOLVENCY AND BANKRUPTCY CODE</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand the concept of corporate insolvency and bankruptcy, regulatory framework, prominent features and application of bankruptcy code.

CO2: be able to examine various concepts such as debt, default, financial information, etc and the process of initiation of insolvency process.

CO3: acquire knowledge of administration and distribution of assets of bankrupt and versatility of Indian laws as per international standards.

CO4: have practical and industrial exposure in cases related to I & B.

**SYLLABUS:**

<b>Module-I</b>	Insolvency and Bankruptcy defined. Earlier legal framework related to Insolvency and Bankruptcy Salient features of Insolvency and Bankruptcy Code 2016 Application of Insolvency and Bankruptcy Code to Companies Act, LLP and other entities.
<b>Module-II</b>	Debt, default, financial information and financial institution, financial service etc defined Procedure for Insolvency resolution against corporate persons. Legal provisions related to financial and operational creditor Insolvency resolution and moratorium, Interim resolution professional-Appointment, duties, functions and powers. Liquidation process, Appointment of liquidator functions and duties Claims, consolidation, verification, admission, rejection and determination of claims Distribution of assets and Dissolution of Corporate debtors
<b>Module-III</b>	Fast track corporate insolvency resolution process. Voluntary liquidation of corporate persons Adjudicating Authority for corporate persons-appeals and malicious initiation of proceedings



	Offences and penalties
<b>Module-IV</b>	Insolvency Procedure for Individuals and Partnership firms Fresh start process and its procedure Provisions relating to Resolution Professional Discharge process and order Insolvency resolution process- application and procedure consequently
<b>Module-V</b>	Administration and distribution of assets of Bankrupt Bankruptcy Trustee- Functions, Rights, Duties and powers. Delivery of property and restrictions on disposition Settling of claims of all and procedure thereof. Other miscellaneous provisions.
<b>Module-VI</b>	Miscellaneous provisions under IBC Insolvency and conflict of jurisdictions Insolvency and Bankruptcy law in other jurisdictions Comparative analysis of Indian law and laws of UK and USA Adaptability of Indian laws as per international standards
<b>Module-VII</b>	Case Studies on insolvency and bankruptcy Expert Session on IBC Practical and Industrial exposure (Clinical visit)

#### REFERENCES:

1. VS Vahi, Treatise on Bankruptcy and Insolvency Code, Bharat Law House Pvt Ltd.
2. VS Datey, Guide to Insolvency and Bankruptcy Code, 8<sup>th</sup> Edn, Taxman Publications, Act, LexisNexis Butterworths, Wadhwa Nagpur.
3. Ravinder Agarwal, Insolvency and Bankruptcy Practice Material, (2018) Taxman Publications. Bhandari MC (2016) Guide to Company Law Procedure, LexisNexis Butterworths Wadhwa Nagpur
4. Wadhwa Brothers, Shorter Insolvency and Bankruptcy Code with procedures by Wadhwa Law Chambers, 1<sup>st</sup> Edn, 2020.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2		2	3	3	3	3		2	3
CO 2	3	2	3	3		2	3	3	3		3
CO 3	3	3	2		2	2	3	3	2	3	3
CO 4	3	3	3	2	3	3	3	3	3	1	3

<b>BAL/BBL/BCL/BSL071A</b>	<b>TAXATION LAW-II (GOODS AND SERVICE TAX)</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: able to understand the various terms related to indirect tax and Good & Service Act and its objectives.

CO2: able to understand the structure of GST Council and registration under GST.

CO3: acquire knowledge and skills related to accounts and records in GST and tax collection& tax deduction at source.

CO4: be able to find out issues in implementation of GST and reforms in GST.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction</b> <ul style="list-style-type: none"> <li>• What is tax?</li> <li>• Source of power to tax</li> <li>• Stages of Taxation</li> <li>• Structure of Indirect taxation</li> <li>• Disadvantage of earlier Indirect taxation system</li> </ul>
<b>Module-II</b>	<b>Introduction to GST</b> <ul style="list-style-type: none"> <li>• What is GST?</li> <li>• Historical developments leading to GST</li> <li>• Constitutional amendment and need for it</li> <li>• What are the objectives of GST regime?</li> <li>• What all taxes are subsumed by GST?</li> <li>• What all taxes are not subsumed by GST?</li> <li>• Which items GST does not cover at present and its effect?</li> <li>• Is GST same as VAT? Or How does present VAT and GST differ?</li> <li>• What is meant by 'cascading effect' in taxation?</li> <li>• How will GST address cascading effect or 'tax on tax'?</li> <li>• What is CGST/ SGST/ IGST/ UTGST?</li> <li>• At What point GST will be levied?</li> </ul>

	<ul style="list-style-type: none"> <li>• What are likely benefits of GST?</li> <li>• What are likely disadvantages of GST?</li> <li>• Global perspective on GST</li> </ul>
<b>Module-III</b>	<b>GST Council</b> <ul style="list-style-type: none"> <li>• Introduction to GST Council</li> <li>• Role of GST Council</li> <li>• How will decisions be taken by the GST Council?</li> <li>• Migration to GST</li> </ul>
<b>Module-IV</b>	<b>Registration</b> <ul style="list-style-type: none"> <li>• Registration under GST - An introduction</li> <li>• Who is liable to register under GST laws?</li> <li>• Who is exempted from registration?</li> <li>• What is an aggregate turnover?</li> <li>• New registration</li> <li>• About GSTN</li> <li>• Cancellation of registration</li> <li>• What are implications of cancellation of registration?</li> <li>• Amendment of registration</li> </ul>
<b>Module-V</b>	<b>Supply under GST</b> <ul style="list-style-type: none"> <li>• Concept of supply under GST</li> <li>• Composition levy</li> <li>• Compensation cess</li> <li>• Actionable claims</li> <li>• Composite/ Mixed supply</li> <li>• Concept of reverse charge</li> <li>• Rate slabs</li> <li>• Exempt service</li> </ul>
<b>Module-VI</b>	<ul style="list-style-type: none"> <li>• Accounts and records in GST</li> <li>• GST practitioners</li> <li>• TDS under GST</li> </ul>



	<ul style="list-style-type: none"> <li>• Tax collection at source</li> <li>• Job work</li> <li>• Transition provisions under GST</li> <li>• Imports under GST</li> <li>• Returns</li> </ul>
<b>Module-VII</b>	<ul style="list-style-type: none"> <li>• Miscellaneous Provisions</li> <li>• GST Implementation issue</li> <li>• GST and federalism</li> <li>• Reforms in GST</li> </ul>

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	2			2	3	3		2	3
CO 2	3	3	2	3	3	3	3	3	3	3	3
CO 3	3	3	3	2	3	3	3	3	1	2	3
CO 4	3	2	3	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL083A</b>	<b>LAND LAWS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of the course, student will:**

CO1: be able to understand state tenancy reforms and its objects & reason.

CO2: be able to analyze revenue act, power and functions of the Boards of Revenue, revenue courts and officers.

CO3: be able to recognize the legal issues relating to land acquisition law.

CO4: be trained as a researcher to conduct legal research on different land laws such as tenancy, revenue, rent control and land acquisition laws.

**SYLLABUS:**

<b>Module-I</b>	<b>Rajasthan Tenancy Act, 1955</b> Preliminary: object and reason, Definition- Agriculture year, Agriculture, Agriculturalist, Crops, Estate, Estate holder, Grove-land, Holding, Improvement, Khudkasht, land, land cultivated personally, Land holder, Pasture land, Rent, Revenue, Sayar, Tenant, Nalbat. Classes of Tenants, Primary Right of Tenant, Surrender, Abandonment and Extinction
<b>Module-II</b>	<b>Rajasthan Tenancy Act, 1955</b> Determination and modification of Rent, Payment and recovery of rent, Ejectment of Tenants, Remedies for Wrongful Ejectment of tenants. Question of proprietary rights in Revenue court, Question of tenancy Right in civil court
<b>Module-III</b>	<b>Rajasthan Revenue Act, 1956</b> The Board of Revenue, Revenue Courts and Officers, Appeal, Reference, Revision and Review, Survey, records of right, Maintenance of maps and record, annual register
<b>Module-IV</b>	<b>Rajasthan Revenue Act, 1956</b> Settlement operation, rent rates, collection of revenue
<b>Module-V</b>	<b>Rajasthan Rent Control Act, 2001</b> Preliminary: object and reasons, Definition-Amenities, Landlord, Premises,

	Tenant. Revision of rent, limited period tenancy, eviction of tenants, right of landlord to recover immediate possession in certain cases, restoration of possession of illegally evicted tenant and procedure there of.
<b>Module-VI</b>	<b>Rajasthan Rent Control Act, 2001</b> Constitution of tribunals, procedure for revision of rent and eviction, Appeal and Execution Amenities.
<b>Module-VII</b>	<b>Land Acquisition Law</b> Preliminary: object and reason, Definition: affected family, agriculture land, cost of acquisition, displaced family, infrastructure project, marginal farmer, market value, person interested, public purpose, and resettlement area. Determination of social impact and public purpose, special provision to safeguard food security, Notification and Acquisition, Rehabilitation and Resettlement Award and procedure relating to it. Procedure relating to land acquisition, rehabilitation and resettlement authority, apportionment and payment of compensation.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	3	2	2	3	3	3	1	3
CO 2	3	3	2		3	3	3	3	2	3	3
CO 3	3	3	3	2	2	1	3	3	3	2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL087A</b>	<b>PENOLOGY AND VICTIMOLOGY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO 1: Understand the philosophy of punishment and its basic purpose in what manner it can prevent the crime and its repetition by a criminal.

CO 2: Understand the impact of professional lawyering skills in societal and environmental contexts, and demonstrate the knowledge of, and need for reforms in the Prison system;

CO 3: Understanding Criminology in context of victims perspectives;

CO 4: Equip with knowledge, passion and drive to excel as leaders in the legal profession, judiciary, public service, non-profit & non-governmental organizations, entrepreneurs, and corporate entities;

CO5: Explore and understand specific issues relating to re-socialization and rehabilitation of prisoners back to the society.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction to penal system–</b> Theory of punishments, Modes of punishment, Capital punishment
<b>Module-II</b>	<b>Police</b> Police, Role and function of police, National Police Commission (recommendations), Mali math committee report
<b>Module-III</b>	<b>Prison system</b> Prison system, History of Prisons, Aims, objectives and conditions of prison, Types of prisons, Prison work, Education, Prison reform (schools and reformations),

	Rights of prisoners (contribution of the Supreme Court)
<b>Module-IV</b>	<b>Re-socialization Process–</b> Probation and Parole, Definitions, Nature of probation and parole, Duties of Probation Officers, Difference between Parole and Probation, Authority for granting Parole, Supervisor of Parole, Problems of the released offender, Attitude of the community towards released offender.
<b>Module-V</b>	<b>Victimology and Compensation–</b> State of Jail Reform - Classification of prisoners Rights of prisoners - open prison.

#### REFERENCES:

1. Mamata Rao Law Relating to Women and Children
2. G B Reddy Law Relating to Women and Children
3. K S Shukla Adolescent Offender [1985]
4. C Chhabbra The Quantum of Punishment in Criminal Law [1970]
5. H. L. A Hart Punishment and Responsibility
6. A Siddique Criminology [1984], Eastern Lucknow
7. Justice N. K. Chakraborti Probation system in the Administration of Criminal Justice
8. Bharat B Das Victims in the Criminal Justice System
9. Maguire Mike, Morgan Rod and Reiner Robert, 2007. The Oxford Handbook of Criminology, Oxford University Press.
10. E.H. Sutherland, 1968, Principles of Criminology (6th Edition), Times of India Press, Bombay.



11. Siegal Larry J, 2007, Criminology, Wordsworth Thomson Learning, New Delhi.
- Ahuja Ram, 2000, Criminology, Rawat Publication, New Delhi.
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13. Williams Katherine S, 2004, Criminology, Oxford University Press
14. Reid Sue Titus, 2006, Crime and Criminology, Mc Graw Hill Publishers.
15. Brien, Martin O, 2008, Criminology, Rutledge Publishers.
16. Schmalleger J Frank, 1999, Criminology Today: An Integrative Introduction, 2nd edition, Prentice Hall, New Delhi.
17. Crime in India published by National Crime Record Bureau, Ministry of Home Affairs, Delhi.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	3	1	3	3	2	1	3	2
CO 2	2	1	2	2	1	2	2	2	2	1	2
CO 3	3	3	2	3	2	1	3	1	1	1	3
CO 4	3	3	3	3	3	3	3	3	2	2	3
CO 5	3	2	3	3	3	2	3	3	2	3	3

# SEMESTER IX

<b>BAL/BBL/BCL/BSL064A</b>	<b>CYBER LAWS &amp; AI</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be familiarized with various types of Cyber-Attacks, Cyber-Crimes & Artificial Intelligence.

CO2: acquire skills in research, discussions and deliberations on issues related to cyber space and cyber laws.

CO3: be able to understand the duties of subscriber, penalty & adjudication and also the liabilities of network service providers.

CO4: be able to understand different types of AI agents, various AI search algorithms, fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation, reasoning.

**SYLLABUS:**

<b>Module-I</b>	Genesis object and scope of IT Act Definitions E Commerce and Digital Signature E Governance
<b>Module-II</b>	Dispatch and Receipt of Electronic Records Security and Receipt under IT Act Regulation of Certifying Authorities Digital Signature Certificate
<b>Module-III</b>	Duties of Subscriber Penalties and Adjudication Cyber Regulation Appellate Tribunal
<b>Module-IV</b>	Offences under IT Act Tampering with Computer Source documents Hacking with Computer System Publishing of form obscene Information in electronic
<b>Module-V</b>	Breach of confidentiality and privacy Offences related to digital signature certificate Computer Forensic and Process of confirmation Liability of network service providers
<b>Module-VI</b>	Power of Police Officer Miscellaneous provisions under IT Act Amendment to IPC 1860



	Amendment to Evidence Act 1872 Amendment to Banker's Books Evidence Act 1891 Amendment to Reserve Bank of India Act 1934 Issue of jurisdiction of Cyber Space Issue of Online defamation Copyright issue in digital medium Trade Mark in online medium
<b>Module-VII</b>	Law relating to Artificial Intelligence.

#### REFERENCES:

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4. Information Technology Law and Practice : Vakul Sharma

#### Cases referred

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2. United States v. 1992 U.S. App. LEXIS 9562 (4<sup>th</sup> cir. May 4, 1992)
3. Miller v. California 413 U.S.1524 (1973)
4. Ranjit D. Udeshi v. State of Maharashtra, AIR 1965 SC 881
5. United States v. Moris, 928 F. 2d 504, 505 (2<sup>nd</sup> cir 1991)
6. Director of Public Prosecutions v. Murdoch (1993) IVR 406

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	3	1	2	2	3	3	1	2	3
CO 2	3	3	2	3	1	2	3	3	3		3
CO 3	3	3	1	2	2	3	3	3		2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL065A</b>	<b>ADMINISTRATIVE LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore the evolution, nature, scope and fundamental doctrines of Administrative Law

CO2: be able to understand the reasons for growth and developments delegated legislation and to distinguish between sovereign and delegated legislation.

CO3: be able to analyze the judicial control of administrative discretionary powers and judicial review of administrative action and administrative adjudications.

CO4: be able to develop the enquiry of understanding the latent aspects of administrative process that imbibe in a powers, liabilities, and its inculcation in the judicial review of the administration action

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction: Evolution, Nature and Scope of Administrative Law</b> <ol style="list-style-type: none"> <li>Evolution, Nature and Scope of Administrative Law</li> <li>Laissez-faire State, Social Welfare State, and Modern State</li> <li>Comparative evolution</li> <li>French Administrative Law-<i>Droit Administratif</i> and Administrative Courts of Canada, Switzerland and Germany</li> <li>Definition, Nature and Scope Administrative Law</li> <li>Relationship between Administrative Law and Constitutional Law</li> </ol>
<b>Module-II</b>	<b>Fundamental Doctrines of Administrative Law</b> <ol style="list-style-type: none"> <li>Classification of Functions</li> <li>Doctrine of rule of Law</li> <li>Doctrine of Separation of Powers</li> <li>How these doctrines influence Administrative Law?</li> </ol>
<b>Module-III</b>	<b>Delegated Legislation</b>

	<ul style="list-style-type: none"> <li>a. Concept of Delegated Legislation</li> <li>b. Reasons for the Growth and Development</li> <li>c. Classification- Title based and Purpose based</li> <li>d. Comparative position –UK; USA; India</li> <li>e. Constitutionality of Delegated Legislation</li> <li>f. Excessive Delegation- Constitutional Limits</li> <li>g. Control of Delegated Legislation- Parliamentary, Procedural and Judicial Controls</li> </ul>
<b>Module-IV</b>	<p><b>Natural Justice</b></p> <ul style="list-style-type: none"> <li>a. Concept and Applicability- Administrative Action or Quasi-Judicial Action?</li> <li>b. <i>nemo judex in causa sua</i> -Rule against bias</li> <li>c. Exception in Doctrine of Necessity and Doctrine of Absolute Necessity</li> <li>d. <i>audi alteram partem</i>- Right to be heard</li> <li>e. Requirements of Natural Justice</li> <li>f. Reasoned decision &amp; Right to legal Representation</li> <li>g. Expanding Horizon of Natural Justice</li> <li>h. Duty to Act Fairly</li> <li>i. Exclusion of Natural Justice.</li> <li>j. Exceptions to Principles of Audi Alteram Partem</li> <li>k. Effect of failure to Comply with Principles of Natural Justice- void or voidable</li> <li>l. Post decisional Hearing</li> </ul>
<b>Module-V</b>	<p><b>Administrative Discretionary Powers</b></p> <ul style="list-style-type: none"> <li>a. Discretionary powers</li> <li>b. When an authority can exercise discretion?</li> <li>c. Judicial Control over administrative discretion</li> <li>d. Abuse of discretion and Non exercise of discretion</li> <li>e. Fundamental Right violation and exercise of administrative discretion</li> <li>f. Reasonable Exercise of Power and Wednesbury Principle</li> </ul>
<b>Module-VI</b>	<b>Judicial Review of Administrative Action and Administrative</b>

	<b>Adjudications</b> <ul style="list-style-type: none"> <li>a. Grounds of Judicial Review of Administrative Action</li> <li>b. Writ Jurisdiction</li> <li>c. Doctrine of Legitimate expectation</li> <li>d. Doctrine of public accountability</li> <li>e. Doctrine of proportionality</li> <li>f. Laches</li> <li>g. Concept of administration adjudication</li> <li>h. Article 323 (A) and Article 323(B) of Constitution of India</li> <li>i. Reason for the growth of Tribunals</li> <li>j. Administrative Tribunals</li> <li>k. Powers and Functions of Administrative Tribunals</li> </ul>
<b>Module-VII</b>	<b>Maladministration &amp; Alternative Remedies and Government as a Litigant</b> <ul style="list-style-type: none"> <li>a. Concept and Need</li> <li>b. Ombudsmen in India-Lakpal</li> <li>c. Lakayukta in States</li> <li>d. Central Vigilance Commission</li> <li>e. Ombudsman</li> <li>f. Right to Information</li> <li>g. Development of the concept of state liability</li> <li>h. Privileges of Government</li> <li>i. Doctrine of Estoppels and Waivers</li> <li>j. Tortious liability</li> <li>k. Contractual liability</li> </ul>

#### REFERENCES:

1. Basu Durga Das, *Administrative Law*, 6<sup>th</sup> ed.; Kamal Law House, Kolkatta, 2005.
2. Craig Paul, *Administrative Law*; 5<sup>th</sup> ed.; Thomson Sweet & Maxwell, 2008.
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4. Elliot Mark, *Beatson, Mathews, and Elliot's Administrative Law Text and Materials*; 3<sup>rd</sup> ed.; Oxford, 2007.
5. Jain M.P. & Jain S.N, *Principles of Administrative Law*; 5<sup>th</sup> ed.; Wadhwa Nagpur, 2009.
6. Jain M.P. & Jain S.N, *Principles of Administrative Law*; 6<sup>th</sup> Enlarged ed.; Vol. I & II; Wadhwa Nagpur, 2010.
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12. Sathe S.P, *Administrative Law*, 7<sup>th</sup> ed.; LexisNexis Butterworths Wadhwa Nagpur, 2008.
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16. Wade H.W.R & Forsyth C.F, *Administrative Law*; 10<sup>th</sup> ed.; Oxford, 2009

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	3	2	3	3	3	3	3	3	1	3
CO 3	3	2	3	2	2	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL066A</b>	<b>TRADEMARK AND DESIGN</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand framework of trademark and design.

CO2: be able to acquire comprehensive knowledge of various principles of trademark and design.

CO3: be acquainted with the registration process of trade mark and design.

CO4: be trained as an expert in different areas of Intellectual Property Rights violations such as Trade Mark, Design, Geographical indication, etc.

**SYLLABUS:**

<b>Module-I</b>	Evolution of Design Protection, Salient features of the Design Act, 2000, important definitions
<b>Module-II</b>	Registration: Requirements and procedure, Design Piracy, Design and Copyright overlap,
<b>Module-III</b>	Infringement and remedies, International Instruments
<b>Module-IV</b>	Principle of Trademark- Economic Justification, Quality Justification, Advertising Justification - What is a Trademark- Definition - Spectrum of Distinctiveness - Grounds of Refusal of Registration.
<b>Module-V</b>	Rights of the Owner of Trademark- Rights of a Trademark Owner, Transfer of Trademarks- Assignment and License of Trademarks, Assignment of Trademarks- Licensing of Trademark.
<b>Module-VI</b>	Infringement of Trademark and Action for Passing off -Infringement of Trademark- Essentials- Dilution of Trademark, Blurring and Tarnishment, Comparative-Advertising Law- Passing Off- General Principles, Essential elements of passing off, Difference between Infringement and Passing Off, Passing-off and protection of well-known trademarks, Reverse passing off, Defences in Trademark Infringement, Remedies.

<b>Module-VII</b>	Protection of Geographical Indication-Justification for protection- International Position- Lisbon Agreement, TRIPs Agreement, Bilateral agreements, Regional Developments EU-Geographical indication protection in India, Criteria- Procedure for Registration in India, Duration- Rights- Overlap between trademark and GI, Remedies, Case study: Darjeeling tea case- Case Study: Rasgulla case.
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MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 3	3	3	3	2	2	1	3	3	2	2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL067A</b>	<b>MERGERS AND ACQUISITIONS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this subject, the student will:**

CO1: be able to understand the process and economic rationale for M&As

CO2: Be able to understand typical valuation techniques in M&As.

CO3: Be able to apply the valuation techniques to M&A assessment and decision making.

CO4: Have acquired analytical skills in analyzing real-world cases in M&As.

**SYLLABUS:**

<b>Module-I</b>	<ul style="list-style-type: none"> <li>• Meaning of Mergers and Acquisitions</li> <li>• Corporate Reconstruction &amp; Corporate Restructuring</li> <li>• Types and Mergers and Acquisitions</li> <li>• Planning and Strategies for Corporate Restructuring in M&amp;A</li> </ul>
<b>Module-II</b>	<ul style="list-style-type: none"> <li>• Meaning of Merger and Amalgamation</li> <li>• Procedural aspect of Merger and Amalgamation</li> <li>• Jurisdiction of Courts: Filing of various forms</li> <li>• Merger aspects under Constitutional law</li> <li>• Amalgamation of Banking Companies and Foreign Companies</li> </ul>
<b>Module-III</b>	<ul style="list-style-type: none"> <li>• Concept of Demerger</li> <li>• Modes of Demerger- Agreement, scheme of arrangement</li> <li>• Demerger and Voluntary winding up</li> <li>• Legal and procedural aspects</li> <li>• Tax aspects and reliefs</li> <li>• Reverse mergers- Procedural aspects</li> </ul>
<b>Module-IV</b>	<ul style="list-style-type: none"> <li>• Meaning and types of takeovers</li> <li>• Legal aspects- SEBI takeover regulations</li> <li>• Disclosure and open offer requirements</li> <li>• Control, Valuation and timing of open offers</li> <li>• Takeover and Delisting</li> <li>• Bailout takeovers and takeover of sick undertakings</li> <li>• Takeover Defenses</li> <li>• Cross border takeover</li> </ul>
<b>Module-V</b>	<ul style="list-style-type: none"> <li>• Reduction of capital</li> <li>• Reorganization of share capital</li> <li>• Buy back of Shares: Concept and necessity</li> </ul>



	<ul style="list-style-type: none"> <li>• Procedure of buyback of shares.</li> </ul>
<b>Module-VI</b>	<ul style="list-style-type: none"> <li>• Objects and reasons of the Competition Act, 2002</li> <li>• Anti-competitive agreements</li> <li>• Abuse of dominant position</li> <li>• Regulation of combination</li> </ul>
<b>Module-VII</b>	<ul style="list-style-type: none"> <li>• Case Studies on M&amp;A</li> <li>• Drafting of Merger Agreement</li> <li>• Drafting and Take over compliances</li> </ul>

#### REFERENCES:

1. Donald MD (2012) Mergers, Acquisitions and other Restructuring Activities, Academic Press.
2. Ramiyah A. (2016) Guide to Companies Act, LexisNexis Butterworths, Wadhwa Nagpur.
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5. Ramanujan S. (2011) Mergers et al, LexisNexis Butterworths Wadhwa Nagpur.
6. Depamphilis D. Academic Press. (2001) Mergers Acquisitions and other Restructuring Activities.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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CO 4	3	3	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL068A</b>	<b>LAW OF TRADE SECRETS AND TECHNOLOGY TRANSFER</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this subject, the student will:**

CO1: be able to understand the various issues pertaining to trade secret as an IPR.

CO2: be able to identify the problems and challenges related to technology transfer of intellectual properties.

CO3: be able to analyze legal provisions to address the interface between trade secret and technology transfer.

CO4: have acquired skills of technology transfer and licensing, drafting a technology transfer agreement.

**SYLLABUS:**

<b>Module-I</b>	Trade Secret: Conceptual analysis, International Protection regime
<b>Module-II</b>	Trade Secret Protection in India, Need for statutory framework for protection of Trade Secrets in India
<b>Module-III</b>	Introduction to Technology and Innovations- Meaning, nature and definitions, technology, research and development and innovations, technology vis-à-vis economic development, Commercialization of technology and inventions , Technology and IPR Diffusion, Technology integration with the business, Need for protection of technology, Theories of protection of inventions, Balancing between private interests and public interests.
<b>Module-IV</b>	International IPR instruments and technology protection- Berne Convention, Paris Convention, TRIPs etc., Technology protection in US, European, Japan and Indian IPR law.
<b>Module-V</b>	Technology Protection and Indian IPR Regime- Technology innovations and protection: Copyright Law, Law of Patents, Law of Trademarks, Law of

	Designs, Circuit layout designs,
<b>Module-VI</b>	Technology Transfer and Licensing- Technology Transfer: meaning and nature, need for technology transfer from research centers to industry, Phases in technology transfer, IP due diligence, Planning for technology transfer, Economic consideration of technology transfer,
<b>Module-VII</b>	Technology transfer and licensing, drafting a technology transfer licensing agreement: Scope, royalty, format and contents of the agreement.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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CO 2	3	2	2	1	3	2	3	3	2	3	3
CO 3	3	3	3	2	2	3	3	3	2	2	3
CO 4	3	3	2	3	2	2	3	3	3	3	3

<b>BAL/BBL/BCL/BSL069A</b>	<b>INSURANCE LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this subject, the student will:**

CO1: Have a systematic understanding of the knowledge of insurance law and its inter-relationship with other fields of study and will demonstrate current understanding of some specialist areas in depth

CO2: Demonstrate knowledge and understanding of a wide range of legal concepts, values, principles and rules of Indian Insurance law and able to explain the relationships between them in a number of particular areas.

CO3: Work with ideas at a level of abstraction, arguing from competing perspectives and identify the possibility of new concepts within existing knowledge frameworks and approaches.

CO4: be able to use a full range of legal sources to identify the principal controversial issues in a topic.

**SYLLABUS:**

<b>Module-I</b>	<p>Introduction to Insurance Law</p> <ol style="list-style-type: none"> <li>Introduction To Concept Of Insurance</li> <li>Nature Of Insurance</li> <li>Principles Of Torts And Its Relation With Insurance Laws</li> <li>History And Development Of Insurance Industry &amp; Law</li> <li>Insurance Industry In India, The Insurance Act, 1938- (Main Sections), The Insurance Regulatory Authority Act, 1999, IRDA's Role And Functions, Insurance Industry And Market, Insurance Management.</li> </ol>
<b>Module-II</b>	<p>Concepts and Principles of Insurance law</p> <ol style="list-style-type: none"> <li>Insurance Law: Essential Tenets</li> <li>Formation, Performance And Discharge of Contract</li> <li>Proposal And Policy, Rules Of Interpretation of Insurance Policy, Logics Behind Providing Exclusion Clauses</li> <li>Classification, Commencement, Duration And Revival of Policy</li> <li>Utmost Good Faith</li> <li>Insurable Interest</li> </ol>



	<ul style="list-style-type: none"> <li>g) Indemnity, Subrogation And Contribution</li> <li>h) Special Features Of Insurance Contract – Aleatory Contract, Contract of Adhesion Etc.</li> <li>i) The Risk, Premium, Proximate Cause</li> <li>j) Re-Insurance</li> </ul>
<b>Module-III</b>	<p>Life Insurance Contracts</p> <ul style="list-style-type: none"> <li>a) Nature And Formation of Life Insurance Contract, The L.I.C. Act, 1956, The Insurance Act, 1938(Relevant Provisions), The IRDA Act, 1999(Relevant Provisions)</li> <li>b) Insurable Interest</li> <li>c) Proposal And Acceptance</li> <li>d) Non-Disclosure And Misrepresentation (Section-45)</li> <li>e) Representations And Warranties</li> <li>f) Policy As A Property-Assignment &amp; Nomination</li> <li>g) Claims And Disputes, Suicide Clause, Non-Forfeiture Clause With Emphasis On Surrender Value, Paid-Up Value And Claim Concession</li> <li>h) Health Insurance-Concept, Policy And Claim Procedures</li> </ul>
<b>Module-IV</b>	<p>Marine Insurance</p> <ul style="list-style-type: none"> <li>a) Origin, Development And Nature Of Marine Insurance, The Marine Insurance Act, 1906, The Marine Insurance Act, 1963</li> <li>b) Marine Insurance Contracts-Essential Tenets</li> <li>c) Insurable Interest</li> <li>d) Disclosure And Representation</li> <li>e) The Marine Policy And Various Types Of Policies</li> <li>f) Warranties</li> <li>g) The Voyage</li> <li>h) Loss And Abandonment</li> <li>i) Partial Losses And Constructive Total Loss</li> <li>j) Measure Of Indemnity And Claims</li> <li>k) Institute Cargo Clauses</li> <li>l) Inco Terms</li> </ul>

<b>Module-V</b>	<p>Fire Insurance</p> <ul style="list-style-type: none"> <li>a) Nature Of Fire Insurance Contract</li> <li>b) Non-Disclosure And Misrepresentation</li> <li>c) Standard Fire Policy</li> <li>d) Proximate Cause, Fire Claims And Amount Recoverable</li> <li>e) Subrogation, Double Insurance, Contribution And Average</li> </ul>
<b>Module-VI</b>	<p>Motor Vehicle Insurance</p> <ul style="list-style-type: none"> <li>a) The Motor Vehicles Act, 1988 (Secs.140-176), Nature And Scope</li> <li>b) Types Of Policies</li> <li>c) Absolute Or No Fault Liabilities, Principles Of Torts And Motor Vehicles Insurance, Workmen Compensation Act And Motor Vehicles Act</li> <li>d) Third Party Or Compulsory Insurance Of Motors Vehicles, Compensation In Hit And Run Cases</li> <li>e) Computation Of Compensation According To Structured Formula Basis, Judicial Approaches Towards Computation Of Compensation</li> <li>f) Motor Vehicles Accident Claims Tribunals-Powers And Procedures</li> <li>g) Alternate Forum For Settlement Of Motor Accident Claims</li> </ul>
<b>Module-VII</b>	<p>Miscellaneous Insurance</p> <ul style="list-style-type: none"> <li>a) Liability Insurance-Public Liability Policy, Products Liability Policy, Professional Indemnity Policy, Directors And Officers Liability Policy, Lift (Third Party) Insurance, Employers' Liability Policy, Carrier's Liability Insurance, Liability Insurance Act Policy, Golfers Indemnity Insurance</li> <li>b) Aviation Insurance</li> <li>c) Agricultural Insurance</li> <li>d) Theft And Burglary Insurance</li> <li>e) Insurance For Nuclear Activities</li> <li>f) Travel Insurance</li> <li>g) Property Insurance</li> <li>h) Social Insurance</li> <li>i) Sports And Entertainment Insurance</li> </ul>

## REFERENCES:

- 1) John Birds & Norma J. Hird, Bird's Modern Insurance law, (6th ed., London; Sweet & Maxwell, 2004).
- 2) K.S.N Murthy & Dr. KVS Sharma, Modern Law of Insurance in India, (4th ed., Lexis Nexis Butterworths, 2002)
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CO 3	3	3	3	2	2	3	3	3	2	1	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL070A</b>	<b>HUMAN RIGHTS, INTERNATIONAL HUMANITARIAN AND REFUGEE LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this subject, the student will be able to:

CO1: grasp the fundamentals of philosophical and analytical skills including close reading and logical analysis in the area of human rights.

CO2: understand the concept of human rights as a political and legal ideal and appreciate the different motivations and assumptions behind key conceptions of human rights.

CO3: identify and analyze problems of human rights violations addressed by NHRC and SHRC within and beyond national communities with a special emphasis on the distinction between national and international rights of human being; and

CO4: appreciate the institutional and practical dimensions of securing rights of an individual in society.

**SYLLABUS:**

<b>Module-I</b>	Human Rights in their Historical perspective -At International Level -At National Level Concept, Meaning and various Theories of Human Rights, i.e. Human Rights Jurisprudence
<b>Module-II</b>	Human Rights under the Constitution of India- Fundamental Rights Human Rights vis-à-vis Directive Principles under the Constitution of India
<b>Module-III</b>	Meaning of Human Rights under the (Indian) Protection of Human Rights Act, 1993 Human Rights Courts in India
<b>Module-IV</b>	National Human Rights Commission in India – Its composition, powers and Functions State Human Rights Commissions – Its composition, powers and functions
<b>Module-V</b>	Judicial Response for the Protection and Enforcement of Human Rights defined in the Constitution of India. Judicial Response for the protection and enforcement of Human Rights as



	<p>defined in the Protection of Human Rights</p> <p>Protection of Human Rights relating to Scheduled Castes and Scheduled Tribes under the various Laws in India (Protection of Civil Rights Act, 1955 and the Prevention of Atrocities Act, 1986)</p> <p>National Commission for Scheduled Castes and Scheduled Tribes, National Commission for Women in India, National Commission for Child Rights in India</p>
<b>Module-VI</b>	<p>International Humanitarian Law: An Overview</p> <p>History Scope Conceptual Background</p> <p>Conduct of Hostilities</p> <p>Treatment of Victims, Prisoners of War</p> <p>International Institutions</p> <p>State and Individual Accountability</p> <p>Enforcement of Humanitarian Law</p> <p>Human Rights and Humanitarian Law</p>
<b>Module-VII</b>	Refugee Law, UN Convention on Refugees

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CO 2	3	2		3	3	2	3	3	3	3	3
CO 3	3	1	3	2	1	3	3	3	1	2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL080A</b>	<b>DRAFTING AND PLEADINGS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this subject, the student will:**

CO1: be able to appreciate the functions and objects of pleadings.

CO2: be able to explore own way of legislative drafting.

CO3: be trained to participate in litigation.

CO4: have acquired expert legal skills of drafting, pleading and advocacy at a proficient level.

**SYLLABUS:**

<b>Module-I</b>	<p>Drafting</p> <ol style="list-style-type: none"> <li>1. General principles of drafting</li> <li>2. What are deeds and its kinds?</li> <li>3. Components of deeds</li> <li>4. Kinds of writs</li> </ol>
<b>Module-II</b>	<p>Pleadings</p> <ol style="list-style-type: none"> <li>1. What are pleadings?</li> <li>2. Functions of Pleadings.</li> <li>3. When Pleadings will be Dispensed with?</li> <li>4. Forms of modern pleadings</li> <li>5. Cardinal rules of pleadings</li> <li>6. Material facts.</li> </ol> <p>Civil Suits:</p> <ol style="list-style-type: none"> <li>1. Suits in contracts</li> <li>2. Suits in Torts</li> </ol>
<b>Module-III</b>	<p>Suits for others; i.r.t. civil: miscellaneous</p> <ol style="list-style-type: none"> <li>1. Written statements for contracts</li> <li>2. Written statement for torts</li> <li>3. Written statement for others (miscellaneous)</li> <li>4. Interlocutory Application</li> <li>5. Petition for the Winding up of the company</li> </ol>

<b>Module-IV</b>	<ol style="list-style-type: none"> <li>1. Affidavit</li> <li>2. Execution application for final decree</li> <li>3. Memo of appeal               <ol style="list-style-type: none"> <li>1) Memorandum of revision</li> <li>2) Writ of Certiorari</li> <li>3) Writ of Habeus Corpus.</li> </ol> </li> </ol>
<b>Module-V</b>	<p>Criminal</p> <ol style="list-style-type: none"> <li>1) complaints</li> <li>2) Application for exemption from appearance               <ol style="list-style-type: none"> <li>1. Bail Application</li> <li>2. Memo of appeal</li> <li>3. Memo of revision</li> </ol> </li> </ol>
<b>Module-VI</b>	<p>Conveyancing</p> <ol style="list-style-type: none"> <li>a. What is conveyancing ?</li> <li>b. Things to be considered while conveyancing</li> <li>c. Sale deed.</li> <li>d. Mortgages deed</li> <li>e. Lease deed</li> <li>f. Gift deed</li> </ol>
<b>Module-VII</b>	<p>Promisory Note</p> <ol style="list-style-type: none"> <li>1. Power of Attorney</li> <li>2. Will               <ol style="list-style-type: none"> <li>1) Separation deed</li> <li>2) Service contracts</li> <li>3) Hire-Purchase Agreements</li> <li>4) Patents</li> </ol> </li> </ol>

**REFERENCES:**

1. Pleading, Drafting and Conveyancing by R.N. Chaturvedi
2. The law of Pleadings, drafting and conveyancing by R.D. Srivastava law of pleadings in India by Mogha
3. Indian Conveyance by Mogha

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	3	3	2	2	3	3	3	2	3
CO 2	3	2	2	3	3	2	3	3	3	3	3
CO 3	3	3	3	2	3	3	3	3	3	3	3
CO 4	3	2	2	3	2	2	3	3	3	3	3

<b>BAL/BBL/BCL/BSL088A</b>	<b>LAW AND ORGANIZED CRIME</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO 1: Understand the development of law and organized crimes in context of Crime Cartels - Mumbai Underworld Cartels, International Cartels, State sponsored Crimes and International Crime syndicate

CO 2: Understand the menace of Drug Trafficking and narcotics substances IPC provisions - Narcotic Substances Act 1985

CO 3: Familiarize with the current problems prevailing in present times to keep students updated with the developments in the criminal field.

CO 4: Identify and analyze the challenges faced and lessons learned in these situations and how Investigating Bodies dealt with these scenarios

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction To Organised Crimes</b> Conception - reasons for Organized Crimes - Crime Cartels - Mumbai Underworld Cartels - International Cartels - State sponsored Crimes - International Crime syndicate
<b>Module-II</b>	<b>Drug Addiction</b> Drug Addiction - trafficking - narcotics substances - National and International Approaches to Drug Abuse - IPC provisions - Narcotic Substances Act 1985
<b>Module-III</b>	<b>Prostitution</b> Prostitution - Causes and concerns - International responses Prevention of Immoral Activities Act - IPC - Cyber prostitution - Internationalization of flesh trade
<b>Module-IV</b>	<b>Naxalite Activities</b> Collective Violence - Naxal problems - causes and concerns- tribal rebellion Dalit struggle - Atrocities - Telangana struggle



<b>Module-V</b>	<b>Violence Against Women</b> <ul style="list-style-type: none"> <li>➤ Domestic violence</li> <li>➤ Workplace violence - male dominated atrocities,</li> <li>➤ Communal violence in India,</li> </ul> background, reasons, solutions, problems in the Legal system-role of police and operation of criminal justice system - Godhra - finding of various commission
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#### REFERENCES:

1. U Baxi Dissent, Development and Violence' in R Meagher [Ed.]

Law and Social Change: Indo American Reflection 92 [1988]

2. U. Baxi [ed.] Law and Poverty: Critical Essays [1988]

3. R Desai [ed.] Peasant Struggles in India, [1979]

4. R Desai Agrarian Struggles in India: After Independence [1986]

5. R Desai Violation of Democratic Rights in India [1986]

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	2	2	2	3	2	3	3	3
CO 2	3	2	2	2	2	2	3	3	2	3	3
CO 3	3	3	3	2	2	3	3	3	2	3	3
CO 4	3	2	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL089A</b>	<b>WHITE COLLOR CRIMES</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO1: Develop their ability to see the practical effects and make comparative analyses of White Collor Crimes.

CO2: Understand and critically examine growth of white collar crime in India and western countries.

CO3: Understand different types of White collar crimes prevalent in the society by way of different Statues.

CO4: Understanding the importance of Mens Rea and how it is different as regards to White Collor Crimes and Strict Liability in White Collor Crimes.

**SYLLABUS:**

<b>Module-I</b>	<b>Introduction to White Collor Crimes</b> Nature and Definition, Genesis of White Collar Crime, Nature and Scope of White Collar Crime
<b>Module-II</b>	<b>Development of White Collor Crime</b> Growth of White Collar Crime in India and Western Countries,
<b>Module-III</b>	<b>Requirement for White Collor Crime</b> Men-rea and White Collar Crime, Vicarious liability in White Collar Crime, Strict liability in White Collar Crime.
<b>Module-IV</b>	<b>Types of Organized Crimes</b> Statues dealing with White Collar Offences. ➤ The Essential Commodities Act, 1955: ➤ The Food Safety and Standards Act, 2006: Provisions relating to Food Articles.

	<p>Implementation of the Act by Food Safety Officers.</p> <p>Food Safety and Standards Authority of India.</p> <p>Breach of Foreign Exchange Regulations(FEMA)</p>
<b>Module-V</b>	<p><b>Indian Scenario and Cyber Crimes</b></p> <p>Indian Scenario,</p> <p>White Collar Crimes in Indian scenario,</p> <p>Corruption in government and politics,</p> <p>Black Money,</p> <p>Judicial response to white collar crimes in India,</p> <p>Cyber Crimes.</p>

#### REFERENCES:

1. Gandhirajan, C K 2004, Organized crime, A P H Publishing Corporation
2. Nair, P M 2002, Combating Organized crime, Konark Publishers
3. Karan Raj, 2002, Dictionary of Terrorism and Bioterrorism, IVY Publishing House, Delhi.
4. V Grover, 2002, Encyclopedia of International Terrorism, Vol. 1,2 &3, Deep & Deep Publications, New Delhi.
5. Shah, Giriraj, 2002, Encyclopedia of International Terrorism, Annol Publications, New Delhi.
6. Holmes, Ronald M, 2001, Murder in America, Sage Publications, New Delhi.
7. Cambridge University Press, 2001, White Collar Crime Explosion: How to protect yourself and your company from prosecution
8. Kelly, Robert J, 2000, Encyclopedia of Organized Crime in the United States from Capone's Chicago to the New Urban Underworld, Greenwood Press, Westport. London.
9. Viano, Emilio C 2000 Global Organized Crime and International Security, Ashgate Publishing Limited
10. Siti, Yingyi, 2000, Environmental Crime: The Criminal Justice System, Role in Protecting the Environment, Sage Publications, New



MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	3	2	3	3	2	2	3
CO 2	3	3	2	2	3	3	3	3	3	2	2
CO 3	3	2	2	2	3	3	3	3	2	3	3
CO 4	3	3	3	2	2	3	3	2	3	2	2

# SEMESTER X

<b>BAL/BBL/BCL/BSL043A</b>	<b>ALTERNATIVE DISPUTE RESOLUTION</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: be able to explore meaning of disputes, kinds of arbitration, necessity of disputes resolution Alternatives to Judicial Process and history of Arbitration in India.

CO2: develop skills and styles of drafting arbitration clauses in an agreement.

CO3: be able to analyze foreign arbitral award and Conciliation proceedings such as appointment, Communication and Role of Conciliator.

CO4: be able to critically analyze the leading case-law pertaining to the Civil Procedure Code, 1908 [Section 89], Arbitration and Conciliation Act, 1996 and the Legal Services Authorities Act, 1987.

**SYLLABUS:**

<b>Module-I</b>	Meaning of dispute, Necessity of Dispute Resolution Mechanism of Dispute Resolution, ADRs and their impotence Alternatives to Judicial Process, Negotiation, Mediation, Compromise, Conciliation Arbitration, Lok Adalats, Panchayats Distinction between ADR & Judicial Dispute Resolution
<b>Module-II</b>	Historical background of Arbitration in India The Arbitration Act, 1940 & its short comings UNCITRAL Model Law Historical Background of Arbitration & Conciliation Act, 1996 Aims and objects of Arbitration and Conciliation Act, 1996
<b>Module-III</b>	Concept of Arbitration, Kinds of Arbitration, International Commercial Arbitration Arbitration Agreement, Essentials, Validity, Reference to Arbitration, Interim Measure by Court Arbitration Tribunal – Composition, Jurisdiction, Appointment Challenge to appointment, Powers Procedures and Court Assistance

<b>Module-IV</b>	Conduct of arbitral proceedings Arbitral award-forms and contents, ground of validity of award Corrections and Interpretations, nature and contents of award. Form of award, Grounds of setting aside an award Finality of arbitral award Enforcement of an award Appeals and Revision, costs.
<b>Module-V</b>	Foreign Arbitral Award Enforcement of Foreign Awards New York convention, 1958 Geneva Convention, 1928
<b>Module-VI</b>	Conciliation-appointment, Communication, Role of Conciliator Termination of Conciliation Proceedings Nature of Awards Costs. Conciliation proceedings in CPC Conciliation proceedings under Industrial Dispute Act Conciliation in Family Disputes
<b>Module-VII</b>	Legal Services Authorities Act Formation of Lok Adalats, Enforcement of Awards Role of NGOs in Dispute Settlement Settlement of International Disputes by Peaceful means.

## REFERENCES:

### Judgments

1. Bombay Gas Company v. Parmeshwar Mittal, AIR 1998 Bom. 118
2. Tamil Nadu Electricity Board v. Bridge Tunnel Construction, AIR 1997 SC 1376
3. M/s ITI limited Allahabad v. Distt. Allahabad AIR 1998 All. 318
4. Grid Corporation of Orissa Ltd. v. Indian Charge Chrome Ltd. AIR 1998 SC 1761
5. Kulbir Singh Rattan Singh v. New Delhi Municipal Council, AIR 1998 Del 230
6. M.M.T.C. Ltd v. Sterlite industries Ltd., AIR 1997 SC 605
7. K.K. Modhi v. K.N. Modhi, AIR 1998 SC 1297

8. Indian Oil Corporation Ltd. v. Kiran Construction Co., AIR 2003 Del. 282
9. Oil and Natural Gas Commission v. Saw Pipes, AIR 2002 SC 2629
10. NTPC v. Singer Company, AIR 1993 SC 998

#### **Books Referred**

1. Law of Arbitration and Conciliation – S.K. Roy Choudhary, H.K. Saharay
2. Arbitration & Conciliation – S.C. Tripathi
3. Alternative Dispute Redressal System – S.R. Maini
4. Law of Arbitration P.M. Bakshi
5. Arbitration & Conciliation - Avtar Singh
6. The Arbitration & Conciliation Act, 1996
7. The Legal Services Authorities Act, 1987

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	3	1	2	2	2	3	3	2	3	3
CO 2	3	3	2	1	3	3	3	3	3	2	3
CO 3	3	3	3	2	2	3	3	3	3	2	3
CO 4	3	2	2	2	3	3	3	3	2	3	3

<b>BAL/BBL/BCL/BSL053A</b>	<b>LAW OF PROPERTY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After completion of this course, the student will:**

CO1: have an understanding of concept, meaning and kinds of property and legislative schemes of law of Property.

CO2: be able to understand the rules related to transfer of immovable property and analyze the different types of transfers

CO3: be able to analyze and evaluate the rules governing Mortgages, Leases, Exchanges, Gift and Actionable Claims rights and liabilities of transferor and transferee

CO4: be able to analyze Benami Transactions Act and latest Amendments.

**SYLLABUS:**

<b>Module-I</b>	Concept and Meaning of property Scope, Object and Scheme, Kinds of property: Movable, Immovable property, Tangible and Intangible, Intellectual Property: copyright, patents, designs and trademarks
<b>Module-II</b>	Law relating to registration of documents affecting property relations, Documents of which registration is compulsory.
<b>Module-III</b>	Transfer of Property Act 1882: Attestation, Notice, Actionable Claim, Transfer of Property, What may be transferred, Persons competent to transfer, Operation of transfer, Oral transfer, Conditions restraining Alienation, Enjoyment. Transfer for the benefit of unborn person, Direction for accumulation, Vested and Contingent interest, Conditional Transfers. Condition precedent, Condition subsequent and Collateral conditions.
<b>Module-IV</b>	Doctrine of Election, Doctrine of lis pendens, Fraudulent Transfer,



	<p>Doctrine of part performance.</p> <p>Sale: Definition, Rights and Duties of seller and buyer.</p>
<b>Module-V</b>	<p>Lease: Definition, Duration, lease making,</p> <p>Right and Liabilities of lessor and lessee,</p> <p>Determination of lease, Waiver of forfeiture, Waiver of notice to quit,</p> <p>Relief against forfeiture for non-payment of rent and in, certain other cases,</p> <p>Effect of holding over,</p> <p>Exemption of leases for agriculture purposes.</p>
<b>Module-VI</b>	<p>Mortgage: Kinds, Mortgage by assurance,</p> <p>Rights and liabilities of mortgagor and mortgagee,</p> <p>Marshalling,</p> <p>Contribution and Charge,</p> <p>Person who may sue for redemption,</p> <p>Subrogation,</p> <p>Gift: Definition, Suspension or Revocation, Onerous Gift.</p> <p>Easement: Definition, Types, Creation, Suspension,</p> <p>Revival. Licenses: Creation, Suspension, Transfer and Revocation</p>
<b>Module-VII</b>	Benami Transactions Act and latest Amendments.

#### REFERENCES:

1. Srivastava, Ashish Kumar. Property Laws, Lexis Nexis, 2015.
2. Mulla, Transfer of Property Act, 11<sup>th</sup> Ed., Universal, Delhi 2013.
3. Sarathi, VP., Transfer of Property (1995), 6<sup>th</sup> Ed., Eastern Book Depot, Lucknow, 2017.
4. Shukla, SN., Transfer of Property Act, 26<sup>th</sup> Ed., Allahabad Law Agency, Allahabad, 2015.
5. Rao, Subba GCV. Law of Transfer of Property (Easement Trust and Wills), 2vol., ALT Publication, 2012.
6. Gujar, Suryakant Mahadev Lectures on Property Laws (Transfer of Property Easement and Equity), Lawman Academic Series, Kamal Publishers, 2017

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	2	1	3	1	3	3	3	3	2	3
CO 3	3	3	3	2	3	3	3	3	3	1	3
CO 4	3	3	2	2	3	3	3	3	2	3	3



<b>BAL/BBL/BCL/BSL074A</b>	<b>ENVIRONMENTAL LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this subject, the student will:**

CO1: be able to develop understanding about the importance of environmental law throughout the world in recent times.

CO2: be able to address varieties of areas such as reducing air pollution and maintain air quality, water quality, waste management, etc.

CO3: be made aware of notable laws and conventions in environment law in recent times.

CO4: have a career as environmental lawyer in different sectors such as Governments, NGOs, International Organizations, consultant in environmental policy and law, etc.

**SYLLABUS:**

<b>Module-I</b>	Meaning and contents of environment Pollution: Meaning, Kinds and effects of pollution International regime
<b>Module-II</b>	Constitutional remedies : Fundamental rights, 42 <sup>nd</sup> amendment Polluter pays principles, precautionary principles, public trust doctrine, sustainable development Other Common law and statutory remedies
<b>Module-III</b>	<b>Environment Protection Act 1986:</b> -Object, section 1 to 10 -Section 10 to 26
<b>Module-IV</b>	<b>The Water (Prevention and Control of Pollution) Act, 1974:</b> Object, Definitions, constitution and functioning of boards under the Act, Prevention and Control of Water Pollution -Funds, Accounts -Penalties and Procedure -Central Water Laboratory -Power of Central Government and State Government to make rules
<b>Module-V</b>	<b>The Air (Prevention and Control of Pollution) Act 1981</b> Object, Definitions, constitution of Boards, powers and functions

	-Prevention and Control of Air Pollution, Air laboratory, penalties and procedure, power of central. -government and state government to make rules.
<b>Module-VI</b>	<b>The Wild Life Act 1972</b> -Need to conserve wild life -Definitions, constitution of National and state board for wild life -Grant of permits, protected area sanctuary
<b>Module-VII</b>	Advisory Committee, Reserve management committee, National park, Central Zoo authority -Offences and penalties under the Act -Noise Pollution

#### REFERENCES:

##### Judgments:

1. Vellore Citizens' Welfare Forum v. Union of India (1996) 5 SCC 647
2. Municipal Council Ratlam v. Vardhichand, AIR 1980 SC 1622
3. M.C. Mehta v. Union of India & ors (1992) 1 SCC 358
4. U.P. Pollution Control Board v. Modi Distillery and ors., AIR 1988 SC 1128
5. Church of god (Full Gospel) v. K.K.R. Majestic Colony Welfare Association & ors., AIR 2000 SC 2773
6. D.D. Vyas & ors. v. Shriram Food and Fertilizers and Union of India, AIR 1987 SC 965
7. R. L&E. Kendra, Dehradun v. State of U.P., AIR 1985 SC 652
8. M.C. Mehta v. Kamal Nath, (1997) 1 SCC 599

##### Suggested Readings:

1. Paras Diwan and Piyushi Diwan, Environmental Administration, Law and Judicial Attitude
2. P.S. Jaswal, Environmental Law
3. R.B. Singh & Suresh Mishra, Environmental Law in India
4. P. Leelakrishna, The Environmental Law in India
5. N.Maheshwari, Text Book on Environmental Law
6. S.C. Shastri, Environmental Law

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
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CO2	3	3			3	3	3	3	1		3
CO3	3	3	1	2	3	3	3	3	3	2	3
CO4	3	3	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL076A</b>	<b>IPR IN PHARMA INDUSTRY</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to grasp the important role of IPR in Pharma Industry.

CO 2: be able to understand the types of IPR which are involved in pharmaceutical companies.

CO 3: be able to apply legal framework in clinical trials and be able to protect the vulnerable people of Country.

CO 4: acquire skills to draft claims involved in IPR violation and in search of patent.

**SYLLABUS:**

<b>Module-I</b>	<b>MODULE 1-Introduction to IPR and Pharmaceutical Industry</b> a) Stages of drug development b) Economics of drugs development c) Patent d) Trademark e) Confidential Information f) Data Exclusivity g) Trade Secret
<b>Module-II</b>	<b>Pharmaceutical Innovation and Patent Protection,</b> a) Patenting pharmaceutical-International b) Patenting pharmaceutical-India
<b>Module-III</b>	<b>Clinical Trials- International</b> a) International guidelines b) Cross- Border clinical trails
<b>Module-IV</b>	<b>Clinical Trials- India</b> a) Indian Scenario b) Legal framework c) Role of Institutional Ethics Committee d) Prior Informed consent e) Protection of the vulnerable population
<b>Module-V</b>	<b>Access to Medicine</b>

	a) Historical view b) Public health needs and doha declaration c) TRIPS Plus
<b>Module-VI</b>	<b>Product Liability and Patent Search Analysis.</b> a) Mishaps in Pharmaceutical company b) Guidelines for examination of patent application
<b>Module-VII</b>	Search of patent Drafting claims

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Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
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CO 2	3	2	2	1	3	2	3	3	1	3	3
CO 3	3	3	3	2	2	3	3	3	2	2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3



<b>BAL/BBL/BCL/BSL077A</b>	<b>FOREIGN TRADE (INTERNATIONAL TRADE LAW)</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to understand structure of International Trade laws.

CO2: be able to grasp fundamentals of international sale contracts regulations.

CO3: be familiar with the major recent developments in the world trading system, and be able to critically analyze key issues raised both by the current round of WTO negotiations and by the spread of regional trading arrangements.

CO4: have acquired skills to analyze functions of International Financial Institutions and be able to explore Meaning, Characteristics and trends in Multi National Enterprises (MNEs) and Foreign Direct Investment.

**SYLLABUS:**

<b>Module-I</b>	<p>Introduction to International Trade Law</p> <ul style="list-style-type: none"> <li>a) International Law and International Economic Relations</li> <li>b) Development of International Trade law – Ancient, Medieval and Modern</li> <li>c) Structure &amp; characteristics of International Trade</li> <li>d) Legal Relationships in International Trade</li> <li>e) International Business and Globalization</li> <li>f) Free Trade and Fair Trade</li> <li>g) Codification and development of International Trade Law by the League of Nation and the United Nations.</li> </ul>
<b>Module-II</b>	<p>International Trade and Financial Institutions</p> <ul style="list-style-type: none"> <li>a) The Nature and Characteristics of International Institutions.</li> <li>b) The Bretton Woods Conference and Establishment of IMF and IBRD</li> <li>c) Promotion of Currency Stability: Role of IMF, Regional Financial Crisis &amp; the Contribution of the IMF to International Trade</li> <li>d) Mobilization of International Capital: The Role of the IBRD</li> <li>e) Structure and Functioning of IBRD</li> <li>f) Constituents of the IBRD</li> <li>g) International Finance Corporation (IFC)</li> </ul>

	<ul style="list-style-type: none"> <li>h) International Development Association (IDA)</li> <li>i) International centers for Settlement of Investment Disputes (ICSID)</li> <li>j) Multilateral Investment Guarantee Agency (MIGA)</li> </ul>
<b>Module-III</b>	<p>Institutional Environment</p> <ul style="list-style-type: none"> <li>a) Pre WTO Scenario, Difference between GATT and WTO</li> <li>b) GATT- WTO –Institutional Structure</li> <li>c) Trade Related Institutions- WTO and UNCTAD</li> <li>d) WTO- Basic Principles, various agreements, Functions and Areas of operations, Dispute Settlement Mechanism (rules and procedures)</li> <li>e) Pillars of GATT               <ul style="list-style-type: none"> <li>i) Most Favored Nation Treatment</li> <li>ii) Tariff Bindings</li> <li>iii) National Treatment</li> <li>iv) Non- Tariff Barriers</li> </ul> </li> <li>f) GATT and Free Trade Agreements (FTA) and Referential Rules of Origin, Market Access, and Beyond.</li> <li>g) Anti- Dumping and Countervailing Laws, Dumping Margin Determination.</li> </ul>
<b>Module-IV</b>	<p>Multi National Enterprises (MNEs) and Foreign Direct Investment</p> <ul style="list-style-type: none"> <li>a) Meaning and Characteristics</li> <li>b) Role of MNEs in host economy</li> <li>c) Trends in GloBCL FDI</li> <li>d) Issues in MNEs- Taxation, Restrictive Trade Practices, Currency, Jurisdiction and Technology Transfer.</li> </ul>
<b>Module-V</b>	<p>International Sale Contract</p> <ul style="list-style-type: none"> <li>a) Historical Overview of the Regulation of International Sale Contract.</li> <li>b) United Nation Convention on Contracts for the International Sale of Goods (CISG).</li> <li>c) Definition and Nature of International Sale Contract.</li> <li>d) International Commercial trade terms-INCOTERMS</li> <li>e) UNIDROIT principles of International commercial contracts</li> </ul>

<b>Module-VI</b>	International Carriage of Goods a) Carriage of Goods by Sea b) Carriage of Goods by Air c) Carriage of Goods by Road d) Combined Transport
<b>Module-VII</b>	Payment in International Transactions a) Documentary Credits. b) Uniform Customs and Practice of Documentary Credits. c) Doctrine of Strict Compliance and the Independence principle in Documentary Credits.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	2	3	3	1	2	3
CO 2	3	2	2	3	3	2	3	3	3	2	3
CO 3	3	3	3	2	2	3	3	3	1	2	3
CO 4	3	2	2	3	2	2	3	3	2	3	3



<b>BAL/BBL/BCL/BSL078A</b>	<b>IPR AND BIO DIVERSITY PROTECTION</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student will:**

CO1: be able to explore salient features, scope, and general overview of biological diversity.

CO2: be able to analyze bio privacy, regulatory regime of access to biological diversity and international conventions on biotechnology and intellectual property rights.

CO3: be able to examine technology transfer on IPR and Comparative approaches to the IPR biodiversity linkage, Current Ideas, Approaches and Activities.

CO4: be able to explore the current regime for Access to Genetic Resources, 1992 Report

**SYLLABUS:**

<b>Module-I</b>	Introduction and overview of Biological Diversity; Meaning and scope of Biological Diversity; Biological resources and traditional knowledge; Salient features of Biological Diversity Act; Biological Diversity concerns and issues;
<b>Module-II</b>	Bio piracy; Regulation of access to Biological Diversity; National Biodiversity Authority; Functions and powers of Biodiversity Authority; State Biodiversity Board; Biodiversity Management Committee and its functions
<b>Module-III</b>	Analysis of the biodiversity convention: biotechnology and intellectual property rights, History and General Scope of the Biodiversity Convention, The provisions concerning intellectual property right, Intellectual property rights on life form, From common heritage to national sovereignty and common concern, IPR- technology transfer and access to genetic resources
<b>Module-IV</b>	IPRs and technology transfer: Article 16(5), the recorded views of participant

	countries, Conclusions on the Convention and Intellectual Property Protection, Indigenous and local community knowledge and IPRs
<b>Module-V</b>	Related activity within the Biodiversity Convention and Secretariat since 1992
<b>Module-VI</b>	Comparative approaches to the IPR/ biodiversity linkage, Current Ideas, Approaches and Activities, Proposed Block of Access, Proposed Amendments to the Patent Act
<b>Module-VII</b>	Current Regime for Access to Genetic Resources, 1992 Report ,

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	1	3	2	2	3	3	1	2	3
CO 2	3	3	2	1	3	2	3	3	2	3	3
CO 3	3	3	3	2	1	3	3	3	1	2	3
CO 4	3	3	2	3	2	2	3	3	2	3	3

<b>BAL/BBL/BCL/BSL079A</b>	<b>INVESTMENT LAWS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student should:**

CO1: be able to explore the evolution, nature and growth of investment law and multi regulation of Foreign Investment.

CO2: be able to understand complete overview of bilateral investment treaties.

CO3: be able to address the issues arising in international investment law and analyze disputes settlement mechanism and Regulatory Regime for Investments in India

CO4: be able to develop skills related to drafting and case study in area of investment law.

**SYLLABUS:**

<b>Module-I</b>	Introduction to Investment Law a) Nature b) Sources c) Evolution
<b>Module-II</b>	Multilateral Regulation of Foreign Investment a) Investment regime – International and Regional b) MNCs as a regulatory challenge
<b>Module-III</b>	Bilateral Investment Treaties a) Rationale b) Structure c) Merits and Demerits
<b>Module-IV</b>	Dispute Settlement in International Investment Law a) Fair & equitable standard of Treatment b) Most Favoured Nation (MFN) c) National Treatment d) Full protection & security e) Expropriation f) Exhaustion of local remedies
<b>Module-V</b>	Investment Law and Human Rights a) Human rights b) Labour c) Environment d) Socially Responsible Investment (SRI)
<b>Module-VI</b>	Regulatory Regime for Investments in India

	a) Regulatory Phases b) From regulation to management of FOREX c) FDI d) Tax e) Human Rights f) Labour g) Environment h) Transfer of Technology
<b>Module-VII</b>	Case Studies Drafting of agreements

#### REFERENCES:

1. Agrawal S and Baby RJ, *SEBI Act* (Taxmann 2011)
2. Kannan S and Geetha V, *FDI in India: Law, Policy and Procedure* (Thomson Reuters 2014)
3. Kaushik L, *Unfair Trade Practices in Securities Market* (Taxmann 2013)
4. Mishra B, *Law Relating to Insider Trading* (Taxmann 2015)
5. Sornarajah M, *The International Law on Foreign Investment* (Cambridge University Press 2010)
6. Subedi SP, *International Investment Law: Reconciling Policy and Principle* (Hart Publishing 2016)
7. Taneja R, *Foreign Direct Investment and Globalisation* (Eastern Book Company 2014)

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	2	3	3	3	2	3
CO 2	3	3	2	3	3	2	3	3	3	1	3
CO 3	3	3	3	1	2	3	3	3	2	2	3
CO 4	3	2	2	3	2	2	3	3	1	3	3



<b>BAL/BBL/BCL/BSL081A</b>	<b>PROFESSIONAL ETHICS</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES: After the completion of this course, the student should:**

CO1: be able to understand importance of professional ethics in order to promote the respect for lawyers in the society.

CO2: have developed skill of attracting clients and a sense of professional responsibility towards their clients.

CO3: be able to handle future problems of advocacy.

CO4: be able to apply new information technology in legal profession.

**SYLLABUS:**

<b>Module-I</b>	Professional conduct of a lawyer Professional conduct Professional misconduct
<b>Module-II</b>	Professional responsibility of advocates Conduct of advocate in general Arguments in appeals and revisions
<b>Module-III</b>	Skill of attracting clients Persuasion through arguments
<b>Module-IV</b>	Preparation of brief Future problems of advocacy
<b>Module-V</b>	Fee structure Maintaining accounts of clients fee
<b>Module-VI</b>	Contempt of courts and lawyers Strikes, protests and demonstrations by legal professions
<b>Module-VII</b>	Information technology and legal profession Advocates and political activities

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	2	2	3	3	3	2	3
CO 2	3	3	2	3	2	3	3	3	1	3	3
CO 3	3	3	3	2	2	3	3	3	2	2	3
CO 4	3	2	1	3	2	2	3	3	2	1	3

<b>BAL/BBL/BCL/BSL090A</b>	<b>INTERNATIONAL CRIMINAL LAW AND TRANSNATIONAL CRIME</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO1: Identify the philosophical and sociological reasoning behind the International Criminal.

CO2: Critically evaluate the different categories of Crimes and treaties relating to transnational crimes in the global arena.

CO3: Identify the lacunae and problems existing in the present and proposed legislative framework.

CO4: Respond to factual and legal issues relating to Drug trafficking, Counterfeiting, Money Laundering and environmental crimes etc.

**SYLLABUS:**

<b>Module-I</b>	<b>International criminal law Development</b> i. The substantive international law a. The concept of an international crime b. Crimes under general international law (i): general c. Crimes under general international law (ii): imposing responsibility d. Crimes under general international law (iii): excluding responsibility e. Treaty crimes (i): general f. Treaty crimes (ii): focus on treaty-based responses to terrorism
<b>Module-II</b>	<b>Role of ICC and Jurisdiction</b> ii. The role of the International Criminal Court and jurisdiction –The Rome Statute a. The crime of aggression b. Genocide c. Crimes against humanity d. War crimes e. Terrorism and transnational crimes iii. The objectives and policies of international criminal law; including issues of amnesty, truth and justice iv. Various International criminal tribunals v. Emerging issues in international criminal law
<b>Module-III</b>	<b>Transnational Crimes</b> i. Definition and Scope ii. Characteristics of Transnational crime iii. Types of Transnational crime

	iv. Causes of Transnational crime a. Criminal Intent and mens-rea in such crimes b. Modus operandi of Transnational crime 2. Classification of Transnational Crimes A. International Perspective i. Drug Trafficking as Transnational Crime ii. Trafficking of Weapons iii. Counterfeit of Goods iv. Trafficking of Persons and Smuggling of Migrants v. Money Laundering vi. Terrorism vii. Environmental Crimes
<b>Module-IV</b>	<b>Laws relating to Transnational Crime</b> i. Organised crime and United Nations, ii. The UN Convention on transnational and organised crime iii. Naples Declaration and Global Action Plan 24 Dec. 1994 iv. United Nations Conventions Against Organized Crime, 2000
<b>Module-V</b>	<b>Prevention, control and correctional strategies</b> i. Extradition Act 1962 (Relevant Provisions) and Extradition Treaty ii. International investigative agencies (Interpol etc), Adjudication authorities (including ad hoc and permanent criminal tribunals), iii. Role of Police in Investigation of organized crime iv. Role of Judiciary, Trial and Sentencing in organized crime v. Profiles of Criminal Gang / Investigation and Prosecution.

#### REFERENCES:

1. The International Criminal Court: Challenges to Achieving Justice and Accountability in the 21st Century by Mark S. Ellis; Richard J. Goldstone. International Debate Education Association, 2008
2. An Introduction to International Criminal Law and Procedure Paperback –June 28, 2010 by Robert Cryer, Hakan Friman, Darryl Robinson
3. International Criminal Law: Cases and Commentary (Paperback) By (author) Antonio Cassese, By (author) Guido Acquaviva, By Mary De Ming Fan, Alex Whiting
4. An Introduction to Transnational Criminal Law (Paperback) by Neil Boister
5. The International Criminal Court: A Commentary on the Rome Statute (Oxford Commentaries on International Law) By William A. Schabas
6. An Introduction to the International Criminal Court By William A. Schabas



7. International and Transnational Criminal Law by David Luban , Julie R. O'Sullivan, David P. Stewart
8. From Nuremberg to the Hague: The Future of International Criminal Justice, Philippe Sands., Cambridge University Press, 2003
9. Transnational Organized Crime-An Overview from Six Continents by Jay Albanese, Philip Reichel
10. Transnational Organized Crime: A Commentary on the United Nations Convention and its Protocols (Oxford Commentaries on International Law) Hardcover –May 17, 2007 by David McClean, Oxford University Press (May 17, 2007)
11. Handbook of Transnational Crime and Justice by Jay Albanese, Philip Reichel, Sage Publication

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	3	2	3	3	2	3	3
CO 2	3	3	3	3	2	3	3	2	3	3	3
CO 3	3	3	3	2	2	2	3	3	2	3	3
CO 4	3	2	2	3	3	3	3	2	2	3	2

<b>BAL/BBL/BCL/BSL091A</b>	<b>COMPARATIVE CRIMINAL LAW</b>	<b>Maximum Marks:100</b>
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**COURSE OUTCOMES:** After the completion of this course, the student will be able to:

CO1: Develop their ability to see the practical effects and make comparative analyses of different sets of regulations within the complex field of comparative criminal law.

CO2: Understand basic principles of different types of crimes in the international jurisdictions.

CO3: Critically examine and analyze different legal institutions and hierarchy of criminal courts and their jurisdiction power and functions of police and judicial officers

CO4: Gain important skills in evaluating sources, researching, writing, normative analysis of text regarding accusatorial and inquisitorial systems prevailing in different countries.

**SYLLABUS:**

<b>Module-I</b>	<b>Principles of legality</b> Classification of offences – kinds of punishments – general defense (infancy, insanity consent, necessity and private defense) – abetment and attempt, recidivism and euthanasia.
<b>Module-II</b>	<b>Types of Offences</b> Culpable homicide and murder – rape and unnatural offences – theft and robbery – defamation – offences relating to marriage.
<b>Module-III</b>	<b>Courts and Police</b> Hierarchy of criminal courts and their jurisdiction – police: power and functions- judicial officer in investigation- prosecuting agencies- role of public prosecutor.
<b>Module-IV</b>	<b>Law of arrest and procedure</b> Rights of arrested and accused – evidentiary value of statements – bail procedure – sentencing process.
<b>Module-V</b>	<b>Accusatorial and inquisitorial system</b> presumption of innocence - types of trial – speedy justice – role of judge, prosecution and defense attorney during trial- victim's role in penal process –

	plea bargaining – appeal procedure – legal aid – public participation in criminal justice.
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#### REFERENCES:

1. Substantive Criminal Law
2. R.V. Kelkar – Criminal Procedure Code, 1973
3. Devlin – Criminal Prosecution in England
4. Esmein – History of Continental Procedure (Chapter I & II)
5. Coffey (Alam) – An Introduction to Criminal Justice System and Process
6. French Code of Criminal Procedure & Penal Code (American Series)
7. 14th & 41st Report of the Law Commission of India
8. Anglo American Criminal Justice – Karlton Delmov
9. Anglo French Legal System – Rene David

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes							Program Specific Outcomes			
	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	3	2	3	3	3	2	3	3	2	3	3
CO 2	3	3	3	2	2	3	3	3	2	3	2
CO 3	3	3	2	2	3	3	3	3	3	2	3
CO 4	3	3	2	3	2	2	3	3	2	3	3



**JECRC<sup>TM</sup>**  
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**Department of Journalism and Mass Communication**

**SYLLABUS**

**&**

**SCHEME OF EXAMINATION**

**of**

**BACHELOR OF ARTS (JOURNALISM & MASS COMMUNICATION)**

**[B.A (JMC)]**

**For**

**First to Sixth Semester**

**(w.e.f. Academic Session 2020-2023)**

  
Department of Mass Communication  
JECRC University, Jaipur-303905

### **Program educational objectives (PEOs) of BA(JMC) Program:**

The overall objectives of the Learning Outcomes-based Curriculum Framework (LOCF) for Mass communication & Journalism degree are:

1. To impart the basic knowledge of Mass communication & Journalism and related areas of studies.
2. To develop the learner into competent and efficient Media & Entertainment Industry- ready professionals.
3. To empower learners by communication, professional and life skills.
4. To impart Information Communication Technologies (ICTs) skills, including digital and media literacy and competencies.
5. To imbibe the culture of research, innovation, entrepreneurship and incubation.
6. To inculcate professional ethics, values of Indian and global culture.
7. To prepare socially responsible media academicians, researchers, professionals with global vision.

### **PROGRAMME LEARNING OUTCOMES (PLOs)**

The key outcomes planned in this undergraduate programme in Mass communication & Journalism are underpinned as follows:

1. Shall acquire fundamental knowledge of Mass communication & Journalism and related study area.
2. Shall acquire the knowledge related to media and its impact.
3. Shall be competent enough to undertake professional job as per demands and requirements of M & E Industry.
4. Shall empower themselves by communication, professional and life skills.
5. Shall be able to enhance the ability of leadership.
6. Shall become socially responsible citizen with global vision.
7. Shall be equipped with ICTs competencies including digital literacy.
8. Shall become ethically committed media professionals and entrepreneurs adhering to the human values, the Indian culture and the Global culture.
9. Shall have an understanding of acquiring knowledge throughout life.
10. Shall acquire the primary research skills, understand the importance of innovation, entrepreneurship and incubation abilities.
11. Shall acquire the understanding of importance of cooperation and teamwork.

### **Program Specific Outcome (PSOs):-**

The B.A.(Journalism and Mass Communication) Program is offered in the School with the following program specific outcomes:

**PSO1:** The graduates will be able to how to write, edit and proof for mass media like Newspaper and Magazine.

**PSO2:** Students will be skilled to write, edit, interview and present for radio news and current affairs programs as a responsible citizen.

**PSO3:** This Program will provide understanding of program production, management in government and private television channels and in Cinema.

**PSO4:** Students will be able in the latest digital audio-video and multimedia technologies to understand agenda and propaganda hidden in web media like Facebook and Twitter.

**PSO5:** The students will be able to measure public opinion, through media research.

  
Head of Institution  
JMC, Udaipur, April 2020/21



### FIRST SEMESTER EXAMINATION

Course Code	Paper	L	T/P	Credits
BJM 101A	Introduction to Communication	4	-	4
BJM 102A	Writing for Media	4	-	4
BMC 051A	Environmental Studies	4	-	4
BJM 104A	IT for Media	4	-	4
<b>Practical</b>				
BJM 105A	Communication Lab	-	2	2
BJM 106A	Writing for Media Lab	-	2	2
BJM 107A	IT for Media Lab	-	2	2
<b>Total</b>		16	6	22

### SECOND SEMESTER EXAMINATION

Course Code	Paper	L	T/P	Credits
BJM 208A	History of Indian Media and Media Organization	4	2	6
BJM 209A	Socio-economic and cultural Studies	4	-	4
BJM 210A	Print Journalism: Reporting & Editing	4	-	4
BJM 211A	Photo Journalism	4	-	4
<b>Practical</b>				
BJM 205	General Awareness Practical	-	2	2
BJM 206A	Print Journalism Lab	-	2	2
BJM 207A	Photo Journalism and Still Imagery Lab	-	2	2
<b>Total</b>		16	8	24

  
 Head of Department  
 School of Mass Communication  
 Anna University, Chennai-600 025

## WRITING FOR MEDIA

Course Code : RJM102A	L: 4	T/P : 0	CREDITS : 4
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### Objectives of the Course:

1. To equip students with the nuances of writing.
2. To develop linguistic and communication abilities.
3. To develop the knowledge of grammar, vocabulary, syntax, spellings and punctuation.
4. To inculcate the skills of translation.
5. To help them understand paragraph writing.

### Unit - I [Essentials of Good Writing]

L-12

1. Writing: Art and Craft, Significance
2. Purpose of Media Writing:
  - i. Writing to Inform
  - ii. Writing to Describe
  - iii. Writing to Persuade
  - iv. Writing to Educate
3. The ABCD of Media Writing
  - i. Accuracy
  - ii. Brevity
  - iii. Clarity
  - iv. Discernment
4. Principles of Media Writing
5. Vocabulary
  - i. Vocabulary Building: Using Dictionaries and Thesauri
  - ii. Understanding the Misunderstood Word
  - iii. Rules of Spelling
6. Overcoming Grammar Problems
7. Punctuation

### Unit - II [The Art of Putting Words Together]

L-10

1. The Sentence
  - i. Concision/Clarity
2. Emphasis
  - i. Total Emphasis (That applies to the Whole Sentence)
  - ii. Partial Emphasis (That Applies to a word or Group of Words)
3. Rhythm - Words and How they Sound
4. Variety
  - i. Variety & Recurrence
5. Changing Sentence Length & Pattern
6. Breaking Monotony

### Unit - III [Putting Sentences Together]

L-12

1. The Paragraph
2. Concise Ideas
  - i. Ideas Dissected into Elements
3. Elements as Paragraphs & Sub Paragraphs
  - i. Putting Paragraphs Together - Logical Sequencing
4. The Complete Picture - The First Draft
5. Reading ALOUD For Further Changes

## IT FOR MEDIA

Course Code : BJM 104A	L: 4	T/P : 0	CREDITS : 4
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### Objectives of the Course:

1. To describe basics of design and graphics.
2. To apply various elements and principles of design to visual and graphic communication.
3. To inform about colour scheme and production.
4. To make students efficient in desktop publishing.
5. To acquaint students with the printing process.

### Unit-I [Principles of Design & Graphics]

L-12

1. Basics of Design and Graphics
2. Elements and principles of design
3. Tools of Design: QuarkXpress, Illustrator, In-design, Corel Draw and Photoshop
4. Typography : Physical form, aesthetics and classifications
5. Colour: Physical forms, psychology, colour scheme and production

### Unit-II [Layout]

L-12

1. Components of layout and layout planning
2. Advertisement layout
3. Broadsheet and Tabloid layout
4. Magazine & Book Layout

### Unit-III [Visuals and Design]

L-12

1. Visuals : Physical forms, functions & editing
2. Poster Design
3. Logo Design
4. Brochure Design

### Unit-IV [DTP & Printing]

L-12

1. Basics of Desktop Publishing
2. Printing Process, Printing Material
3. Printing Methods - Letter Press, Cylinder Press, Rotary Press, Screen, Offset,
4. Paper and finishing: Types, size, GSM(Weight)

### Course Outcomes: After the completion of the course, students will be able to:

- CO1: Develop entrepreneurship skills.
- CO2: Learn effective communication through visual and design.
- CO3: Understand the growth and development of typography.
- CO4: Know about effective application of colors.
- CO5: Develop desktop publishing skills.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1					M	L				H	
CO2				H	M						
CO3	H	M	L					H			
CO4	H	L	L								
CO5	H	H	H					M			L



Compulsory question	Q.no.1. 10 Multiple Choice question of 10 marks each. For framing this question, any topic from any unit can be selected.
Setting of other questions	Q.no.2. Very short type question : 5 X 2 marks=10 ( Maximum word limit 50 words) Q.no.3. short type question : 5 X 6 marks=30( Maximum word limit 150 words) Q.no.4. Long type question : 5 X10 marks=50 ( Maximum word limit 350 words)

**Note2: Instructions for Paper Setter/Moderator Internal Examinations:**

Internal assessment is based on Continuum evaluation System. The Total Marks for the Internal assessment will be 50-marks. Internal assessment is divided into four parts:-

1. First Internal Semester (In Sem.) Examination-15 Marks
2. Second Internal Semester (In Sem.) Examination-15 Marks
3. Attendance Assessment- 5 Marks
- Assignments & Activities Assessment- 15 Marks

**Suggested Readings:**

1. Sunny Thomas
2. Brian Carroll
3. Melvin Mencher
4. A.S.Horsey
5. Prof. V.S.Sreedharan
6. P.J Rajendra and J.S Karanthalli.
7. Rooney, L. Coen
8. Taylor, Shirley
9. R. Mithelton
10. Neeta Arjuna Dey, Anuradha Murwari and Swati Pal

11. Wren & Martin
12. Thomas S. Kane
13. Collins
14. George A.Hough
15. Robert Mc. Lish
16. Joseph Saurman
17. Dr. K.K. Rattu
18. Jyoti Chet and Prayadharan
19. Dr. Laxminant Pankey
20. Chicago Manual of Style

Writing for Media, Vision Books, New Delhi.  
Writing for Digital Media, Knowledge Publication.  
Basic Media Writing, William C Brown Publication.  
Guide to Patterns and Usage in English, ELBS, Oxford Uni. Press.  
How to write correct English, Goodwill Publications, New Delhi.  
Essentials of English and Business Communication, S. Chand.  
New Handbook of Basic Writing Skills, Harlowest College Pp, Orlando.  
Communication for Business, Pearson Education Ltd, Edinburgh Gate, Harero, Essex, England.  
Sentences, IIVY Publishing House, New Delhi-95.

Creative Writing, A Beginner's Manual, Daring Koderosey (India) Pvt. Ltd., New Delhi 2009.  
High School English Grammar & Composition, S.Chand  
Oxford Essentials Guide To Writing Collins Grammar Publication.  
News Writing : Kamalika  
Radio Production : Focal Press  
The Ad Week Copy Writing Hand Book.  
Translation through media in New Millennium, Sarathi Publication, Jaipur  
Paradise from Anurad, Radha Krishna Publications, New Delhi  
Formulation, Objects and Methods University of Chicago Press

6. Revise – Re-write–Edit
7. Writing – Formats : Journals, Letters, Essays & Reports
8. Glossary of Administration, Politics, Legal, Economics and International related terminology.

#### Unit-IV [Translation in Journalism]

L- 14

1. Concept & Definition of Translation.
2. Nature & Norms of Translation.
3. Types of Translation
  - i. Word to Word Translation
  - ii. Literal Translation
  - iii. Summarized Translation
  - iv. Free Translation
  - v. Translation based on appropriate reference
  - vi. Translation according to pronunciation (Translation of words & sentences from the source language as it is)
  - vii. Paraphrased Translation (Using Synonyms)
4. The need and importance of Translation in Journalism.
5. The process of Translation and How to maintain its originality:
  - i. Source Material Perception (Comprehending the Source Language)
  - ii. Analyzing the text or Source Material
  - iii. Transfer of Language (Translation Process)
  - iv. Revision of the Translated Text
  - v. Co-ordination & Comparison of Source Language with Original Text and Thus Final Text in Target Language.
6. Guidelines for Translation:
  - i. Don't Omissionize
  - ii. KISS rule
  - iii. Maintaining Originality
  - iv. Summarize with Clarity
  - v. Adhere to Norms of Translation.
7. Practice of Translation from Hindi to English & Vice – Versa.

**Course Outcomes:** After the completion of the course, Students will be able to

- CO1: Learn the purpose of media writing.  
 CO2: Develop communication skills through media writing.  
 CO3: Know about vocabulary and syntax.  
 CO4: Learn entrepreneurship skills by means of translation.  
 CO5: Develop communication skills to be a social leader.

Course Outcome	Program Learning Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	2	3	4	5	6	7	8	9	10	11
CO2	H		H	H	M			L	L		
CO3	H	M	H						L		
CO4	L		L							H	
CO5	M	L	L	L	H	M					

**COURSE CODE: BJM102A**

**Note 1: Instructions for Paper Setter/Moderator for External Examination:**

Maximum Marks	100 (Maximum marks will be converted proportionately into 50 marks)
Time	3 hours

*[Signature]*  
 Head of Department  
 Department of Journalism & Mass Communication  
 University of Delhi

## IT FOR MEDIA LAB

(PHOTOSHOP, COREL DRAW, PAGEMAKER, QUARK XPRESS, INDESIGN)

Course Code : BJM 107A	L : 0	T/P : 2	CREDITS : 2
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### Objectives of the Course:

1. To describe DTP software used for design and layout.
2. To design and create layouts of newspapers and magazines.
3. To know about effective visual communication through printing technology.
4. To skill students in design various PR tools.
5. Understand relation between media and technology.

### Exercises and Assignments

1. To work with different textures, color schemes and other elements on at least 10 different topics/themes.
2. To work on various types of calligraphic and typographic letterforms
3. Use of colors in different schemes-complementary, analogous, split complementary, triad, soft, dark and monochromatic.
4. To visit printing press.
5. Following assignments can be given to students in each of these software- Photo Shop, Coral Draw, Illustrator, Quark Xpress, In Design
  - A. Design a visiting card
  - B. Design a postcard
  - C. Design a poster
  - D. Design a brochure
  - E. Design a magazine (at least 16 pages)
  - F. Prepare a tabloid
  - G. Prepare a front page of a newspaper

**Course Outcomes:** After the completion of the course, students will be able to;

CO1: Design various media material (e.g. Newspaper and magazine).

CO2: Know operations of design software.

CO3: Design various public relation (PR) material (visiting card, poster & booklet etc.).

CO4: Explore print designs.

CO5: Design a brochure and house journal.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11
CO1	H	M	H				H				
CO2	H	M	M				H				
CO3	H	M	M	H			M				
CO4	H	M	M				H				
CO5	H	M	M	H			M				

**Internal Assessment:** Students should maintain a file & soft copy of their assignments/jobs duly checked and signed by the concerned faculty. The marks assigned for internal evaluation are 50.

# WRITING FOR MEDIA LAB

Course Code : MM 106A	L : 0	T/P : 2	CREDITS : 2
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**Objective of the Course:** On completion of the course students should be able:

1. To make them understand effective media writing.
2. To know about printing technologies.
3. To enrich student's social media writing skills.
4. To help them know about typography.
5. To help them understand research writing.

## Exercises and Assignments

1. Hindi and English typing
2. News writing, Feature writing and Article writing
3. Story writing, Satire, Essay writing, reportage, travelogue, Memoirs
4. Writing for blog and website, WhatsApp and mobile writing.
5. Social Media writing to enrich their own social media profile.

**Course Outcomes:** After the completion of the course, students will be able to:

- CO1: Publish a newspaper, magazine or other media material, independently.  
 CO2: Write for various social media platforms.  
 CO3: Know use of media tools for content writing.  
 CO4: Work on writing skills for effective social messages.  
 CO5: Develop typing skills.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	H	H	H	L					L		
CO2	H	H	H	H			H				L
CO3	H	M	M	M			H				
CO4	H	H	H	H							
CO5	H		M	H			H				

**Internal Assessment:** The students should maintain a file and soft copy of their assignments/jobs duly checked and signed by the concerned faculty. The marks assigned for internal evaluation are 50.

## Instructions for External Examiner for Oral & Practical Examination

A.	Students need to be evaluated on the basis of print material designed and developed by them during the semester which they will present before the examiner. (40 marks)
B.	Also on the basis of questions pertaining to the subject be asked by the examiner. (10 marks)
Max Marks	The marks prescribed for evaluating a student by the External Examiner are 50

**Note 1: Instructions for Paper Setter/Moderator for External Examinations:**

Maximum Marks	100 (Maximum marks will be converted proportionately into 50 marks)
Time	3 hours
Compulsory question	Q no. 1. 10 Multiple Choice question of 10 marks each. For framing this question, any topic from any unit can be selected.
Setting of other questions	Q no. 2. Very short type question is 5 X 2 marks=10 (Maximum word limit 50 words) Q no. 3. short type question 5 X 6 marks=30( Maximum word limit 150 words) Q no. 4. Long type question 5 X10 marks=50 ( Maximum word limit 300 words)

**Note 2: Instructions for Paper Setter/Moderator Internal Examinations:**

Internal assessment is based on Continuous evaluation system. The Total Marks for the Internal assessment will be 50-marks. Internal assessment is divided into four parts:-

1. First Internal Semester (1st Sem.) Examination-15 Marks
2. Second Internal Semester (2nd Sem.) Examination-15 Marks
3. Attendance Assessment- 5 Marks
4. Assignments & Activities Assessment- 15 Marks

**Suggested Readings:**

1. K. K. Dasgupta
2. A. K. Dhar
3. N. N. Sanyal

Book Publishing  
Printing and Publishing  
Art and Production, Sage Publishers,  
New Delhi, 2001

*[Signature]*  
Date: \_\_\_\_\_  
Page: \_\_\_\_\_



## IT FOR MEDIA LAB

(PHOTOSHOP, COREL DRAW, PAGEMAKER, QUARK XPRESS, INDESIGN)

Course Code : BJM 107A	L : 0	T/P : 2	CREDITS : 2
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### Objectives of the Course:

1. To describe DTP software used for design and layout.
2. To design and create layouts of newspapers and magazines.
3. To know about effective visual communication through printing technology.
4. To skill students in design various PR tools.
5. Understand relation between media and technology.

### Exercises and Assignments

1. To work with different textures, color schemes and other elements on at least 10 different topics/themes.
2. To work on various types of calligraphic and typographic letterforms
3. Use of colors in different schemes-complementary, analogous, split complementary, triad, soft, dark and monochromatic.
4. To visit printing press.
5. Following assignments can be given to students in each of these software- Photo Shop, Coral Draw, Illustrator, Quark Xpress, In Design
  - A. Design a visiting card
  - B. Design a postcard
  - C. Design a poster
  - D. Design a brochure
  - E. Design a magazine (at least 16 pages)
  - F. Prepare a tabloid
  - G. Prepare a front page of a newspaper

**Course Outcomes:** After the completion of the course, students will be able to;

- CO1: Design various media material (e.g. Newspaper and magazine).  
CO2: Know operations of design software.  
CO3: Design various public relation (PR) material (visiting card, poster & booklet etc.).  
CO4: Explore print designs.  
CO5: Design a brochure and house journal.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	H	M	H				H				
CO2	H	M	M				H				
CO3	H	M	M	H			M				
CO4	H	M	M				H				
CO5	H	M	M	H			M				

**Internal Assessment:** Students should maintain a file & soft copy of their assignments/jobs duly checked and signed by the concerned faculty. The marks assigned for internal evaluation are 50.

**Instructions for External Examiner for Oral & Practical Examination**

A.	Students need to be evaluated on the basis of their knowledge of computer and its operations, and prescribed softwares (20 marks)
B.	Also on the basis of the assignments and their presentation to be made before the examiner using the prescribed software (30 marks)
Max Marks	The marks prescribed for evaluating a student by the External Examiner are 50

  
School of Mass Communication  
University of Kerala

## THIRD SEMESTER INTRODUCTION TO ADVERTISING

Course Code : BJM 301 A

L : 4

T.P : 0

CREDITS : 4

### Objectives of the Course:

1. To define and explain advertising, its role and functions.
2. To identify various types of advertising.
3. To differentiate between advertising as a communication, marketing and PR tool.
4. To explain the working of an ad agency
5. To explain advertising as a social process.

L-12

### Unit I [Introduction]

1. Definition & Meaning of Advertising
2. Role and functions of Advertising
3. Nature & Scope of Advertising
4. Growth & Development of Advertising in India & World
5. Global Scenario of Advertising
6. Ethical & Regulatory Aspects of Advertising

L-12

### Unit II [Advertising as a tool & process]

1. Advertising as communication tool, communication process & advertising
2. Models of Advertising Communication
  - i. AIDA model
  - ii. DAGMAR model
  - iii. Maslow's Hierarchy of need
3. Advertising as a social process- consumer welfare, standard of living and cultural values

L-12

### Unit III [Classification & Aspects]

1. Classification of Advertising on the basis of
  - i. Target Audience
  - ii. Geographical Area
  - iii. Medium
  - iv. Purpose
2. Advertising Creativity- Definition & importance.
3. Elements of Print advertising - Copy, slogan, identification mark, clashing illustrations.
4. Characteristics, Advantages & Disadvantages of
  - i. Broadcast media - Television, Radio, Audio-Video Cassettes & CD's, Cyber media
  - ii. Print Media - Newspaper, Magazines
  - iii. Support Media - Out-of-home, in-store, transit, yellow pages, Movie theatre, in-flight
  - iv. Direct marketing

L-12

### Unit IV [Ad Agency Structure & Functions]

1. Concept of advertising agencies
2. Ad agency-Role, Types, Structure & functions
3. The advertisers; client -agency relationship
4. Criteria to select an ad agency

**Course Outcomes:** After the completion of the course, students will be able to;

CO1: Understand the philosophy and the functions of Advertising Companies.

CO2: Understand different types of Advertisements and their making.

CO3: Understand the production, marketing and distribution of Advertising world.

CO4: Learn the functioning of Advertising agencies.



CO5: Understand advertising as a social process.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	H	M	L	L							
CO2	H	M	L	M							
CO3	H	L	M	M			M				
CO4	H	L	L	M			M				
CO5	M					M					L

Course Code: BJM 301A

**Note 1: Instructions for Paper Setter/Moderator for External Examination;**

Maximum Marks	100 (Maximum marks will be converted proportionately into 50 marks)
Time	3 hours
Compulsory question	Q.no.1. 10 Multiple Choice question of 10 marks each. For framing this question, any topic from any unit can be selected.
Setting of other questions	Q.no.2. Very short type question s 5 X 2 marks=10 ( Maximum word limit 50 words) Q.no.3. short type question 5 X 6 marks=30( Maximum word limit 150 words) Q.no.4. Long type question 5 X10 marks=50 ( Maximum word limit 300 words)

**Note2: Instructions for Paper Setter/Moderator Internal Examinations;**

Internal assessment is based on Continuous evaluation System. The Total Marks for the Internal assessment will be 50-mark. Internal assessment is divided into four parts:-

1. First Internal Semester (In Sem.) Examination-15 Marks
2. Second Internal Semester (In Sem.) Examination-15 Marks
3. Attendance Assessment- 5 Marks
4. Assignments & Activities Assessment- 15 Marks

#### Suggested Readings

1. Sandage C H, Fryburger Vernon & Rotzoll Kim
2. Mohan Mahender
3. Ogilvy David
4. Lewis Herschell Gordion
5. Little Field James E & Kirkpatrick C.A.:
6. White Roderick
7. Bulmore Jeremy

Advertising Theory and Practice: A.I.T.B.S. Publishers & Distributors, Delhi  
Advertising Management: Concepts & Cases; Tata McGraw Hill Publishers  
Ogilvy on Advertising; Prion Books Ltd.  
The Complete Advertising and Marketing Handbook: East West Books(Madras) Pvt. Ltd., Chennai  
Advertising: Mass Communication in Marketing: Vakils, Feffer & Simons Pvt. Ltd., Bombay  
Advertising: What it is and How to do it: McGrawHill Book Company, London  
Behind the scenes in Advertising: NTC Publishers, Henley

# MEDIA LAWS & ETHICS

Course Code : BJM 302A

L : 4

T/P : 2

CREDITS : 6

## Objectives of the Course::

1. To define freedom of the press as enshrined in article 19(1) (a) of the Constitution
2. To list the reasonable restrictions for freedom of the press
3. To describe the salient features of the Press Council of India, its powers and functions
4. To identify and apply the necessary provisions of laws and acts applicable to publication and broadcast of news and programmes of a sensitive nature
5. To cover judicial proceedings, parliament and state legislature without attracting penal action

L-14

## Unit-I [Freedom of the Press and the Law]

1. Salient Features of Indian Constitution: Relevance of Fundamental Rights and Directive Principles.
2. Freedom of the press and the Constitution-need for a free press in a democracy.
3. Article 19(1)(a) of the Indian Constitution-Freedom of speech and expression.
4. Article 19(1)2 reasonable restrictions to freedom of speech and expression.
5. Supreme Court decisions on freedom of the press.
6. Press laws before Independence and after.
7. First Press Commission and Second Press Commission.
8. The Press Council Acts, National Emergency.

L-12

## Unit-II [Media laws pertaining to the State, Citizens, Judiciary, Legislature and Parliament]

1. **The State:** Sedition-incitement to violence (section 121 IPC) IPC 121 read with 511 inflammatory writing (IPC 353)
2. **Citizens:** Defamation (IPC (499) 500) civil and criminal defamation-libel, slander
3. **Legislature:** Parliamentary privileges / Articles 105 (Parliament) Article 194 (State Legislation)
4. **Judiciary:** Contempt of Court, Covering and reporting court proceedings (Article 361A)
5. **Common court terminology** - Plaintiff, defendant, affidavit, evidence, prosecution, conviction, accused, acquittal, bail, prima facie, subjudice
6. **Media Ethics-** Why Media Ethics- truth-accuracy-balance-decency-human rights
7. **Ethics and Principles**

L-12

## Unit-III [Acts and Laws]

(Introduction to various Acts/Laws which a journalist needs to know)

1. Press and Registration of Books Act. 1867/1955 role of RNI
2. Role and functions of the Registrar of Newspapers
3. Intellectual Property Rights: Design and Patent Act, Copyright Act 1957
5. Official Secrets Act 1923
6. Working Journalist Act 1955
7. Right to Information Act 2005

L-10

## Unit-IV [Electronic and New Media Laws]

1. The Commercial and Broadcasting Codes of AIR & Doordarshan
2. Cable Television Act and Rules
3. IT Act
4. Advertising Standards Council
5. Cinematography Act

**Course Outcomes:** After the completion of the course, students will be able to;  
CO1: Understand the Indian Constitution specially article 19(1) in a better way.



- CO2: Understand the roles, responsibilities and powers of different media authorities.  
 CO3: Understand the working process of legislature, executive and judiciary.  
 CO4: Understand different media ethics and laws of print, electronic and web media.  
 CO5: Understand press laws before and after the independence.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	M	L			L			L			
CO2	H	H	M	L	L	L		M			
CO3	H	M	L	L	L	L					
CO4	H	M	L	L			L	H			
CO5	H	H	L					L			

### COURSE CODE: BJM 302A

#### Note 1: Instructions for Paper Setter/Moderator for External Examination:

Maximum Marks	100 (Maximum marks will be converted proportionately into 50 marks)
Time	3 hours
Compulsory question	Q.no.1. 10 Multiple Choice question of 10 marks each. For framing this question, any topic from any unit can be selected.
Setting of other questions	Q.no.2. Very short type questions 5 X 2 marks=10 (Maximum word limit 50 words) Q.no.3. short type question 5 X 6 marks=30 (Maximum word limit 150 words) Q.no.4. Long type question 5 X 10 marks=50 (Maximum word limit 300 words)

#### Note 2: Instructions for Paper Setter/Moderator Internal Examinations:

Internal assessment is based on Continuous evaluation System. The Total Marks for the Internal assessment will be 50-marks. Internal assessment is divided into four parts:-  
 First Internal Semester (In Sem.) Examination-15 Marks  
 Second Internal Semester (In Sem.) Examination-15 Marks  
 Attendance Assessment- 5 Marks  
 Assignments & Activities Assessment- 15 Marks

#### Suggested Activities:

- Witnessing court proceedings
- Parliament session

#### Suggested Readings:

- Relevant Sections of IPC from Criminal Law Manual, Universal
- Constitution of India (Article 19 (1) and 19 (2) 105, 194) The Law Dictionary, Universal
- Vidisha Barua Press & Media Law Manual, Universal Law Publishing Co. Pvt. Ltd. New Delhi
- P.K. Ravindranath Press Laws and Ethics of Journalism, Author Press, New Delhi
- R.K. Ravindrana Press in the Indian Constitution
- K.S. Venkateshwaran Mass Media Laws and Regulations in India, Published by AMCIC
- Dr. Ambrish Saxena Freedom of Press and Right to Information in India, Kanishka Publication, New Delhi
- M. Neelamalar Media Law and Ethics, PIII Publisher.
- Shash, Ajay Freedom Of Press

- CO2: Understand the roles, responsibilities and powers of different media authorities.  
 CO3: Understand the working process of legislature, executive and judiciary.  
 CO4: Understand different media ethics and laws of print, electronic and web media.  
 CO5: Understand press laws before and after the independence.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	M	L			L			L			
CO2	H	H	M	L	L	L		M			
CO3	H	M	L	L	L	L					
CO4	H	M	L	L			L	H			
CO5	H	H	L					L			

### COURSE CODE: BJM 302A

#### Note 1: Instructions for Paper Setter/Moderator for External Examination:

Maximum Marks	100 (Maximum marks will be converted proportionately into 50 marks)
Time	3 hours
Compulsory question	Q.no.1. 10 Multiple Choice question of 10 marks each. For framing this question, any topic from any unit can be selected.
Setting of other questions	Q.no.2. Very short type question $5 \times 2$ marks=10 (Maximum word limit 50 words) Q.no.3. short type question $5 \times 6$ marks=30 (Maximum word limit 150 words) Q.no.4. Long type question $5 \times 10$ marks=50 (Maximum word limit 300 words)

#### Note2: Instructions for Paper Setter/Moderator Internal Examinations:

Internal assessment is based on Continuous evaluation System. The Total Marks for the Internal assessment will be 50-mark. Internal assessment is divided into four parts:-

1. First Internal Semester (In Sem.) Examination-15 Marks
2. Second Internal Semester (In Sem.) Examination-15 Marks
3. Attendance Assessment- 5 Marks

Assignments & Activities Assessment- 15 Marks

#### Suggested Activities:

1. Witnessing court proceedings
2. Parliament session

#### Suggested Readings:

1. Relevant Sections of IPC from Criminal Law Manual, Universal
  2. Constitution of India (Article 19 (1) and 19 (2) 105, 194) The Law Dictionary, Universal Press & Media Law Manual, Universal Law Publishing Co. Pvt. Ltd. New Delhi
  3. Vidisha Barua
  4. P.K. Ravindranath
  5. R.K. Ravindrana
  6. K.S. Venkateshwaran
  7. Dr. Ambrish Saxena
  8. M. Neelamalar
  9. Dash, Ajay
- Press Laws and Ethics of Journalism, Author Press, New Delhi  
 Press in the Indian Constitution  
 Mass Media Laws and Regulations in India, Published by AMCIC  
 Freedom of Press and Right to Information in India, Kanishka Publication, New Delhi  
 Media Law and Ethics, PHI Publisher.  
 Freedom Of Press

*[Signature]*  
 School of Journalism and Mass Communication  
 Anna University, Chennai



# RADIO JOURNALISM AND PRODUCTION

Course Code : BJM 303A	L : 4	T/P : 0	CREDITS : 4
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## Objectives of the Course:

1. To describe the characteristics of radio as a medium of mass communication and its limitations
2. To describe different formats of radio programs
3. To list basic inputs, equipment and main elements of radio production
4. To identify the right kind of music and sound effects for different formats of radio programs
5. To acquaint students with different modes of transmission.

## Unit-I [Radio as a medium]

L-12

1. Radio: as a medium of mass communication, Characteristics, and Limitations
2. Different types of radio stations: State, Private FMs, Community Radio
3. Three Modes of transmission: AM, SW and FM
4. AIR Code, Commercial Broadcast Code and Guidelines of Election Broadcast
5. Autonomy of All India Radio: Chanda Committee to Verghese Committee—Prasar Bharati Act 1997—Formation of Prasar Bharati —Composition and Functions of Prasar Bharati.

## Unit-II [Radio Formats]

L-12

1. Types of Formats:
  - A. Simple announcements
  - B. Radio News
  - C. Radio talks
  - D. Radio features and documentaries
  - E. Radio play
  - F. Radio ads
  - G. Phone in Programs and Music Shows

## Unit-III [Writing for the Ear]

L-12

1. Knowing your audience
2. Developing your style
3. Writing for different formats

## Unit-IV [Radio Production]

L-12

1. Radio production: Introduction, Elements, Acoustics, Sound effects and Music
2. Different types of microphones
3. Recording
4. Editing

**Course Outcomes:** After the completion of the course, students will be able to;

- CO1: Understand the concept of Radio as a mass communication medium.  
 CO2: Work on different formats of Radio programs.  
 CO3: Produce various Radio programs including jingles and news.  
 CO4: Work on community Radio station for the welfare of poor people.  
 CO5: Establish his/her own Radio station.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	H	H	M	M							



## ADVERTISING LAB

Course Code : BJM 306A	L: 0	T/P: 2	CREDITS : 2
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### Objective of the Course:

1. Plan an advertising campaign
2. Design and develop a marketing plan
3. Evaluate and analyze various brand campaigns.
4. Write TV commercials and develop script.
5. Write Radio spots and jingles.

**Exercises/Assignments:** Students should undertake the following assignments as part of their practical training in advertising

1. Analyse 5 Print Advertisements
2. Critically evaluate print ads of competing brands two each from FMCG, Consumer Durables and Service Sector
3. Design display advertisement, classified & display classified (one each)
4. Print advertising preparation – copy writing, designing, making posters, handbills
5. Writing radio spots and jingles
6. Writing TV commercials, developing script and story board
7. Formulate, plan and design an Ad Campaign based on market and consumer research on the assigned topic/theme.
8. Making advertisements for print, Radio and TV.

**Course Outcomes:** After the completion of the course, students will be able to;

- CO1: Understand the philosophy and the functioning of Advertising Campaigns.  
 CO2: Understand the production, marketing and distribution of a brand.  
 CO3: Deconstruct various campaigns of the brands.  
 CO4: Acquire fundamental knowledge of TV commercials.  
 CO5: Gain knowledge about Radio spots.

CO4: Acquire fundamental knowledge of PLOs											
CO5: Gain knowledge about Radio spots.											
Course Outcome	Program Learning Outcomes										
	PL O1	PLO 2	PL O 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	H	L	L	L			L		L		
CO2	H	M	L	L							
CO3	H	L	L	L					L		
CO4	H	L	L	L							
CO5	H	L	M	L							

... various assignments and students need to ... campaigns in

**Internal assessment:** The concerned faculty should develop various assignments and students need to be evaluated on the basis of their performance. Students will also prepare advertising campaigns in groups. The marks assigned for internal evaluation are 50.

### Instructions for External Examiner for Oral & Practical Examination

A.	Students should be evaluated on the basis of assignments file & soft copy prepared by them (20 marks)
B.	Due weightage should be given to the research, formulation and planning of the project prepared by students during the semester. (20 marks)
C.	The examiner should also interview the student to find out his/her level of understanding of advertising. (10 marks)



**RADIO JOURNALISM AND PRODUCTION LAB**

Course Code : BJM 307A

L : 0

T/P : 2

CREDITS : 2

**Objectives of the Course:**

1. To prepare an audio brief
2. To apply various elements of radio production for producing different radio formats
3. To write and record effectively for radio
4. To produce radio interviews, discussions, features and documentaries
5. To learn the basics of sound editing.

**Practical Exercises**

1. Research and Preparation of audience profile
2. Writing exercises : Scripting of radio documentary/feature/drama
3. Recording : In the studio and OB recordings
4. Production : Radio discussions, Radio Social messages (max 30 seconds), Radio documentary/feature
5. Sound editing exercises

**Course Outcomes:** - After the completion of the course, students will be able to

CO1: Make a Radio bulletin.

CO2: Produce various Radio Programs including Jingles and News.

CO3: Write Radio Script and record the Voice.

CO4: Take Interviews and Documentaries on various issues for radio.

CO5: Acquire the knowledge of sound editing.

Course Outcome	Program Learning Outcomes									
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10
CO1	H	H	H	H			L			
CO2	H	M	M	L			M			
CO3	H	M	L	M			L			
CO4	H	L	L	L			M			
CO5	H	L	L	M						

**Internal Assessment:** Students should maintain a file & soft copy of their assignments/jobs duly checked and signed by the faculty. The marks assigned for internal evaluation are 50.

**Instructions for External Examiner for Oral & Practical Examination**

A.	Students to be evaluated on the basis of the individual and group production work undertaken during the semester. (15marks)
B.	The examiner should also interview the student to find out his/her level of understanding of radio as a medium and his/her skills in audio production. (15 marks)
C.	Final Production for Evaluation: Students in group will produce a 10 minutes of radio production (Feature/ Documentary/ Play/Celebrity Interview) and 30 seconds Spot/Jingle. Public Service Announcement. The examiner will listen to the radio programmes produced by the students. (20 marks)



Max Marks

The marks prescribed for evaluating a student by the External Examiner are 50.

## TELEVISION JOURNALISM AND PRODUCTION

Course Code : BJM 402A

L : 4

T/P : 0

CREDITS : 4

### Objectives of the Course:

1. To explain the salient features of TV as a medium
2. To describe the process of gathering news and reports for TV.
3. To list the stages of production of a video program
4. To describe the steps involved in editing of a video program
5. To describe the use of graphics and special effects.

Marks for Internal Assessment: 50

L-10

### Unit-I [TV as a medium]

1. Understanding the medium - Nature and Language of TV
2. Formats and types for TV Programmes
3. TV News script format
4. Scripting for Fiction/Non Fiction

L-14

### Unit-II [TV News Gathering]

1. Fundamentals of TV reporting - Reporting skills, Ethics for TV reporting
2. Writing and Reporting for TV: Finding the story and Developing the sources, Gathering the facts (Getting right visuals, facts and figures, establishing the scene, cut away)
3. Interview - types of news interview, art of conducting a good interview
4. Anchoring - Live shows
5. Packaging

L-14

### Unit-III [TV Programme Production]

1. Steps involved in production & utilisation of a TV Program
2. Stages of production- pre-production, production and post-production
3. The production personnel - Single camera and Multi camera production
4. Use of graphics and special effects
5. Developing a video brief

L-10

### Unit-IV [Basics of Video editing and Programme Evaluation]

1. Aesthetic Factor of video editing.
2. Types of video editing- Non-Linear editing, Cut to cut, assemble & insert, on line, off line editing
3. Designing, Evaluation and field testing of programme

**Course Outcomes:-** After the completion of the course, students will be able to:

- CO1: Analyze and work in the TV industry.  
CO2: Write stories and collect news for the TV news and entertainment industry.  
CO3: Produce different formats of TV programs.  
CO4: Work on editing softwares.  
CO5: Acquire the knowledge of graphics and special effects.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11
CO1	H	H	H	H			M				
CO2	H	L	L	H							
CO3	H	M	M	M			M				
CO4	H		L	L			H				
CO5	H	H	M	M			H				

Course Code : BJM 402A

Note 1: Instructions for Paper Setter/Moderator for External Examination;

Maximum Marks	100 (Maximum marks will be converted proportionately into 50 marks)
Time	3 hours
Compulsory question	Q.no.1. 10 Multiple Choice question of 10 marks each. For framing this question, any topic from any unit can be selected.
Setting of other questions	Q.no.2. Very short type question s 5 X 2 marks=10 ( Maximum word limit 50 words) Q.no.3. short type question 5 X 6 marks=30( Maximum word limit 150 words) Q.no.4. Long type question 5 X10 marks=50 ( Maximum word limit 300 words)

Note2: Instructions for Paper Setter/Moderator Internal Examinations;

Internal assessment is based on Continuous evaluation System. The Total Marks for the Internal assessment will be 50-mark. Internal assessment is divided into four parts:-

1. First Internal Semester (In Sem.) Examination-15 Marks
2. Second Internal Semester (In Sem.) Examination-15 Marks
3. Attendance Assessment- 5 Marks
4. Assignments & Activities Assessment- 15 Marks

#### Suggested Readings:

- |  |   |
|--|---|
| 1. Jan R. Hakemulder,<br>Ray AC de Jonge, PP Singh | Broadcast Journalism, Anmol Publications,<br>New Delhi                    |
| 2. Janet Trewin                                    | Presenting on TV and Radio, Focal Press,<br>New Delhi                     |
| 3. Stuart W. Hyde                                  | TV & Radio Announcing, Kanishka Publishers                                |
| 4. Andrew Boyd                                     | Techniques of Radio and Television News<br>Publisher: Focal Press, India. |
| 5. Janet Trewin                                    | Presenting on TV and Radio, Focal Press, India.                           |
| 6. Ralph Donald and Thomas Spann                   | Fundamentals of Television Production<br>Surjeet Publications, New Delhi. |
| 7. Herbert Zettl                                   | Handbook of Television Production,<br>Publisher: Wadsworth                |
| 8. Thomas D Burrows & Lynne S.                     | Video Production Publisher: MC Graw Hill                                  |
| 9. Ralph Donald, Thomas Spann                      | Fundamentals of TV Production, Surjeet Publications,<br>New Delhi         |
| 10. Lynn S Gross, Larry W. Ward                    | Electronic Movie making Wadsworth Publishing                              |
| 11. Neill Hicks                                    | Screen Writing, Michael Wiese Productions                                 |
| 12. Thomas D Burrows, Lynne S Gross                | Video Production, Mc Graw Hill  |
| 13. Belavadi, Vasuki                               | Video Production  |

*[Signature]*  
 Date: 11/11/2020  
 Page: 1 of 1

# PUBLIC RELATIONS

Course Code : BJM 403A	L : 4	T/P : 0	CREDITS : 4
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## Objectives of the Course:

1. To define PR and its functions
2. To differentiate between PR & Corporate Communication
3. To apply tools and techniques for handling public and corporate relations.
4. To understand PR ethics.
5. To define role of PR in developing countries

## Unit-I [Public Relations]

L-12

1. Definition of Public Relations - Its need, nature and scope
2. Types of Publics, Functions of PR
3. How PR is different from advertising, publicity and propaganda
4. Corporate Communication, Difference between Corporate communication & PR
5. Ethics of PR - IPRA code - professionalism, PRSI

## Unit-II [Tools & Techniques]

L-12

1. Tools and techniques of Corporate Communication
2. News release - seven point formula
3. Media relations - press conference and press tours
4. Internal and External PR media - corporate film, house journal, annual report, writing, minutes and official memo, institutional advertising

L-14

## Unit - III [Role of PR]

1. Role of PR in developing countries
2. Role of PR in Educational and Research Institutions
3. Role of PR in Rural Sector
4. Role of PR in Defence
5. Role of PR in Political and Election Campaigns
6. PR for Individuals

L-10

## Unit-IV [PR Campaign]

1. Finding a problem
2. PR campaign - programme planning, evaluation
3. Research in PR
4. Role of Digital Public Relation

**Course Outcomes:-** After the completion of the course, students will be able to;

CO1: Understand the philosophy and the concept of public relations activities.

CO2: Analyze public relations and other communications.

CO3: Produce and handle different tools and techniques of PR activities.

CO4: Acquire the knowledge of PR ethics.

CO5: Know the role of PR in developing countries.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11
CO1	H	L	L	M					L		
CO2	H	H	M	L							
CO3	H	L	M	M			M				
CO4	H	H						H			
CO5	H		L	L					L		

*[Signature]*  
 Jyoti University, Jaipur



**Course Code: BJM 403A****Note 1: Instructions for Paper Setter/Moderator for External Examination;**

Maximum Marks	100 (Maximum marks will be converted proportionately into 50 marks)
Time	3 hours
Compulsory question	Q.no.1. 10 Multiple Choice question of 10 marks each. For framing this question, any topic from any unit can be selected.
Setting of other questions	Q.no.2. Very short type question s 5 X 2 marks=10 ( Maximum word limit 50 words) Q.no.3. short type question 5 X 6 marks=30( Maximum word limit 150 words) Q.no.4. Long type question 5 X10 marks=50 ( Maximum word limit 300 words)

**Note2: Instructions for Paper Setter/Moderator Internal Examinations;**

Internal assessment is based on Continuous evaluation System. The Total Marks for the Internal assessment will be 50-mark. Internal assessment is divided into four parts:-

1. First Internal Semester (In Sem.) Examination-15 Marks
2. Second Internal Semester (In Sem.) Examination-15 Marks
3. Attendance Assessment- 5 Marks
4. Assignments & Activities Assessment- 15 Marks

**Suggested Readings:**

- |                                       |  |
|---------------------------------------|--|
| 1. Black Sam & Melvin L. Sharpe       | Practical Public Relations, Universal Book Stall, New Delhi                |
| 2. JR Henry and A. Rene               | Marketing Public Relations, Surjeet Publications, New Delhi                |
| 3. Jeffkins Frank                     | Public Relations Techniques, Butterworth-Heinmann Ltd., Oxford             |
| 4. Cutlip S.M and Center A.H.         | Effective Public Relations, Prentice Hall                                  |
| 5. Kaul J.M.                          | Public Relation in India, Noya Prakash, Calcutta Pvt. Ltd.                 |
| 6. Heath Robert L                     | Handbook of Public Relations, Sage Publications, New Delhi                 |
| 7. K.R. Balan                         | Applied Public Relations and Communications, Sultan Chand and Sons         |
| 8. Philip Hens lowe                   | Public Relations : A Practical Guide to the Basics, Crest Publishing House |
| 9. Dennis L. Wilcose & Glen T Cameron | Public Relations, Pearson, New Delhi                                       |
| 10. Lesly, Philip                     | Hand Book Of Public Relation And Communication                             |
| 11. Vachani, Jagdish                  | Public Relations Management In Media And Journalism                        |

## WEB MEDIA

Course Code : BJM 409A	L : 4	T/P : 0	CREDITS : 4
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### Objectives of the Course:

1. To explain new media technology for journalistic purpose
2. To describe online discussion forums keeping in mind cyber laws and create blogs.
3. To understand the language and write the text for social media.
4. To understand various dimensions of cybercrimes and security
5. To understand the basics of website designing.

### Unit-I [Cyber Communication and Internet]

L-12

1. Cyber Communication
  - i. Meaning and definition
  - ii. Features of Online Communication
2. Internet
  - i. Characteristics
  - ii. Networking, ISP and browsers
  - iii. Types of websites, Video conferencing, Webcasting

### Unit-II [Web Media]

L-14

1. Digital media and communication, ICT and digital divide
2. Information Society, New World Information Order and E-governance
3. Convergence : Need, nature and future of convergence
4. Emerging Trends: Mobile Technology, Social Media & Web 2.0, Social Networking Websites.

### Unit-III [Online Journalism]

L-14

1. Online Journalism-difference in news consumption, Presentation and uses
2. Online Writing & Editing: do's and don'ts
3. Cyber Crimes & Security : Types and Dimension
4. Cyber Laws & Ethics and the difficulty in enforcing them

### Unit-IV [Web Designing and Web Series]

L-8

1. Writing for various web platform
2. OTT
3. Current trends: News and Analysis platforms
4. Basics of Web designing

**Course Outcomes:** After the completion of the course, students will be able to;

CO1: Understand the purpose & features of Online Communication for the betterment of the society.

CO2: Handle the tools and techniques of Online Media.

CO3: Make websites and write text for the same.

CO4: Empower them by imparting education about cyber-crimes and security.

CO5: Understand media convergence.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	H	H	M	M		M	M				
CO2	H		L	L			H				
CO3	H		L	L			H				
CO4	H			L			H				
CO5	H	L	L	L			H				

**COURSE CODE: BJM 409A**

**Note 1: Instructions for Paper Setter/Moderator for External Examination;**

*[Signature]*  
 School of Mass Communication  
 JECRC University, Jaipur-303905

Maximum Marks	100 (Maximum marks will be converted proportionately into 50 marks)
Time	3 hours
Compulsory question	Q.no.1. 10 Multiple Choice question of 10 marks each. For framing this question, any topic from any unit can be selected.
Setting of other questions	Q.no.2. Very short type question s 5 X 2 marks=10 ( Maximum word limit 50 words) Q.no.3. short type question 5 X 6 marks=30( Maximum word limit 150 words) Q.no.4. Long type question 5 X10 marks=50 ( Maximum word limit 300 words)

**Note2: Instructions for Paper Setter/Moderator Internal Examinations;**

Internal assessment is based on Continuous evaluation System. The Total Marks for the Internal assessment will be 50-mark. Internal assessment is divided into four parts:-

1. First Internal Semester (In Sem.) Examination-15 Marks
2. Second Internal Semester (In Sem.) Examination-15 Marks
3. Attendance Assessment- 5 Marks
4. Assignments & Activities Assessment- 15 Marks

**Suggested Readings :**

- |                           |  |
|---------------------------|--|
| 1. Ronal Dewolk           | Introduction to Online Journalism Allyn & Bacon, ISBN 0205286895                                   |
| 2. John Vernon Pavlik     | New Media Technology Allyn & Bacon ISBN 020527093X   |
| 3. Michael M. Mirabito,   | New Communication Technologies : Application, Policy & Impact Focal Press, 4 <sup>th</sup> edition |
| 4. Barbara . Mogrenstorn, | ISBN 0240804295  |
| 5. Jagdish Chakravarthy   | Cyber Media Journalism Emerging Technologies   |

  
 Director of Mass Communication  
 JECRC University, Jaipur-303005



## TELEVISION JOURNALISM AND PRODUCTION LAB

Course Code : BJM 405A	L : 0	T/P : 2	CREDITS : 2
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### Objectives of the Course:

1. To prepare a video brief
2. To handle various aspects of TV production and direction
3. To write scripts for TV
4. To apply production and post-production techniques effectively to produce a video program.
5. To understand ideation

### Exercises/Assignments

1. Preparation of a video brief
2. Idea generation – fiction and non fiction
3. Developing an idea into story
4. Script and story board
5. Production schedule
6. Budget
7. Floor plan
8. Lighting plan
9. Shooting script
10. Production of a programme
11. Post production

At the end students will produce a programme [fiction/non-fiction]

**Course Outcomes:** After the completion of the course, students will be able to;

CO1: Analyze and work in the TV industry.

CO2: Write stories and collect news for the TV news and entertainment industry.

CO3: Produce different formats of TV programs.

CO4: Work on editing softwares.

CO5: Understand post-production work

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	H	M	M	M			M				
CO2	H		L	M							
CO3	H		L	L			M				
CO4	H		L	L			H				
CO5	H		M	M			M				

**Internal Assessment:** The concerned faculty should develop various assignments and students need to be evaluated on the basis of their performance. The marks assigned for internal evaluation are 50.


### Instructions for External Examiner for Oral & Practical Examination

A.	Students need to be evaluated on the basis of the production file & soft copy and programme (Fiction/Non-Fiction) made by them to be submitted in mini DV & DVD format. (30 marks)
B.	Questions regarding various stages of production and subject matter of the programme may be asked so as to assess the level of understanding of the student(20 marks)

  
 External Examiner  
 Jaipur University, Jaipur-302005

Max Marks

The marks prescribed for evaluating a student by the External Examiner are 50.

  
Dean  
School of Mass Communication  
JECRC University, Jaipur-302004



## PUBLIC RELATIONS LAB

Course Code : BJM 406A	L : 0	T/P : 2	CREDITS : 2
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### Objectives of the Course:

1. To plan, design and implement PR tools effectively.
2. To design presentations
3. To write press releases, speeches, memos and notices
4. To understand PR campaigns
5. To collect corporate & institutional ad of a product/service

### Exercises/Assignments:

1. Collect at least five press clippings of any company for its launch of product/service/corporate communication.
2. Collect Corporate & Institutional ad of a product/service (five each)
3. Write press note and press release
4. PR campaign planning and evaluation
5. Organize press conference in the situation of crisis
6. Write speeches, memos and notices
7. Minute-to-minute planning of a event
8. Prepare power point presentations

**Course Outcomes:** After the completion of the course, students will be able to;  
 CO1: Understand the philosophy and the concept of the public relation activities.  
 CO2: Analyze public relations and other communications.  
 CO3: Produce and handle different tools and techniques of PR activities.  
 CO4: Empower them by imparting knowledge of PR campaigns  
 CO5: To enhance interpersonal skills.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	H	L	L	M						L	
CO2	H	H	M	L							
CO3	H	L	M	M			M				
CO4	H		L	L							
CO5	H		L	L							

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1								H			
CO2	M										
CO3	H	M	H	L	L	L					
CO4	L	L									
CO5	M		L		M						

**Internal Assessment:** The students should maintain a file & soft copy of their assignments/jobs duly checked and signed by the concerned faculty. The marks assigned for internal evaluation are 50.

### Instructions for External Examiner for Oral & Practical Examination

  
 Dean  
 School of Mass Communication  
 Jyoti University, Jaipur-302005

A.	A student should be evaluated on the basis of assignments undertaken by him/her during the Ad & PR kept and preserved in a file & soft copy. (30marks)
B.	The examiner should also interview the student to find out his/her level of understanding of Ad& PR.(20 marks)
Max Marks	The marks prescribed for evaluating a student by the External Examiner are 50.

  
 School of Mass Communication  
 EDUITE UNIVERSITY

## WEB MEDIA LAB

Course Code : BJM 407A	L : 0	T/P : 2	CREDITS : 2
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### Objectives of the Course:

1. To use search engines effectively
2. To write content for Social Media
3. To learn computer languages
4. To design websites.
5. To create and maintain blogs.

### Exercises/Assignments

1. To create and maintain blogs
2. Analyze different elements and content of a news website. Distinguish between news, views, opinions, advertisements
3. Web publishing, learning HTML, creating a simple web page with links to text document, graphics and audio & video document
4. Students in groups should create a dynamic website with each one given a different assignment regarding the components of website.
5. Fact checking tools.

**Course Outcomes:** After the completion of the course, students will be able to;

CO1: Understand the purpose and the features of the Online Communication for the betterment of the society.

CO2: Handle the tools and techniques of the Online Media.

CO3: Make websites and write text for the same.

CO4: Understand the basics of fact checking.

CO5: Impact knowledge about creating and maintaining blogs.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	H	H	M	M		M	M				
CO2	H		L	L			H				
CO3	H		L	L			H				
CO4	H			L			H				
CO5	H	L	L	L			H				

**Internal Assessment:** The students should maintain a files & soft copy of their assignments/jobs duly checked and signed by the concerned faculty. The marks assigned for internal evaluation are 50.

### Instructions for External Examiner for Oral & Practical Examination

A.	Students will be evaluated on the basis of individual and group assignments undertaken by him/her during the semester. The examiner will see the website (hard & soft copy) made by the students. (30 marks)
B.	The examiner should also interview the student to find out his/her level of understanding of new media as a medium and his/her skills in web designing. (20 marks)



Max Marks	The marks prescribed for evaluating a student by the External Examiner are 50.
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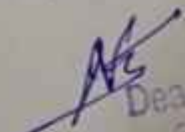
## DISSERTATION

Course Code : BJM 607A	L : 0	T/P : 0	CREDITS : 6
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The Dissertation carries 100 Marks. It will be evaluated by External and Internal Examiners separately from out of 50 marks each. The External Examiner will be appointed by the HOD. This must be based on a Media research Project.

The Dissertation should contain the following components:-

1. **Title or Cover Page:** The title should contain the following information:- University logo at the top, project title, student's name and role number, course, year, supervisor's name, Name of the University and the department.
2. **Preface:** A good preface should be straight to the point, not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project but rather a concise summary of the scope and results of the project.
3. **Acknowledgement:** Acknowledgement to any advisory or financial assistance received in the course of work may be given.
4. **Certificate:-** ( By project supervisor) A certificate from the project guide to be enclosed.
5. **Table of Contents:-** Title and subtitles are to correspond exactly with those in the text.
6. **Introduction:-** Here a brief Introduction to the problem that is a central to the project and an outline of the structure of the rest of the report should be provided. Project objective is a must where as a hypothesis is to be included necessary. The Introduction should aim to catch the imagination of the reader, so excessive detail should be avoided.
7. **Research Design:** This Section aims at an experimental design, Methodology should be mentioned in details including modifications if any.
8. **Hypothesis:** This Section consists of pre-assumed measures of the researcher based on empirical findings related to Research topic.
9. **Literature Review:** This Section should contain a detail list of related literature reviewed by the Project Investigator while preparing.
10. **Research Findings:** A Conclusion should be final section in which the outcome of the work is mentioned.
11. **Results & Discussions:** Present results, discuss and compare these with those from other workers, etc. In writing, these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in the detail what is readily available in the text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow. Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should be numbered and unless it is really necessary never write in 'Point' form.
12. **Suggestions and Recommendations:** This section must contain material briefly supported by some suggestive recommendations.
13. **Appendices:-** The Appendix consists of material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
14. **References/Bibliography:-** This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of the Journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognized system.
- 15 **Examples:** Footnotes to be given.

  
Dean  
School of Mass Communication  
Jawahar Education Trust, Bangalore

## FIRST SEMESTER INTRODUCTION TO COMMUNICATION

Course	Code	L : 4	T/P :	CREDITS
BJM101A			0	: 4

**Objectives of the Course:** Students should be able

1. To understand human communication.
2. To explain different types of communication.
3. To explain the importance of communication with others.
4. To differentiate between mass communication and mass media.
5. To acquaint students with the theories and the models of communication.

### Unit-I [Defining Communication] L-12

1. Understanding human communication
2. Brief history with special reference to India.

#### 3 Communication: Definition,

1. Communication: Types
2. Communication: Five senses of communication
3. Non-verbal communication: Body language, gestures, eye contact.
4. Evolution of Indian languages

### Unit-II [Introduction to Mass Communication] L-12

1. Mass Communication: Meaning, Functions and Elements
2. Brief introduction to Mass Media: Newspapers and Journalism
3. Audio and/or Visual Communication: Photographs, Films, Radio, Television & New Media
4. Folk Media
5. Intercultural Communication


### Unit-III [Communication Theories] L-12

1. What is Communication Theory?
2. A brief introduction to Communication theories
  - i. Multistep Theory
  - ii. Selective Exposure, Selective Perception, Selective Retention
  - iii. Play Theory
  - iv. Uses & Gratification Theory
  - v. Cultivation Theory
  - vi. Agenda Setting Theory

### Unit-IV [Communication Models] L-12

1. What is Communication Model?
2. A brief introduction to Communication Models
  - i. SMCR Model
  - ii. Shannon & Weaver Model
  - iii. Wilbur Schramm Model
  - iv. Lasswell Model
  - v. Gate Keeping Model
  - vi. Gerbner's Model

**Course Outcomes:** After the completion of the course, CO1: Students will be able to communicate effectively.

  
Dean  
First Semester Communication

CO2: Students will be able to know about various communication models and theories. CO3: Students will be able to understand social interactions to be social leaders. CO4: Students will be able to know about visual communication.

CO5: Students will be able to disseminate communication among various cultures.

Course	Program Learning Outcomes										
Outcome	PL O1	PL O2	PL O3	PL O4	PL O5	PL O6	PL O7	PL O8	PL O9	PL O10	PL O11
CO1	M	M	M	H	H	L		L	M		L
CO2	H	H	L	H		M		L			L
CO3	L			L	H	H			L		M
CO4	H	M			L	L	H				L
CO5	M	M		H	H	H		M			L

COURSE CODE: BJM101A

*Note 1: Instructions for Paper Setter/Moderator for External Examination;*

Maximum Marks	100 (Maximum marks will be converted proportionately into 50 marks)
Time	3 hours
Compulsory question	Q.no.1. 10 Multiple Choice question of 10 marks each. For framing this question, any topic from any unit can be selected.
Setting of other questions	Q.no.2. Very short type questions 5 X 2 marks=10 (Maximum word limit 50 words) Q.no.3. short type question 5 X 6 marks=30 (Maximum word limit 150 words) Q.no.4. Long type question 5 X10 marks=50 (Maximum word limit 300 words)

*Note2: Instructions for Paper Setter/Moderator Internal Examinations;*

Internal assessment is based on Continuous evaluation System. The Total Marks for the Internal assessment will be 50-mark. Internal assessment is divided into four parts:-

1. First Internal Semester (In Sem.) Examination-15 Marks
2. Second Internal Semester (In Sem.) Examination-15 Marks
3. Attendance Assessment- 5 Marks
4. Assignments & Activities Assessment- 15 Marks

#### Suggested Readings:

1. Dan Laughey Key Themes in Media Theories, Rawat Publication.
2. Taylor, Rosegrant, Meyers Communicating, Prentice Hall
3. Allan and Barbara Pease The Definitive Book of Body Language, Munjal Publishing House
4. D.M. Silveira Personal Growth Companion, Classic Publishing
5. Edward De Bono How to Have a Beautiful Mind, Vermillion
6. De Fleur, M Theories of Mass Communication, 2nd Edition, New York; David Mc Kay

*[Signature]*  
BJM101A



9. Siebert, Fred S. Peterson Four Theories of Press, Urbana University of Illinois Theodore B. and Schramm W. Press, 1856
8. Berlo, D.K. The Process of Communication, New York : Holt Rinehart and Winston, 1960.
7. Klapper, J.T. The effects of Mass Communications, New York Free Press, 1960
10. Kumar, Keval J Mass Communication in India
11. Mcquail, Denis Mcquail's Mass Communication Theory
12. Daniel, Chandler Oxford Dictionary of Media and Communication

### MEDIA RESEARCH LAB

<b>Course Code : BJM 508A</b>	<b>L : 0</b>	<b>T/P : 2</b>	<b>CREDITS : 2</b>
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#### Objectives of the Course:

1. To apply research techniques in media studies.
2. To conduct media research
3. To write research project
4. Acquire knowledge about research design
5. To measure media effects and media agenda

#### Exercises/Assignments

1. Using any of the research technique students will conduct media research culminating
  - a. into hard and soft copies of the report.
2. Following studies will have to be conducted by the students who will prepare the reports based on the study :
  - i. Constructing the research design
  - ii. Conducting a survey – preparing questionnaires and schedule
  - iii. Analysis of any media context
  - iv. Measuring media effects and media agenda
  - v. Pre-testing/evaluation tools for audio-video, print, publicity material
  - vi. Writing the report

**Course Outcomes:** After the completion of the course, students will be able to:

CO1: Understand the philosophy, concept and process of communication & media research based on social issues.

CO2: Conduct media researches on the basis of different research methodologies. CO3: Analyze the data on the basis of different statistical tools.

CO4: Able to handle ICT tools for media research.

CO5: Enhance leadership qualities by doing impactful research.

Course Outcome	Program Learning Outcomes										
	PL O1	PL O2	PL O3	PL O4	PL O5	PL O6	PL O7	PL O8	P L O9	PL O10	PL O11
CO1	M		L	L		M				H	
CO2	H		L	L						H	
CO3	L									L	
CO4	L						H			H	

*Handwritten signature*

CO5					H					M	
-----	--	--	--	--	---	--	--	--	--	---	--

**Internal Assessment:** Students should be evaluated on the basis of research report prepared by them after conducting the assigned project as mentioned above. An internal faculty will be assigned as research guide by the Director of the institute for each student. The marks prescribed for internal evaluation are 50.

**Instructions for External Examiner for Oral & Practical Examination**

### MEDIA RESEARCH

Course Code : BJM 503A	L : 4	T/P : 0	CREDITS : 4
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**Objectives of the Course:**

1. To explain the process of media research.
2. To develop the skills of research design and sampling.
3. To inculcate the skills of surveying the society as well as industry.
4. To impart the knowledge of basics of statistics and media metrics.
5. To learn primary research skills.

#### Unit-I [Research and its Designs] L-10

1. Meaning, objectives and types of research
2. Research Approaches – quantitative and qualitative
3. Research Process – the steps involved
4. Research Design – Meaning and different types
5. Sampling – Selecting a sample, types of sampling – Probability and Non- Probability
6. Hypothesis /Research Questions

#### Unit-II [Research Methods and Data Collection] L-14

1. Primary and Secondary data
2. Observation method
3. Interview method
4. Collection of data through questionnaire
5. Collection of data through schedule
6. Content Analysis
7. Case Study Method
8. Focus group interview and Group discussions.

#### Unit-III [Survey] L-10

1. Survey – Meaning, Characteristics and types
2. Public opinion surveys, TRPs
3. BARC and TAM
4. Readership survey, IRS, NRS,
5. Election related survey – opinion poll, exit poll and Psephology.

#### Unit-IV [Data Analysis and Report Writing] L-14

1. Writing a proposal, synopsis, abstract for a project.
2. Processing of data – editing, coding, classification, tabulation
3. Measures of central tendency – Mean, median and mode.
4. Analysis and interpretation of data
5. Report writing – parts of a report, steps involved.
6. Measuring impact, evaluation, monitoring and feedback.
7. Plagiarism and how to check plagiarism in research



**Course Outcomes:** After the completion of the course, students will be able to: CO1: Understand the concept of communication research and its processes.  
CO2: Gain knowledge about need, role and types of communication research. CO3: Able to learn practical skills of conducting media research.  
CO4: Analyse the data using different statistical tools.  
CO5: Able to learn research as per demands and requirements of the industry.

Outcome	PLO 1	PL O 2	PL O 3	PL O 4	PL O 5	PL O 6	PL O 7	PL O 8	PLO 9	PL O 10	PL O 11
CO1	M	L	L	M						H	
CO2	H		L	L						H	
CO3	H	L	L	M						H	
CO4	M		L	L						H	
CO5	H		L	L						H	

Course Code: BJM 503A

**Note 1: Instructions for Paper Setter/Moderator for External Examination:**

Maximum Marks	100 (Maximum marks will be converted proportionately into 50 marks)
Time	3 hours
Compulsory question	Q.no.1, 10 Multiple Choice question of 10 marks each. For framing this question, any topic from any unit can be selected.
Setting of other questions	Q.no.2. Very short type question 5 X 2 marks=10 (Maximum word limit 50 words) Q.no.3. short type question 5 X 6 marks=30 (Maximum word limit 150 words) Q.no.4. Long type question 5 X10 marks=50 (Maximum word limit 300 words)

**Note2: Instructions for Paper Setter/Moderator Internal Examinations:**

Internal assessment is based on Continuous evaluation System. The Total Marks for the Internal assessment will be 50-mark. Internal assessment is divided into four parts:-

First Internal Semester (In Sem.) Examination-15 Marks Second Internal Semester (In Sem.) Examination-15

Marks Attendance Assessment- 5 Marks

Assignments & Activities Assessment- 15 Marks

**Suggested Readings:**

1. Graham, Myrton Media Audience Research & Cengage Learning Inc.
2. C.R. Kothari Research Methodology: Methods and Techniques, Wishwa Parkashan, New Delhi
3. S.R. Sharma & Anil Chaturvedi Research in Mass Media, Radha Publications,

New Delhi

1. G.R. Basotia & K.K. Sharma Research Methodology, Mangal Deep Publications
2. Sadhu Singh Research Methodology in Social Science, Himalaya Publishing House, Mumbai
3. Flick, Uwe Introducing Research Methodology
4. Dayal, Manoj Media Metrics
1. Dayal, Manoj Media Metrics
2. Wimmer, Roger D. Mass Media Research : An Introduction

  
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FUNCTIONAL EXPOSURE REPORT			
Course Code : BJM 505A	L : 0	T/P : 0	CREDITS : 4

#### Objectives:

1. To develop accountability towards organization.
2. To understand and write report on electronic media.
3. To fill the gaps between the academic and Media Industry Interface.
4. To provide real time experience to students of working in industry.
5. To understand team spirit and leadership skills.

**Process:** Soon after the Fourth Semester End Term Examination, each student will undergo a Functional Exposure Training for four to six weeks in Electronic Media/Advertising /Public Relations and will submit a Functional Exposure Report [FER] along with the Power point Presentation containing the actual experiential learning. The hard copy of the FER (in duplicate) is to be submitted along with a soft copy of the Power Point Presentation, at least 4 weeks before the commencement of End Term Examination of the Fifth semester.

The Functional Exposure Report [FER] carries 100 marks. These reports will be evaluated out of 50 marks each by a Board of Examiners comprising Director/Principal or his/her nominee and one External Examiner to be appointed by the Vice-Chancellor.

**Course Outcomes:** After the completion of the course, students will be able to; CO1: Be a responsible and accountable scholar.

CO2: Write report on electronic media training programs.

CO3: Understand industry functioning and better relate it to academics. CO4: Be ethically committed media professionals.

CO5: Inculcate leadership skills and team spirit.

Course Outcome	Program Learning Outcomes										
	PLO 1	PL O 2	PL O 3	PL O 4	PL O 5	PL O 6	PL O 7	PL O 8	PL O 9	PL O 10	PL O 11
CO1						L				L	
CO2	H		L	L			L				
CO3	H		L	L							
CO4	L		L	L				H			
CO5					H						H

  
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**Of**

**BACHELOR OF ARTS (JOURNALISM & MASS COMMUNICATION)**

**[M.A (JMC)]**

**For**

**First to Fourth Semester**

**(w.e.f. Academic Session 2021-2023)**

*Shail*

*Amal K. Singh*

*Shashwat*

*Shruti*

*Shruti*  
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JECRC University, Jaipur-303905

## Program educational objectives (PEOs) of MA (JMC) Program:

The overall objectives of the Learning Outcomes-based Curriculum Framework (LOCF) for Mass communication & Journalism degree are:

1. To impart the basic knowledge of Mass communication & Journalism and related areas of studies.
1. To develop the learner into competent and efficient Media & Entertainment Industry- ready professionals.
2. To empower learners by communication, professional and life skills.
3. To impart Information Communication Technologies (ICTs) skills, including digital and media literacy and competencies.
4. To imbibe the culture of research, innovation, entrepreneurship and incubation.
5. To inculcate professional ethics, values of Indian and global culture.
6. To prepare socially responsible media academicians, researchers, professionals with global vision.

## PROGRAMME LEARNING OUTCOMES (PLOs).

The key outcomes planned in this undergraduate programme in Mass communication & Journalism are underpinned as follows:

1. Shall acquire fundamental knowledge of Mass communication & Journalism and related study area.
1. Shall acquire the knowledge related to media and its impact.
2. Shall be competent enough to undertake professional job as per demands and requirements of M & E Industry.
3. Shall empower themselves by communication, professional and life skills.
4. Shall be able to enhance the ability of leadership.
5. Shall become socially responsible citizen with global vision
6. Shall be equipped with ICTs competencies including digital literacy.
7. Shall become ethically committed media professionals and entrepreneurs adhering to the human values, the Indian culture and the Global culture.
8. Shall have an understanding of acquiring knowledge throughout life.
9. Shall acquire the primary research skills, understand the importance of innovation, entrepreneurship and incubation abilities.
10. Shall acquire the understanding of importance of cooperation and teamwork.

## Program Specific Outcome (PSOs):-

The B.A. (Journalism and Mass Communication) Program is offered in the School with the following program specific outcomes:

**PSO1.** The graduates will be able to how to write, edit and proof for mass media like Newspaper and Magazine.

**PSO2.** Students will be skilled to write, edit, interview and present for radio news and current affairs programs as a responsible citizen.

**PSO3.** This Program will provide understanding of program production, management in government and private television channels and in Cinema.

**PSO4.** Students will be able in the latest digital audio-video and multimedia technologies to understand agenda and propaganda hidden in web media like Facebook and Twitter.

**PSO5.** The students will be able to measure public opinion, through media research.




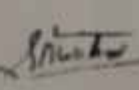
Theory Papers	Credit	Discipline Elective	Credit	Lab Papers	Credit
Communication Theory and Research (MJM001A)	4	Business Journalism (MJM008A)	4	Media Research Lab (MJM005A)	2
Print Journalism: Reporting and Editing (MJM002A)	4	OR Investigative Reporting (MJM009A)		Print Journalism Lab (MJM006A)	2
Communication Skills (MJM003A)	2	Or Event Management (MJM010A)		Communication Skills Lab (MJM007A)	2
Journalism: History, Ethics and Regulations (MJM004A)	4				Total Credit-24

  
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## Media Research Lab

Course Code : MJM005A	L : 0	T/P : 2	CREDITS : 2
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**Objectives of the Course:** On completion of the course students should be able:

1. To understand the tools and methods of Media Research
2. To apply research techniques in media studies.
3. To write research project
4. To conduct media research

### Exercises & Assignments

1. Writing a Research Proposal on significance of media in war against crimes/ Commodification of Women in Media
2. Design a Google form for Data Collection (Survey Method).
1. Using any of the research technique students will conduct media research culminating into hard and soft copies of the report.
2. Following studies will have to be conducted by the students who will prepare the reports based on the study:
  - i. Constructing the research design
  - ii. Conducting a survey – preparing questionnaires and schedule
  - iii. Analysis of any media context
  - iv. Measuring media effects and media agenda
  - v. Pre-testing/evaluation tools for audio-video, print, publicity material
  - vi. Writing the report

**Course Outcomes:** After the completion of the course, students will be able to;

- CO1: Understand the philosophy, concept and process of communication & media research based on social issues.
- CO2: Conduct media researches on the basis of different research methodologies.
- CO3: Analyze the data on the basis of different statistical tools.

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# Print Journalism Lab

Course Code : MJM006A	L : 0	T/P : 2	CREDITS : 2
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## Objectives of the Course:

1. To write reports for newspapers and magazines.
2. To prepare questions for interview
3. To develop the skills of press release writing and attending press conferences.
4. To organize mock press conferences.
5. To help them understand civic issues.

## Exercises/Assignments

1. Take a Newspaper. List all the news items in a piece of paper. Write against each of them whether hard or soft.
2. Writing some sources of News and write in which news (beats) they are frequently quoted.
3. Writing reports on civic problems incorporating information from civil organization based on interview.
4. Prepare questions for an interview with Prime Minister of India.
5. Writing Press Release of events conducted in your campus.
6. Filing report after attending one press conference after going to the field.
7. Go to field and interview some persons engaged in public service.
8. Design a Newspaper first page using Quark Xpress/In design.

**Course Outcomes:** After the completion of the course, students will be able to;

- CO1: Write News and press releases.  
 CO2: Set up his own print media lab or newspaper organization.  
 CO3: Be vigilant newspaper reader and analyzer.  
 CO4: Able to attend the press conferences and file the reports.  
 CO5: Able to conduct Interview.

Course Outcome	Program Learning Outcomes										
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO1	H	L	M	L							
CO2	H	L	L	M			H				
CO3	H	H	M	M							
CO4	H	L	M	M							

CO5	H	M	L	L							
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**Internal Assessment:** Student should be evaluated on the basis of his/her performance while undertaking various exercises and submission of assignments. All the stories should be documented in a file & soft copy duly checked and signed by concerned faculty. The marks assigned for internal evaluation are 50.

**Instructions for External Examiner for Oral & Practical Examination**

A.	Due weightage to be given to the file and soft copy of assignments prepared by a student during the semester. (30 marks)
B.	The examiner should also interview the student to find out his/her level of understanding of Journalism and knowledge of current affairs. (20 marks)
Max Marks	The marks prescribed for evaluating a student by the External Examiner are 50.

*Nitin*  
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*Chait*

*Amal*

*Shashwat*

*Shruti*



## Communication Skills Lab

Course Code : MJM007A	L: 0	T/P : 2	CREDITS : 2
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UNIT 1	<b>Basics of Organizational Communication:</b> Role Plays and presentations related to different corporate related matters- How to greet, how to deny politely, how to handle different types of problems related to the types of communication, how to avoid grapevine and use it in a positive manner, how to keep positive mindset during work pressure, Activities to teach Time-management, Following Deadlines etc
UNIT 2	<b>Write Dialogue from the different contexts of corporate culture:</b> Employee and Employer, Customer and Service Provider, Customer and Product Review, How to react on Day to day corporate interactions- Memo, Notice, Email, Circular etc
UNIT 3	<b>Composition:</b> , Letter Writing, Email Writing, Précis Writing, Essay Writing, Practice sessions by using Ms Word- Following the process of Drafting-Redrafting, Proof Reading, Editing etc
UNIT 4	<b>Vocabulary Building:</b> Word Formation from one word form to another, Origin of Words, Affixes, Synonyms, Antonyms- Using video clips and comprehension passages to find out the difference between words, similarity between words, origin of words, neologism concepts etc
UNIT 5	<b>Professional and Technical Communication :</b> Drafting a CV/Resume, Practice Sessions on Telephonic Interview and Online Interview, Presenting projects, proposals etc through PPT Making.

### Methodology for Evaluation

*Shail*

*Amalika*

*Shashwat*

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1. Internal Assessment (Theory)		
a) Home Assignments: One from each Unit	:	15 Marks
b) In Semester Tests (Minimum two)	:	30 Marks
c) Attendance	:	05 Marks
2. Term End (Theory)	:	50 Marks
3. Internal Assessment (Lab)		
(a) Daily Performance in the Lab	:	50 Marks
4. Term End (Lab)	:	50 Marks

#### Suggested Reading:

1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. Raymond V. Lesikar and Marie E. Flatley. Basic Business Communication, Tata McGraw Hill Pub. Co. New Delhi. 2005. Tenth Edition.
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III, Hyderabad. Oxford University Press.
8. Syamala, V. Speak English in Four Easy Steps, Improve English Foundation Trivandrum: 2006

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## Television Program Production Lab

Course Code : MJM015A	L : 0	T/P : 2	CREDITS : 2
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### Objectives of the Course:

1. To prepare a video brief
2. To handle various aspects of TV production and direction
3. To write scripts for TV
4. To apply production and post-production techniques effectively to produce a video program.
5. To understand ideation

### Exercises/Assignments

1. Preparation of a video brief
2. TV writing for Different Types of Visuals
3. Idea generation – fiction and non-fiction
4. Film and TV Fiction Script writing exercises
5. Script and story board
6. Production schedule
7. Budget
8. Floor plan
9. Lighting plan
10. Shooting script
11. Production of a programme
12. Post production

**Course Outcomes:** After the completion of the course, students will be able to;

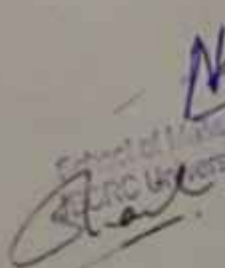
CO1: Analyze and work in the TV industry.

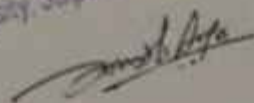
CO2: Write stories and collect news for the TV news and entertainment industry.

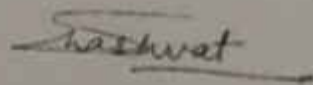
CO3: Produce different formats of TV programs.

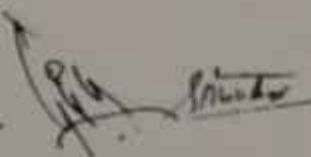
CO4: Work on editing softwares.

CO5: Understand post-production work

  
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## Radio Program Production Lab

Course Code : MJM016A	L : 0	T/P : 2	CREDITS : 2
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### Objectives of the Course:

1. To prepare an audio brief
2. To apply various elements of radio production for producing different radio formats
3. To write and record effectively for radio
4. To produce radio interviews, discussions, features and documentaries
5. To learn the basics of sound editing.

### Assignments/Activities

1. Research and Preparation of audience profile
2. Writing Radio News Bulletin
3. Production of field based Radio Reports, Features and Documentaries
4. Production of Radio programmes in different formats for Community Radio.
5. Production of Podcasts.
6. Writing Radio Feature.
7. Making Radio Documentary.
8. Preparing Radio Talk Show.
9. Making Jingles.
10. Sound editing exercises

Course Outcomes: - After the completion of the course, students will be able to  
CO1: Make a Radio bulletin.  
CO2: Produce various Radio Programs including Jingles and News.  
CO3: Write Radio Script and record the Voice.  
CO4: Take Interviews and Documentaries on various issues for radio.  
CO5: Acquire the knowledge of sound editing.

## Art of Photography (Lab)

Course Code : MJM017A	L : 0	T/P : 2	CREDITS : 2
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### Objectives of the Course:

1. To handle DSLR and other types of cameras.
2. To compose and shoot in different lighting conditions.
3. To make photo features on specific topics.
4. To learn shooting in studio and outdoor.
5. To learn the concept of photo-editing.

### Exercises/Assignments

1. Outdoor Shoot:
  - i. Using Digital SLR and Mobile camera/developing an idea and practice
  - ii. Making a Photo feature on a specific topic by using self-clicked photographs from Digital Camera
  - iii. Photographs should be of 4x6 size. A photo feature should comprise 10-16 photographs.
2. Studio Photo Shoot:

Shooting exercise in artificial lights.
3. Photo Lab
  - i. Use of software for modification of picture
  - ii. Editing of captured images with the help of Photoshop
  - iii. Preparing a softcopy of photo feature

**Course Outcomes:** After the completion of the course, students will be able to;

CO1: Understand and handle the various kinds of cameras.

CO2: Analyze and use of light for indoor and outdoor shooting.

CO3: Understand different genres of the photography.

CO4: Do photo-editing.

CO5: Develop entrepreneurship skills in photography.

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### Study Scheme MA JMC (3rd Semester)

Theory Papers	Credit	Discipline Elective	Credit	Lab Papers	Credit
New Media Journalism ( MJM021A)	4	Global Media Scenario ( MJM028A)	4	New Media Journalism Lab ( MJM025A)	2
Film Study and Production ( MJM022A)	4	<b>OR</b> Media Entrepreneurship ( MJM029A)		Film production Lab ( MJM026A)	2
Advt. & PR: Principles, Concepts and Managements ( MJM023A)	4	<b>OR</b> Contemporary Media Study ( MJM030A)		Advt. & PR Lab ( MJM027A)	2
Digital Media Marketing ( MJM024A)	2				<b>Total Credit-24</b>

  
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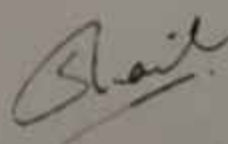
# New Media Journalism Lab

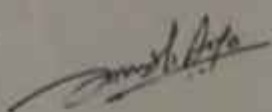
Course Code : MJM025A	L : 0	T/P : 2	CREDITS : 2
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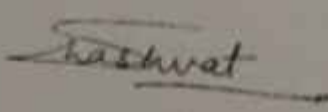
## Assignments


1. Write news reports using LinkedIn Company Pages
2. Develop news report using Instagram
3. Identify Indian influencers in the Social Media space and make a presentation
4. Use Canva to create visual content
5. Write search engine optimised business reports
6. Write news headlines for web
7. Review news alerts moved by any two media houses; Review commercial alerts pushed by any one e-commerce site
8. Analyse news website and make presentation
9. Create a multimedia story using mobile

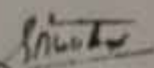
  
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JGCRC University, Jaipur-302005

  
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# Film Study and Production Lab

Course Code : MJM026A	L : 0	T/P : 2	CREDITS : 2
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## Objectives of the Course:

1. To make a movie independently
2. To edit any movie-project
3. To manage production-management
4. To write a screenplay, creatively
5. To shoot video songs and documentaries.

## Exercises/Assignments:

1. Prepare a Short-Film
2. Plan, organize a Film-Screening/ Festival event.
3. Re-edit Famous Movie-Projects, as per own Creativity
4. Make a Video Song
5. Develop Production-management plan
6. Making of a Documentary Film of maximum 5 to 10 minutes
7. Get familiar with Shooting and editing style
8. Structure and Scripting the short Film/ Documentary
9. Pre-production; Researching, Library, Achieves, Location, Life Stories.

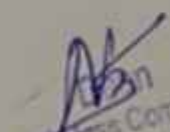
**Course Outcomes:** After the completion of the course, students will be able to;

CO1: Understand the Cinema and be able to interpret different aspects of the subject.

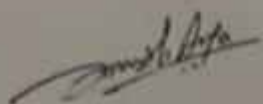
CO2: Understand the outcome of the cinema and drama and utilize it for the welfare of the society. CO3: Understand the different eras of cinema and formats.

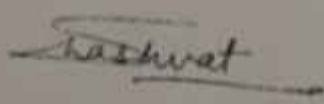
CO4: Understand how to read and teach Theatre and Cinema.

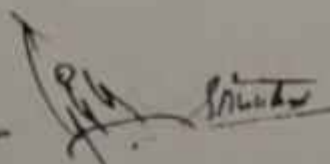
CO5: Be a professional filmmaker by acquiring knowledge of filmmaking.

  
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# Advt. & PR Lab

Course Code : MJM027A	L : 0	T/P : 2	CREDITS : 2
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## Objective of the Course:

1. Plan an advertising campaign
2. Design and develop a marketing plan
3. Write TV commercials and develop script.
4. To plan, design and implement PR tools effectively.
5. To write press releases, speeches, memos and notices

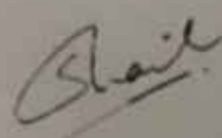
**Exercises/Assignments:** Students should undertake the following assignments as part of their practical training in advertising

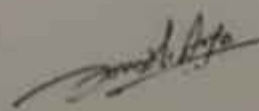
1. Analyse 5 Print Advertisements
2. Critically evaluate print ads of competing brands two each from FMCG, Consumer Durables and Service Sector
3. Design display advertisement, classified & display classified (one each)
4. Formulate, plan and design an Ad Campaign based on market and consumer research on the assigned topic/theme.
5. Making advertisements for print, Radio and TV.
6. Collect at least five press clippings of any company for its launch of product/service/corporate communication.
7. Collect Corporate & Institutional ad of a product/service (five each)
8. Write press note and press release
9. Organize press conference in the situation of crisis
10. Minute-to-minute planning of an event

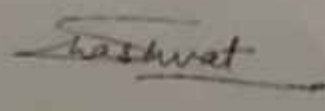
**Course Outcomes:** After the completion of the course, students will be able to;

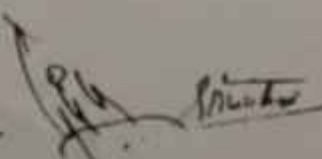
- CO1: Understand the philosophy and the functioning of Advertising Campaigns.
- CO2: Understand the production, marketing and distribution of a brand.
- CO3: Analyze public relations and other communications.
- CO4: Produce and handle different tools and techniques of PR activities.
- CO5: To enhance interpersonal skills.

  
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School of Mass Communication

  
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# Digital Media Marketing

Course Code : MJM024A	L : 2	T/P : 0	CREDITS : 2
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## Objectives

- Apprise the students about the size and scale of digital media
- Give them an understanding of Web and Apps
- Make them able to create and run add on social media platforms
- To train student to know and write SEC friendly content for digital media

## Unit I: Overview of Digital Landscape

1. Evolution and Size of Indian Digital Market, Main platforms and sites by traffic
2. Emergence of Mobile Media: Scale and Size, Indian languages and the web
3. Platforms and Key Metrics: Websites, Mobiles, Apps, User Experience, User Interface
4. Content Consumption Trends: Page Views, Impressions, Reach, Visits, Unique visitors, Sessions, Engagement Rate, Click through rate

## Unit II: Optimizing a Website for Google Search

1. Why do a Competitive Analysis? How to Perform a Competitive Keyword Analysis, Analysing Your Competition, Develop a Plan to Compete, Creating a Keyword Map for Clients
2. Advanced SEO Strategies: Competitive Content Analysis, Internal Content Audit, Organizing and Evaluating Content, Strategy for Optimizing Content, Different Types of Content, Creating Impactful Content
3. Creating an SEO Campaign: Creating an SEO Campaign, Scoping an SEO, Proving Your Value to Potential Clients, Managing Client Expectations, Reporting Progress to Your Client
4. Social Media tools for advertising: Facebook, LinkedIn, YouTube, Instagram/Snapchat, Lead Ad, Call Ad, Traffic Ad, Reach Ad, LinkedIn and Social Selling, YouTube and Social Video Marketing, Google ad

**Course Outcomes:** *After the completion of the course, the students will be able to;*

- CO1: Describe the size and scale of digital media  
CO2: have understanding about SEO strategies.  
CO3: Describe the emerging content consumption patterns  
CO4: Know about Social Media tools for advertising.  
CO5: Create an SEO campaign.

*Signature*  
Secretary, Mass Communication  
www.mca.ac.in

*Shail*

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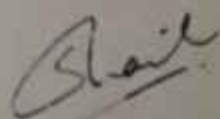
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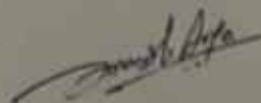
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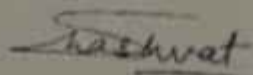
## Study Scheme MA JMC (4th Semester)

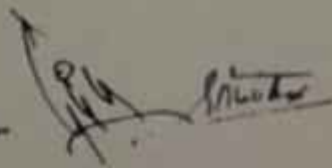
	Credit
<b>Theory Papers</b>	
Dissertation	4
Media Internship II (Three Months)	12
	16

  
School of Mass Communication  
JECRC University, Jaipur-302005











# JECRC UNIVERSITY

School of Science  
Course Structure and Syllabus  
B. Sc. Biotechnology (Hons.)  
2022-2025

Dr. Shamkant B. Badgujar

Dr. Shamkant B. Badgujar



**JECRC<sup>TM</sup>**  
**UNIVERSITY**  
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School of Science  
Syllabi and Course Structure  
B.Sc. Biotechnology (Hons.)  
Academic Programmes  
Batch (2022-2025)

Total credit for Batch 2022-2025: 148 Credits

Details of Scheme for B Sc. Biotechnology (Hons.) with various Courses & their credits with contact Hours

**\*\*Note:** In 6th Semester Students have a Choice either he can go for offered Courses or he may avail Internship in some reputed Institute / Industry or In House Dissertation

Semester I

S. No		Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1		1	BMI070 A	Cell and molecular Biology	4	0	0	4	4	0	0	4	Core Course 1
2		1	BMI071 A	Cell and molecular Biology Lab	0	0	2	2	0	0	1	1	

  
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3		1	BBI021 B	Biological Macromolecules	4	0	0	4	4	0	0	4	Core Course 2
4		1	BBI022 B	Biological Molecules Lab I	0	0	2	2	0	0	1	1	
5		1	BBI023 B	Microbiology	4	0	0	4	4	0	0	4	Core Course 3
6		1	BBI024 B	Microbiology Lab	0	0	2	2	0	0	1	1	
7		1	DCA001 A	Web Development	2	0	0	2	2	0	0	2	
8		1	DCA002 A	Web Development lab	0	0	2	2	0	0	1	1	
9		1	DEN001 A	Communication Skills	2	0	2	4	2	0	1	3	
10		1	DIN001 A	Culture Education -1	2	0	0	2	2	0	0	2	
11		1	DCH001 A	Environment Studies	3	0	2	5	3	0	1	4	
				Total	21	0	12	33	21	0	6	27	

\*Field/ Project Work and Report

### Semester II


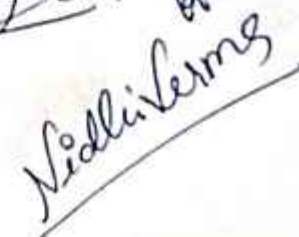
S.No	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1	2	BBI026 B	Metabolic Pathways	4	0	0	4	4	0	0	4	Core Course 4
2	2	BBI027 B	Biological Molecules Lab II	0	0	2	2	0	0	1	1	

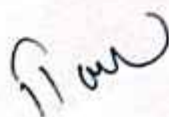
  
Dr. Shambant B. Dabguler



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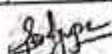
  




3	2	BBI028 B	Genetics	4	0	0	4	4	0	0	4	Core Course 5
4	2	BBI029 B	Genetics Lab	0	0	2	2	0	0	1	1	
5	2	BBI030 B	Analytical Techniques	4	0	0	4	4	0	0	4	Core Course 6
6	2	BBI031 B	Analytical Techniques lab	0	0	2	2	0	0	1	1	
7	2		DE 1	4	0	0	4	4	0	0	4	DE1
8	2		DE 1 Lab	0	0	2	2	0	0	1	1	
9	2	DCA003 A	Project Management Lab	0	0	2	2	0	0	1	1	
10	2	DEN002 A	Professional Skills	2	0	2	4	2	0	1	3	
11	2	DIN002 A	Culture Education -2	2	0	0	2	2	0	0	2	
			Total	20	0	12	32	20	0	6	26	

### Semester III

S. No	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1	3	BBI033 B	Introductory Immunology	4	0	0	4	4	0	0	4	Core Course 7
2	3	BBI034 B	Immunological Techniques Lab	0	0	2	2	0	0	1	1	
3	3	BBI035	r-DNA	4	0	0	4	4	0	0	4	Core

  
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		B	technology									Cou rse 8
4	3	BBI036 B	Genetic Engineer ing Lab	0	0	2	2	0	0	1	1	
5	3		DE 2	4	0	0	4	4	0	0	4	DE 2
6	3		DE2 Lab	0	0	2	2	0	0	1	1	
7	3	DCA004 A	Advance d Spread Sheet Lab	0	0	2	2	0	0	1	1	
8	3	DEN003 A	Life Skills 1(Person ality Develop ment)	1	0	2	3	1	0	1	2	
9	3	DIN003 A	Value Educatio n and Ethics-1	1	0	0	1	1	0	0	1	
10	3		Open Elective- I	3	0	0	3	3	0	0	3	
11	3		Research Methodo logy	3	1	0	3	3	1	0	4	
			Total	20	0	10	30	20	1	5	26	

#### Semester IV

S. No.	Sem este r	Subject code	Subject	Lect ure Hou rs	Tu tor ial Hou rs	Pract ical Hour s	Tot al Ho urs	Lect ure Cre dit	Tuto rial Cred it	Pract ical Credi t	Tota l Cre dits	Cou rse Typ e
1	4	BBI040 B	Molecula r Biology	4	0	0	4	4	0	0	4	Core Cour se 9
2	4	BBI041 B	Molecula r Biology Lab	0	0	2	2	0	0	1	1	

  
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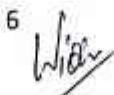
3	4	BBI042 B	Plant Biotechnology	4	0	0	4	4	0	0	4	Core Course 10
4	4	BBI043 B	Plant Biotechnology Lab	0	0	2	2	0	0	1	1	
5	4	BBI044 B	Bioprocess Engineering and Technology	4	0	0	4	4	0	0	4	Core Course 11
6	4	BBI045 B	Fermentation Technology Lab	0	0	2	2	0	0	1	1	
7	4	DCA005 A	Python programming	2	0	0	2	2	0	0	2	
8	4	DCA006 A	Python programming Lab	0	0	2	2	0	0	1	1	
9	4	DMA011A	Life Skills-II (Aptitude)	1	0	2	2	1	0	1	2	
10	4	DIN004 A	Value Education and Ethics-2	1	0	0	1	1	0	0	1	
11	4		Open Elective II	3	0	0	3	3	0	0	3	
			Total	19	1	10	28	19		5	24	

#### Semester V

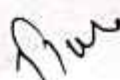
S. No.	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
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				rs								
1	5	BBI047 B	Proteomics and Genomics	4	0	0	4	4	0	0	4	Core Course 12
2	5	BBI048 B	Bioinformatics Lab	0	0	2	2	0	0	1	1	
3	5		Department Elective-3	4	0	0	4	4	0	0	4	DE-3
4	5		Department Elective Lab-3	0	0	2	2	0	0	1	1	
5	5		Department Elective 4	4	0	0	4	4	0	0	4	DE-4
6	5		Department Elective Lab-4	0	0	2	2	0	0	1	1	
7	5	BBI092	Open Elective III	3	0	0	3	3	0	0	3	Inter-disciplinary
8	5	BBI071 A	Project	0	0	12	12	0	0	6	6	Discipline specific
				15	0	18	33	15	0	9	24	

#### Semester VI

S. No.	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type

  
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1	6		Department Elective 5	4	0	0	4	4	0	0	4	DE-5
2	6		Department Elective -5 Lab	0	0	2	2	0	0	1	1	
3	6		Department Elective 6	4	0	0	4	4	0	0	4	DE-6
4	6		Department Elective -6 Lab	0	0	2	2	0	0	1	1	
5	6		Department Elective 7	4	0	0	4	4	0	0	4	DE-7
6	6		Department Elective-7Lab	0	0	2	2	0	0	1	1	
7			Department Elective 8	4	0	0	4	4	0	0	4	DE-7
8			Department Elective-8Lab	0	0	2	2	0	0	1	1	
9			Seminar	1		0	1	1			1	
				17	0	8	25	17	0	4	21	

**\*\*Note:** In 6th Semester Student have a Choice either he/she can go for offered Courses or he may avail Internship in some reputed Institute / Industry or In House Dissertation  
Total Credits

Credits	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total
	27	26	26	24	24	21	148

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Track	Department Elective 1			Department Elective 2			Department Elective 3			Department Elective 4		
	Course Code	Course Name	Course Credit (L,T,P)	Course Code	Course Name	Course Credit (L,T,P)	Course Code	Course Name	Course Credit (L,T,P)	Course Code	Course Name	Course Credit (L,T,P)
Bioinformatics	BBH42A	DESCRIPTIVE STATISTICS, PROBABILITY AND DISTRIBUTIONS	4	BBH45A	COMPUTER PROGRAMMING IN C++ AND SAS	4	BBH47A	STATISTICAL GENETICS AND ECOLOGY	4	BBH49A	LINEAR ALGEBRA, REGRESSION TECHNIQUES AND BIOASSAYS	4
Lab	BBH43A	Basic Biostatistics Lab	1	BBH46A	Computer Programming Lab	1	BBH48A	STATISTICAL GENETICAL LAB	1	BBH50A	Basic Algebra Lab	1
Environmental Biotechnology	BBH128A	Environmental Biology	4	BBH130A	Solid Waste Management	4	BBH132A	Environmental Pollution	4	BBH134A	Environmental Microbiology	4
Lab	BBH129A	Environmental Biology Lab	1	BBH131A	Solid Waste Management Lab	1	BBH133A	Environmental Pollution Lab	1	BBH135A	Environmental Microbiology Lab	1
Agriculture Biotechnology	BBH114A	Advances in agriculture Biotechnology	4	BBH116A	Agriculture microbiology	4	BBH118A	Molecular plant breeding	4	BBH120A	Principles of plant physiology	4
Lab	BBH115A	Agriculture Biotechnology Lab	1	BBH117A	Agriculture microbiology Lab	1	BBH119A	Molecular plant breeding Lab	1	BBH121A	Plant Physiology Lab	1
Industrial Biotechnology	BBH100A	Fundamental of industry Biotechnology	4	BBH102A	Microbial Physiology	4	BBH104A	Microbial genetics and r-DNA technology	4	BBH106A	Pharmaceutical chemistry	4
Lab	BBH101A	Industrial Biotechnology Lab	1	BBH103A	Practicals of Microbial Physiology	1	BBH105A	Microbial genetics Lab	1	BBH107A	Pharmaceutical chemistry Lab	1
Bioinformatics	BBH157A	Basis of Bioinformatics	4	BBH159A	Structural Bioinformatics	4	BBH161A	Informatics in Omics and its application	4	BBH163A	Molecular Modelling and molecular mechanics	4
Lab	BBH158A	Bioinformatics Lab	1	BBH160A	Practicals of Structural bioinformatics	1	BBH162	Practicals of Omics applications	1	BBH164A	Molecular modelling lab	1
Nanotechnology	BBH171A	Nanoscience and Nanotechnology	4	BBH173A	Nanotechnology in material science	4	BBH175A	Instruments in Nanotechnology	4	BBH177A	Toxicity in Nanotechnology	4
Lab	BBH172A	Practical of nanotechnology	1	BBH174A	Synthesis and characterization of metallic nanoparticles	1	BBH176A	Characterization of P nanoparticles	1	BBH178A	Estimation of PNP's toxicity	1

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Track	Department Elective 5			Department Elective 6			Department Elective 7		
	Course Code	Course Name	Course Credit (L,T,P)	Course Code	Course Name	Course Credit (L,T,P)	Course Code	Course Name	Course Credit (L,T,P)
Biostatistics	BBI151A	CONTROLLED CLINICAL TRIALS AND OPERATIONS RESEARCH	4	BBI153A	BIOINFORMATICS AND COMPUTATIONAL BIOLOGY	4	BBI155A	DESIGN OF EXPERIMENTS AND QUALITY CONTROL	
Lab	BBI152A	Clinical operations Lab	1	BBI154A	Biocomputational Lab	1	BBI156A	Experimental Design Lab	
Environmental Biotechnology	BBI136A	Biodiversity	4	BBI138A	Microbial and Industrial Application	4	BBI140A	Bioremediation	
Lab	BBI137A	Biodiversity Lab	1	BBI139A	Industrial Microbial Lab	1	BBI141A	Bioremediation Lab	
Agriculture Biotechnology	BBI122A	Biotechnology for biotic and abiotic stress tolerance	4	BBI124A	Biodiversity Conservation	4	BBI126A	Techniques in Biochemistry and molecular biology	
Lab	BBI123A	Plant stress Lab	1	BBI125A	Biodiversity Conservation Lab	1	BBI127A	Molecular Biology Lab	
Industrial Biotechnology	BBI108A	Bioprocess Engineering	4	BBI110A	Enzyme technology and Biotransformation	4	BBI112A	Industrial Manufacturing	
lab	BBI109A	Bioprocess Engineering Lab	1	BBI111A	Enzyme technology Lab	1	BBI113A	Industrial Manufacturing Lab	
Bioinformatics	BBI165A	genomics analysis	4	BBI167A	Advance in Bioinformatics	4	BBI169A	in silico drug designing	4
Lab	BBI166A	Practicals on genome analysis	1	BBI168A	Advance in Bioinformatics practical lab	1	BBI170A	practicals in silico drug designing	
Nanotechnology	BBI179A	Surface science in Nanotechnology	4	BBI181A	Methods of synthesis in Nanotechnology	4	BBI183A	Bio nanotechnology and application	
lab	BBI180A	Surface studies in Nanotechnology	1	BBI182A	Properties estimation of metallic nanoparticles	1	BBI184A	Determination of bio-interfacial interaction of nanoparticles	

  
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## OPEN ELECTIVES

Track	Open Elective 1			Open Elective 2		
	Course Code	Course Name	Course Credit (L,T,P)	Course Code	Course Name	Course Credit (L,T,P)
	BBI091	Basics of Bioinformatics	T	BBI037B	Medical Biotechnology	T
	Open Elective 3			Open Elective 4		
	Course Code	Course Name	Course Credit (L,T,P)	Course Code	Course Name	Course Credit (L,T,P)
	BBI092	Molecular Marker Technology	T	BBI093	Biotechnology and Business Management	T
	Open Elective 5					
	Course Code	Course Name	Course Credit (L,T,P)			
	BBI094	Herbal diet and Life style	T			

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## PROGRAM OUTCOMES

**PO 1. Disciplinary Knowledge and Skills:** Good knowledge and understanding of major concepts, theoretical principles in Biotechnology and its allied fields. The knowledge about the experimental findings in Biotechnology and its different subfields like Cell biology, Biochemistry, Microbiology, Genetic Engineering, medical biotechnology, environmental biotechnology, plant biotechnology, molecular biology, industrial biotechnology and immunology including broader interdisciplinary subfields like Chemistry, Mathematics, Life sciences, Environmental sciences, Computer science, Information Technology, forensic science and etc.

**PO 2. Skilled communicator:** Ability to transmit complex technical information relating all areas in Biotechnology in a clear and concise manner in writing and oral ability to present complex and technical concepts in a simple language for better understanding.

**PO 3. Critical thinker and problem solver:** Ability to employ critical thinking and efficient problem solving skills in all the basic areas of Biotechnology

**PO 4. Sense of inquiry:** Capability for asking relevant/appropriate questions relating to the issues and problems in the field of Biotechnology, and planning, executing and reporting the results of a theoretical or experimental investigation

**PO 5. Skilled project manager:** Capable of identifying/mobilizing appropriate resources required for a project, and manage a project through to completion, while observing responsible and ethical scientific conduct; and safety and laboratory hygiene regulations and practices.

**PO 6. Ethical awareness / reasoning and Environmental Sustainability:** The graduate should be capable of demonstrating ability to think and analyze rationally with modern and scientific outlook and identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights, and adopting objectives, unbiased and truthful actions in all aspects of work. Understand the issues of environmental contexts and sustainable development.

**PO 7. Self-directed, Team player and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context social technological changes. Capable of working effectively in diverse teams in both classroom, laboratory, Biotechnology projects and workshop and in industry and field-based situations.

  
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Nidhi B. B. Badgujar

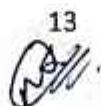


Semester I

S. No.	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1	1	BMI070 A	Cell and molecular Biology	4	0	0	4	4	0	0	4	Core Course 1
2	1	BMI071 A	Cell and molecular Biology Lab	0	0	2	2	0	0	1	1	
3	1	BBI021 B	Biological Macromolecules	4	0	0	4	4	0	0	4	Core Course 2
4	1	BBI022 B	Biological Molecules Lab I	0	0	2	2	0	0	1	1	
5	1	BBI023 B	Microbiology	4	0	0	4	4	0	0	4	Core Course 3
6	1	BBI024 B	Microbiology Lab	0	0	2	2	0	0	1	1	
7	1	DCA001 A	Web Development	2	0	0	2	2	0	0	2	
8	1	DCA002 A	Web Development Lab	0	0	2	2	0	0	1	1	
9	1	DEN001 A	Communication Skills	2	0	2	4	2	0	1	3	
10	1	DIN001 A	Culture Education -1	2	0	0	2	2	0	0	2	
11	1	DCH001 A	Environment Studies	3	0	2	5	3	0	1	4	
			Total	21	0	12	33	21	0	6	27	

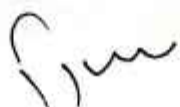
  
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Department of Biotechnology,  
B.Sc. Semester – I  
Course – Cell and molecular Biology  
Course Code –BMI070A  
Lectures: 4 Hrs/week

Course code	Course Title	L	P	Contact Hr.	Contact Hr.	Total Credit
BMI070A	Cell and Molecular Biology	4	1	4	2	5

**Course outcome (CO)**

On completion of the course, students are able to:

CO1- Understand the cell structural organization and function of cell organelles.

CO2- Understand the structure of DNA and its component.

CO3- Understand the cell cycle and its regulation along with extracellular control of cell growth and apoptosis.

CO4- Understand the transcription in prokaryotes and its regulation.

CO5- Understand the concept of split genes, concept of introns and exons and processing of rRNA.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	0	1	0	0	1
CO2	1	2	0	1	0	0	1
CO3	3	3	1	0	1	2	0
CO4	2	2	2	0	0	2	1
CO5	2	3	2	0	0	2	1

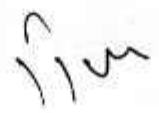
3 = Highly Related; 2 = Medium; 1 = Low

**CELL AND MOLECULAR BIOLOGY(BMI070A)**

**Unit I**

  
Dr. Shambhant B. Redgejer









Concepts of cell- Prokaryotic & Eukaryotic cells. Cell organization of Prokaryotic cells with special reference to Bacteria. Eukaryotic cells - cell wall & plasma membrane; structure & function of cell organelles and inclusions. Episome, Mesosome, Flagella and Fimbriae.

## Unit II

Experimental evidences for nucleic acid as genetic material. Structure of DNA; Models of DNA replication. Enzymes, proteins and other factors involved in DNA replication. Mechanism of DNA replication in prokaryotes & eukaryotes Super helicity in DNA, linking number, topological properties.

## Unit III

Cell cycle: Eukaryotic Cell Cycle, Regulation of Cell cycle progression, Events of Mitotic Phase, Meiosis and Fertilization. Cell cycle and Programmed cell death- Control system, intracellular control of cell cycle events, Apoptosis, extracellular control of cell growth and apoptosis.

## Unit IV

Transcription: Definition, difference from replication, promoter - concept and strength of promoter RNA Polymerase and the transcription unit. Transcription in Eukaryotes: RNA polymerases, general Transcription factors. Translational machinery, Charging of tRNA, aminoacyl tRNA synthetases, Mechanisms of initiation, elongation and termination of polypeptides in both prokaryotes and eukaryotes, Fidelity of translation, Inhibitors of protein synthesis in prokaryotes and eukaryote

## Unit V

Split genes, concept of introns and exons, RNA splicing, spliceosome machinery, concept of alternative splicing, Polyadenylation and capping, Processing of rRNA, RNA interference: si RNA, miRNA and its significance.

### Suggested Readings:

1. Karp, G., Cell and Molecular Biology: Concepts and Experiments, 6<sup>th</sup> Edition, 2010, John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. Cell and Molecular Biology, 8<sup>th</sup> Edition, 2006, Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman R.E., The Cell: A Molecular Approach, 5<sup>th</sup> Edition, 2009, ASM Press & Sunderland, Washington, D.C.
4. Becker W.M., Kleinsmith L.J., Hardin. J. and Bertoni G. P., The World of the Cell, 7<sup>th</sup> Edition, 2009, Pearson Benjamin Cummings Publishing

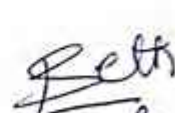
### Cell and Molecular Biology (BMI071A)

- 1) To analyze prepared slides of mitosis.

  
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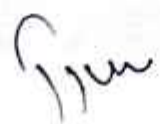














- 2) To perform and identify different stages of mitosis in onion root tip.
- 3) To analyze prepared slides of meiosis.
- 4) To perform and identify different stages of meiosis in onion flower bud.
- 5) To prepare the slide of giant chromosome.
- 6) Isolation of genomic and plasmid DNA from *E.coli*
- 7) Estimations of DNA using diphenylamine reagent, and UV spectrophotometer (A260 measurement)
- 8) Estimations of RNA using orcinol reagent, and UV spectrophotometer (A260 measurement)
- 9) Resolution and visualization of DNA by Agarose Gel Electrophoresis.

#### Virtual Lab link

S.No.	Course name	Sources	Link
1.	Cell Biology Virtual Lab I	Amrita Vishwa Vidyapeetham	<a href="http://cbi-au.vlabs.ac.in/">http://cbi-au.vlabs.ac.in/</a>
2.	Cell Biology Virtual Lab II	Amrita Vishwa Vidyapeetham	<a href="http://cbii-au.vlabs.ac.in/">http://cbii-au.vlabs.ac.in/</a>
3.	Cell Biology Tutorials I	Genetic Science Learning Center by Arthur Lakes Library Colorado School of Mines	<a href="https://learn.genetics.utah.edu/content/cells/">https://learn.genetics.utah.edu/content/cells/</a>
4.	Cell Biology Tutorials II	MIT	<a href="http://star.mit.edu/CellBio/animations/index.html">http://star.mit.edu/CellBio/animations/index.html</a>

**B.Sc. Semester- I**  
**Course-Biological Macromolecules**  
**Course Code-BBI021B**  
**Lectures: 4 Hrs/week**

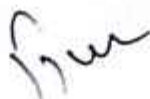
UNIT 1	Molecular Interaction and vitamins
UNIT 2	Carbohydrates
UNIT 3	Lipids
UNIT 4	Amino acids and Proteins
UNIT 5	Nucleic acids

#### Course outcome

CO-1 Students will be able to describe the basics of biomolecules and carbohydrates  
 CO-2 Students will be able to illustrate different types of lipids and relate their structure to their role in biological systems.

  
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CO-3 Students will be able to recognize amino acid structures and illustrates the function of proteins.

CO-4 Students will be able to describe/recognize nucleic acids, DNA and RNA.

Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	2
CO2	3	2	3	1	2	2	1
CO3	3	2	2	1	2	2	2
CO4	2	3	3	2	2	1	2

1-LOW, 2-MEDIUM, 3-HIGH

**BBI021B: BIOLOGICAL MACROMOLECULES**

**Credit(s):4**

**Unit-I**

**Molecular interactions:** The concept of pH, dissociation and ionization of acids and bases, Lewis acid and base, buffers and their role in biology, buffering mechanism, Henderson-Hasselbalch equation, biological buffer and Their Importance

**Vitamins:** Structure and biochemical properties of water soluble and fat soluble vitamins and their coenzyme activity.

**Unit-II**

**Carbohydrates:** Introduction, biological importance. Definition, Classification, Monosaccharides other than glucose, glycosidic bond, disaccharides, polysaccharides (starch, glycogen, peptidoglycan) Hetero polysaccharides, Mutarotation, osazone formation, Inversion of Sucrose

**Unit-III**

**Lipids:** Introduction Structure, distribution and biological importance of fats and fatty acids; Chemical properties and characterization of Fats, Waxes, Cerebrosides, gangliosides, phospholipids and their types and proteolipids; Steroids and Prostaglandins

**Unit-IV**

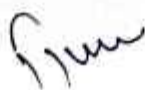
  
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17



**Amino acids:** Definition, Classification, Structure and types; **Proteins:** Classification, structure and properties, biologically active peptides, classification and properties of proteins, structure of proteins-primary, secondary, tertiary and quaternary structure of proteins.

#### Unit-V

**Nucleic acids:** Structure of purines, pyrimidines, nucleosides and nucleotides; Structure, types and biological role of RNA and DNA

#### Text / Reference Books

1. Linda Sherwood, Chris Woolverton, Joanne Willey; Prescott's Microbiology, 9<sup>th</sup> Edition, McGraw-Hill LLC.
2. E E Conn, P K Stumpf, G Bruening and R Y; General Microbiology, 5th Edition, 1987, John Wiley and Sons, New York.
3. Albert L. Lehninger, David L. Nelson, and Michael M. Cox.; Principles of Biochemistry, 2<sup>nd</sup> Edition, Worth Publishers, 33 Irving Place, New York
4. Jeremy M Berg, John L Tymoczko, and Lubert Stryer; Biochemistry, 5th edition, 2002.

#### BBI022B: Biological Molecules Lab 1

Credit(s): 1

1. To prepare the solutions of given normality and its standardization.
2. To Calibrate the pH meter by using different buffer solutions
3. To Prepare the buffer solutions
4. To determine the pKa value and hence the Dissociation constant of a given acid by using pH meter.
5. To perform Qualitative estimation of carbohydrates
6. To perform Qualitative estimation of proteins
7. To perform Qualitative estimation of lipids
8. To Determine the acid value of oil

#### Virtual Labs link

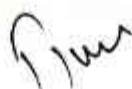
S.No.	Course name	Sources	link
1	Biochemistry Virtual Lab I	Amrita Vishwa Vidyapeetham	<a href="http://biotech01.vlabs.ac.in/">http://biotech01.vlabs.ac.in/</a>
2	Biochemistry Virtual Lab II	Amrita Vishwa Vidyapeetham	<a href="https://vlab.amrita.edu/?sub=3&amp;brch=64">https://vlab.amrita.edu/?sub=3&amp;brch=64</a>

  
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**B.Sc. Semester- I**  
**Course- Microbiology**  
**Course Code: BBI023B**  
**Lectures: 4 Hrs/week**

UNIT 1	History, classification and staining
UNIT 2	Diversity, morphology and microbial associations
UNIT 3	Bacterial Growth, cultivation and preservation
UNIT 4	Nutritional classification, Control of Growth of Microbes
UNIT 5	Virus structure and types

**Course outcome**

CO-1 Students will learn the fundamentals of microbiology, describe the facts and principles about microorganisms that apply to various fields, and explain how microorganisms are used as model systems to study basic biology, genetics, metabolism, and ecology.

CO-2 Students will explain and analyze the concepts, structures, nature, types of associations present among microbes and differentiate and classify them.

CO-3 Students will be able to assess the elements of a problem and develop and test a solution based on logic and the best possible information, analyze and interpret results and use mathematical and graphing skills and reasoning to solve problems in microbiology.

CO-4 Students will be able to understand and appreciate the value of cooperating and working effectively with peers and demonstrate a commitment to developing such skills and identifying and discussing the ethical issues and responsibilities of microbiology.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	2		1	
CO2	3	3	2	1			1
CO3	2	2	3	2	3	3	3
CO4	1	1			3	3	3

L-1, M-2, H-3

**BBI023B: MICROBIOLOGY**

**Credit(s): 4**

**Unit-I**

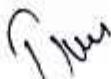
  
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19



  
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**Microbiology:** Introduction, Scope, History and Evolution of Microbiology

**Stains & Staining techniques:** Definition of auxochrome; Chromophores; Compounds for Staining, Aims and Theories of Staining, Smear-Preparation and Fixation, Simple staining-negative and monochrome staining, Differential staining- Gram staining; acid fast staining, endospore staining;; capsule staining; flagella staining

**Microbial Taxonomy:** Terminologies, Whittaker's Five-kingdom classification, three- domain classification, Binomial Nomenclature, Classification of microorganisms – numerical taxonomy, chemotaxonomy, molecular taxonomy; introduction to Bergy's manual

## Unit-II

**Microbial Diversity:** Morphology and cell structure of major groups of microorganisms e.g., Bacteria-Actinomycetes, Rickettsia, Archaeobacteria; Fungi, Algae, Protozoa and Unique features of viruses; Mycoplasma and Cell wall deficient bacteria

**Anatomy of Prokaryotic Cell:** Cell wall, Plasma Membrane, Cytoplasm, Nucleoid, plasmids, episomes, mesosomes, ribosomes, cell Inclusions, flagella and endoflagella, pili, fimbriae, glycocalyx, endospores and sporulation; Difference between Prokaryotic and Eukaryotic cells

**Microbial Associations:** Mutualism, Proto-co-operation, Syntrophism, Commensalism, Predation, Parasitism, Amensalism

## Unit-III

**Microbial growth:** Growth curve, Mathematical expression for Growth, Generation time, measurement of growth, continuous growth, synchronous growth and diauxic growth, environmental factors (physical and chemical) affecting growth.

**Cultivation and Identification of Microbes:** Media-types; Isolation methods for bacteria and fungi, Identification – morphological, biochemical, cultural characteristics, physiology, serology

**Preservation of Microorganisms:** objectives, necessities and methods of preservation, culture collection centre

## Unit-IV

**Nutritional Classification of Microbes:** Basis of classification and categorization

**Control of Growth of Microbes:** Introduction and related terminologies, Sterilization- physical method of disinfection and sterilization; radiation (mode of action, applications); Chemical agents-gases and liquid; Mechanical methods-filtration;

**Disinfection–** Characteristics of disinfectant, disinfectants, Methods of assessment of chemicaldisinfectant-phenol coefficient-definition and method of determination

  
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## Unit-V

**Viruses:** Structure of viruses, Prions and Viroids, cultivation and identification of viruses, Virus Replication Cycles, Mechanisms of Viral Entry and Spread of Infection, Bacteriophages – structure and replication, Animal viruses - HIV, Plant Viruses - TMV

### Text / Reference Books

1. Rogier Y. Stanier, John L. Ingraham, Mark L. Wheelis, Page R. Painter; General Microbiology, 5th ed., 2000, Tata-McGraw Hill.
2. Ronald M. Atlas; Principles of Microbiology, 2nd edition, 1997, McGraw-Hill.

### BBI024B: Microbiology Lab

Credit(s): 1

1. To perform the Simple staining
2. To perform the Gram staining
3. To perform the Endospore staining
4. To perform the Acid fast staining
5. To Prepare Broth for bacterial and fungal culture
6. To Prepare Nutrient Agar or Potato Dextrose Agar (PDA) or Sabouraud Dextrose Agar (SDA) media for bacterial and fungal culture
7. To isolate microflora from soil of Rajasthan and identify their shapes
8. To Culture microflora from Industries water of local area by serial dilution method spreading
9. Determination of bacterial cell size by micrometry.
10. Enumeration of microorganism- total & viable count.

### Virtual Labs link

S. No.	Course Name	Source	Link
1.	Microbiology Virtual Lab I	Amrita Vishwa Vidyapeetham	<a href="https://mvi-au.vlabs.ac.in/">https://mvi-au.vlabs.ac.in/</a>
2.	Microbiology Virtual Lab II	Amrita Vishwa Vidyapeetham	<a href="https://vlab.amrita.edu/?sub=3&amp;brch=76">https://vlab.amrita.edu/?sub=3&amp;brch=76</a>

  
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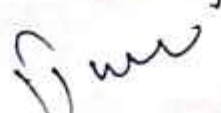


21











# SEMESTER-II

S.N o.	Se me ster	Subject code	Subject	Lect ure Hou rs	Tuto rial Hour s	Practi cal Hours	Tot al Hou rs	Lect ure Cred it	Tuto rial Credi t	Practi cal Credi t	Tota l Credi ts	Cour se Type
1	2	BBI026 B	Metaboli c Pathways	4	0	0	4	4	0	0	4	Core Course 4
2	2	BBI027 B	Biologic al Molecule s Lab II	0	0	2	2	0	0	1	1	
3	2	BBI028 B	Genetics	4	0	0	4	4	0	0	4	Core Course 5
4	2	BBI029 B	Genetics Lab	0	0	2	2	0	0	1	1	
5	2	BBI030 B	Analytica l Techniqu es	4	0	0	4	4	0	0	4	Core Course 6
6	2	BBI031 B	Analytica l Techniqu es lab	0	0	2	2	0	0	1	1	
7	2		Departm ent Elective I	4	0	0	4	4	0	0	4	DE1
8	2		Departm ent Elective I Lab	0	0	2	2	0	0	1	1	
9	2	DCA003 A	Project Manage ment Lab	0	0	2	2	0	0	1	1	
10	2	DEN002 A	Professio nal Skills	2	0	2	4	2	0	1	3	
11	2	DIN002 A	Culture Educatio n -2	2	0	0	2	2	0	0	2	
			Total	20	0	12	32	20	0	6	26	

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**B.Sc. Semester-II**  
**Course – Metabolic Pathways**  
**Course Code – BBI026B**  
**Lectures: 4 Hrs/week**

<b>UNIT 1</b>	<b>Bioenergetics; General Concepts of Thermodynamics</b>
<b>UNIT 2</b>	<b>Carbohydrate Metabolism</b>
<b>UNIT 3</b>	<b>Lipid Metabolism</b>
<b>UNIT 4</b>	<b>Amino Acid Metabolism</b>
<b>UNIT 5</b>	<b>Nucleotide Metabolism</b>

**Course outcome**

- CO-1 Students will be able to demonstrate familiarity with the basics of metabolic pathways and metabolism of carbohydrates.  
CO-2 Students will be able to describe what happens in fatty acid oxidation and synthesis.  
CO-3 Students will be able to explain what happens during protein metabolism.  
CO-4 Students will be able to acquire skills to demonstrate the functioning and metabolism of nucleic acids.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	2
CO2	3	3	3	2	2	1	1
CO3	3	3	3	2	2	1	1
CO4	3	3	3	2	1	2	2

1 – LOW , 2- MEDIUM , 3-HIGH

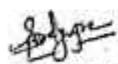
**BBI026B: Metabolic Pathways**

**Credit(s): 4**

**Unit-I**

**Bioenergetics; General concepts of Thermodynamics:** Laws of Thermodynamics, Enthalpy, Entropy, Free energy & Chemical Equilibria, High Energy Bonds & Compounds, ATP-ADP Cycle, Oxidation-reduction Reactions and Redox potential, chemosmotic theory for ATP Production, Metabolism: Introduction (Anabolism & catabolism),

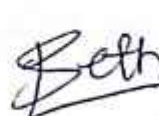
**Unit-II**

  
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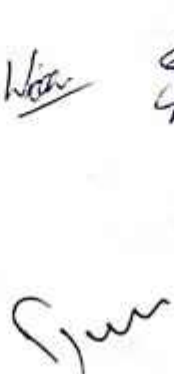
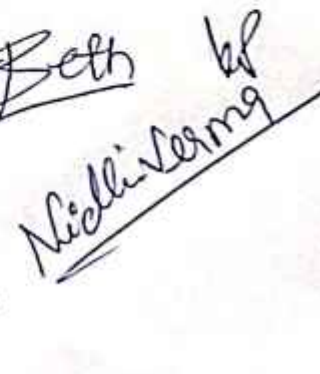


 23







**Carbohydrate metabolism:** Glycolysis, Fermentation, Citric acid cycle, Oxidative Phosphorylation and ETS, Gluconeogenesis, Glycogenesis and Glycogenolysis, HMP shunt, Glyoxylate pathway.

### Unit-III

**Lipid metabolism:** Fatty acid degradation (beta, alpha, and omega degradation), degradation of odd chain fatty acids, Fatty acid synthesis, Regulation of fatty acid metabolism. Cholesterol Biosynthesis, Ketone Bodies formation and degradation

### Unit-IV

**Amino acid metabolism:** Transamination, deamination, oxidative deamination, Amino acid degradation & Biosynthesis, Urea cycle and its regulation.

### Unit-V

**Nucleotide metabolism:** Synthesis of purines & pyrimidines nucleotides, salvage pathway, nucleotide degradation, associated metabolic disorders. Lesch-Nayan Syndrome, SCID

### Text / Reference Books

1. E E Conn, P K Stumpf, G Bruening and R Y; General Microbiology, 5th edition., 1987, John Wiley and Sons, New York
2. Jeffery Zubey; Principles of Biochemistry, 4th edition, (1997), McGraw-Hill College, USA
3. Jeremy M Berg, John L Tymoczko, and Lubert Stryer; Biochemistry, 5th edition, 2002.
4. Donald Voet, Judith G. Voet, Charlotte W. Pratt; Principles of Biochemistry, 5<sup>th</sup> Edition , 2018, Wiley.
5. David L. Nelson, Michael M. Cox; Lehninger's Principles of Biochemistry, 7<sup>th</sup> edition, 2017, WH Freeman.

### BBI027B: Biological Molecules Lab II

Credit(s): 1

1. To perform Quantitative estimation of carbohydrates by anthrone method
2. To perform acid value for given oil
3. To perform Quantitative estimation of RNA using Orcinol method
4. To perform Quantitative estimation of DNA using DPA method
5. To separate Amino acid using paper chromatography
6. To Determine saponification value of oil
7. To perform Quantitative estimation of Protein by Biuret method
8. To perform Quantitative estimation of Protein by Bradford method

  
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24

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9. To perform Quantitative estimation of reducing sugar

#### Virtual Labs Link

S.No.	Course Name	Sources	Link
1	Biochemistry Virtual Lab I	Amrita Vishwa Vidyapeetham	<a href="http://biotech01.vlabs.ac.in/">http://biotech01.vlabs.ac.in/</a>
2	Biochemistry Virtual Lab II	Amrita Vishwa Vidyapeetham	<a href="https://vlab.amrita.edu/?sub=3&amp;brch=64">https://vlab.amrita.edu/?sub=3&amp;brch=64</a>

**B.Sc. Semester-II**  
**Course-Genetics**  
**Course Code-BBI028B**  
**Lectures: 4 Hrs/week**

<b>UNIT 1</b>	<b>Mendelian Principles and factor hypothesis</b>
<b>UNIT 2</b>	<b>Linkage and crossing over, chromosome maps, genes and genetic code</b>
<b>UNIT 3</b>	<b>Sex determination, sex linked and extra chromosomal inheritance</b>
<b>UNIT 4</b>	<b>Heteroploidy, chromosomal aberrations and mutations</b>
<b>UNIT 5</b>	<b>Human and Population Genetics</b>

#### Course outcome

CO-1 Students will describe and explain genetics, Mendel's experimental design, principles, gene linkage, and the role of genetic mechanisms in evolution. They will be able to explain and evaluate the principles of genetics, gene mapping, sex determination, chromosomal anomalies, study pedigrees, evolutionary and quantitative genetics, etc.

CO-2 Students will acquire knowledge to design, execute, and analyze the results of genetic experiments, recognize the experimental rationale of genetic studies, and evaluate conclusions based on genetic data. They will gain insight into the mathematical, statistical, and computational basis of genetic analyses.

CO-3 Students will apply communication skills required in the discipline, including oral presentations; publish articles, and poster presentations.

CO-4 Students will learn teamwork and leadership skills, including group analysis of data, working together in the laboratory, joint compositions of written reports, substantive participation in research group meetings, etc.

  
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25










### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1		2		1	
CO2	2		3	2	3	3	1
CO3	1	3			1	2	
CO4	1	1	2	1	2		3

1-LOW, 2-MEDIUM, 3-HIGH

**BBI028B: Genetics**

**Credit(s): 4**

#### **Unit-I**

Mendelian principles: Principle of segregation, monoclinal crosses, dominance, co dominance, lethal genes. Principle of independent assortment: dihybrid gene interactions, epistasis, multiple alleles. Interaction of Genes: Inter-allelic, Non-allelic interactions, Pleiotropic effect of genes

#### **Unit-II**

Linkage: linkage groups, history, arrangement of linked genes, complete and incomplete linkage; linkage and recombination in Neurospora. Crossing over: mechanism of crossing over, stages at which crossing over occurs, cytological basis of crossing over, frequency, types of crossing over Chromosome maps: chromosome mapping by two factor and three factor crosses, interference and coincidence. Genes: gene concept, molecular structure of gene, types of genes, functioning of gene. Genetic code: degeneracy and discovery of genetic code

#### **Unit-III**

Sex determination: Mechanism of sex determination: identification of sex chromosomes, chromosomal mechanism, genic balance theory of sex determination, hormonal and environmental factors in sex determination, Y chromosome and sex determination in mammals, Sex linked inheritance: discovery, sex linkage-drosophila, man, poultry and moths, types, sex limited and sex influenced genes. Extra-chromosomal inheritance: Extra chromosomal inheritance: Rules of extra nuclear inheritance, maternal effects, maternal inheritance, cytoplasmic inheritance, organelle heredity

#### **Unit-IV**

  
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26






Variation in chromosome number (Heteroploidy): euploidy and aneuploidy and other types of variations. Chromosomal Aberrations: change involving number of gene loci and arrangement of genes, Mutations: spontaneous and induced, substitution mutation, frame shift mutation, induced mutations in plants, animal and microbes for economic benefit of man

#### Unit-V

Human Genetics and Population Genetics: Human Karyotype, Pedigree analysis, chromosomal banding, turner syndrome, klinefelter syndrome, Down syndrome, patau syndrome, Edward syndrome, cat cry syndrome, barr body, Hardy-Weinberg frequencies

#### Text / Reference Books

1. Monroe W. Strickberger; Genetics, Macmillan international editions in science.
2. David Freifelder; Microbial Genetics, Jones and Barlett, 1987, The university of Michigan

#### BBI029B: Genetics Lab

Credit(s): 1

1. To study the Mendel's law of inheritance
2. To analyze various chromosomal abnormalities
3. To perform the Karyotyping of normal and abnormal human cells
4. To perform the Pedigree analysis
5. To determine the Problems related to pedigree analysis (2)
6. To determine the Problems related to linkage
7. To analyze Barr body using methylene blue
8. Pedigree charts of diseases in families

#### Virtual Labs link

S. No.	Course Name	Source	Link
1.	Genetics Lab Tutorials I	Genetic Science Learning Center by Arthur Lakes Library Colorado School of Mines	<a href="https://learn.genetics.utah.edu/content/basics/">https://learn.genetics.utah.edu/content/basics/</a>
2.	Genetics Lab Tutorials II	Genetic Science Learning Center	<a href="https://learn.genetics.utah.edu/content/pigeons/">https://learn.genetics.utah.edu/content/pigeons/</a>
3.	Genetics Lab Tutorials III	Genetic Science Learning Center	<a href="https://learn.genetics.utah.edu/content/epigenetics/">https://learn.genetics.utah.edu/content/epigenetics/</a>
4.	Genetics Lab Tutorials IV	Genetic Science Learning Center	<a href="https://learn.genetics.utah.edu/content/science/">https://learn.genetics.utah.edu/content/science/</a>

  
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**B.Sc. Semester-II**  
**Course-Analytical Techniques**  
**Course Code-BBI030B**  
**Lectures: 4 Hrs/week**

<b>UNIT 1</b>	<b>Instruments, basic principle and usage</b>
<b>UNIT 2</b>	<b>Microscopy</b>
<b>UNIT 3</b>	<b>Basic principles of electrophoresis</b>
<b>UNIT 4</b>	<b>Chromatography</b>
<b>UNIT 5</b>	<b>Spectroscopic Techniques</b>

**Course outcome**

CO-1 Students will be able understand different analytical techniques for identification of biomolecules in Biotechnology

CO-2 Students will be able to describe and compare different types of chromatographic, electrophoresis and spectrometric techniques

CO-3 Students will be able to distinguish different separation techniques used for different molecules.

CO-4 Student will able to acquire skills to analyze the critical problems related to instruments used in biology

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	2	2	0	1
CO2	3	2	2	1	3	0	1
CO3	3	1	2	2	2	0	2
CO4	3	2	3	2	2	0	1

**BBI030B: Analytical Techniques**

**Credit(s): 4**

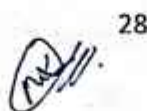
**Unit-I**

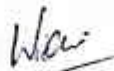
**Instruments, basic principle and usage:** pH meter, Measurement of pH: Principles of glass and reference electrodes, types of electrodes, calibration of pH meter, Handerson equation, biological buffer.

**Unit-II**

  
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 28









**Microscopy:** Simple microscopy, Phase contrast microscopy and electron microscopy (TEM and SEM). Fluorescence microscopy, Sedimentation-Sedimentation velocity, preparative and analytical ultracentrifugation techniques

### Unit-III

**Basic principles of electrophoresis:** AGE and SDS-PAGE and their importance, Native-PAGE, Radioisotopic Techniques: Types of radioisotopes used in Biochemistry, units of radioactivity measurements, isotopes commonly used in biochemical studies –  $^{32}\text{P}$ ,  $^{35}\text{S}$ ,  $^{14}\text{C}$  and  $^3\text{H}$ ), application of isotopes, Autoradiography: Biological hazards of radiation and safety measures in handling radioisotopes; Biological applications

### Unit-IV

**Chromatography:** General principles and applications of – Adsorption chromatography, Ion-exchange chromatography, Thin-layer chromatography, Hydrophobic chromatography, Gas-liquid chromatography, HPLC, Affinity chromatography, Paper chromatography.

### Unit-V

**Spectroscopic Techniques:** Beer-Lambert law, light absorption and its transmittance, determination and application of extinction coefficient, application of visible and UV spectroscopic, and its application, IR spectroscopy and their applications

#### Text / Reference Books

1. D.P. Khandelwal; Textbook of optics and atomic physics, Himalaya Publishing House.
2. S.B. Patel; Nuclear physics an introduction, 2<sup>nd</sup> Edition, New Age International Pvt Ltd
3. Vasantha Pattabhi and N. Gautham; Biophysics, 2<sup>nd</sup> edition, Narosa Publishing House.
3. B C Nakara, K K Choudhari; Instrumentation measurements and analysis, 2<sup>nd</sup> Edition, Tata McGraw Hill.
4. Raghbir Singh Khandpur; Handbook of analytical instruments, Tata McGraw Hill.
5. Arthur Beiser; Perspectives of modern physics, McGraw Hill.
6. Harvey Elliott White; Introduction to atomic spectra, McGraw Hill.
7. Harvey Lodish, Arnold Berk, S Lawrence Zipursky, Paul Matsudaira, David Baltimore, and James Darnell. Molecular cell biology; New York: W. H. Freeman.
8. Cotrell; Biophysics, Eastern Economy Edition.

  
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29











9. P. Narayanan; Clinical Biophysics –Principles and Techniques; 1<sup>st</sup> Edition, Bhallani Pub., Mumbai

**BBI031B: Analytical Techniques Lab**

**Credit(s): 1**

1. To Calibrate the spectrophotometer
2. To perform Verification of Beer-Lambert Law
3. To calibrate pH meter without buffer solution
4. To prepare a solution of different Normality, molarity
5. To prepare primary and secondary standard solution
6. To convert secondary standard solution into primary standard solution
7. To determine the  $\lambda_{max}$  for DNA
8. To separate various molecule on the basis of their sedimentation coefficient
9. To separate Amino acid using paper chromatography
10. To separate Amino acid using thin layer chromatography
11. To separate the aliphatic and aromatic fraction of oil by column chromatography
12. To separate the DNA using agarose gel electrophoresis

**Virtual Labs link**

S. No.	Course Name	Source	Link
1.	Analytical Techniques Lab II	Labster.com	<a href="https://www.labster.com/try/">https://www.labster.com/try/</a>

**SEMESTER-III**

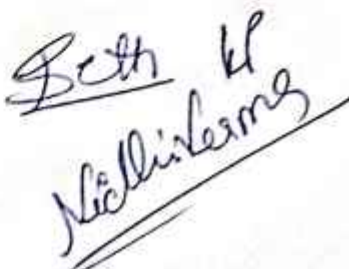
S. No	Sem ester	Subject code	Subject	Lect ure Hou rs	Tuto rial Hou rs	Pract ical Hou rs	Tot al Ho urs	Lect ure Cre dit	Tuto rial Cred it	Pract ical Cred it	Tota l Cre dits	Cou rse Typ e
1	3	BBI033 B	Introductory Immunology	4	0	0	4	4	0	0	4	Core Course 7
2	3	BBI034 B	Immunological Techniques Lab	0	0	2	2	0	0	1	1	
3	3	BBI035 B	r-DNA technol	4	0	0	4	4	0	0	4	Core

  
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30









			ogy									Con tinue %
4	3	BBI036 B	Genetic Enginee ring Lab	0	0	2	2	0	0	1	1	
5	3		DE 2	4	0	0	4	4	0	0	4	DE 2
6	3		DE2 Lab	0	0	2	2	0	0	1	1	
7	3	DCA004 A	Advanc ed Spread Sheet Lab	0	0	2	2	0	0	1	1	
8	3	DEN003 A	Life Skills 1(Person ality Develop ment)	1	0	2	3	1	0	1	2	
9	3	DIN003 A	Value Educati on and Ethics- I	1	0	0	1	1	0	0	1	
10	3	BBI091	Open Elective -I	3	0	0	3	3	0	0	3	
11	3		Researc h Method ology	3	1	0	3	3	1	0	4	
			Total	20	0	10	30	20	1	5	26	

B.Sc. Semester- III  
Course-Introductory Immunology  
Course Code-BBI033B  
Lectures: 4 Hrs/week

  
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31


UNIT 1	Overview of Immune System
UNIT 2	Antigen and Antibody
UNIT 3	Antigen-Antibody Interaction and MHC
UNIT 4	Major Histocompatibility complex
UNIT 5	Vaccines

### Course outcome

CO-1 Students will demonstrate a basic concept of immunology at the cellular and molecular level, define central principles and concepts, outline, compare, contrast innate and adaptive immunity, and describe the different cell types and organs that make up the immune response.

CO-2 Students will illustrate various mechanisms that regulate immune responses and maintain tolerance; elucidate the genetic basis for immunological diversity and the generation of adaptive immune responses. They will outline key events and cellular players in antigen presentation and how the nature of the antigen will shape resulting effector responses and be able to apply basic techniques for identifying antigen-antibody interactions.

CO-3 Students will understand the principles governing vaccination and the mechanisms of protection against infectious diseases and will be able to elucidate the reasons for immunization and aware of different vaccination.

CO-4 Students will be able to communicate effectively in both oral and written formats, using appropriate vocabulary for immunology, response mechanisms, regulation, and genetic basis; apply scientific principles in interpreting responses and data; and understand immunology's roles in disease protection.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	2			
CO2	3	1	2	3		1	
CO3	3	2	2	3			
CO4	3	3	3	2			

1-LOW, 2-MEDIUM, 3-HIGH

BBI033B: Introductory Immunology

Credit(s): 4

### Unit-I

Overviews of immune system: Historical perspectives. Types of immunity: Innate and acquired. Features of immune response: Memory, Specificity and recognition of self and

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32

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non-self, Clonal nature of immune response; Hematopoiesis and differentiation; Cells and organs of the immune system

### Unit-II

**Antigen:** Immunogenicity v/s antigenicity, factors affecting immunogenicity, nature of immunogen, biological system, epitopes, haptens and antigenicity; Immunoglobulins: Structure of antibody, antibody mediated effector functions, antibody classes and biological activities; Monoclonal antibodies: Production and applications, antibody determinants isotype, idiotype and allotypes

### Unit-III

**Antigen-Antibody interactions:** types: precipitation and agglutination reaction, radioimmunoassay, ELISA, chemiluminescence, ELISPOT assay, western blot, immune precipitation, immune fluorescence, flow cytometry and fluorescence.

### Unit-IV

**Major histocompatibility complex:** General organization, MHC molecules: structure & genes, their mode of antigen presentation and interaction, cellular distribution of MHC, regulation of MHC expression and disease susceptibility. Complement system: Function, components, activation, regulation and deficiencies of complement.

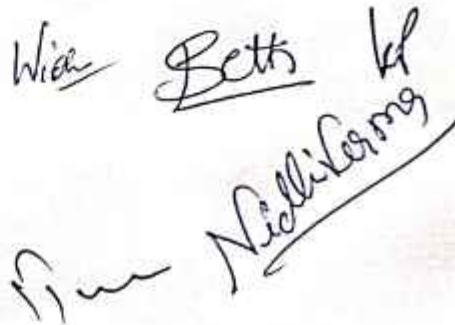
### Unit-V

**Vaccines:** Active and Passive Immunization Types of Vaccines – Inactivate Attenuated, Purified macromolecules and Recombinant-vector, DNA, Multivalent subunit Vaccines.

### Text / Reference Books

1. Roitt I.M, Brostoff, J., Male D.K.; Immunology, Illustrated Publisher, Mosby.
2. T. J. Kindt, R.A. G. B. A. Osborne, J. Kuby; Immunology, W.H. Freeman and Company, New York.
3. Austyn, J.M., Wood, K.J; Principles of cellular and molecular immunology, 1993, Oxford University Press Inc. New York.
4. Paul, W.E; Fundamental immunology, Lippincott Williams & Wilkins.
5. Birch J.R., Lennox E.S; Monoclonal antibodies: Principles and applications, Wiley-Liss.
6. T.G. Parslow, D.P. Stites, A.I. Terr; Medical Immunology, Lange Medical Books/McGraw-Hill.
9. P.K. Gupta., Elements of Biotechnology, 1st Edition, 2001, Rastogi Publications.

  
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**BB1034B: Immunological Techniques Lab****Credit(s): 1**

1. To perform the Differential leucocytes count
2. To perform total leucocyte count
3. To perform the Total RBC count
4. To determine the Blood group
5. To perform RID
6. To perform Ouchterlony Double diffusion (ODD)
7. To perform Rocket Immuno-electrophoresis
8. To perform sandwich ELISA
9. To perform Dot ELISA.

**Virtual Labs link**

S. No.	Course Name	Source	Link
1.	Immunology Virtual Lab I	Amrita Vishwa Vidyapeetham	<a href="https://vlab.amrita.edu/?sub=3&amp;brch=69">https://vlab.amrita.edu/?sub=3&amp;brch=69</a>
2.	Immunology Virtual Lab II	Amrita Vishwa Vidyapeetham	<a href="https://vlab.amrita.edu/?sub=3&amp;brch=70">https://vlab.amrita.edu/?sub=3&amp;brch=70</a>

**B.Sc. Semester-III**  
**Course-r-DNA Technology**  
**Course Code-BBI035B**  
**Lectures: 4 Hrs/week**

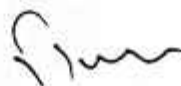
UNIT 1	Expression of genes in prokaryotic and eukaryotic systems
UNIT 2	Tools used in r-DNA technique
UNIT 3	DNA sequencing
UNIT 4	Polymerase Chain Reaction
UNIT 5	Application of r-DNA Technology

**Course outcome**

CO-1 Students will be able to explain term regulation, technical know-how on versatile tools and techniques in recombinant DNA technology.

  
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34



- CO-2 Students will be able to describe principle and technique of DNA sequencing.
- CO-3 Students will be able to explain principle of PCR and site directed mutagenesis.
- CO-4 Students will be able to acquire skills to understand application of genetic engineering techniques in basic and applied experimental biology.

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	2	2	2
CO2	3	3	3	2	1	2	1
CO3	3	3	3	1	2	2	2
CO4	3	3	3	2	1	2	1

1 – LOW, 2- MEDIUM, 3-HIGH

#### **BBI035B: r-DNA Technology**

**Credit(s): 4**

##### **Unit-I**

**Expression of genes in prokaryotic and eukaryotic systems:** Gene structure in prokaryotic and eukaryotic cells. Gene expression – concept of operon and related elements in the unit, regulatory and structural gene, post translational processing of mRNA, extra chromosomal DNA and its functions. Restriction endonuclease, Ribonucleases, taq DNA, SI nuclease, Alkaline phosphatase, klenow enzyme, methyl transferase, restriction modification system

##### **Unit-II**

**Preparation of desired gene by genomic DNA, from reverse transcriptase and by gene machine; Vectors:** bacteriophages, cosmids, Triplasmids, yeast artificial chromosome, shuttle and binary vectors, DNA labeling radioactive and non-radioactive methods

##### **Unit-III**

**DNA sequencing, Southern and Northern blotting in situ, DNA fingerprinting, Ligation method for gene transfer, Gene transfer technology cDNA and genomic DNA library, gene isolation and cloning, Selection of recombinants**

##### **Unit-IV**

  
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35






**Polymerase chain reaction and site directed mutagenesis- Expression of cloned gene in recombinant cells, production of biochemicals with examples.**

#### **Unit-V**

**Application of rDNA technology** Antisense and ribozyme technology, Human genome project and its application, Gene therapy prospect and future, DNA vaccine, Transgenic plants, Current production of rDNA products, Bio-safety measures and regulations for rDNA work.

#### **Text / Reference Books**

1. D.M. Glover; Genetic Engineering, Cloning DNA, Chapman and Hall, New York.
2. S. Mahesh and A.B. Vedamurthy; Biotechnology-4 (rDNA Technology, Environmental biotechnology, Animal cell culture), New Age publisher.
3. T. A. Brown; Genome 4, 4<sup>th</sup> Edition, Garland Science.
4. Sandy B. Primrose, Richard Twyman, Bob Old; Principles of Gene Manipulation: An Introduction to Genetic Engineering, 6<sup>th</sup> Edition, Wiley-Blackwell.

#### **BBI036B: Genetic Engineering Lab**

**Credit(s): 1**

1. To Isolate the genomic DNA from bacteria
2. To perform Isolation of plasmid from bacteria
3. To perform Agarose gel electrophoresis for DNA separation
4. To perform Restriction Digestion DNA/plasmid
5. To perform DNA isolation from plant by CTAB method
6. To perform Ligation
7. To estimate DNA by DPA method
8. To determine the molecular weight of DNA
9. To estimate the amount of RNA by Orcinol method
10. To isolate DNA from Onion cell

# SEMESTER-IV

S. No.	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1	4	BBI040 B	Molecular Biology	4	0	0	4	4	0	0	4	Core Course 9
2	4	BBI041 B	Molecular Biology Lab	0	0	2	2	0	0	1	1	
3	4	BBI042 B	Plant Biotechnology	4	0	0	4	4	0	0	4	Core Course 10
4	4	BBI043 B	Plant Biotechnology Lab	0	0	2	2	0	0	1	1	
5	4	BBI044 B	Bioprocess Engineering and Technology	4	0	0	4	4	0	0	4	Core Course 11
6	4	BBI045 B	Fermentation Technology Lab	0	0	2	2	0	0	1	1	
7	4	DCA005 A	Python programming	2	0	0	2	2	0	0	2	
8	4	DCA006 A	Python programming Lab	0	0	2	2	0	0	1	1	
9	4	DMA01 1A	Life Skills-II (Aptitude)	1	0	2	2	1	0	1	2	
10	4	DIN004	Value	1	0	0	1	1	0	0	1	

  
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37











		A	Education and Ethics-2									
11	4		Open Elective II	3	0	0	3	3	0	0	3	
			Total	19	1	10	28	19		5	24	

**B.Sc. Semester- IV**  
**Subject- Molecular Biology**  
**BBI040B**  
**Lectures: 4Hrs/week**

UNIT 1	Nucleic Acids
UNIT 2	Transcription in prokaryotes and eukaryotes
UNIT 3	Translation in prokaryotes and eukaryotes
UNIT 4	Regulation of gene expression in prokaryotes
UNIT 5	Mutation

**Course outcome**

- CO-1 Students will be able to describe about structure of nucleic acid, replication process and mutation.
- CO-2 Students will be able to learn the transcription in prokaryotes and eukaryotes.
- CO-3 Students will be able to explain the translational process for prokaryotes and eukaryotes.
- CO-4 Students will be able to analyze the regulation of gene expression in living organisms.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	1	2	2
CO2	3	3	3	2	1	1	1
CO3	3	3	3	1	2	1	1
CO4	3	3	3	2	1	2	1

1 – LOW, 2- MEDIUM, 3-HIGH

  
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38

**Unit-I**

**Nucleic Acids:** as the genetic material, structure and aggregation of DNA and RNA, DNA double helix, different conformations of double helix, DNA super coiling, Denaturation and renaturation of DNA, C-value paradox, Cot value, chemical complexity; DNA replication: Mechanism, Enzymes and accessory proteins involved, DNA damage, DNA mutagenesis and DNA repair (SOS and excision repair); Homologous recombination, site specific recombination and transposons.

**Unit-II**

**Transcription in prokaryotes and eukaryotes:** General and specific transcription factors, Regulatory elements and mechanism of transcription regulation, Modifications of RNA; Genetic code: deciphering the genetic code, nature of the code.

**Unit-III**

**Translation in prokaryotes and eukaryotes:** machinery- tRNA, Ribosomes, mRNA, aminoacyl-tRNA synthases and aminoacylation of tRNA; Mechanisms of initiation, elongation and termination, Regulation of translation, post translational modifications of proteins, protein localization, protein degradation.

**Unit-IV**

**Regulation of gene expression in prokaryotes:** lac, arabinose and trp operons - induction, repression and attenuation mechanism.

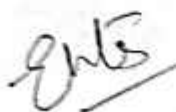
**Unit-V**

**Mutation:** Induced mutation, spontaneous mutation, frameshift mutation, point mutation, non sense mutations, site directed mutagenesis

**Text / Reference Books**

1. Glick, B.T and Pasternak J.J; Molecular Biotechnology, Principles and application of recombinant DNA, Washington D.C. ASM press.
2. Howe.C.; Gene Cloning and Manipulations, Cambridge University Press, USA

  
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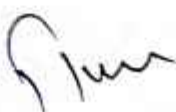














3. Lewin, B., Gene VI New York, Oxford University Press.
4. Rigby, P.W.J.; Genetic Engineering, Academic Press Inc. Florida, USA.
5. Sambrook; Molecular Cloning Volumes I, II, & III Cold spring Harbor Laboratory Press, New York, USA
6. Walker J.M. and Gingold E.B.; Molecular Biology and Biotechnology, Indian Edition Royal Society of Chemistry, U.K.
7. Karp.G; Cell and Molecular Biology, 3rd Edition, John Wiley and Sons; INC.
8. P.K. Gupta; Cell and Molecular Biology, Rastogi Publishers, Meerut.
9. Bruce alberts; Molecular Biology of the Cell, 5<sup>th</sup> Edition, Garland Science, Taylor and Francis group.
10. Voet and Voet; Biochemistry, 2004, John Willey and Sons Inc.
12. James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Losick, Inglis CSHLP; Molecular Biology of the Genes, 2007, Benjamin Cummings.
13. Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Matthew P. Scott, Anthony Bretscher, HiddePloegh, Paul Matsudaira; Molecular Cell Biology, 2007, Freeman & Co.

#### BBI041B: Molecular Biology Lab

Credit(s): 1

1. To Isolate genomic DNA
2. To perform Gel electrophoresis
3. To perform SDS-PAGE
4. To perform Quantification of RNA
5. To perform Quantification of DNA
6. To perform transformation

#### Virtual Labs Link

S.No	Course Name	Source	Link
1.	Molecular Biology Virtual Lab I	Amrita Vishwa Vidyapeetham	<a href="http://mbvi-au.vlabs.ac.in/">http://mbvi-au.vlabs.ac.in/</a>
2.	Molecular Biology Virtual Lab II	Amrita Vishwa Vidyapeetham	<a href="https://mbvii-au.vlabs.ac.in/">https://mbvii-au.vlabs.ac.in/</a>
3.	Biomedical and Signal Processing Laboratory	COEP, Pune	<a href="https://bmspcoep.vlabs.ac.in/List%20of%20experiments.html?domain=Biotechnology">https://bmspcoep.vlabs.ac.in/List%20of%20experiments.html?domain=Biotechnology</a>

B.Sc. Semester- IV  
Subject- Plant Biotechnology  
BBI042B  
Lectures: 4Hrs/week

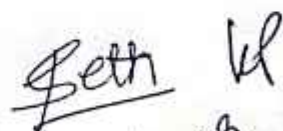
  
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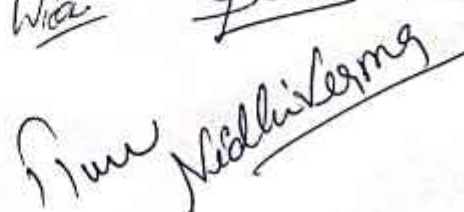




40









UNIT 1	History and Aseptic techniques
UNIT 2	Tissue culture media, Cell and Suspension culture
UNIT 3	Protoplast technology
UNIT 4	Genetic Transformations
UNIT 5	Soma-clonal variation and micro-propagation; Conservation

Course outcome

CO-1 Students will be able understand different plant tissue culture and sterilization techniques

CO-2 Students will be able to describe and compare different type's tissue culture media, cell and suspension cultures, genetic transformation and micro-propagation techniques

CO-3 Students will be able to distinguish different plant tissue culture techniques and able to raise callus

CO-4 Student will able to acquire skills to analyze the critical problems related to plant tissue culture

Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	2	1	2
CO2	3	2	3	2	2	1	1
CO3	3	3	3	2	2	2	2
CO4	3	3	3	1	3	1	2

1 – LOW , 2- MEDIUM , 3-HIGH

**BBI042B: Plant Biotechnology**

**Credit(s): 4**

**Unit-I**

**History:** Milestones in the history of plant tissue culture, Cellular totipotency: 'Explant' for plant tissue culture: Laboratory Requirements for plant tissue culture laboratory different work areas, equipments & instruments required, techniques, other requirements.

**Aseptic techniques:** Washing & preparation of glassware, packing & sterilization, media sterilization, surface sterilization, aseptic work station, precautions to maintain aseptic conditions;

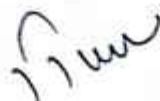
  
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41









## 42

## Micro propagation of medicinal plants found in Rajasthan

### Unit-III

## Unit-IV

## Unit-V

### Text / Reference Books

1. John H. Dodds, Lorin W. Robert; Experiments in Plant Tissue Culture. Press syndicate of University of Cambridge.
2. S.S. Bhojwani and M.K. Razdan; Plant tissue Culture: Theory and Practice, 1996, Elsevier, Amsterdam.
3. H S Chawla; An Introduction to Plant Biotechnology, 2002, Oxford and IBH.

  
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**BBI043A: Plant Biotechnology Lab****Credit(s): 1**

1. To Prepare stock solution for M.S. media
2. To prepare and inoculate node and inter node
3. To culture callus
4. To perform suspension culture
5. To prepare media and inoculate shoot tip
6. To prepare media and inoculate root tip
7. To prepare media and inoculate anther
8. To Prepare the synthetic seeds
9. To perform Bergmann's cell plating technique for single cell culture
10. To determine the Composition of various plant tissue culture media
11. To Prepare stock solution for various growth hormones
12. To Prepare M.S. media for seed inoculation
13. To Inoculate seed in M.S. media for micro-propagation
14. **Preparation of Herbarium sheet using medicinal plants found in Rajasthan**

**B.Sc. Semester- IV**  
**Subject- Bioprocess Engineering and Technology**  
**BBI044B**  
**Lectures: 4 Hrs/week**

<b>UNIT 1</b>	<b>Introduction to Bioprocessing techniques</b>
<b>UNIT 2</b>	<b>Microbial metabolism, selection and strain improvement</b>
<b>UNIT 3</b>	<b>Fermentation technology and upstream processing</b>
<b>UNIT 4</b>	<b>Downstream processing</b>
<b>UNIT 5</b>	<b>Enzyme technology</b>

**Course outcome**

CO-1 Students will use correct biological terms to describe and analyze phenomena/problems in bioprocesses, describe and explain the principles and processes involved in fermentation technology, investigate properties of microbes for product formation and their improvement.

CO-2 Students will analyze the characteristic of suitable media for product formation, formulation of media, selection of appropriate bioreactor models based upon

  
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43












bioproducts and cell lines, and other process criteria

CO-3 Students will be able to apply the concept in the field of industrial biotechnology and design a suitable scheme of bioproduct separations based upon the molecular characteristics of the product and other process criteria

CO-4 Students will be able to simplify the concepts and explain them through oral presentations

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3					1	
CO2	3		2		1	3	
CO3	3	2	2	2	3	1	
CO4	1	3					2

1-LOW, 2-MEDIUM, 3-HIGH

**BBI044B: Bioprocess Engineering and Technology**

**Credit(s): 4**

#### **Unit-I**

Introduction, Objectives and Scope; Range of bioprocess, Basic principle components of fermentation technology, Types of microbial culture-Batch, Fed batch and Continuous culture; Difference between Primary metabolite and secondary metabolites

#### **Unit-II**

**Industrial microorganisms:** selection of Microorganisms, industrial strains and strain improvement, strain stability, isolation and selection of microorganisms, production of stock culture.

#### **Unit-III**

**Fermentation technology:** definition, stages of fermentation, Inoculum development

**Fermentation Media:** formulation of medium, sterilization of medium,

**Fermentation System:** designing of bioreactors, Design of bioprocess vessels- Significance of Impeller, Baffles, Sparger; Introduction to oxygen requirement in bioprocess, mass transfer coefficient; factors affecting K<sub>La</sub>, Bioprocess measurement and control system with special reference to computer aided process control

**Downstream processes:** Cell harvesting, cell disruption, product recovery, Distillation, Finishing Steps

#### **Unit-IV**

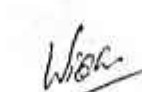


**Production of primary and secondary metabolites:** -penicillin, tetracycline, ethanol, citric acid, single cell protein, Baker's Yeast, Xanthan Gum, Vitamins B12, Pigments (Shikonin)

#### **Unit-V**

  
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44  

**Enzyme technology:** enzyme versus catalyst, microbial production of enzyme, mechanisms of enzyme action, extraction and purification of enzymes, storage of enzyme, immobilization of enzyme, industrial application of microbial enzyme and production of industrial enzymes-glucose Isomerase, cellulase and lipases

#### Text / Reference Books

1. T.D. Brock; Biotechnology: A Text Book of Industrial Microbiology, 1990, Smaeur Associates.
2. L.E. Casida; Industrial Microbiology, 1989, Willey Eastern Ltd.
3. Prescott, Dunn; Industrial Microbiology, 1987, CBS Publishers.
4. Bioprocess Technology- fundamentals and applications, S O Enfors & L Hagstrom (1992), RIT, Stockholm.
5. E J. Dasilva, C Rutledge, A Sasson; Biotechnology, Economic & Social Aspects, Cambridge University Press, Cambridge.
6. W. Crueger and A. Crueger; Biotechnology - a handbook of industrial microbiology.
7. Channarayappa; Microbial Biotechnology, 2003, University press, Hyderabad.
8. Gary Walsh; Protein: Biochemistry and Biotechnology, 2002, John Wiley & Sons Ltd.
9. S.N. Mukhopadhyay; Process Biotechnology Fundamentals, 2001, Viva Books Private Limited.

#### BBI045B: Fermentation Technology Lab

Credit(s): 1




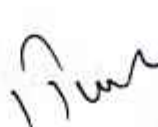

1. To perform Sauerkraut Production
2. To Prepare grape wine
3. To perform the Production of citric acid
4. To estimate the Production of citric acid by *Aspergillus niger*
5. To perform MBRT test
6. Primary screening for amylase producing potent microbial strain
7. To perform various biochemical tests (IMViC, Catalase, etc.)
8. Determination of bacterial growth by turbid metric method
9. Visit to a local Fermentation Laboratory

  
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45





# SEMESTER-V

S. No	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1	5	BBI047 B	Proteomics and Genomics	4	0	0	4	4	0	0	4	Core Course 12
2	5	BBI048 B	Bioinformatics Lab	0	0	2	2	0	0	1	1	
3	5		Department Elective-3	4	0	0	4	4	0	0	4	DE-3
4	5		Department Elective Lab-3	0	0	2	2	0	0	1	1	
5	5		Department Elective 4	4	0	0	4	4	0	0	4	DE-4
6	5		Department Elective Lab-4	0	0	2	2	0	0	1	1	
7	5		Open Elective III	3	0	0	3	3	0	0	3	Inter-disciplinary
8	5	BBI071 A	Project	0	0	12	12	0	0	6	6	Discipline specific
				15	0	18	33	15	0	9	24	

B.Sc Semester- V  
Subject- Proteomics and Genomics  
BBI047B  
Lectures: 4Hrs/week

## Course outcome

CO-1 Students will be able to understand the basics of Genomics

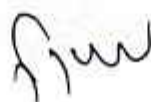
CO-2 Students will be able to illustrate different sequencing and mapping approach.

  
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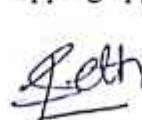
46













- CO-3 Students will be able to explain the methods used for Proteome analysis
- CO-4 Students will be able to describe application of genomics and proteomics

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

**BBI047B: Proteomics and Genomics**

**Credit(s): 4**

#### **Unit-I: Introduction to Genomics**

Introduction: Genome, Genomics, Omics and importance, General features, Organization and structure of genomes, Genome size, Sequence complexity. Gene identification; gene prediction rules and softwares, Genome databases; Annotation of genome. Genome diversity: taxonomy and significance of different model genomes.

#### **Unit- II: Genome Sequencing and mapping**

DNA sequencing methods – manual & automated, Next Generation Genome Sequencing Methods, Genome sequence assembly software, The Human genome project, HapMap Project, The 1000 genome project, and The ENCODE Project, Genetic and Physical Mapping, Molecular Markers.

#### **Unit-III: Introduction to Proteomics**

Introduction to Proteomics – The Proteome, Mining proteomes, Bridging Genomics and Proteomics. Proteomics and the new biology. Protein structural genomics, determining gene function by sequence comparison and through conserved protein structure Global expression profiling – Introduction, traditional approaches to expression profiling.

#### **Unit-IV: Analysis of Proteomes**

Analysis of proteomes - Two-dimensional polyacrylamide gel electrophoresis, Mass spectrometry based methods for protein identification, 2-DE gel electrophoresis coupled with mass spectrometry, Micro array techniques and advanced analytical techniques

#### **Unit V: Applications of Genomics and Proteomics analysis**

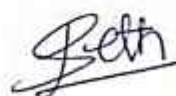
  
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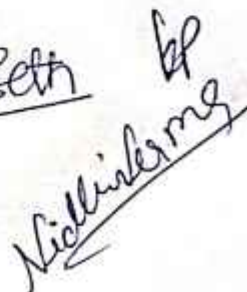




47









Analysis of Genomes – Human, Mouse, *Plasmodium falciparum*, *Saccharomyces cerevisiae*, *Mycobacterium tuberculosis*. Application of proteome analysis- drug development and toxicology, Pharmaceutical Applications, Proteomics in drug Discovery in human, phage antibodies as tools, Proteomics in plant genetics and breeding.

#### Text / Reference Books

1. S. B. Primrose and R.M. Twyman - Principles of Genome Analysis and Genomics, 7 th Edition, Blackwell Publishing, 2006.
2. S. Sahai - Genomics and Proteomics, Functional and Computational Aspects, Plenum Publication, 1999.

#### REFERENCE/TEXT BOOKS

1. Andrezej K Konopka and James C. Crabbe, Compact Hand Book - Computational Biology, Marcel Dekker, USA, 2004.
2. Pennington & Dunn - Proteomics from Protein Sequence to Function, 1 st edition, Academic Press, San Diego, 1996.
- 3- R. Amjesh and S.S. Vinodchandra, Bioinformatics for Beginners, Lambert Publisher, 2019.
- 4- Stephen Misener, Stephen A. Krawetz, Bioinformatics- Methods and Protocols, Humana Press, 2010

#### BBI048B: Bioinformatics Lab

Credit(s): 1

1. To retrieve the sequence of the Human keratin protein from GenBank database and to interpret the results.
2. To retrieve the structure of a protein and viewing it in RASMOL viewer.
3. To find the similarity between sequences using BLAST
4. To find the similarity between sequences using FASTA
5. To align more than two sequences and find out the similarity between those sequences
6. To perform Sequence analysis
7. Detection of Open Reading Frames using ORF Finder
8. Software for Protein localization.

S. No.	Course Name	Source	Link
1.	Bioinformatics Virtual Lab I	Amrita Vishwa Vidyapeetham	<a href="https://vlab.amrita.edu/index.php?sub=3&amp;brch=273">https://vlab.amrita.edu/index.php?sub=3&amp;brch=273</a>
2.	Bioinformatics Virtual Lab II	Amrita Vishwa Vidyapeetham	<a href="https://vlab.amrita.edu/index.php?sub=3&amp;brch=274">https://vlab.amrita.edu/index.php?sub=3&amp;brch=274</a>

#### B.Sc. Biotechnology Semester-V

  
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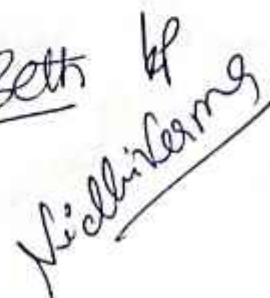


48











**Course - Project**  
**Course Code-BBI071A**

**BI071A: Project**

**Credit(s): 6**

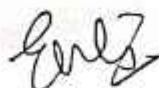
Student has to undergo one month research training on any private or government institute on a chosen research topic decided by the advisor and has to prepare a report and a presentation.

**Semester VI:**

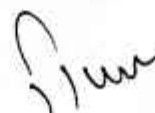
S. No.	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1	6		Department Elective 5	4	0	0	4	4	0	0	4	DE-5
2	6		Department Elective -5 Lab	0	0	2	2	0	0	1	1	
3	6		Department Elective 6	4	0	0	4	4	0	0	4	DE-6
4	6		Department Elective -6 Lab	0	0	2	2	0	0	1	1	
5	6		Department Elective 7	4	0	0	4	4	0	0	4	DE-7
6	6		Department Elective-7Lab	0	0	2	2	0	0	1	1	

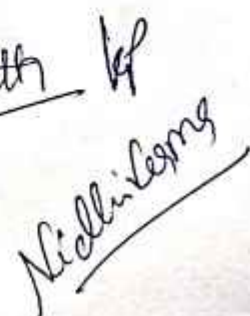
  
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49









7	6	BBI093	Open Elective-IV	3	0	0	3	3	0	0	3	Inter disciplinary
8	6	BBI094	Open Elective-V	3	0	0	3	3	0	0	3	Inter disciplinary
				18	0	6	24	18	0	3	21	

**\*\*Note: In 6th Semester Student have a Choice either he/she can go for offered Courses or he/she may avail Internship in some reputed Institute / Industry or in House Dissertation**

**B.Sc. Biotechnology**  
**Course – Department/Discipline Electives**  
**Lectures: 4 Hrs/week**

**Track A: Industrial Biotechnology**

**Department Elective- 1A**

**Course Code: BBI100A**

**Course Name: Fundamental of Industry Biotechnology**

**Course outcome**

CO-1 Students will learn about bioprocessing techniques and explain techniques used for microbial culture for bioproduct formation

CO-2 Students will be able to analyse the process of development and recovery of bioproducts including primary and secondary metabolites as well enzymes

CO-3 Students will be apply the principles in the field of fermentation technology

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			2		1	
CO2	2	1	2	1		2	3
CO3	1	2	3		2	2	

1-Low, 2-Medium, 3-High

**UNIT I**

  
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50



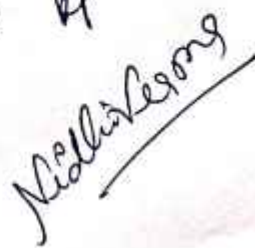












## INTRODUCTION TO INDUSTRIAL BIOPROCESS

Fermentation – Definition, Process basic steps. Organisms involved in fermentation, applications. Basic concepts of Upstream and Downstream processing in Bioprocess, Process flow sheet – block diagrams, pictorial representation.

## UNIT II

### PRODUCTION OF PRIMARY METABOLITES

Primary Metabolites- Production of commercially important primary metabolites like organic acids, amino acids and alcohols.

## UNIT III

### PRODUCTION OF SECONDARY METABOLITES

Secondary Metabolites- Production processes for various classes of secondary metabolites: Antibiotics, Vitamins and Steroids.

## UNIT IV

### PRODUCTION OF ENZYMES AND OTHER BIOPRODUCTS

Production of Industrial Enzymes, Bio-pesticides, Bio-fertilizers, Bio-preservatives, Biopolymers, Biodiesel. Cheese, Beer, SCP & Mushroom culture.

## TEXT BOOKS

1. Satyanarayana, U. "Biotechnology" Books & Allied (P) Ltd., 2005.
2. Kumar, H.D. "A Textbook on Biotechnology" 2 nd Edition. Affiliated East West Press Pvt. Ltd., 1998.
3. Balasubramanian, D. et al., "Concepts in Biotechnology" Universities Press Pvt.Ltd., 2004.
4. Ratledge, Colin and Bjorn Kristiansen "Basic Biotechnology" 2 nd Edition Cambridge University Press, 2001.
5. Dubey, R.C. "A Textbook of Biotechnology" S.Chand & Co. Ltd., 2006.

## REFERENCES

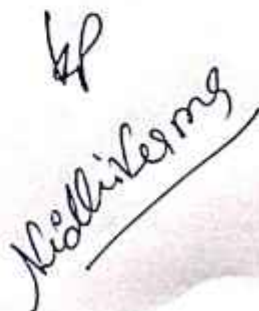
1. Casida, L.E. "Industrial Microbiology", New Age International (P) Ltd, 1968.
2. Presscott, S.C. and Cecil G. Dunn, "Industrial Microbiology", Agrobios (India), 2005.
3. Cruger, Wulf and Anneliese Crueger, "Biotechnology: A Textbook of Industrial Microbiology", 2nd Edition, Panima Publishing, 2000.
4. Moo-Young, Murrey, "Comprehensive Biotechnology", 4 Vols. Pergamon Press, (An Imprint of Elsevier) 2004.
5. Stanbury, P.F., A. Whitaker and S.J. Hall "Principles of Fermentation Technology", 2 nd Edition, Butterworth – Heinemann (an imprint of Elsevier), 1995.
6. C.F.A Bryce and EL.Mansi, Fermentation microbiology & Biotechnology, 1999.
7. K.G.Ramawat & Shaily Goyal, Comprehensive Biotechnology, 2009, S.Chand publications.
8. K. G Ramawat J.M. Merillon, Biotechnology secondary metabolites, 2<sup>nd</sup> edition, 2019.

  
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51









**Course Code: BBI101A**

**Course Name: Industry Biotechnology Lab**

1. Production of cheese
2. Production of wine
3. Mushroom cultivation

**Department Elective- 2A**

**Course Code: BBI102A**

**Course Name: Microbial Physiology**

**Lectures: 4 Hrs/week**

UNIT 1	Nutritional enzymes and bacterial genetics
UNIT 2	Energy Production and Metabolite Transport and Microbial metabolism
UNIT 3	Microbial nutrition and Photosynthesis and Inorganic Metabolism
UNIT 4	Nitrogen Metabolism
UNIT 5	Microbial Stress Responses and Host-parasite interactions

**Course outcome**

CO-1 Students will be able to describe microbial enzymes and bacterial genetics.

CO-2 Students will be able to identify and explain energy production and metabolite transport in microbes and understand microbial metabolism.

CO-3 Students will be able to describe microbial nutrition, understand the process of microbial photosynthesis and inorganic metabolism

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			2		1	
CO2	2	1	2	1		2	3
CO3	1	2	3		2	2	

1-Low, 2-Medium, 3-High

**BBI102: Microbial Physiology**

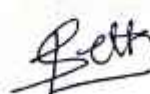
**Credit(s):4**

  
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52













## Unit I

**Bacterial Genetics:** DNA exchange, Recombination, Mutagenesis and Repair-Transfer of Genetic Information in Prokaryotes, Plasmids-Plasmid Replication, Addiction Modules: Plasmid Maintenance by Host Killing: The *ccd* Genes; Conjugation-cis/trans complementation test, Conjugation and Pheromones in Enterococci, Conjugation, Cell-Cell Signaling, and Bacterial-Induced Tumors; Transformation-Gram-Positive and Gram-Negative Transformation, Transfection and Forced Competence; Transduction, Recombination-General Recombination, Genetics of Recombination, Restriction and Modification, Insertion Sequences and Transposable Elements, Mutagenesis, DNA Repair Systems

## Unit II

**Energy Production and Metabolite Transport:** Energy Production-Substrate-Level Phosphorylation, Oxidative Phosphorylation, Measurement of PMF, Electron Transport Systems, Anaerobic Respiration, Conversion of PMF to Energy, Structure of  $F_1F_0$  and the ATP Operon, Energy Yield, Generating ATP in Alkalophiles, Energetics of Chemolithotrophs, pH Homeostasis; Metabolite Transport-Facilitated Diffusion, Mechanosensitive Channels,

## Unit III

**Microbial Nutrition:** Nutritional categories of micro-organisms, Nutritional types (definition and example) - Photoautotrophs, Photoorganotrophs, Chemolithotrophs (ammonia, nitrite, sulfur, hydrogen, iron oxidizing bacteria); Chemoorganotrophs, Nutritional classification of microorganisms based on carbon, energy and electron sources, Chemolithotrophic metabolism, Physiological groups of aerobic and anaerobic chemolithotrophs. Hydrogen oxidizing bacteria and methanogens.

## Unit IV

**Nitrogen Metabolism:** Biological Nitrogen Fixation, The Nitrogen Fixation Process-Components of the Nitrogenase System; Symbiotic Nitrogen Fixation; Inorganic Nitrogen Metabolism; Assimilation of Inorganic Nitrogen

## Unit V

  
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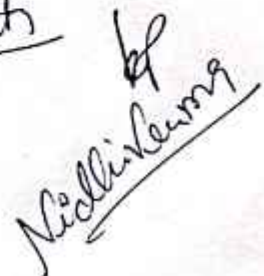
53













**Microbial Stress Responses:** -Osmotic Stress and Osmoregulation-High Osmolality, Low Osmolality, Osmotic Control of Gene Expression; Aerobic to Anaerobic Transitions-Formate Nitrate Regulation, Nitrate Response, ArcAB System; Oxidative Stress-Regulation of the Oxidative Stress Response; pH Stress and Acid Tolerance; Thermal Stress and the Heat Shock Response; Nutrient Stress and the Starvation—Stress Response, Starvation—Stress Response, Stringent Control; Extremophiles

#### Text / Reference Books

1. Gottschalk G. (1986). Bacterial Metabolism. 2nd edition. Springer Verlag
2. Madigan MT, Martinko JM and Parker J. (2003). Brock Biology of Microorganisms. 10<sup>th</sup> edition. Pearson/ Benjamin Cummings.
3. Moat AG and Foster JW. (2002). Microbial Physiology. 4th edition. John Wiley & Sons.
4. Reddy SR and Reddy SM. (2005). Microbial Physiology. Scientific Publishers India.
5. Stanier RY, Ingrahm JJ, Wheelis ML and Painter PR. (1987). General Microbiology. 5<sup>th</sup> edition, McMillan Press.

**Course Code: BBI103A**

**Course Name: Practicals of Microbial Physiology**

1. To study and plot the growth curve of *E. coli* using turbidometric method and to calculate specific growth rate and generation time.
2. To study and plot the growth curve of *Aspergillus niger* by radial growth measurements.
3. To study the effect of pH on the growth of *E. coli*
4. To study the effect of temperature of *Aspergillus niger* by dry weight method.
5. Demonstration of the thermal death time and decimal reduction time of *E. coli*.

**Department Elective- 3A**

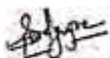
**Course Code: BBI104A**

**Course Name: Microbial genetics and r-DNA technology**

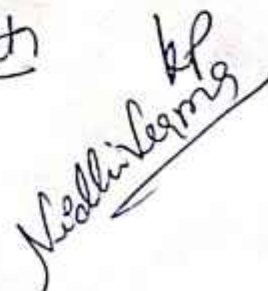
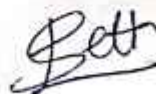
**Lectures: 4 Hrs/week**

#### Course Outcomes

CO-1 Students will improve the knowledge on genomic structure of microbe and various molecular tools used for genetic manipulation



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CO-2 Students will utilize the knowledge for improving the products and production process in industries.

CO-3 Students will identify appropriate resources required for a project while observing safety and laboratory hygiene regulations and practices.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1		2		1	
CO2		2	2	1	1	2	
CO3			2		3	2	2

1-Low, 2-Medium, 3-High

### UNIT I

Origin of Molecular Genetics-Structure of DNA-Mutations-Luria and Delbruck's Fluctuation Test-Spontaneous mutations-nonsense, missense, frame-shift mutations-Induced mutagenesis-Physical agents-UV,X-Rays-Chemical agents-NTG, Base Analogues etc., Reversion-AMES Test-DNA Replication-Messelson and Stahl's Experiment-Okazaki's fragment-DNA polymerases-DNA damage-SOS response-DNA repair.

### UNIT II

Gene transfer in bacteria-Transformation-discovery and its significance-competence and factors involved-joint transformation and its uses-Conjugation-F<sup>+</sup> and F<sup>-</sup> nature of E.coli Origin of Hfr and F' strains-Zygotic induction -Chromosome transfer by Hfr - circular nature of E.coli DNA - Use of Hfr strains in genetic mapping-Transduction -  $\lambda$  phage and specialized transduction -

### UNIT III

Elucidation of genetic code- Benzer, Khorana and Crick's contributions-Triplet nature of the Genetic code and Adaptor hypothesis-Wobble hypothesis- Bacterial translation, Suppression of nonsense, missense and frame-shift mutations-Intragenic and extragenic suppressions of mutations-modern aspects-structure and function relationship

### UNIT IV

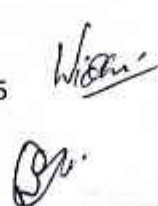
Birth of r-DNA technology- Agarose Gel electrophoresis and its principle-Restriction enzymes and their role in r-DNA technology-Restriction-modification system of E.coli-Types of restriction enzymes - Plasmid vectors as cloning vehicles-Vectors for protein over expression, protein secretion and controlled expression

### TEXT BOOKS

1. Principles of Gene Manipulation and Genomics-S.B.Primrose and R.M.Twyman, 2006.John Wiley & Sons Ltd.
2. Molecular Genetics: An introductory narrative, Second Edition - Gunther.S.Stent and Richard Calendar,2002. CBS Publishers and distributors.

  
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## REFERENCE BOOKS

1. A Short Course in Bacterial Genetics: A Laboratory Manual and Handbook for *Escherichia coli* and Related Bacteria- Jeffrey. H. Miller, 1992. CSHL Press.
2. Fundamental Bacterial Genetics - Nancy Trun and Janine Trempy, 2004. Blackwell publishing
3. From Genes to Genomes: Concepts and Applications of DNA Technology, Second Edition- Jeremy. W. Dale and Malcolm Von Schantz, 2007. John Wiley & Sons Ltd.

Course Code: BBI105A

Course Name: Microbial genetics Lab

1. Identification of food pathogen
2. Isolation of pathogen from patient
3. Haemolytic testing of bacteria
4. Differential test of Staphylococci through growth on agar plates (Mannitol agar, DNA agar plate and Coagulase test method)

Department Elective- 4A

Course Code: BBI106A

Course Name: Pharmaceutical Chemistry

Lectures: 4 Hrs/week

## Course Outcomes

- CO-1 Students will encode information on drug designing, drug discovery and drug metabolism.  
CO-2 Students will know the actual path of metabolism of drugs and drug discovery.  
CO-3 Students will gain information that will help the students to formulate novel drugs.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	2	2	1	1	
CO2	3	1	2	2			
CO3	3			1	1	1	

1-Low, 2-Medium, 3-High

## UNIT I

Introduction to Pharmaceuticals : Routes of drug administration, Pharmacokinetics: Absorption, Distribution, Metabolism- Oxidation, reduction, hydrolysis, conjugation and Elimination, absorption enhancement / solubility factor/ bioavailability; Pharmacodynamics; Assay systems and models (e.g., Knock-out Mice); Inter species scaling.

## UNIT II

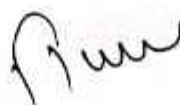
  
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56

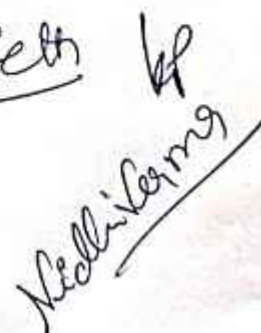












Drug discovery: Need for developing new drugs; Substances derived from bacteria, plants, insects, and animals; Sources of active principles; Combinatorial Synthesis: Chemistry, Biology, and Biotechnology.

### UNIT III

Drug designing: Procedure followed in drug design; Molecular modification of lead compounds and proteins; Prodrug and soft drugs; Physico-chemical parameters in drug design; QSAR; Active site determination of enzymes; Design of enzyme inhibitors; Protein molecular modeling by computer; Docking studies; Structure based drug designing using software.

### UNIT IV

Pharmaceutical products: Microbial products - Antibiotics (penicillin, streptomycin, tetracycline), vitamins, probiotics. Plant secondary metabolites -alkaloids, flavanoids, steroids, terpenoids. Animal vaccines. Clinical trials.

### TEXT BOOKS

1. Daan Crommelin, Robert D Sindelar, "Pharmaceutical Biotechnology", Tailor and Francis Publications, New York, 2002.
2. Remington's Pharmaceutical sciences, 18th edition, Mack publishing & Co., Easton, PA (20th Ed, 2000).

### REFERENCE

1. Heinrich Klefenz, "Industrial Pharmaceutical Biotechnology", WILEY-VCH Publication, Germany, 2002.
2. Jay P Rho, Stan G Louie, "Hand book of Pharmaceutical Biotechnology", Pharmaceutical products press, New York, 2003.
3. Lachman L Lieberman, HA, Kanig, J, "Theory and practice of industrial pharmacy", 3rd edition, Varghese publishing & Co, New Delhi, 1986.

Course Code: BBI107A

Course Name: Pharmaceutical Chemistry Lab

1. Identification of food pathogen
2. Isolation of pathogen from patient
3. Haemolytic testing of bacteria
4. Differential test of Staphylococci through growth on agar plates (Mannitol agar, DNA agar plate and Coagulase test method).

Department Elective- 5A

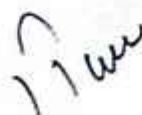
  
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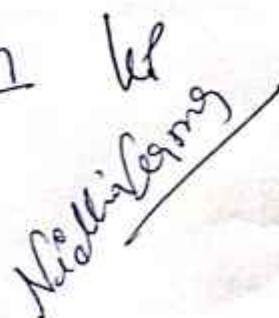


57











Course Code: BBI108A

Course Name: Bioprocess Engineering

Lectures: 4 Hrs/week

### Course Outcomes

CO-1 Students will discuss fermenter design and its types and kinetics involved in the fermentation processes to manipulate for improvement.

CO-2 Students will illustrate the application of bioprocess engineering for development of improvised products.

CO-3 Students will be able to transmit complex technical information related to bioprocess engineering in a clear and concise manner in writing to in a simple language for better understanding.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3		1	1			
CO2	2	2	2	1	1	2	2
CO3	1	3				1	

1-Low, 2-Medium, 3-High

### UNIT I

Types and design of bioreactor: Fermenter structure - Construction material, Basic components - Agitator, aerator, valves and steam traps, seals, stirrer glands. Measurement and control of parameters (on-line and off line sensors) - temperature, flow rate, pressure, pH, DO, gas analysis, computer control pathways. Fermenters - Air-lift, stirred tank, tower, fluidized bed, packed bed, pulsed, photo bioreactors

### UNIT II

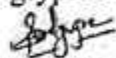
Process kinetics: Kinetics - batch, fed-batch and continuous process; Sterilization methods - batch sterilization, continuous sterilization of medium and air. Solid state and submerged; aerobic and anaerobic fermentation. Inoculum development - Development of inocula for yeast, bacterial, mycelial and vegetative fungal processes. Immobilization - immobilization of cells and co-immobilization; Transport phenomena - Mass transfer, heat transfer, oxygen transfer.

### UNIT III

Downstream processing: Removal of microbial cells and solid matter, foam separation, precipitation, filtration, centrifugation, cell disruptions, liquid-liquid extraction, chromatography, membrane process, drying and crystallization. Quality analysis and product formulation -.

### UNIT IV

Application of transgenic plants for Stress tolerance: Herbicide resistance: phosphinothricin and glyphosate; Insect resistance: Bt genes and alpha amylase inhibitor. Disease resistance: chitinase



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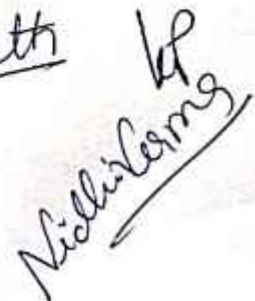












and 1,3-beta glucanase; Virus resistance: coat protein mediated, nucleocapsid gene; Nematode resistance; Abiotic stress: Drought, cold and salt;

### TEXT BOOKS

1. Fundamentals of Bioanalytical Techniques and Instrumentation, Ghosal and Srivastava, PHI Learning Pvt. Ltd., 2009.
2. Principles of Fermentation technology, Stanbury PF and Whitaker A. Pergamon Press, 1984.
3. Introduction to Biochemical Engineering, D.G.Rao, Tata McGraw Hill Publishers, 2005.
4. Bioprocess Engineering: Basic Concepts, 2nd edition, Shuler, M.L. and Kargi, F., Prentice Hall, Englewood Cliffs, 2001
5. Molecular Biotechnology: Principles and Applications of Recombinant DNA. Bernard R. Glick and Jack J. Pasternak. ASM Press. 2010.
6. Plants, genes and agriculture by M.J. Chrispeels and D.F. Sadava. 2000. The American Scientific Publishers, USA.
7. Biotechnological innovations in Animal productivity, BIOTOL Series, Butterworth – Heineman Ltd. Oxford, 1992

### REFERENCES

1. Practical Application of Plant Molecular Biology by R.J. Henry. 1997. Chapman and Hall.
2. Plant Biotechnology and Transgenic Plants, Edited by Kirsi-Marja Oksman- Caldentey and Wolfgang H. Barz. 2002, Marcel Dekker, Inc. New York.
3. Plant Biotechnology (The genetic manipulation of plants) by Adrian Slater, Nigel W. Scott and Mark R. Fowler, 2003, Oxford University press, UK.
4. Molecular Plant Biology: A practical approach (Vol. I and II), Edited by Gilmartin and Bowler, 2002, Oxford University press, UK.
5. Instrumentation, measurement and analysis, II edition, Nakra BC and Chaudhry KK, Tata McGrawHill Publishing Co. Ltd., New Delhi, 2004
6. Fermentation Microbiology and Biotechnology, Mansi El-Mansi and Charlie Bryce, Taylor and Francis Ltd., 2002.
7. Manual of Industrial Microbiology and Biotechnology, III edition, Arnold L. Demain and Julian Davies, ASM press, Washington DC, 1999.

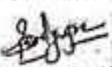
Course Code: BBI109A

Course Name: Bioprocess Engineering Lab

1. Production of cheese
2. Production of wine
3. Mushroom cultivation
4. Colourant production

Department Elective- 6A

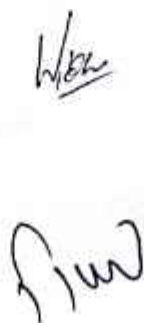
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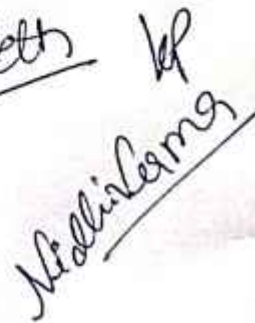


59











**Course Name: Enzyme technology and Biotransformation**  
**Lectures: 4 Hrs/week**

### Course Outcome

CO-1 Students will describe and discuss enzymes, mode of action, illustrate principles of catalysis, kinetics of enzymes and their regulation.

CO-2 Students will explain the methods of enzyme purification, immobilization of enzymes and discuss the use of enzymes in industry.

CO-3 Students will able to employ critical thinking and efficient problem solving skills how enzymes and their potential can be harnessed for development of enzymatic assays.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	2			
CO2	3	2		2		1	
CO3		1	3		1	2	1

1-Low, 2-Medium, 3-High

### Unit i

#### Introduction to enzymes

Classification of enzymes. Mechanisms of enzyme action; concept of active site and energetics of enzyme substrate complex formation; specificity of enzyme action; principles of catalysis – collision theory, transition state theory; role of entropy in catalysis.

### Unit ii

#### Kinetics of enzyme action

Kinetics of single substrate reactions; estimation of Michelis – Menten parameters, multisubstrate reactions- mechanisms and kinetics; turnover number; types of inhibition & models –substrate, product. Allosteric regulation of enzymes, Monod Changeux Wyman model, pH and temperature effect on enzymes & deactivation kinetics

### Unit iii

#### Enzyme Immobilization And Biosensors

Physical and chemical techniques for enzyme immobilization – adsorption, matrix entrapment, encapsulation, cross-linking, covalent binding etc., - examples, advantages and disadvantages, design of enzyme electrodes and their application as biosensors in industry, healthcare and environment.

### Unit iv

#### Purification And Characterization Of Enzymes From Natural Sources

Production and purification of crude enzyme extracts from plant, animal and microbial sources; methods of characterization of enzymes; development of enzymatic assays

  
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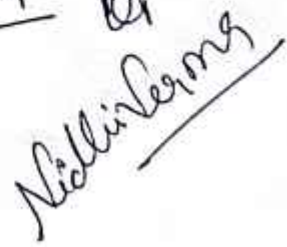












## REFERENCES

1. Harvey W. Blanch, Douglas S. Clark, Biochemical Engineering, Marcel Dekker, Inc.
2. James M. Lee, Biochemical Engineering, PHI, USA.
3. James. E. Bailey & David F. Ollis, Biochemical Engineering Fundamentals, McGraw Hill.
4. Wiseman, Enzyme Biotechnology, Ellis Horwood Pub.

## TEXT BOOKS

1. Trevor Palmer , Enzymes II ed Horwood Publishing Ltd
2. Faber K , Biotransformations in Organic Chemistry, IV edition , Springer

**Course Code: BBI111A**

**Course Name: Enzyme technology Lab**

1. Production of cheese
2. Production of wine
3. Mushroom cultivation
4. Colorant production
5. Identification of food pathogen

**Department Elective- 7A**

**Course Code: BBI112A**

**Course Name: Industrial Manufacturing**

**Lectures: 4 Hrs/week**

## Course Outcomes

CO-1 Students will discuss industrial structure how raw materials are collected, how R&D is done and quality is assured, certifications are done.

CO-2 Students will explain how process is designed and validation of the design is done.

CO-3 Students will able to employ critical thinking and efficient problem solving skills by studying cases.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2		2			
CO2	3		2		2	1	
CO3	2	1	3	2	1		1

1-Low, 2-Medium, 3-High

### Unit-I

  
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61





**Industrial Structure:** Administrative department, Raw material department – collection of raw material, types of raw material, problems in collection of raw material, preservatives used in raw material collections, R&D department, Quality control, Quality Assurance, Logistic, Supply chain management, Store & procurement department, Block diagram, Pictorial Representation.

## Unit-II

**Awareness of ISO system applicable for R&D department:** Awareness of ISO 13485:2016 and ISO 9001:2015, Different clauses – applicable for R&D system, planning, Design input (DIP), Design output (DOP), Method of analysis, Batch Manufacturing Record, Master Formula Record, Review, Risk analysis, Verification, Validation, Design Transfer, Design and Development File, Design closure. Studies of ISO certified company dealing with environment waste management in Rajasthan.

## Unit-III

**Case Study-I (Manufacturing of cord blood protein marker: AFP):** Alpha Feto Protein, Introduction, Biochemical properties, Functions, Applications, Laboratory setup for manufacturing of AFP, Raw material (RM), RM screening, DIP and DOP of AFP, Applicable method of manufacturing process, Yield profile

## Unit-IV

**Case Study-II (Manufacturing of Serum/Plasma protein: IgG-FC):** FC fragment of Human Immunoglobulin-G (IgG), Introduction, Biochemical properties, Functions, Applications, Laboratory setup for manufacturing of IgG and IgG-FC, Raw material (RM), RM screening, DIP and DOP of IgG-FC, Applicable method of manufacturing process, Yield profile.

## Text / Reference Books

- [1] Shuler, Michael L. and Fikret Kargi, "Bioprocess Engineering", Prentice Hall, 1992.
- [2] Lydersen, Bjorn K. "Bioprocess Engineering Systems, Equipment and Facilities" John Wiley, 1994.
- [3] Belter, P.A. E.L. Cussler And Wei-Houhu – "Bioseparations – Downstream Processing For Biotechnology, Wiley Interscience Pun. (1988).
- [4] Sivasankar, B. "Bioseparations : Principles and Techniques". PHI, 2005.

  
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- [5] R.O. Jenkins, (Ed.) – Product Recovery In Bioprocess Technology – Biotechnology By Open Learning Series, Butterworth-Heinemann (1992).
- [6] J.C. Janson And L. Ryden, (Ed.) – Protein Purification – Principles, High Resolution Methods And Applications, VCH Pub. 1989.
- [7] R.K. Scopes – Protein Purification – Principles And Practice, Narosa Pub. (1994).
- [8] Itay Abuhav - ISO 9001: 2015 - A Complete Guide to Quality Management Systems, CRC Press (Taylor & Francis Group) 2017.
- [9] Itay Abuhav - ISO 13485:2016, A Complete Guide to Quality Management in the Medical Device Industry, Second Edition, CRC Press (Taylor & Francis Group) 2018

**Course Code: BBI113A**

**Course Name: Industrial Manufacturing Lab**

1. Production of cheese
2. Production of wine
3. Mushroom cultivation
4. Colorant production
5. Identification of food pathogen

**Track B: Agricultural Biotechnology**

**Department Elective- 1B**

**Course Code: BBI114A**

**Course Name: Advances in Agriculture Biotechnology**

### Course outcome

- CO-1 Students will be able to understand the basics and important tools in agricultural biotechnology.
- CO-2 Students will be able to illustrate different gene transfer methods for plant.
- CO-3 Students will be able to explain different blotting techniques
- CO-4 Students will be able to describe different techniques used in agricultural biotechnology

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
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63

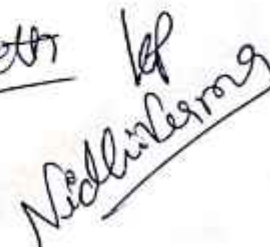














CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

### Unit 1

Introduction Definition, Classical vs modern biotechnology, Basic concepts and history of biotechnology, Different branches of biotechnology, Modern Biotechnology application in agriculture, Tools of Genetic Engineering: Cloning vehicles, Restriction enzymes, Modifying enzymes, DNA ligase, Polymerase etc. Cloning Vectors: Plasmids, Lambda phage, Phagemids, Cosmids, Artificial chromosomes (BACs, YACs), Shuttle vectors, virus based vectors,

### Unit 2

Methods of gene transfer: Transformation, transduction, Particle gun, Electroporation, liposome mediated, microinjection, Agro-bacterium mediated gene transfer, Preparation and application of molecular probes: DNA probes, RNA probes, Radioactive labeling, Non-radioactive labeling, use of molecular probes, DNA fingerprinting, Analysis and expression of cloned gene in host cells: Expression vectors

### Unit 3

Restriction enzyme analysis, Southern blotting, Northern blotting, Western blotting, In-situ hybridization, Colony and plaque hybridization, Factors affecting expression of cloned genes, Reporter genes, Fusion proteins, Gene libraries - cDNA synthesis, Genomic DNA libraries, Amplification of gene libraries, Identifying the products of cDNA clones, Isolation, Sequencing and synthesis of gene

### Unit 4

Different methods of gene isolation, Techniques of DNA sequencing, Artificial DNA synthesis, Polymerase Chain reaction (PCR): Basic principles, modifications, applications, Modifying Genes: Site-directed mutagenesis, Insertion & Deletion Mutagenesis.

Course Code: BBII15A

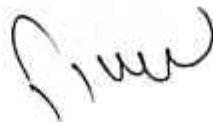
Course Name: Agriculture Biotechnology Lab

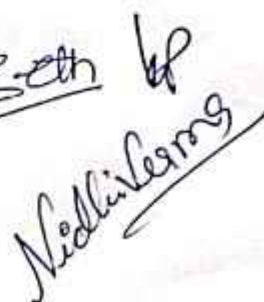
1. Isolation of DNA from Plant sample and bacteria
2. Isolation of RNA from plant sample
3. Restriction analysis of the plant DNA and bacterial DNA

  
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4. Separation of DNA by Gel Electrophoresis methods
5. Application of Polymerase Chain reaction
6. Genetic transformation through Agro-bacterium

### Reference Books

1. Biotechnology Vol I and VII by Rehm HJ and Reed G 1997. Verlg Chemic Weinheim, USA.
2. Elements of Biotechnology by Gupta PK 1999. Rastogi Publi cation, Meerut, India.
3. Biotechnology by Singh BD. Kalyani publishers, New Delhi.
4. Introduction to Plant Biotechnology by H.S. Chawala, 2002, Oxford IBH

### Department Elective- 2B

Course Code: BBI116A

Course Name: Agriculture Microbiology

### Course outcome

- CO-1 Students will be able to understand the basics agricultural microbiology  
 CO-2 Students will be able to illustrate different type of metabolism in bacteria  
 CO-3 Students will be able to explain soil microflora useful for crops  
 CO-4 Students will be able to evaluate the uses of different types of biofertilizer

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

### Unit 1

History of Microbiology: Spontaneous generation theory, Role of microbes in fermentation, Germ theory of disease, Protection against infections, Applied areas of Microbiology

### Unit 2

Metabolism in bacteria: ATP generation, chemoautotrophy, photo autotrophy, respiration, fermentation. Bacteriophages: structure and properties of Bacterial viruses – Lytic and Lysogenic cycles: viroids, prions.






### Unit 3

65

  
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Microbial groups in soil, microbial transformations of carbon, nitrogen, phosphorus and sulphur, Biological nitrogen fixation. Microflora of Rhizosphere and Phyllosphere microflora, microbes in composting. Microbiology of food: microbial spoilage and principles of food preservation.

#### Unit 4

Beneficial microorganisms in Agriculture: Biofertilizer (Bacterial Cyanobacterial and Fungal), microbial insecticides, Microbial agents for control of Plant diseases, Biodegradation, Biogas production, Biodegradable plastics, Plant – Microbe interactions.

**Course Code: BBI117A**

**Course Name: Agricultural Microbiology Lab**

- 1- Familiarization with instruments, materials, glassware etc. in a microbiology laboratory
- 2- Methods of Sterilization and Preparation of media
- 3- Plating methods for Isolation and Purification of bacteria
- 4- Morphological examination of bacteria by Simple and Differential staining
- 5- Different biochemical tests for identification of bacterial culture

#### Reference Books

1. Agricultural Microbiology. 1998. G. Rangaswani and D.J. Bagyaraj. Prentice Hall of India. , New Delhi.
2. An Introduction to Microbiology. 1996. P. Tauro, K.K. Kapoor and K.S. Yadav. Wiley Eastern Ltd. , New Delhi.
3. Microbiology, 1986. M. J. Pelczar, E.C.S. Chan and N.L. Krieg. Mc Graw Hill 5th Edition, New York, USA.
4. Soil microorganisms and plant growth. 1977. N. S. . Subbarao Oxford & IBH Publ. Co. , New Delhi.

**Department Elective- 3B**

**Course Code: BBI118A**

**Course Name: Molecular Plant Breeding**

#### Course outcome

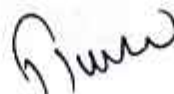
- CO-1 Students will be able to understand the basics of molecular plant breeding  
CO-2 Students will be able to illustrate different type of pollination in crops

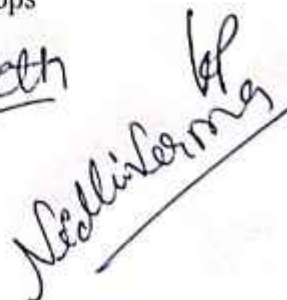
  
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66









CO-3 Students will be able to explain Heterosis in crops  
 CO-4 Students will be able to evaluate different type of seed production

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

#### **Unit 1**

Historical milestones in plant breeding, Aims and objectives of plant breeding Significance of plant breeding in crop development.

#### **Unit 2**

Various methods of plant breeding in self- and cross-pollinated crops, acclimatization, selection, pure line theory, Reproductive systems of plants, Flora biology, flower parts, Self- and cross-pollinated crops. Genetic consequences and differences between self- and cross-pollinated crops

#### **Unit 3**

Clonal selection, population improvement program, Heterosis, Genetics and physiological basis. Male sterility Types of male sterility combining ability-general and specific, its exploitation. Interspecific/ Intergeneric hybridization, Heterosis inbreeding depression, Polyploidy its types

#### **Unit 4**

Mutation breeding Gene actions, heritability, genotype and environmental interactions, its importance in plant breeding, Introduction to seed production (Nucleus, breeder, foundation, certified), Maintenance of genetic purity during seed production, Molecular markers and their application

**Course Code: BBI119A**

**Course Name: Molecular Plant Breeding Lab**

- 1- Floral morphology of important crops
- 2- Emasculation-pollination techniques in self and cross pollinated crops
- 3- Pollen viability test through chemical tests
- 4- Hybridization study of male sterility and incompatibility in field

  
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67













**Reference books:**

1. Principles of Plant Breeding by Allard R W 1960 .Kalyani Publishers, New Del hi
2. Principles of Plant Breeding by Singh B.D 1983 .Kalyani Publishers, New Delhi.
3. Principles of Genetics by Gardner E.J, M.J Simons and D. P Sanstad 1991.John Wiley and Sons Inc New York.
4. Plant Breeding by Lamkey and Lee 2006, Panima, N. Delhi.
5. Breeding Field Crops by Sleper and Poehlman 2007, Panima N. Delhi.

**Department Elective- 4B****Course Code: BBI120A****Course Name: Principles of Plant Physiology****Course outcome**

CO-1 Students will be able to understand the basics of different plant-water relations and nutrition

CO-2 Students will be able to discuss the Photosynthesis and their role in crop productivity

CO-3 Students will be able to explain different plant hormones

CO-4 Students will be able to evaluate different stress related resistant mechanism in plants

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

**Unit 1**

Definition, scope and introduction in agriculture, Osmosis, DPD, TP. Water absorption by plants; Ascent of sap. Transpiration-Mechanism, factors affecting it, Structure and function of stomata. Osmotic pressure, guttation. Plant Nutrition: Major and minor nutrients; their roles and deficiency symptom; Active and passive mineral uptake mechanisms.

**Unit 2**

Photosynthesis Structure and function of chloroplast; Light and dark reactions; Cyclic and non-cyclic electron transfer; C3, C4, Crassulacean acid metabolism and photorespiration.

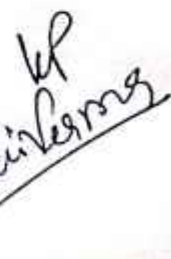
  
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68











### Unit 3

Respiration types; R.Q. Hormones: types and role in agriculture biotechnology. Growth phases, photoperiodism, and vernalization.

### Unit 4

Stress physiology (Drought, heat, frost and salinity); mechanism of resistance to above types. Physiological aspects and problems of cereals, pulses, oilseeds, cotton and sugarcane.

**Course Code: BBI121A**

**Course Name: Plant Physiology Lab**

- 1- Plasmolytic method of cell sap determination.
- 2- Effect of osmotic pressure on rate of imbibition
- 3- Determination of dry matter content in leaves, stem and roots
- 4- Determination of transpiration by photometric---and cobalt chloride paper method.
- 5- Study of deficiency symptoms of major and minor plant nutrients

### Reference Books:

1. A Text Book Plant Physiology by Verma V 1973 M.K publication house New Delhi
2. An Introduction to Plant Physiology of Field Crops by Shivraj A 1978 Oxford and I.B.H publishing Co-operative PVT Ltd , New Delhi
3. Plant Physiologists by Pande S.N and Sinha B.K 1978 Vikas publishing house New Delhi.
4. Practical Plant Physiology by Amar Singh 1982 Kalyani publisher New Delhi
5. Useful techniques for plant scientist by Dhopte A.N and Levra N 1989 Publication of forum of plant physiologist Akola
6. Plant Physiology by Salisbury F and C. Ross 1990, Prentice Hall of India New Del hi

**Department Elective- 5B**

**Course Code: BBI122A**

**Course Name: Biotechnology for Biotic and Abiotic Stress Tolerance**

### Course outcome

- CO-1 Students will be able to understand the different types of biotic and abiotic stress in plants  
CO-2 Students will be able to discuss the different types of proteins in plant stress response  
CO-3 Students will be able to explain different biotic stresses in plants  
CO-4 Students will be able to evaluate different abiotic stresses in plants


  
Dr. Shamkant B. Badgujar

69











### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

#### **Unit 1**

Prospects & Perspective of Biotic & abiotic stress resistant plants, Genetics of host-pathogen interactions, Mechanism of plant resistance. Role of jasmonates and salicylic acid in systematic resistance induction on wounding.

#### **Unit 2**

Insect pest resistance – Structural/morphological changes; Protease and amylase inhibitors; polyphenol oxidases; peroxidases; lectins; chitinase; seed proteins; their limitations and significance in multi-gene pyramiding. Vertical and Horizontal resistance to pathogens, Hypersensitive host response (HRGP) and apoptosis in relation to plant defense.

#### **Unit 3**

Virulence- Avirulence in host-pathogens interaction. Race specific Resistance Gene Analogues (RGAs). Pathogenesis related proteins – groups with examples (Glucanases; chitinases; osmotin, chitin binding proteins; thaumatin like proteins; micro peptidal defensins; phytoalexins) and their role. Role of Phenylalanine ammonia lyase, callose synthases, detoxification for pathogen resistance.

#### **Unit 4**

Biochemical basis of abiotic stresses namely osmotic (drought, salinity), temperature, heavy metals, air and water pollutants, synthesis and functions of proline and glycine betaine in stress tolerance interaction between biotic and abiotic stresses; stress adaptation. Reactive oxygen species and biotic and abiotic stress, antioxidants, enzymes defense system. Role of calcium, nitric oxide and salicylic acid in plant development. Molecular strategies for imparting tolerance against biotic and abiotic stress.


Course Code: BBI123A

Course Name: Plant Stress Lab

1. Measurement of Relative Water Content (RWC) in plant tissues.

  
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70 



2. Measurement of water potential by tissue volume/weight method.
3. Estimation of chlorophyll content in plant tissues.
4. Determination of osmotic potential by vapour pressure and freezing point depression.
5. Separation of photosynthetic pigments by chemical method.
6. Measurement of stomata density, stomata index and perimeter of stomata in different leaves.
7. Effect of osmotic concentration and temperature on imbibition and germination of seed.

#### Reference Books:

1. Basra AS. 1997. Stress Induced Gene Expression in Plants. Harwood Academic Publ.
2. Chessin M, DeBorde D & Zipf A. 1995. Antiviral Proteins in Higher Plants. CRC Press.
3. Crute IR, Burdon JJ & Holub EB. (Eds.). 1997. Gene-for-Gene Relationship in Host Parasite Interactions. CABI.
4. Hopkins WG & Huner NPA. 2004. Introduction to Plant Physiology. John Wiley & Sons.
5. Salisbury FB & Ross C. 1992. Plant Physiology. 4th Ed. Wadsworth Publ. Taiz L & Zeiger E. 2006. Plant Physiology. 4th Ed. Sinauer Associates.
6. Kosuge T & Nester EW. 1989. Plant-Microbe Interactions: Molecular and Genetic Perspectives. Vols I-IV. McGraw Hill.
7. Verma DPS & Kohn TH. 1984. Genes Involved in Microbe-Plant Interactions. Springer Verlag.
8. Molecular Plant-Microbe Interactions. Journal Published by APS.

#### Department Elective- 6B

Course Code: BBI124A

Course Name: Biodiversity Conservation

#### Course outcome

- CO-1 Students will be able to understand the basics of diversity and their importance for crops  
 CO-2 Students will be able to discuss the different types of Biodiversity centres of origin  
 CO-3 Students will be able to explain different factors for extinction of biodiversity  
 CO-4 Students will be able to evaluate various biodiversity conservation method

#### Mapping of PO/CO

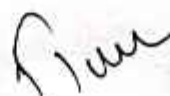
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2

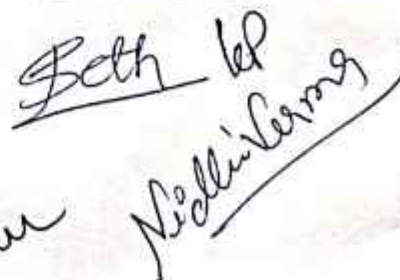
  
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71











CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

### Unit 1

Definition, Historical and geographical causes of diversity, Types of diversity- Genetic, Species and population diversity. Distribution of diversity in life forms.

### Unit 2

Ecological diversity and stability. Biodiversity and centers of origins of plant. Hot spots in India. Principles of conservation biology. Biosphere concept, Genetical and evolutionary principles of conservation. Collection Maintenance and conservation of biodiversity.

### Unit 3

Assessing and documenting of vulnerability and extinction of biodiversity; red list categories as per IUCN (International Union for the Conservation of Nature and Natural resources): Extinct, Extinct in the wild, Critically Endangered, Endangered, Vulnerable, Lower risk, Data deficient and Non Evaluated.

### Unit 4

Bio- village concept: in situ and ex situ conservation. Community level Gene banks, Utilization of biodiversity. Global biodiversity system. Intellectual Property Rights and legal concerns of Bio-resources. Biodiversity and human welfare

**Course Code: BBI125A**

**Course Name: Biodiversity Conservation Lab**

1. Collection of ITK (Flora) Study of species composition in surrounding areas
2. Morphological description of plant parts
3. Collection of seeds of rare species of forest and medicinal plants
4. List of important medicinal plants used in healthcare

### Reference Books:

1. Biodiversity Utilization and conservation by Arunachalam, 2008, Avishkar, Jaipur
2. Biodiversity conservation and legal aspects by Kandya, 2007, Avishkar, Jaipur
3. Biodiversity conservation by Kumar M.S. 2008
4. Biodiversity conservation and systematics by P. Singh, 2007

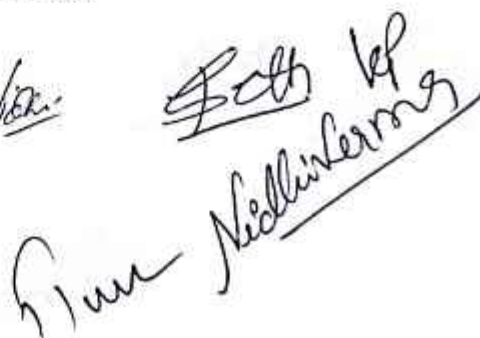
  
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72







Department Elective- 7B

Course Code: BBI126A

Course Name: Techniques in Biochemistry and Molecular Biology

Course outcome

CO-1 Students will be able to understand the need for molecular techniques for research in biotechnology

CO-2 Students will be able to discuss the different centrifugation and chromatographic techniques

CO-3 Students will be able to explain the electrophoresis and blotting techniques

CO-4 Students will be able to evaluate various molecular biology techniques

Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

**Unit 1**

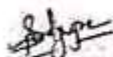
General principles of biochemical investigations. Units in biochemistry and molecular biology. Principle methods of separation of biomolecules.

**Unit 2**

Centrifugation techniques – Basic principles, analytical and preparative centrifugation, their applications. Spectrophotometry: UV-visible spectrophotometer, fluorimetry. Chromatographic techniques – Basic principles, types adsorption, partition, ion exchange, molecular sieve, affinity, GLC and HPLC and mass spectrometry, flow cytometry and its application in DNA estimation.

**Unit 3**

Electrophoresis: theory and different types – PAGE, SDS-PAGE, capillary electrophoresis, and IEF. Radioisotope techniques: Nature, detection and measurement of radioactivity. Molecular biology techniques – Southern hybridization, northern hybridization, western blotting, microarray technology, complementation techniques.



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#### Unit 4

Polymerase chain reaction (PCR); radioactive/ nonradioactive labeling, RFLP, AFLP, RAPD; RT-PCR and DNA sequencing.

Course Code: BBI127A

Course Name: Molecular Biology Lab

11. Extraction of DNA from seeds of cereal, legume and oilseed plant material
2. Concentration of the proteins using ammonium sulfate precipitation, dry sephadex, dialysis, ultra filtration, and organic polymers.
3. Separation of the proteins by native – and SDS - PAGE
4. Separation and identification of amino acids by paper chromatography.
5. Restriction digestion of DNA.
6. Agarose gel electrophoresis of DNA

#### Reference Books:

1. Techniques in Molecular Biology by Walker J.M. and W. Gastra. 1983. Croom Helm, London.
  2. A biologist's Guide to Principles and Techniques of Practical Biochemistry by Wilson K. and K.H. Goulding. 1992. 3<sup>rd</sup> edition, Cambridge University Press, Cambridge.
  3. Standard methods of biochemical analysis. 1999. By Thimmaiah, S. R. Kalyani Publishers, Ludhiana
  4. Methods in plant biochemistry and molecular biology. 1997. By Dashek, W. V. CRC Press, Boca Raton, New York
  5. Practical biochemistry – Principles and Techniques 2005. By Wilson, K. and Walker, J. Cambridge University Press, UK.
  6. Rob Reed, David Holmes, Jonathan., Practical Skills in Biomolecular Sciences., Weyers and Allan Jones. Addison Wesley Longman Ltd. 1998.
  7. Williams and Fleming, 1980. Spectroscopic Methods in Organic Chemistry
- Track C: Environmental Biotechnology

Department Elective- 1C

Course Code: BBI128A

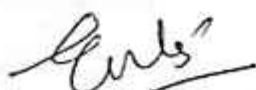


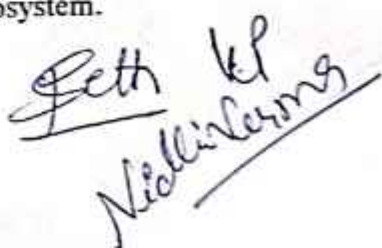
Course Name: Environmental Biology

#### Course Outcomes:

CO-1 Students will be able to understand ecology and ecosystem.

  
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74



CO-2 Students will be able to describe and compare different Ecological pyramids and biogeochemical cycles.

CO-3 Students will be able to explain and distinguish different population ecology and population interactions- Mutualism, Parasitism

CO-4 Students will be able to acquire skills to analyze major earth ecosystem and ecological model.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	2
CO2	3	3	3	2	1	2	1
CO3	3	3	3	2	1	2	2
CO4	3	3	3	2	2	2	2

1 - LOW , 2- MEDIUM , 3-HIGH

### **Unit-i**

Definition, principles and scope of ecology, human ecology and human settlements, evolution, origin of life and specification, Ecosystem stability-cybernetics and ecosystem regulation, evolution of biosphere.

### **Unit - ii**

Ecosystem structure and functions, abiotic and biotic component, Energy flow, food chain, food web, Ecological Pyramids-types, biogeochemical cycles, ecological succession, Ecads and ecotypes.

### **Unit - iii**

Population ecology- density, natality, mortality, survivorship curves, age distribution, growth curves and models, r & k selection, population interactions- Mutualism, Parasitism, Predator-Prey relations, System Theory and Ecological Model.

### **Unit - iv**

Earth's major ecosystem - terrestrial and aquatic ecosystem, soil microorganism and their functions, coastal management with respect to Indian conditions, criteria employed for disposal of pollutants in marine ecosystem, coastal water system and man-made reservoirs, biology and ecology of reservoirs.



  
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75







**Course Code: BBI129A**

**Course Name: Environmental Biology Lab**

1. Study of all the biotic and abiotic components of any simple ecosystem- natural pond or terrestrial ecosystem or human modified ecosystem.
2. Determination of population density in a terrestrial community or hypothetical community by quad rate method and calculation of the Simpson's and Shannon- Weiner diversity index for the same community.
3. Principle of GPS (Global Positioning System).

**Reference Books**

1. Basic ecology - E. P. Odum
2. Ecology and field biology - R.L. Smith
3. Ecology - P.D. Sharma
4. Fundamentals of ecology -E.P. Odum
5. Principles of ecology – Rickleff

**Department Elective- 2C**

**Course Code: BBI130A**

**Course Name: Solid Waste Management**

**Course outcome**

CO-1 Students will be able to understand solid waste and its management methods.

CO-2 Students will be able to describe hazardous waste and its treatment.

CO-3 Students will be able to explain and distinguish different handling rules amendments for hazardous waste management.

CO-4 Students will be able to acquire skills to analyze treatment of various effluents.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	1	2	2
CO2	3	3	3	2	2	2	1
CO3	3	3	3	2	1	2	2
CO4	3	3	3	2	2	2	1

1 – LOW, 2- MEDIUM, 3-HIGH

  
Dr. Shemkant B. Badgujar

76





### Unit-1

Sources, generation, classification & composition of solid wastes. Solid waste management methods - Sanitary land filling, Recycling, Composting, Vermi composting, Incineration, energy recovery from organic waste.

### Unit - 2

Solid Waste Management Plan, Waste minimization technologies, Hazardous Waste Management, Sources & Classification, physicochemical properties, Hazardous Waste Control & Treatment.

### Unit - 3

Hospital Waste Management, Hazardous Waste Management & Handling rules, 1989 & 2000 (amendments), Microbiological management of hazardous waste and waste lands management in Jaipur.

### Unit- 4

Disaster Management, Fly ash generation & utilization, Primary, secondary & tertiary & advance treatment of various effluents.

#### References:

1. Solid Waste Management CPCB, New Delhi.
2. Ecotechnology for pollution control & environmental management - By R.K. Trivedi & Arvind Kr.
3. Basic Environmental Technology - J.A. Nathanson

Course Code: BB131A

Course Name: Solid Waste management Lab

- 1- To study the legal aspects of solid waste disposal
- 2- To study various techniques to minimization of paint waste
- 3- To study the solid waste management in dumping ground

Department Elective- 3C

Course Code: BBI32A

Course Name: Environmental Pollution

#### Course outcome

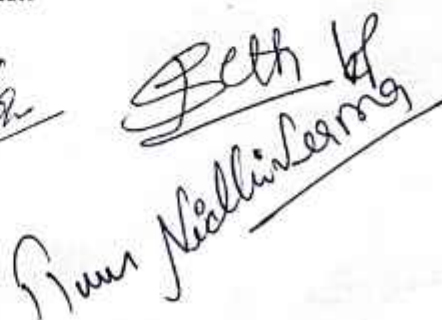
- CO-1 Students will be able to understand pollution, its sources and treatment.  
CO-2 Students will be able to describe hazardous waste and its treatment.  
CO-3 Students will be able to explain and distinguish

  
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77







CO-4 Students will be able to acquire skills to analyze quality of air, water and soil treatment of various effluents.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	1	2	2
CO2	3	3	3	2	2	2	1
CO3	3	3	3	2	1	2	2
CO4	3	3	3	2	2	2	1

1 – LOW , 2- MEDIUM , 3-HIGH

**Unit - i**

Air pollution- natural and anthropogenic sources of pollution, primary and secondary pollutants, transport and diffusion of pollutants, gas laws governing the behaviour of pollutants in the atmosphere, Methods of monitoring and control of air pollution, SO<sub>2</sub>, NO<sub>2</sub>, CO, SPM.

**Unit - ii**

Water pollution - types sources and consequences of water pollution, physico-chemical and bacteriological sampling, Analysis of water quality, standards, sewage and wastewater treatment and recycling, water quality and standards.

**Unit - iii**

Soil pollution chemical and bacteriological sampling as analysis of soil quality, soil pollution control, industrial waste effluents and heavy metals and their interactions with soil components.

**Unit - iv**

Noise pollution - sources of noise pollution, measurement and indices. Marine pollution, sources of marine pollution and its control. Effects of pollutants on human beings, plants, animals and climate. Air quality standards and air pollution.

**Course Code: BBI133A**

**Course Name: Environmental Pollution Lab**

1. To determine Water holding capacity
2. To determine moisture content
3. Study the soil and their texture by sieve method.
4. To determine the pH of soil and water.
5. To estimate chloride in soil and water.

**References**

  
Dr. Shantant B. Badgojar


1. Air pollution and control - K.V.S.G. Murlikrishan
2. Industrial noise control - Bell & Bell
3. Environmental engineering -Peary
4. Introduction to environmental engineering and science - Gilbert Masters.

Department Elective- 4C

Course Code: BBI134A

Course Name: Environmental Microbiology

Course outcome

CO-1 Students will be able to understand microorganism and their sampling, culture and cultivation.

CO-2 Students will be able to describe genetically modified organism.

CO-3 Students will be able to explain and distinguish aerobic and anaerobic fermentation and different microbial bioreactors.

CO-4 Students will be able to acquire skills to analyze environmental problems & environmental monitoring through microorganism.

Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	1	2	2
CO2	3	3	3	2	1	2	1
CO3	3	3	3	2	2	2	2
CO4	3	3	3	1	2	2	1

1 – LOW , 2- MEDIUM , 3-HIGH

**Unit - 1**

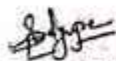
Microbiology- organisms in nature & their importance, sampling, culture & cultivation of microorganisms, microbes in service of nature & mankind, batch culture & continuous culture of microbes for commercial use.

**Unit - 2**

Microbial Reactors, genetically modified microbes & their uses in Environmental management recycling & up gradation technologies, Production of products, energy from waste.

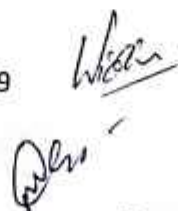
**Unit - 3**

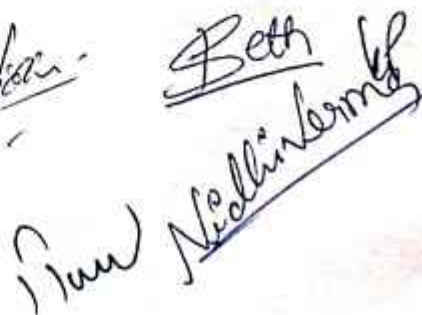
Biogas technology, plant design, construction, operation, biogas from organic wastes, water weeds, landfills, microbiology of anaerobic fermentation.



Dr. Shamkant B. Badgujar







#### Unit- 4

Biotransformation, bioconversion, bioremediation, phytoremediation technology, fermentation technology, development of stress tolerant plants, Environmental problems & Environmental monitoring through microorganism, microbiology of water, air and soil, microbes as pathological agent in plant, animal and man.

**Course Code: BBI135A**

**Course Name: Environmental Microbiology Lab**

1. To study the different bioreactors.
2. To study between aerobic and anaerobic fermentation.
3. To prepare potato dextrose media
4. Identification of soil microorganisms through microscope and staining

#### References:

1. Principles of microbiology - Pelzar
2. Microbial bio technology - A.N.
3. Glazer Microbial ecology - R.M.
4. Atlas Molecular biology - H.D. Kumar
5. Environmental bio Technology - Sayler & Fox

**Department Elective- 5C**

**Course Code: BBI136A**

**Course Name: Biodiversity**

#### Course outcome

CO-1 Students will be able to understand the term biodiversity and different flora and fauna in India.

CO-2 Students will be able to describe strategies for Biodiversity Conservation.

CO-3 Students will be able to explain and distinguish gene banks, tissue culture and artificial seed technology.

CO-4 Students will be able to acquire skills to analyze international convention and protocols for Biodiversity Conservation.

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	2	2	2
CO2	3	3	3	2	1	2	1
CO3	3	3	3	2	2	2	2

  
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80















CO4	3	3	3	1	1	2	2
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1 - LOW, 2- MEDIUM, 3-HIGH

### Unit - I

Biodiversity - definition, hot spots of Biodiversity, strategies for Biodiversity Conservation, National Parks, Sanctuaries and Biosphere reserves, gene pool with respect to Rajasthan.

### Unit - 2

Aquatic common flora and fauna in India - phytoplankton, zooplankton and macrophytes, terrestrial common flora and fauna in India - forests, endangered and threatened species.

### Unit - 3

Strategies for Biodiversity Conservation, cryopreservation, gene banks, tissue culture and artificial seed technology, new seed development policy 1988, conservation of medicinal plants.

### Unit- 4

International conventions, treaties and protocols for Biodiversity Conservation, Biodiversity in the welfare of mankind, Species concept, Biological nomenclature theories of biological classification.

**Course Code: BBI137A**

**Course Name: Biodiversity Lab**

1. Study any five endangered/ threatened species- one from each class.
2. To study the effect of plant biodiversity on population and ecosystem process
3. To study different flora native to your region.
4. To study the ecosystem impacts on species adaptation

#### References:

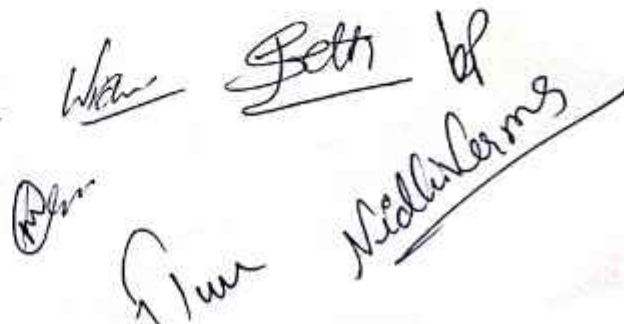
1. Global Biodiversity - W.R. L.IUCN
2. Ecology of natural resource - Ramade
3. Ecology - P.D. Sharma

**Department Elective- 6C**

  
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81





Course Code: BBI138A

Course Name: Microbial and Industrial application

Course outcome

CO-1 Students will be able to understand microbial diversity and their classification.

CO-2 Students will be able to describe microbial growth and physiology.

CO-3 Students will be able to explain and distinguish host-Pathogen interactions and various microbial infections.

CO-4 Students will be able to acquire skills to analyze role of microorganisms in natural system and artificial system and protocols for Biodiversity Conservation.

Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	1	2	2
CO2	3	3	3	2	2	2	2
CO3	3	3	3	1	2	2	2
CO4	3	3	3	1	1	2	2

1 – LOW , 2- MEDIUM , 3-HIGH

**Unit I**

Microbial Diversity & Systematics Classical and modern methods and concepts; Domain and Kingdom concepts in classification of microorganisms; Criteria for classification; Classification of Bacteria according to Bergey's manual.

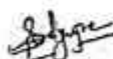
**Unit II**

Microbial Growth & Physiology Ultrastructure of Archaea (Methanococcus); Eubacteria (E.coli); Unicellular Eukaryotes (Yeast) and viruses (Bacterial, Plant, Animal and Tumor viruses); Microbial growth: Batch, fed-batch, continuous kinetics, synchronous growth, yield constants, methods of growth estimation, stringent response, death of a bacterial cell.

**Unit III**

Microbial Interactions and Infection Host-Pathogen interactions; Microbes infecting humans, veterinary animals and plants; Pathogenicity islands and their role in bacterial virulence Microbes and Environment Role of microorganisms in natural system and artificial system; Influence of Microbes on the Earth's Environment and Inhabitants.

**Unit IV**



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Industrial Applications Basic principles in bioprocess technology; Media Formulation; Sterilization; Thermal death kinetics; Batch and continuous sterilization systems; Primary and secondary metabolites; Extracellular enzymes; Biotechnologically important intracellular products; exopolymers.

**Course Code: BBI139A**

**Course Name: Industrial Microbial Lab**

1. Isolation of microbes from soil.
2. Isolation of microbes from water sample.
3. Serial dilution.
4. Gram staining.
5. To study fed batch culture and Continuous culture.

#### **References**

1. Michael J. Pelczar, Microbiology, Tata McGraw-Hill
2. L.E Casida, JR, Industrial Microbiology, New Age International, PJ Limited, Publisher.
3. Prescott and Dunn, Industrial Microbiology, C BS Publisher and Distributor
4. Gerand J. Tortora, Berbell R. Funke, Christine L. Case, Microbiology, Pearson

**Department Elective- 7C**

**Course Code: BBI140A**

**Course Name: Bioremediation**

#### **Course outcome**

CO-1 Students will be able to explain bioremediation and its types- in situ and ex situ.

CO-2 Students will be able to describe hazardous waste and its management.

CO-3 Students will be able to distinguish and explain phytoremediation and bioremediation and their techniques.

CO-4 Students will be able to acquire skills to analyze the techniques of bioremediation to remove the toxic elements from environment.

#### **Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	1	2	2
CO2	3	3	3	2	2	2	2
CO3	3	3	3	2	1	2	2
CO4	3	3	3	1	1	2	2

1 - LOW, 2- MEDIUM, 3-HIGH

  
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### Unit I

Bioremediation- I Introduction, constraints and priorities of Bioremediation, Biostimulation of Naturally occurring microbial activities, Bioaugmentation, in situ, ex situ, intrinsic & engineered bioremediation

### Unit II

Bioremediation – II Solid phase bioremediation - land farming, prepared beds, soil piles, Phytoremediation. Composting, Bioventing & Biosparging; Liquid phase bioremediation - suspended bioreactors, fixed biofilm reactors.

### Unit III

Hazardous Waste Management biotechnology application to hazardous waste management - examples of biotechnological applications to hazardous waste management- cyanide detoxification, detoxification of oxalate, urea etc., toxic organics, phenols. Case studies with respect to different Industries of Rajasthan.

### Unit IV

Concept of bioremediation (in-situ & ex-situ), Bioremediation of toxic metal ions biosorption and bioaccumulation principles. Concepts of phytoremediation. Microbial leaching of ore-direct and indirect mechanisms. Mining and metal. Use of microorganisms in augmentation of petroleum recovery. Biotechnology-with special reference to Copper and Iron.

**Course Code: BBI141A**

**Course Name: Bioremediation Lab**

1. Role of bacterial systems in decolourization of effluents.
2. Role of fungal systems in decolourization of effluents
3. Estimation of nitrates, carbonates and organic carbon in soil and water.
4. To determine Temporary Hardness.
5. To determine permanent hardness.

#### References:

1. Environmental Biotechnology by S. K. Agarwal
2. Biodegradation & Bioremediation (1999), Martin Alexander, Academic press.
3. Stanier R. Y., Ingram J.L., Wheelis M.L., Painter R.R., General Microbiology, McMillan Publications, 1989.

  
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4. Foster C.F., John Ware D.A., Environmental Biotechnology, Ellis Horwood Ltd., 1987.
5. Karrelly D., Chakrabarty K., Omen G.S., Biotechnology and Biodegradation, Advances in Applied Biotechnology Series, Vol.4, Gulf Publications Co. London, 1989.
6. Bioremediation engineering; design and application 1995 John. T. cookson, Jr. Mc Graw Hill.

#### Track D: Biostatistics

Department Elective- 1D

Course Code: BBI142A

Course Name: Descriptive Statistics, Probability and Distributions

#### Course outcome

CO-1 Students will be able to exposed to concepts of statistical methods and statistical inference that would help them in understanding the importance of statistics

CO-2 Students will be able to describe and understand the concepts involved in data presentation, analysis and interpretation.

CO-3 Students will get the exposure to presentation of data, probability distributions, parameter estimation and test of significance, regression and multivariate analytical techniques

CO-4 Student will able to acquire skills to analyze the critical problems related to statistics, hands on experience in the analysis of their research data.

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	2
CO4	3	2	3	2	3	1	1

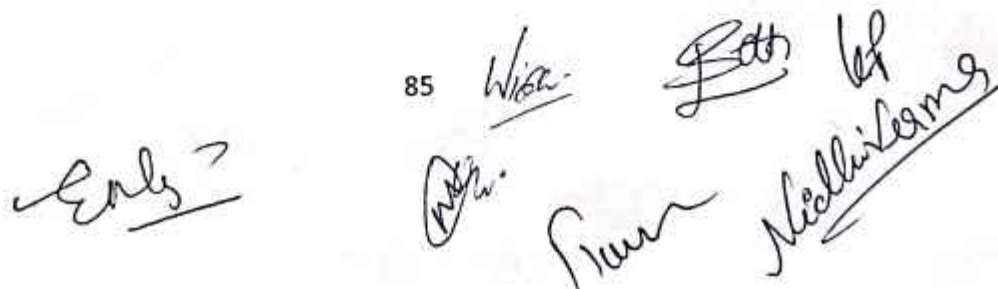
1-LOW, 2-MEDIUM, 3-HIGH

#### Unit 1

Elementary concepts in Statistics: Concepts of statistical population and sample from a population; qualitative and quantitative data; nominal, ordinal, ratio, interval data; cross sectional and time series data; discrete and continuous data.

  
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85





Collection and scrutiny of data: Primary data; designing a questionnaire and a schedule; secondary data and sources of secondary data.

## Unit 2

Probability: Random Experiment; sample point; sample space; events; mutually exclusive and exhaustive events; frequency and classical definitions of probability. Axiomatic definition of probability; addition and multiplication theorems; conditional probability and independence; Bayes' theorem. Discrete and continuous random variables.

## Unit 3

Standard Univariate Distributions: Standard univariate discrete and continuous distributions- uniform; binomial; Poisson; geometric; negative binomial and hyper-geometric distributions. Uniform; exponential; normal; Laplace, gamma, beta, lognormal, logistic and Weibull distributions.(elementary properties and applications only)

## Unit 4

Sampling Distributions, Law of large numbers and Central Limit Theorem: Concepts of random sample and statistic; distribution of sample mean from a normal population; chi-square distribution; F and t statistics, distributions (no derivations) and their applications. Chi-square test.

### References:

1. Dutta, N. K. (2004). Fundamentals of Biostatistics, Kanishka Publishers.
2. Gurumani N. (2005) . An Introduction to Biostatistics, MJP Publishers.
3. Daniel, W. W. (2007). Biostatistics- A Foundation for Analysis in the Health Sciences, Wiley.
4. Rao, K. V. (2007). Biostatistics – A Manual of Statistical Methods for use in Health Nutrition and Anthropology.
7. Pagano, M.& Gauvreau, K. (2007). Principles of Biostatistics.
8. Rohatgi, V.K.& Saleh, A.K.Md. (2001). An Introduction to Probability and Statistics, John Wiley & Sons.
9. Sundaram, K.R.(2010) Medical Statistics-Principles & Methods, BI Publications, New Delhi

Course Code: BBI143A

Course Name: Basics Biostatistics Lab

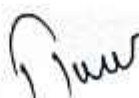
1- Introduction to graphical presentation data

  
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86













- 2- Computations of Mean, Media and Mode.
- 3- Computation of Geometric Mean and Harmonic Mean
- 4- Computation of Mean Deviation.
- 5- Computation of Quartile deviation.
- 6- Computation of Variance.
- 7- Computation of Coefficient of Variation
- 8- To check the symmetry of the distribution by coefficient of Skewness.
- 9- To check the Shape of the distribution by coefficient of Kurtosis.

Department Elective- 2D

Course Code: BBI145A

Course Name: COMPUTER PROGRAMMING IN C++ AND SAS

#### Course Outcomes

CO1: Demonstrate the use of algorithms and flowcharts to plan the solution of a computing problem.

CO2: Describe the object-oriented programming approach in connection with C++

CO3: Apply the concepts of object-oriented programming

CO4: Use different data structures and create / manipulate basic data files and developing applications for real world problems.

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	2
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

#### Unit 1:

Fundamentals of Computer Programming.


#### Unit-2

  
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87











Operating Systems- Windows, Linux, Internet, algorithms, Flow charts, data types and variables, Operators, Input Output statements, Control statements:- if, if-else, nested if-else, goto and switch statements.

### Unit 3

Loops: for, while, do...while loops. Break, continue, exit ( ), Library functions. One dimensional, two-dimensional and multi-dimensional arrays.

### Unit 4

Functions, definition and declaration, Illustrative examples from statistics. Pointers and references.

### References

1. Balaguruswamy E. (1997). Object-Oriented Programming with C++, Tata McGraw-Hill Publishing Company Ltd.
2. Der, G. and Everitt, B.S.(2006). A Handbook of Statistical Analysis Using SAS, CRC Press.
3. Der, G. and Everitt, B.S.(2006). Statistical Analysis of Medical Data Using SAS, CRC Press.
4. Littell R.C., Stroup W.W. & Freud R.J. (2002). SAS For Linear Models, SAS Institute Inc.
5. Lora, D. and Susan, S.(2009)The Little SAS, support.sas.com

Course Code: BBI146A

Course Name: Computer Programming Lab

1. WAP to print Hello World in C++.
2. WAP to add two numbers.
3. WAP to check whether the number is even or odd.
4. WAP to find largest among three numbers.
5. WAP To find reverse of a number.
6. WAP to find entered number is palindrome or not.
7. WAP to find that entered year is leap year or not.
8. WAP to find sum of two matrices.
9. WAP to swap two numbers using functions.
10. WAP to find factorial of a number using functions

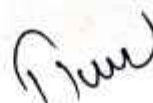
Department Elective- 3D

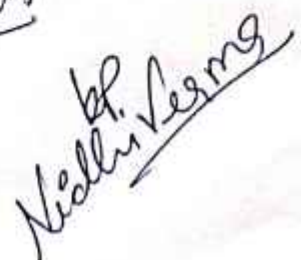
  
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88











Course Code: BBH147A

Course Name: STATISTICAL GENETICS AND ECOLOGY

**Course Outcomes**

CO1 Student will able to understand about the genetics

CO2: Student will able to correlate between genetics and statistics

CO3: Student will able to describe the ecology and evolution

CO4: Student will able to apply the concepts of genetics

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	0	2	0	0	1
CO2	3	3	3	2	1	0	1
CO3	3	2	1	2	3	0	1
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

**Unit 1**

Basic biological concepts in genetics, Mendel's law, Hardy Weinberg equilibrium, estimation of allele frequency (dominant/co-dominant cases), Approach to equilibrium for X-linked gene. The law of natural selection, mutation, genetic drift.

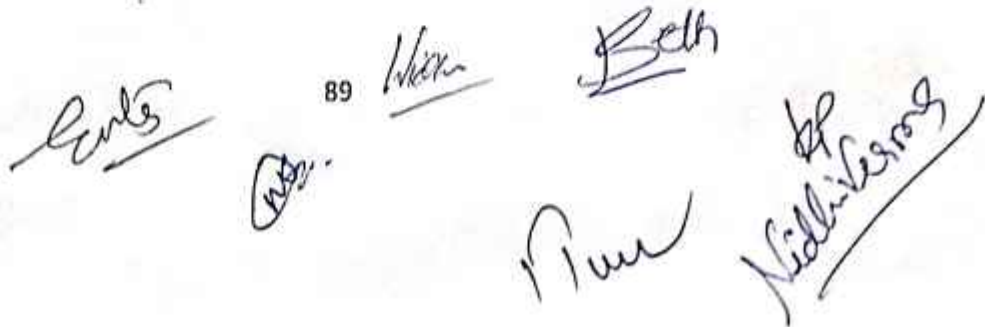
**Unit 2**

Non-random mating, inbreeding, phenotypic assortative mating. I, T, O matrices, identity by descent. Family data-estimation of segregation ratio under ascertainment bias, pedigree data : Elston - Stewart algorithm for calculation of likelihoods. Linkage, estimation of re-combination fraction, inheritance of quantitative traits.

**Unit 3**

Introduction to ecology and evolution, population dynamics: single species- Exponential, Logistic and Gompertz models, Leslie matrix model for age and stage Structured population, survivorship curves-Constant, monotone and bath tub shaped hazard rates.

  
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## Unit 4

Two species: Lotka-Volterra equations, isoclines. Abundance estimation: Capture-recapture, Nearest Neighbor, line transect sampling, indirect methods. Ecological Diversity: Species abundance curve, indices of diversity (Simpson's index, Shannon-Wiener index). Game theory in ecology – Evolutionarily stable strategy, its properties, simple games such as Hawk-Dove game, Prisoner's dilemma, etc. Preservation of ecology and biodiversity.

### References:

1. Anil Gore & Sharayu Paranjpe (2001). A Course in Mathematical and Statistical Ecology, Kluwer academic Publishers
2. Gardner E.J. & Snustad D.P. Principles of Genetics, John Wiley & Sons Inc. Lange, K (2002). Mathematical and Statistical Methods for Genetic Analysis, Springer.

### STATISTICAL GENETICAL LAB(BBI148A)

#### List of practical's

1. Introduction to Genetics, Probability, Mendelian genetics, chi-square and measurements
2. Cytogenetics and karyotyping, Chromosomal alterations and human disease
3. Mitosis and Meiosis, Sordaria recombination and genetic crosses
4. Monohybrid and dihybrid crosses in fruit fly (*Drosophila*)
5. Population genetics, Human blood type frequencies estimation
6. Simulating population genetic processes, Genetic drift, mutation, gene flow, natural selection

### Department Elective- 4D

Course Code: BBI149A

Course Name: Linear Algebra, Regression Techniques and Bioassays

### Course Outcomes

- CO1. To understand the concept of Linear algebra.  
CO-2. To analyze the concept of correlation and Regression.  
CO-3 To calculate and apply estimation of Regression  
CO4: To understand the concept of Linear Model and non-parametric tests

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
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CO1	3	1	0	2	0	0	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	0
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

### Unit 1

Linear Algebra: Set operations, vectors and matrices, matrix operations, determinants, inverse of a square matrix; linear independence, rank of a matrix, generalized inverse and applications, linear equations, characteristic roots and vectors, quadratic forms and nature of definiteness.

### Unit 2

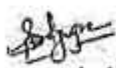
Analysis of Bivariate data: Scatter diagram, Principle of least squares; Karl Pearson's correlation coefficient; coefficient of determination; correlation ratio; rank correlation; partial and multiple correlations, Linear regression, Simple linear regression, multiple regression, fit of polynomials and use of orthogonal polynomials.

### Unit 3

Generalized linear models, analysis of binary and grouped data by using logistic models, large sample tests about parameters, goodness of fit, analysis of deviance, variable selection, introduction to Poisson regression, log-linear models, Random and mixed effect models, Nonparametric regression and generalized linear models.

### Unit 4

Bioassays: Types of biological assays, direct assays, ratio estimators, asymptotic distributions, regression approaches for estimating dose response relationships. Quantal responses, methods of estimation of parameters, dose allocation schemes, median dose, estimation of points on the quantal response function, Estimation of safe doses.

  
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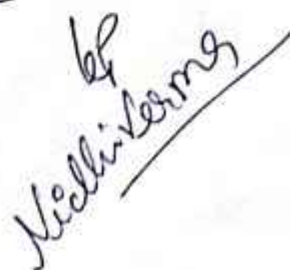














**References:**

1. Draper, N.R. and Smith, H (2003). Applied Regression Analysis, John Wiley & Sons.
2. Rossi R.J.(2010).Applied Biostatistics for Health Sciences, Wiley.

**Course Code: BBI150A****Course Name: Basics Algebra Lab**

1. Determinants - by row and column operations, by partitioning.
2. Inverses of a matrix - by row and column operations, by partitioning
3. Rank of a matrix
4. Solutions of matrix equations
5. Characteristic roots and vectors of a matrix.
6. Solve the problems of Linear Correlation and Regression.

**Department Elective- 5D****Course Code: BBI151A****Course Name: Controlled Clinical Trials and Operations Research****Course Outcome**

CO1 Student will able to understand about the medical practices and role of different regulatory bodies

CO2 Student will able to learn about the analysis and handling of data

CO3 Student will able to make the graphical presentation of statistical data

CO4 Student will able to acquire skills to analyze the critical problems related to statistics, hands on experience in the analysis of their research data

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	0	1	0	3	2
CO2	3	3	2	1	1	0	1
CO3	2	2	2	0	0	0	0
CO4	3	2	3	2	3	0	1

1-LOW, 2-MEDIUM, 3-HIGH

**Unit 1**

Introduction to clinical trials: the need and ethics of clinical trials, Drug Development Process, ICH GCP, Relevant FDA and EMEA guidelines (Industry, TA-,

  
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92

phase-specific), data management, objectives and end points of clinical trials, bias and random errors in clinical studies, conduct of clinical trials, overview of phase I-IV trials, multi-center trials.

## Unit 2

Statistical Methods (Industry-, TA-, phase-specific), Defining objectives and end-points, Various study designs, Analysis data sets, Handling missing data, Handling multiplicity, Baseline and covariates, Sub-group analysis, Modeling treatment effects, Design of bio-equivalence trials, Understanding Protocol, Sample Size Determination, Inputs to Data Management Documents, Understanding Clinical Study Report, Randomization Methods, Statistical Analysis Plan, TLG Shells

## Unit 3

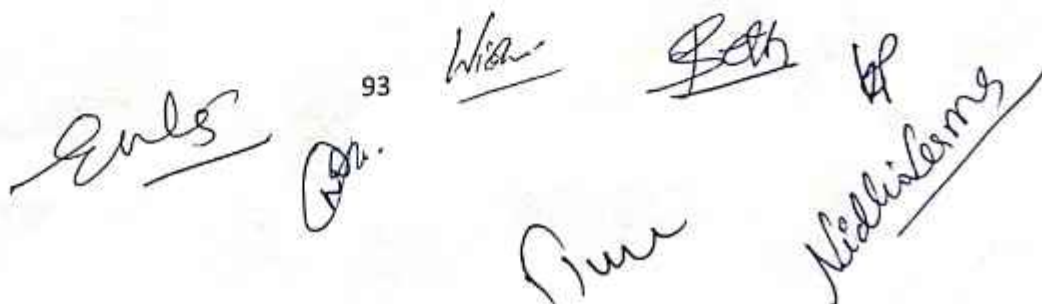
Analysis methods / models for continuous, categorical, binary, survival data, Repeated measures analysis, Quality of life data analysis, Interim analysis, Data Comprehension, Data Interpretation, Adaptive Trials, Meta Analysis.

## Unit 4

Introduction to Operations Research, linear programming problems (LPP), framing an LPP problem, graphical solution, feasible, basic feasible and optimal basic feasible solutions to an LPP, simplex method, dual of linear programming, transportation problems, assignment problems, simple numerical problems as illustration.

## Reference books

1. Friedman L.M., Furberg C.D. & Demets D.L. (1998). Fundamentals of clinical trials, Springer
2. Shein-Chung Chow and Jen-Pei Liu (2004). Design and Analysis of Clinical Trials: Concepts and Methodologies (2nd edition) Wiley-Interscience
3. Stuart J. Pocock (2010) Clinical Trials – A practical approach (Reprint), John Wiley & Sons
4. Stephen Senn (2009) Statistical Issues in Drug Development (2nd edition), John Wiley & Sons Ltd.
5. Alex Dmitrienko, Geert Molenberghs, Christy Chuang-Stein, Walter Offen (2005). Analysis of Clinical Trials Using SAS – A Practical Guide, SAS Publishing
6. David Collett (2003) Modeling Binary Data (2nd edition), Chapman & Hall/CRC
7. Alan Agresti (2002) Categorical Data Analysis (2nd edition), Wiley-Interscience





Course Code: BBI152A

Course Name: Clinical operations Lab

1. Mathematical formulation of L.P.P and solving the problem using graphical method,
2. Simplex technique and Charne's Big M method involving artificial variables.
3. Identifying Special cases by Graphical and Simplex method and interpretation
4. Degenerate solution
5. Unbounded solution
6. Alternate solution
7. Infeasible solution
8. Allocation problem using Assignment model.

Department Elective- 6D

Course Code: BBI153A

Course Name: Bioinformatics and Computational Biology

#### Course Outcomes

1. The student will be able to relate the biotechnology and informatics
2. The student will gain an understanding of bioinformatics databases, phylogenetic analysis and alignment
3. The student will able to distinguish different tools used in bioinformatics
4. Student will able to acquire skills to analyze the critical problems related bioinformatics

#### 5. Mapping of PO/CO

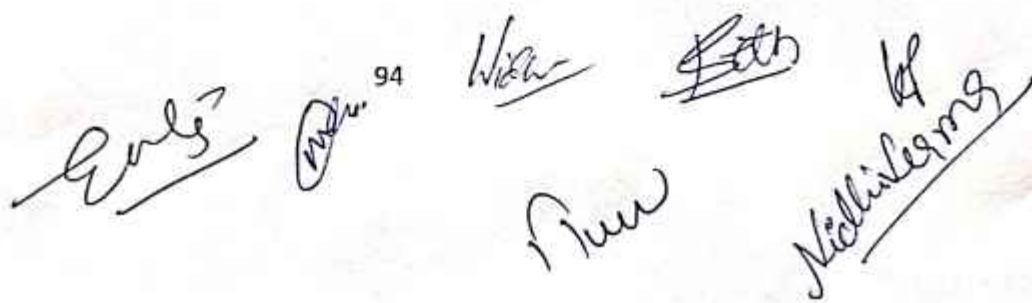
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	1	0	0	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	2	0	1
CO4	3	2	3	2	3	0	1

6. 1-LOW, 2-MEDIUM, 3-HIGH

#### Unit 1

Introduction to Bioinformatics: Bioinformatics Overview, Bioinformatics Concepts:- Functional Genomics, Comparative genomics, Structural biology, classification of protein structure, Medical information, Objectives of Bioinformatics.

  
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Applications, Challenges in Molecular biology, Careers in Bioinformatics, Major databases & tools, Bioinformatics in India.

## Unit 2

Genomics: Data Mining –ORF, Pubmed, Phylogenetic Analysis, MSA, Gen BANK, COG Cluster, OMIM, Gene Mapping, Sequence Assembly & Expression, Alignment of MS. Proteomics: Visualization & prediction of Protein Structure, Methods used in protein structure prediction, PROSITE, DNA Micro array (DNA chip).

## Unit 3

Tools in Bioinformatics: Web based Bioinformatics Applications, Desktop based softwares, Online Analysis Tools & Servers, PDB, SWISS-PROT, CATH, Annotation Systems-DAS, Homology Tools –BLAST, FASTA, Multiple Alignment-CLUSTALW, Molecular visualization software-Swisspdb viewer, Rasmol Gene Prediction Softwares- Genescan, Protein, Modelling software-SWISSMODEL.

## Unit 4

Computational Biology: Genetic Algorithms, HMMR, Dynamic Programming Algorithm. Local & Global Alignment Algorithm, Needleman- Wunsch Algorithm, Heuristic Algorithm like BLAST, FASTA-Multiple Segment Alignment Algorithm, Protein secondary structure prediction Algorithm.

### References:


1. Bergeron, B.(2003). Bioinformatics Computing, Prentice Hall of India.
2. Bozdogan, H (2003). Statistical Data Mining & Knowledge Discovery, CRC Press
3. Chen, Z (2001). Intelligent Data Warehousing, CRC Press
4. Ewens, W.J. and Grant, G.R. (2002). Statistical Methods in Bioinformatics, Springer.
5. Mount D.W. (2003). Bioinformatics – Sequence and Genome Analysis, CBS Publishers.
6. Rajan S.S. and Balaji R. (2002). Introduction to Bioinformatics, Himalaya Publishing.
7. Shanmughavel P. (2005). Principles of Bioinformatics, Pointer Publishers.
8. Waterman, M.S.(2000). Introduction to Computational Biology, CRC Press.
10. Xiong, J.(2006). Essential Bioinformatics, Cambridge University Press.
11. Deshmukh, S.R. and Purohit, S.G.(2007) Microarray Data: Statistical Analysis Using R, Alpha Science.

Course Code: BBI154A

Course Name: BioComputational Lab


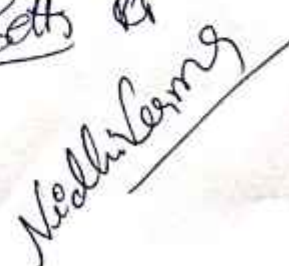
  
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 95





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1. To retrieve the sequence of the Human keratin protein from GenBank database and to interpret the results.
2. To retrieve the structure of a protein and viewing it in RASMOL viewer.
3. To find the similarity between sequences using BLAST
4. To find the similarity between sequences using FASTA
5. To align more than two sequences and find out the similarity between those sequences
6. To perform Sequence analysis

Department Elective- 7D

Course Code: BBI155A

Course Name: Design of Experiments and Quality Control

**Course Outcomes:**

CO-1: Student will able to understand the basic concept of ANOVA.

CO-2: Student will able to acquire the basic concepts of Experimental design and CRD

CO3: Student will able to differentiate between of RBD, LSD

CO4: Students will be able to distinguish SQC and control charts

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	0	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	0
CO4	3	2	3	2	3	1	1

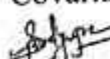
1-LOW, 2-MEDIUM, 3-HIGH


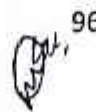

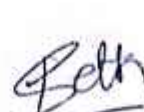

**Unit 1**

Introduction to design of experiments: estimable linear parametric functions and their estimation, Gauss-Markov Theorem (meaning and statement only), testing of linear hypotheses, Basic principles of experimental design, uniformity trials, analysis of variance, CRD, RBD, LSD (equal and unequal number of observations, missing observations).

**Unit 2**

Incomplete block designs, Balanced incomplete block designs (BIBD), group testing, PBIBD, hierarchical and nested designs. Split plot experiments, Analysis of Covariance.

  
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### Unit 3

General factorial experiments, factorial effects,  $2n$  and  $3n$  factorial experiments in randomized block, Yate's method, complete and partial confounding, simple problems

### Unit 4

Quality and related concepts, ISO Certification, six-sigma, Statistical process control, theory of control charts, Shewhart control charts for variables –  $\bar{x}$ , R, sigma charts, attribute control charts – p, np, c charts, modified control charts.

### References

1. Angela Dean & Daniel Voss (2006). Design and Analysis of Experiments, Springer Verlag
2. Campbell M.J, Machin D. & Walters S.J (2007). Medical Statistics – A Text Book for the Health Sciences, Wiley.
3. Cochran & Cox (2000). Experimental Designs, Wiley Asia
4. Das M.N. & Giri N.C. (2006). Design and Analysis of Experiments, New Age Publications
5. Montgomery, D.C. (2001). Design and Analysis of Experiments, Wiley.
6. Montgomery D. C. (2005) Introduction to Statistical Quality control, 5th edition, Wiley.

Course Code: BBI156A

Course Name: Experimental Design Lab

1. Computations with one way analysis
2. Computations with Two-way analysis
3. Computations with CRD
4. Computations with RBD
5. Computations with LSD
6. Computation of Variable Control Charts.
7. Computation for Mean and Range Control Charts.
8. Computation for p, np and c Control Charts.

Track E

Department Elective-1E

Course Code: BBI157A

Course Name: BASICS OF BIOINFORMATICS

  
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97





### Course Outcomes:

CO-1: Student will able to understand the basic concept of Bioinformatics.

CO-2: Student will able to acquire the basic concepts of biological databases and their file format.

CO3: Student will able to determine identity between the biological sequences by similarity alignments.

CO4: Students will be able to understand the gene expression of the organisms.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	0	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	0
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

### **Unit I**

What is Bioinformatics and its relation with molecular biology Examples of related tools (FASTA, BLAST, BLAT, RASMOL), databases (GENBANK, Pubmed, PDB) and software (RASMOL, Ligand Explorer), Data generation; Generation of large-scale molecular biology data. (Through Genome sequencing, Protein sequencing, Gel electrophoresis, NMR Spectroscopy, X-Ray Diffraction, and microarray). Applications of Bioinformatics.

### **Unit II**

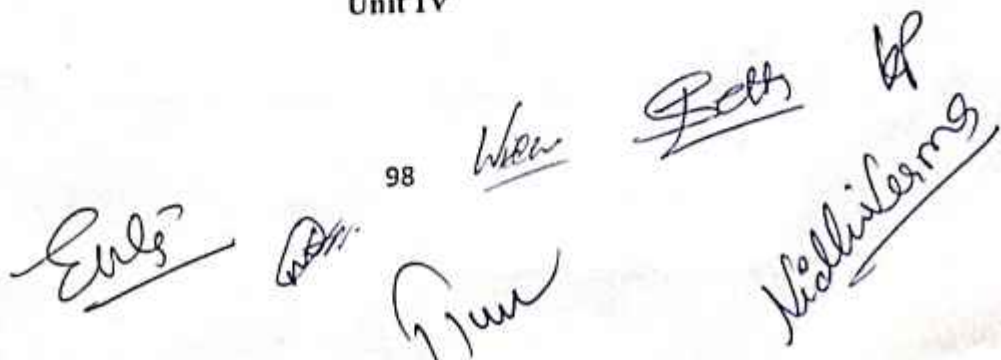
Biological Database and its Types, Introduction to data types and Source. Population and sample, Classification and Presentation of Data. Quality of data, private and public data sources. General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL). Protein databases (Primary, Composite, and Secondary). Specialized Genome databases: (SGD, TIGR, and ACeDB). Structure databases (CATH, SCOP, and PDBsum).

### **Unit III**

Data storage and retrieval and Interoperability, Flat files, relational, object-oriented databases and controlled vocabularies. File Format (Genbank, DDBJ, FASTA, PDB, SwissProt).

### **Unit IV**

  
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Sequence Alignments and Visualization, Introduction to Sequences, alignments and Dynamic Programming, Local alignment and Global alignment (algorithm and example), Pairwise alignment (BLAST and FASTA Algorithm) and multiple sequence alignment (Clustal W algorithm). Methods for presenting large quantities of biological data: sequence viewers (Artemis, SeqVISTA), 3D structure viewers (Rasmol, SPDBv, Chime, Cn3D, PyMol), Anatomical visualization.

## Unit V

Gene Expression and Representation of patterns and relationship, General introduction to Gene expression in prokaryotes and eukaryotes, transcription factors binding sites. SNP, EST, STS. Introduction to Regular Expression, Hierarchies, and Graphical models (including Markov chain and Bayes notes). Genetic variability and connections to clinical data.

### References:

1. David W. Mount - Bioinformatics: Sequence and Genome Analysis, Cold Spring Harbor Laboratory, 2004.

**Course code: BBI158A**

**Course name: practical exercises on basics of bioinformatics**

1. To Characterize of a Known Gene.
2. To Find out open reading frames (ORF) through NCBI ORF finder.
3. To Identify a gene using BLAST program.
4. To Find the conserved Domains in Protein Sequences.
5. To find the sequence similarity between sequence by using nucleotide BLAST.
6. To find the sequence similarity between sequence by using protein BLAST.
7. To perform Sequence alignment through FASTA.
8. To perform multiple alignment with T-coffee.
9. To perform agarose gel electrophoresis.

**Department Elective -2E**

**Course Code: BBI159**






**Course Name: Structural Bioinformatics**

### Course Outcomes:

CO-1: Student will able to understand the basic concept of protein structures.

  
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99



CO-2: Student will able to acquire the basic concepts of protein databases and their file format.  
 CO3: Student will able to determine homology between the biological sequences by similarity alignments.  
 CO4: Students will be able to understand the structural features of RNA of the organisms.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	0	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	0
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

### **Unit I**

Fundamentals of X-ray diffraction, NMR spectroscopy of macromolecules, Protein Structure: Primary, Secondary, Super Secondary, Domains, Tertiary, Quaternary, Ramachandran plot.

### **Unit II**

Protein secondary structure classification databases: HSSP, FSSP, CATH, SCOP, Protein secondary structure prediction methods: GOR, Chou-Fasman, PHD, PSI- PRED, J-Pred.

### **Unit III**

Protein Tertiary structure prediction methods: Homology Modeling, Fold Recognition, Ab- initio Method, Protein folding, Molecular Dynamics of Protein, Molecular Docking of Protein, Small molecule and Nucleotide, Concepts of Force Field


### **Unit IV**

Motif and Domain: Motif databases and analysis tools, Domain databases (CDD, SMART, ProDom) and Analysis tools. HMM (Hidden Markov Model): Introduction to HMM, its application in Sequence alignment and Structure prediction, HMM based Softwares (HMMER and HMMSTR)

### **Unit V**

  
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 100











Structural features of RNA: Primary, Secondary, Tertiary. Introduction to RNA Secondary structure prediction, Methods for RNA Secondary structure prediction, Limitation of RNA Secondary structure prediction.

**References:**

1. David W. Mount - Bioinformatics: Sequence and Genome Analysis, Cold Spring Harbor Laboratory, 2004.

**Course code: BBI160A**

**Course name- Practical of structural bioinformatics**

1. To retrieve the protein sequences from NCBI database and to interpret the results.
2. To Study protein X-ray diffraction data by using Protein Structure Database.
3. To Find the conserved Domains in Protein Sequences.
4. To analyse the retrieve protein sequence for Ramachandran Plot by using PSVS.
5. To study structural features of RNA by using different RNA database and softwares.
6. To determine the motifs, present in your target proteins.
7. To perform homology alignment by using pdb-BLAST.
8. To analyse the secondary structural elements of the given target proteins.

**Department Elective-3E**

**Course Code: BBI161A**

**Course Name: Informatics in Omics and its application**

**Course Outcomes:**

CO-1: Student will able to understand the basic concept of genomics.

CO-2: Student will able to acquire the basic concepts of system biology and metagenomic.

CO3: Student will able to understand metabolic pathway database and drug designing.

CO4: Students will be able to understand the structural features of compound library.

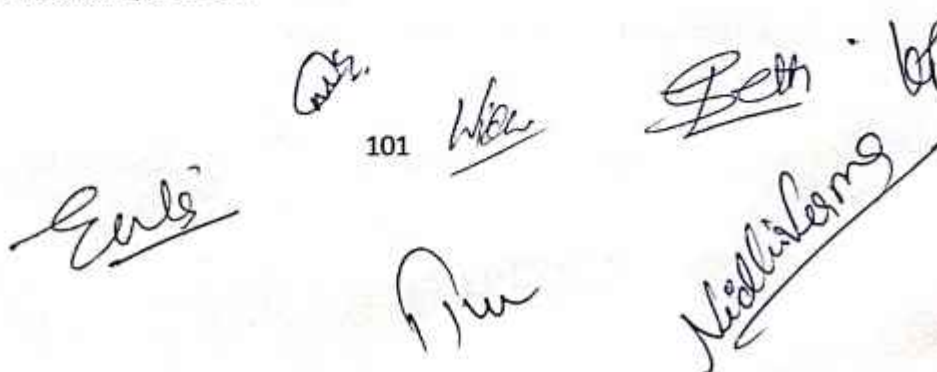
**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	0	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	0
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

  
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101





### Unit I:

Genomics: Genome Annotation, Genome Assembly, Structural and Functional Genomics, Comparative Genomics, Microarray: technique, Design, Analysis, Drug target identification.

### Unit II

System biology: Introduction, Associated disciplines, Interactomics (PPI), Fluxomics, Biomics, Metagenomics: Introduction, metagenome, shotgun metagenomics (pyrosequencing). Tool's in metagenomics, MEGAN, MG- RAST, and SEED. Application: Gene survey, Environmental genomes, Microbial diversity.

### Unit III

Metabolic pathway database (KEGG pathway database), Concept of metabolome and metabolomics. Drug Discovery and design: Target identification, Target Validation, Lead Identification, lead optimization, preclinical Pharmacology & Taxology.

### Unit IV

Chemoinformatics: Cheminformatics tools for drug discovery. Chemical Structure Representation (SMILE & SMART). Chemical databases: CSD, ACD, WDI, ChemBank, hazardous chemical database, PUBCHEM.

### Unit V

Quantitative Structure Activity Relationship (2D & 3D). Combinatorial libraries & their design. High throughput screening, virtual screening, Lipinski's rule of five.

### Reference:

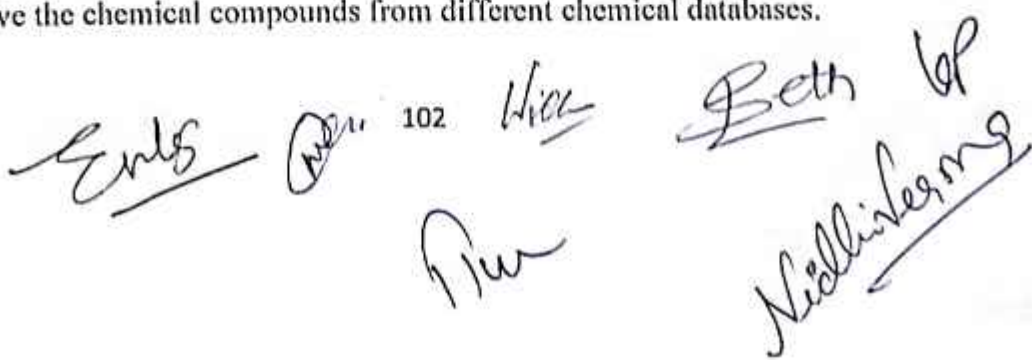
1. D. Baxivanis and Foulette - Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley Indian Edition, 2001.
2. David W. Mount - Bioinformatics: Sequence and Genome Analysis, Cold Spring Harbor Laboratory, 2004.

Course Code: BBI162A

Course Name - Practical of omics and its application:

1. To study CADD (computer added drug designing) database.
2. To perform ADMET analysis of chemical compounds by using computational tools.
3. To study the installation of the softwares.
4. To retrieve the chemical compounds from different chemical databases.

  
Dr. Shankar H. Badgujar

 102

5. To study the Lipinski's rule of five with respect to chemical compounds.
6. To perform metagenomic analysis by using MG-RAST.
7. To perform string analysis for protein-protein interaction studies.
8. To retrieve the whole genome sequences from ncbi database and study the containing ORF regions in particular genome.
9. Find out the number of entries in SWISSPROT for Serine kinase in PIG.

**Department Elective - 4E**

**Course Code: BBI163A**

**Course Name: Molecular Modelling and molecular mechanics**

**Course Outcomes:**

CO-1: Student will able to understand the basic concept of molecular modelling.

CO-2: Student will able to acquire the basic concepts of biomolecules.

CO3: Student will able to understand the concept of molecular dynamic.

CO4: Students will be able to understand the structural features of compound library and drug designing.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	0	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	0
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

**Unit I**

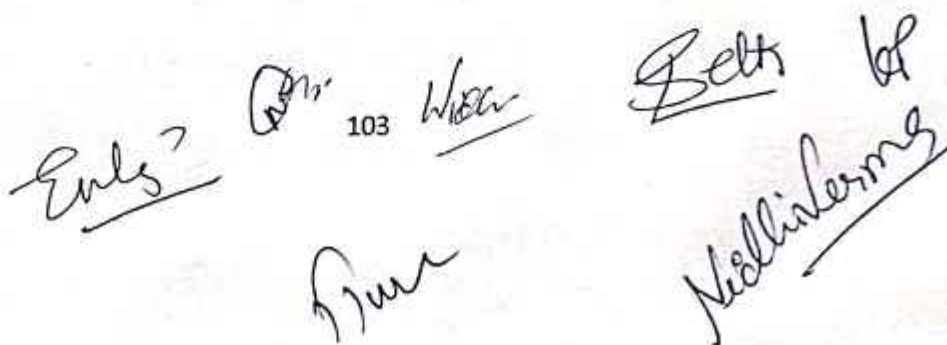
Molecular Modeling and Molecular Mechanics: Introduction to Molecular Modelling, Protein Secondary and Tertiary structure elements, Empirical Force Fields for Molecular Mechanics: bond stretching, angle bending, torsion, improper torsion, Lennard-Jones potential and van der waals interactions.

**Unit II**

Macromolecules: Study of self-organized assemblies, bio-molecules like peptides, proteins, membranes and ion channels through simulations. Concept of hydrophobic and hydrophilic interactions. Use of molecular modelling in drug design.

**Unit III**

  
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 103



Molecular Dynamics and Monte Carlo simulation: Introduction – Using single Model – time steps – Multiple steps – Setting up MD – energy conservation in MD Simulation Examples – Monte Carlo – Random number generation – Difference in MD & MC.

#### Unit IV

Homology Modelling – steps to get a model, Refinement of the model, Comparative modeling of proteins – comparison of 3D structure – Homology – steps in homology modeling – tools – databases – side chain modeling – loop modeling.

#### Unit-V

Drug design: General approach to discovery of new drugs - lead discovery – lead modification – physiochemical principles of drug action – drug stereo chemistry –drug action - 3D database search – computer aided drug design – docking - molecular modeling in drug design – structure-based drug design – pharmacophores - QSAR.

#### TEXT BOOKS:

1. A. R. Leach - Molecular Modeling Principles and Application, 2nd edition, Longman Publications, 1996.

2. D. Baxivannis and Foulette - Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley Indian Edition, 2001.

REFERENCE BOOK: 1. T K Attwood, D J parry-Smith, Introduction to Bioinformatics, Pearson Education, 1st Edition, 11th Reprint 2005.

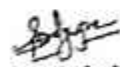
Course code: BBII64A



Course name: Molecular Modelling Lab

1. To install modeler for homology modelling
2. To compare the predicted model with homologous protein structure with respect to Ramachandran plot and Z-score.
3. To visualize the predicted homology model by the help of Pymol viewer.
4. To perform loop modelling of generated 3D model of target proteins.
5. To perform threading modelling by using different computational tools.
6. To install GROMACS a molecular dynamics platform.
7. To perform 3D-QSAR by using online 3D-QSAR tool.
8. To draw a chemical entity by using chemdraw.

Department Elective- 5E

Course Code: BBII65A

  
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Course Name: Genomics analysis

**Course Outcomes:**

- CO-1: Student will be able to understand the basic concept of genome sequencing.  
CO-2: Student will be able to acquire the basic concepts of bioinformatics databases.  
CO3: Student will be able to understand the concept of gene expression.  
CO4: Students will be able to understand the different types of genomics.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	0	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	0
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

**Unit I**

Large scale genome sequencing strategies, Genome assembly and annotation, Genome databases of Plants, animals and pathogens, Metagenomics, Gene networks: basic concepts, computational model such as Lambda receptor and lac operon, Prediction of genes, promoters, splice sites, regulatory regions: basic principles, application of methods to prokaryotic and eukaryotic genomes and interpretation of results.

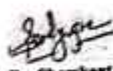
**Unit II**


Basic concepts on identification of disease genes, role of bioinformatics-OMIM database, reference genome sequence, integrated genomic maps, gene expression profiling; identification of SNPs, SNP database (DbSNP). Role of SNP in Pharmacogenomics, SNP arrays,

**Unit iii**

DNA microarray: database and basic tools, Gene Expression Omnibus (GEO), ArrayExpress, SAGE databases, DNA microarray: understanding of microarray data, normalizing microarray data, detecting differential gene expression, correlation of gene expression data to biological process and computational analysis tools (especially clustering approaches).

**Unit IV**

  
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105  








Comparative genomics: Basic concepts and applications, BLAST2, MegaBlast algorithms, PipMaker, AVID, Vista, MUMmer, applications of suffix tree in comparative genomics, synteny and gene order comparisons, Comparative genomics databases: Clusters of Orthologous Groups (COGs)

### Unit V

Functional genomics: Application of sequence based and structure-based approaches to assignment of gene functions – e.g., sequence comparison, structure analysis (especially active sites, binding sites) and comparison, pattern identification, etc.

#### Reference:

1. D. Baxivanis and Foulette - Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley Indian Edition, 2001.

Course code: BBI166A

Course name: Practical on Genomics analysis

1. To retrieve whole genome from genome database.
2. To perform FASTQC analysis with reference to given genomic sequences.
3. To perform metagenomic analysis by using MG-RAST.
4. To perform string analysis for protein-protein interaction studies.
5. To retrieve the whole genome sequences from ncbi database and study the containing ORF regions in particular genome.
6. Identify the Genes present if any in the given genomic sequence NC\_010456.
7. To study genome assembly and gene annotation tools.
8. To view human genome in ENTEZ map viewer.

Department Elective-6E

Course Code: BBI167A

Course Name: Advance in Bioinformatics

#### Course Outcomes:

CO-1: Student will able to understand the basic concept of SNPs.

CO-2: Student will able to acquire the basic concepts of proteomics.

CO3: Student will able to understand the concept of drug designing and drug development.

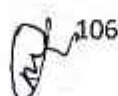
CO4: Students will be able to understand the vaccine design.

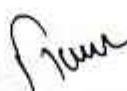
#### Mapping of PO/CO



CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
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106



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CO1	3	2	0	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	0
CO4	3	2	3	2	3	1	1

9. 1-LOW, 2-MEDIUM, 3-HIGH

### Unit I

Use of various derived databases in function assignment, use of SNPs for identification of genetic traits, Gene/Protein function prediction using Machine learning tools: supervised/unsupervised learning, Neural network, SVM etc

### Unit II

Proteomics Protein arrays: basic principles, Computational methods for identification of polypeptides from mass spectrometry, Protein arrays: bioinformatics-based tools for analysis of proteomics data (Tools available at ExPASy Proteomics server); databases (such as InterPro) and analysis tools Protein-protein interactions: databases such as STRINGS, DIP, PPI server and tools for analysis of protein-protein interactions,

### Unit III

Modeling biological systems, Systems biology – Use of computers in simulation of cellular subsystems, Metabolic networks, or network of metabolites and enzymes, Signal transduction networks, Gene, regulatory networks, Metabolic pathways: databases such as KEGG, EMP, MetaCyc, AraCyc Drug design Drug discovery process, Role of Bioinformatics in drug design, Target identification and validation and lead optimization, Different systems for representing chemical structure of small molecules like SMILES etc, Generation of 3D coordinates of small molecules,

### Unit IV

Structure-based drug design: Identification and Analysis of Binding sites and virtual screening, Ligand based drug design: Structure Activity Relationship – QSARs and QSPRs, QSAR Methodology, Pharmacophore mapping, In silico prediction ADMET properties for Drug Molecules

### Unit V

Vaccine design: Reverse vaccinology and immunoinformatic, Databases in Immunology, Principles of B-cell and T-cell epitope prediction.

  
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107  














Course code: BBI168A

Course name: Advance in Bioinformatics practical lab

1. Biological Databases with Reference to Expasy and NCBI.
2. To find out the SNP information of a given protein sequence by using predictsnp server.
3. To predict MHC and B-cell epitope regions in given protein sequences.
4. To perform ADMET analysis of chemical compounds.
5. To find out the QSAR (quantitative structural relationship) between the pharmacophores.
6. To perform in silico cloning by using snapgene.
7. To analysis the active sites in a given target proteins.
8. To study the metabolic networks by using string.

Department Elective- 7E

Course Code: BBI169A

Course Name: *In Silico* drug designing

Course Outcomes:

CO-1: Student will able to understand the basic concept of CADD.

CO-2: Student will able to acquire the basic concepts of QSAR.

CO3: Student will able to understand the concept of drug designing and drug development.

CO4: Students will be able to understand the Pharmacophore mapping.

Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	0	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	0
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

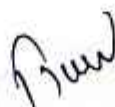
Unit I

Introduction to Computer Aided Drug Design (CADD) History, different technique sand applications  
Quantitative Structure Activity Relationships: Basics History and development of QSAR:  
Physicochemical parameters and methods to calculate physicochemical parameters: Hammett equation  
and electronic parameters (sigma), lipophilicity effects and parameters (log P, pi substituent constant),  
steric effects (Taft steric and MR parameters) Experimental and theoretical approaches for the  
determination of these physicochemical parameters.

  
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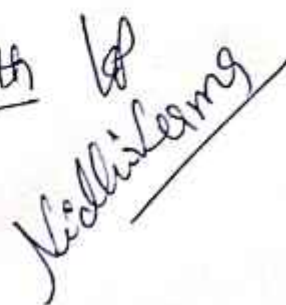












## Unit II

Quantitative Structure Activity Relationships: Applications Hansch analysis, Free Wilson analysis and relationship between them, Advantages and disadvantages; Deriving 2D-QSAR equations 3D-QSAR approaches and contour map analysis Statistical methods used in QSAR analysis and importance of statistical parameters.

## Unit III

Molecular Modeling and Docking: Molecular and Quantum Mechanics in drug design, Energy Minimization Methods: comparison between global minimum conformation and bioactive conformation, Molecular docking and drug receptor interactions: Rigid docking, flexible docking and extra-precision docking. Agents acting on enzymes such as DHFR, HMG-CoA reductase and HIV protease, choline esterase (AChE & BChE).

## Unit IV

Molecular Properties and Drug Design: Prediction and analysis of ADMET properties of new molecules and its importance in drug design. De novo drug design: Receptor/enzyme-interaction and its analysis, Receptor/enzyme cavity size prediction, predicting the functional components of cavities, Fragment based drug design. Homology modelling and generation of 3D-structure of protein.

## Unit V

Pharmacophore Mapping and Virtual Screening Concept of pharmacophore, pharmacophore mapping, identification of Pharmacophore features and Pharmacophore modeling; Conformational search used in pharmacophore mapping In Silico Drug Design and Virtual Screening Techniques Similarity based methods and Pharmacophore based screening, structure based In-silico virtual screening protocols.

### REFERENCES:

1. Computational and structural approaches to drug discovery, Robert M Stroud and Janet F Moore, RCS Publishers.
2. Introduction to Quantitative Drug Design by Y.C. Martin, CRC Press, Taylor & Francis group.
3. Drug Design by Ariens Volume 1 to 10, Academic Press, 1975, Elsevier Publishers.
4. Principles of Drug Design by Smith and Williams, CRC Press, Taylor & Francis.
5. The Organic Chemistry of the Drug Design and Drug action by Richard B. Silverman, Elsevier Publishers.
6. Medicinal Chemistry by Burger, Wiley Publishing Co
7. An Introduction to Medicinal Chemistry - Graham L. Patrick, Oxford University Press.

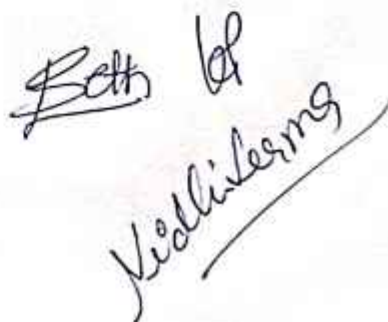
  
Dr. Shamkant B. Hedgkhar



 109









8. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, Ippincott Williams & Wilkins.

9. Comprehensive Medicinal Chemistry – Corwin and Hansch, Pergamon Publishers.

10. Computational and structural approaches to drug design edited by Robert M Stroud and Janet. F Moore

Course code: BBI170A

Course name: practical on *In Silico* drug designing

1. To perform ADMET analysis of chemical compounds.
2. To find out the QSAR (quantitative structural relationship) between the pharmacophores.
3. To perform string analysis for protein-protein interaction studies.
4. To perform loop modelling of generated 3D model of target proteins.
5. To perform threading modelling by using different computational tools.
6. To install GROMACS a molecular dynamics platform.
7. To perform 3D-QSAR by using online 3D-QSAR tool.
8. To draw a chemical entity by using chemdraw.
9. To perform molecular docking and dynamics calculation by online servers.

Track -F

Department Elective- 1F

Course Code: BBI171A

Course Name: Nanoscience and Nanotechnology

### Course outcome

CO-1 Students will be able to understand the basics nanotechnology

CO-2 Students will be able to illustrate the historical aspects of nanomaterials uses, discoveries, and involvement of various scientists.

CO-3 Students will be able to explain the importance of physicochemical parameters of nanoparticles and their characterization.

CO-4 Students will be able to evaluate the uses of nanotechnology in all the area.

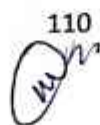
### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

  
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110  






### Unit 1

Basic nanotechnology: Nanotechnology definition, history of nanotechnology, application of nanotechnology, nanotechnology as modern technology, introduction to nanomaterials. unique properties of nanomaterials.

### Unit 2

Historical aspects of nanomaterials: uses since centuries, definition of nanomaterials, differences between bulk form of materials and nanomaterials, contribution of different scientists, Theory by *Richard Feynman* supporting the Era of nanotechnology, Role of *Eric drexler* in nanotechnology

### Unit 3

Synthesis of nanomaterials: 'Top down' vs. 'Bottom up' approaches, physicochemical properties of nanomaterials, Classifications and types of nanomaterials as nano particles and 1D, 2D, and, 3D nanomaterials.

### Unit 4

Understanding of physicochemical properties, (Size, shape, surface charge, hydrophobicity, hydrophilicity. role of surface functionalization on nanoparticles, Impact in toxicological studies, ways to overcome the toxicity of nanomaterials

Course Code: BBI 172A

Course Name: Practical of nanotechnology

- 6- Aqua-regia washing of glassware's for nanomaterial synthesis.
- 7- Nanomaterial synthesis AgNPs using amino acids.
- 8- Dialysis of synthesized nanoparticles.
- 9- Visual observation of nanoparticles, understanding of optical properties.

### Reference Books

1. Nanoscience in Medicine Vol. 1, Springer.
2. Text book of Nanoscience and Nanotechnology by B S Murty, P Shankar, Baldev Raj, B B Rath, James Murday, Springer
3. An Introduction to Nanoscience and Nanotechnology by Alain Nouailhat, Wiley.
4. Nanoscience volume 8 by Royal Society of Chemistry.



Department Elective- 2F

Course Code: BBII73A

Course Name: Nanotechnology in material science

### Course outcome

  
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  111     
 



CO-1 Students will be able to understand the basics nanotechnology including the scientific discoveries, and different types of effects on the surface to volume.

CO-2 Students will be able to illustrate the classification of nanoparticles, synthesis approaches and properties of nanoparticles.

CO-3 Students will be able to explain the properties of nanomaterials.

CO-4 Students will be able to evaluate the including carbon based and metal oxide.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

#### **Unit 1**

Background to nanoscience and nanotechnology - scientific revolutions - nanosized effects surface to volume ratio- – atomic structure – molecules & phases – energy at the nanoscale molecular and atomic size -quantum effects- types of nanotechnology and nano machines.

#### **Unit 2**

Definition of a nano system - classification of nanocrystals - dimensionality and size dependent phenomena; Quantum dots, Nanowires and Nanotubes, 2D films; Nano & mesopores – top down and bottom up- Misnomers and misconception of Nanotechnology importance of the nanoscale materials and their devices -size dependent variation in mechanical, physical and chemical, magnetic, electronic transport, reactivity etc.

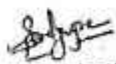
#### **Unit 3**

Nanostructured materials-metal-semiconductor-ceramics and composites- size dependent properties - uniqueness in these properties compared to bulk and microscopic solids- nanomaterials and nanostructures in nature- super hydrophobicity, self-cleaning - antifogging.

#### **Unit 4**

Recent special nanomaterials - Carbon based nanomaterials – CNT- graphene- core-shell structures- Micro and Mesopores Materials- Organic-Inorganic Hybrids- ZnO- Silicon --DNA- RNA- Nanoproducts.

References:



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112













1. "Nanostructures & Nanomaterials: Synthesis, Properties & Applications" G. Cao, Imperial College Press, 2004,
2. Nanomaterials, Nanotechnologies and Design: An introduction for engineers and Architects, Micheal P. Ashby, P.J. Ferreria, D.L. Schodek,
3. Introduction to Nanoscience and Nanotechnology, Gabor J. et al,
4. Fundamentals of Nanotechnology, Hornyak, G. Louis, Tibbals, H. P., Dutta, Joydeep, CRC Press, 2009
5. Nanomaterials: An introduction to synthesis, properties and application, Dieter Vollath, WILEY-VCH, 2008

**Course Code: BBI 174A**

**Course Name: Synthesis and characterization of metallic nanoparticles**

- 1- Washing of glassware's for nanomaterial synthesis.
- 2- Synthesis of AgNPs nanoparticles using Plant extract.
- 3- Visual observation of nanoparticles, understanding of optical properties.
- 4- Characterization of synthesized using UV-visible, SEM, TEM techniques.
- 5- Biomedical application of synthesized nanoparticles-antimicrobial activity.

**Department Elective- 3F**

**Course Code: BBI175A**

**Course Name: Instruments in Nanotechnology**

### Course outcome

- CO-1 Students will be able to understand the risk associated toxicity due to nanoparticles.  
 CO-2 Students will be able to illustrate the toxicity of nanosized particles in biological membranes.  
 CO-3 Students will be able to explain the adverse impact of nanoparticles on the environment.  
 CO-4 Students will be able to evaluate the uses of nanotechnology in all the area.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

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### Unit 1

Principles, Overview of Instrumentation and Sample preparation, Experimental techniques adopted in: Scanning Electron Microscopy: SEM and FESEM -Transmission Electron Microscopy (TEM) – HRTEM- application for analysis of Nanomaterials.

### Unit 2

Scanning Tunnelling Microscopy (STM), Atomic Force Microscopy (AFM)-Non-contact contact- Tapping- conducting mode-.Near Field Scanning Optical Microscopy; Scanning capacitance Microscopy- Scanning Microwave Microscope- Magnetic Force Microscopes (MFM)- Chemical Force Microscope (CFM)- Applications for analysis of nanomaterials .

### Unit 3

Optical and Confocal microscopes- Use of polarized light microscopy – Phase contrast microscopy – Interference Microscopy – hot stage microscopy - surface morphology – Etch pit density and hardness measurements. -Confocal Microscopes - Confocal Raman – Application in Nanobiotechnology. Fluorescence Microscope

### Unit 4

Principle and Instrumentation of Thermogravimetry; Differential Thermal Analysis and Differential scanning calorimetry-Importance of thermal analysis for nanostructures. New Advances and challenges in biological and biomedical materials characterizations- Dynamic light scattering spectroscopy.

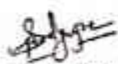
### References:

1. J.Goldstein, D. E. Newbury, D.C. Joy, and C.E. Lym, "Scanning Electron Microscopy and X-ray Microanalysis", 2003.
2. S.L. Flegler, J.W. Heckman and K.L. Klomparens, "Scanning and Transmission Electron Microscopy: An Introduction", WH Freeman & Co, 1993.
3. P.J.Goodhew, J.Humphreys, R.Beanland, "Electron Microscopy and Analysis",
4. R.Haynes, D.P.Woodruff and T.A.Talchar, "Optical Microscopy of Materials", Cambridge University press, 1986.
5. R.M.Rose, L.A.Shepard and J.Wulff, "The Structure and Properties of Materials", Wiley Eastern Ltd,

Course Code: BBI 176A

Course Name: Characterization of Pt nanoparticles

- 1- Washing of glassware's for nanomaterial synthesis.
- 2- Nanomaterial synthesis Pt nanoparticles using amino acids.
- 3- Surface modification of synthesized nanoparticles by using antibiotics.

  
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- 4- Characterization of synthesized and surface modify nanoparticles using sophisticated instruments.
- 5- Estimation of antimicrobial and antioxidant activity of synthesized nanoparticles.

Department Elective- 4F

Course Code: BBI177A

Course Name: Toxicity in Nanotechnology

### Course outcome

CO-1 Students will be able to understand the risk associated toxicity due to nanoparticles.

CO-2 Students will be able to illustrate the toxicity of nanosized particles in biological membranes.

CO-3 Students will be able to explain the adverse impact of nanoparticles on the environment.

CO-4 Students will be able to evaluate the uses of nanotechnology in all the area.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

### Unit I

Introduction – Definition of terms-Toxicity-Hazards and hazard types-risk and assessment of risk.

### Unit II

Mechanism of Nano size particle toxicity-Passage through biological membranes-toxicokinetic

### Unit III

Nano pollution – Nanomaterials in environment-sources of pollution-transport through environment

### Unit IV

Different regulatory bodies associated with the control of nanoparticle toxicity.

  
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115















## References:

1. Nanotechnology: Health and Environmental Risks, Jo Anne Shatkin, CRC Press, 2008
2. Nanotechnology: Environmental Health and Safety, Risks, Regulation and Management, Matthew Hull and Diana Bowman, Elsevier, 2010
3. Principles and Methods of Toxicology. Edited by A.W. Hayes. Taylor and Francis, 2008.

**Course Code: BBI 178A**

**Course Name: Estimation of PtNPs toxicity**

1. Washing of glassware's for nanomaterial synthesis.
2. Nanomaterial synthesis PtNPs using amino acids.
3. Surface modification of synthesized nanoparticles by using antibiotics.
4. Visual observation of nanoparticles, understanding of optical properties.
5. Characterization of synthesized and surface modify nanoparticles.
6. Estimation of antimicrobial and antioxidant activity of synthesized nanoparticles.

**Department Elective- 5F**

**Course Code: BBI179A**

**Course Name: Surface science in Nanotechnology**

## Course outcome

CO-1 Students will be able to understand the fundamentals of nanotechnology

CO-2 Students will be able to illustrate the size and shape dependent properties of nanomaterials

CO-3 Students will be able to explain the classification of nanomaterials

CO-4 Students will be able to evaluate the stabilization of nanomaterials

## Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

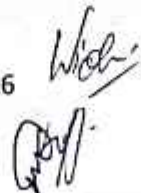
1-LOW, 2-MEDIUM, 3-HIGH

Unit I

  
Dr. Shambhaji B. Badgujar



116







History of Nanotechnology, Feynmann's vision on Nano Science & technology, bulk vs nanomaterials. Central importance of nanoscale morphology - small things making big differences, nanotechnology as nature's technology, clusters and magic numbers, nanoscale architecture. Recent developments, challenges and future prospects of nanomaterials.

## Unit 2

Size and shape dependent properties, Melting points and lattice constants, Surface Tension, density of states, Wettability - Specific Surface Area and Pore - Composite Structure - Mechanical properties, Optical properties: Surface plasmon resonance in metal nanoparticles and quantum size effect in Semiconductors, Electrical conductivity: Surface scattering, change of electronic structure, quantum transport, effect of microstructure, Magnetic properties: Ferroelectrics, dielectrics and superparamagnetism.

## Unit 3

Classification based on the dimensionality, Zero-dimensional nanostructures: metal, semiconductor and oxide nanoparticles. One-dimensional nanostructures: nanowires and nanorods, Two-dimensional nanostructures: Thin films, Three-dimensional nanomaterials, Special Nanomaterials: Carbon fullerenes and carbon nanotubes, micro and mesoporous materials, core-shell structures, organic-inorganic hybrids.

## Unit 4

Surface science for nanomaterials, surface energy, stabilization mechanisms, electrostatic - Nernst Equation, electric double layer, Debye-Huckel Screening strength. Interaction between nanoparticles - DLVO Theory, steric stabilization and electrosteric stabilization, nucleation and growth of nuclei, critical radius, homogenous and heterogeneous nucleation.



## References/compulsory reading

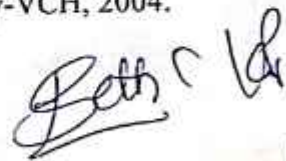

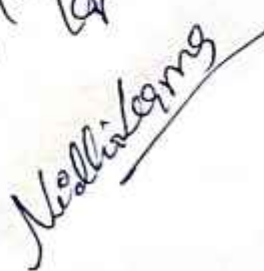
1. G. Cao and Y. Wang, Nanostructures and Nanomaterials, 2nd Ed., Imperial College Press, 2004.
2. R. Kelsall, I. Hamley and M. Geoghegan, Nanoscale Science and Technology, Wiley, 2005.
3. K. J. Klabunde, R. M. Richards, Nanoscale Materials in Chemistry, 2nd Ed., Wiley, 2009.
4. T. Pradeep, A text book of Nano Science and Technology, Tata McGraw-Hill Education, 2012.
5. G. Schmidt, Nanoparticles: from Theory to applications, Wiley-VCH, 2004.

  
Dr. Shankar B. Badgujar



117



6. Murty, B. S., P. Shankar, Baldev Raj, B. B. Rath, and James Murday. Textbook of Nano Science and nanotechnology. Springer Science & Business Media, 2013.

7. Robert K, Ian H, Mark G, Nanoscale Science and Technology, John Wiley & sons Ltd.,2005.

**Course Code: BBI 180A**

**Course Name: Surface studies in Nanotechnology**

- 1- Washing of glassware's for nanomaterial synthesis.
- 2- Synthesis of different sized Ag nanoparticles by aqueous method and their optical microscopy studies
- 3- Synthesis of different sized Au nanoparticles by aqueous method and their optical microscopy studies
- 4- Biomedical application of synthesized nanoparticles-antimicrobial activity and anti-tumor activity.

**Department Elective- 6F**

**Course Code: BBI181A**

**Course Name: Methods of synthesis in Nanotechnology**

**Course outcome**

CO-1 Students will be able to understand the physical methods for synthesis of nanomaterials

CO-2 Students will be able to illustrate the chemical methods of nanoparticle synthesis

CO-3 Students will be able to explain the biological methods of nanoparticle synthesis

CO-4 Students will be able to evaluate the lithographic technique for fabrication of nanomaterials

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

Unit 1

  
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Inert gas condensation, arc discharge, RF plasma, ion sputtering, laser ablation, laser pyrolysis, layer deposition ball milling, Spray pyrolysis, Microwave irradiation Gamma radiation, ion implantation, molecular beam epitaxy, Physical Vapour deposition, chemical vapour deposition method and Electrospinning

## Unit 2 Chemical Methods for synthesis of nanomaterials

Chemical methodologies, their advantages, nanoparticles, 1D-nanostructures-Nanowires, nanotubes and nanorods; 2D-nanostructures-thin films-Nanoparticles through homogeneous & heterogenous nucleation in solution, co-precipitation, chemical reduction, hydrothermal and solvothermal synthesis, template based synthesis, electrochemical synthesis, sonochemical synthesis, polyol method, sol-gel synthesis, micelles and microemulsion assisted synthesis, thermal decomposition, self-assembly methods and Langmuir Blodgett (LB) method.

## Unit 3 Biological Methods for synthesis of nanomaterials

Use of bacteria, fungi, actinomycetes and algae for nanoparticle synthesis, natural synthesis of magnetic nanoparticles using magnetotactic bacteria, viruses as components for the formation of nanostructured materials, role of plant derivatives in nanoparticle synthesis. Nanoparticle synthesis with the help of enzymes and biomolecules, nanomaterial synthesis from industrial or agricultural wastes

## Unit 4 Lithographic Techniques for fabrication of nanomaterials

Electron beam lithography, SEM based nanolithography, X-ray lithography, focused ion beam lithography, near field scanning optical microscopy, AFM lithography, dip pen lithography.

## References

1. Nanostructures and Nanomaterials- Synthesis, Properties & applications by Guozhong Cao , Imperial college Press, (2006). Publisher: World Scientific Publishing Company; 2 edition (4 January 2011) ISBN-13: 978-9814324557
2. An introduction to Electrospinning and Nanofibers by Seeram Ramakrishna, Kazutoshi Fujihara, Wee Eong Tee, Teck Cheng Lim, Zaveri Ma, World Sci. Pub. Ltd. Singapore, 2005. Publisher: World Scientific Publishing Co Pte Ltd (8 May2005) ISBN-13: 978-9812564542
3. Springer Handbook of Nanotechnology - Bharat Bhushan Publisher: Springer-Verlag (15 May 2006) ISBN-13: 978-3540343660

  
Dr. Shankar B. Badgujar



119



4. Introduction to Nano Science & Nanotechnology by Gabor L. Hornyak, Harry F. Tibbals, Joydeep Dutta, John J. Moore, CRC Press, Tylor & Francis Group New York, 2009. Publisher: CRC Press (15 December 2008) ISBN-13: 978-1420047790

5. Introduction to Nanoscale Science & Technology, Di Ventra, Evoy, Heflin, Springer Science, NY, 2004. Publisher: Springer; 1 edition (30 June 2004)

6. Nanofabrication- Fundamentals and Applications, By Ampere A Tseng, Singapore 2008. Publisher: World Scientific Publishing Co Pte Ltd (18 March 2008) ISBN-13:978-9812705426

7. Nanoparticles and Nanostructured Films- Preparation Characterization and Applications by Janos H. Fendler, WILEY-VCH Verlag GmbH, D-69469 Weinheim (Federal Republic of Germany), 1998. Publisher: Wiley VCH (28 May 1998) ISBN13: 978-3527294435

8. Introduction to Nanotechnology - Charles P. Poole Jr. and Franks. J. Qwens, Publisher: Wiley-Interscience; 1 edition (30 May 2003) Sold by: Amazon AsiaPacific Holdings

**Course Code: BBI 182A**

**Course Name: Properties estimation of metallic nanoparticles**

- 1- Washing of glassware's for nanomaterial synthesis.
- 2- Synthesis of different sized Ag nanoparticles by aqueous method and their optical microscopy studies
- 3- Synthesis of different sized Au nanoparticles by aqueous method and their optical microscopy studies
- 4- Biomedical application of synthesized nanoparticles-antimicrobial activity and anti-tumor activity.

**Department Elective- 7F**

**Course Code: BBI183A**

**Course Name: Bio nanotechnology and application**

**Course outcome**

- CO-1 Students will be able to understand the basic of biotechnology  
CO-2 Students will be able to illustrate the lipid and DNA technology  
CO-3 Students will be able to explain the importance of bio nanocomposites  
CO-4 Students will be able to evaluate the characterization methods for nanobiomaterials.

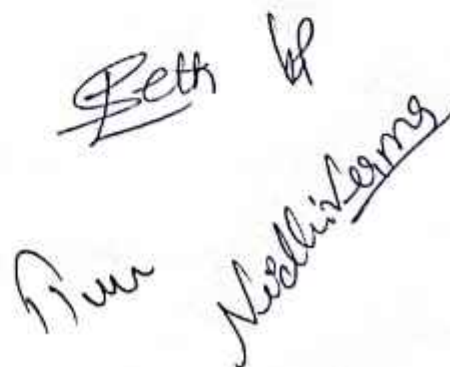
**Mapping of PO/CO**

  
Dr. Shankant B. Badgujar



120





CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

#### Unit 1. Basics of biotechnology

Biology inspired concepts - biological networks – biological Neurons – the function of neuronal cell – biological neuronal cells on silicon modeling of neuronal cells by VLSI circuits – bioelectronics – molecular Processor – DNA analyzer as biochip – molecular electronics

#### Unit 2. Lipid and DNA Technology

Nano-biometrics - introduction – lipids as nano-bricks and mortar: self-assembled nanolayers – the bits that do think – proteins – three dimensional structures using a 20 amino acid – biological computing – A Protein based 3D optical memory using DNA to build nano cubes and hinges - DNA as smart glue – DNA as wire template – DNA computer.

#### Unit 3. Bio nanocomposites

Natural nano composites - introduction – natural nano composite materials – biologically synthesized nano structures – biologically derived synthetic nano composites – protein based nanostructure formation – biologically inspired nano composites. Nanotechnology in Agriculture (Fertilizers and pesticides).

#### Unit 4. Characterization methods for Nano biomaterials

Nanoanalytics - quantum dot biolabeling – nanoparticle molecular labels – analysis of biomolecular structure by AFM and molecular pulling-force spectroscopy– biofunctionalized nanoparticles for SERS and SPR.

#### References

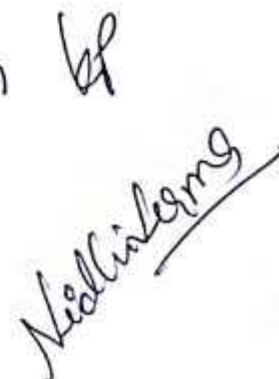
  
Dr. Shankar B. Badgujar













1. Nanoelectronics and Nanosystems: From transistors to molecular devices. K.Goser, P. Glosekotter, J. Dienstuhl, Springer (2004).
2. Nanotechnology: basic science and emerging technologies – Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
3. Nanobiotechnology: Concepts, Applications and Perspectives, Christof M. Niemeyer, / Chad A. Mirkin, (eds.), Wiley-VCH, Weinheim, (2004)
4. Bionanotechnology : Lessons from Nature, by: David S. Goodsell, Wiley-Liss (2004)
5. NanoBiotechnology Protocols, Sandra J Rosenthal, David W. Wright, Series: Methods in Molecular Biology, (2005)
6. Protein Nanotechnology, Protocols, Instrumentation, and Applications, Tuan Vo-Dinh, Series: Methods in Molecular Biology (2005).

**Course Code: BBI 184A**

**Course Name: Determination of bio-interfacial interaction of nanoparticles**

- 1- Washing of glassware's for nanomaterial synthesis.
- 2- Green-synthesis of silver nanoparticles.
- 3- Surface modification of synthesized nanoparticles antioxidants.
- 4- Visual observation of nanoparticles, understanding of optical properties.
- 5- Characterization of synthesized and surface modify nanoparticles.
- 6- Biomedical application of synthesized nanoparticles-antimicrobial activity.

**B.Sc. Biotechnology  
Course – Open Electives  
Lectures: 3 Hrs/week**

**Open Elective- 1**

**Course Code: BBI091**

**Course Name: Basics of Bioinformatics**

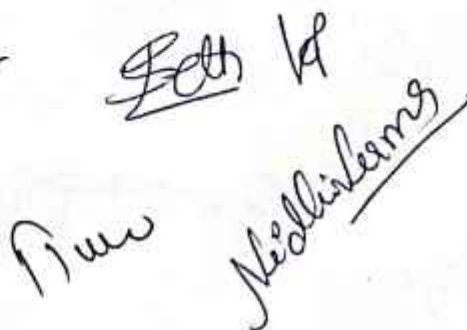
<b>UNIT 1</b>	<b>Introduction to Bioinformatics</b>
<b>UNIT 2</b>	<b>Biological Database</b>
<b>UNIT 3</b>	<b>Sequence Alignment</b>

  
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122







### Course outcome

- CO-1 Students will be able to explain basics of bioinformatics including different tools and software's.
- CO-2 Students will be able to have knowledge of different databases
- CO-3 Students will be able to perform alignment of sequences

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	L	M	M	L	M	M
CO2	M	L	L	M	L	L	L
CO3	H	M	M	L	M	M	M

L – LOW, M- MEDIUM, H-HIGH

Course- Open Elective-1 (Basics of Bioinformatics)

Credits-3

#### Unit I

Introduction to bioinformatics and data generation, Bioinformatics and its relation with molecular biology, Examples of related tools (FASTA, BLAST, BLAT, RASMOL), databases (GENBANK, Pubmed, PDB) and software (RASMOL, Ligand Explorer). Data generation; Generation of large scale molecular biology data. (Through Genome sequencing, Protein sequencing, Application of Bioinformatics.

#### Unit II

Biological Database and its Types Introduction to data types and Source. Population and sample, Classification and Presentation of Data. Quality of data, private and public data sources. General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL). Protein databases (Primary, Composite, and Secondary). Specialized Genome databases: (SGD, TIGR, and ACeDB). Structure databases (CATH, SCOP, and PDBsum)

#### Unit III

Sequence Alignments and Visualization Introduction to Sequences, alignments and Dynamic Programming; Local alignment and Global alignment (algorithm and example), Pairwise

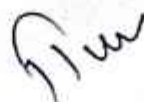
  
Dr. Shankar B. Redgejer





123







alignment (BLAST and FASTA Algorithm) and multiple sequence alignment (Clustal W algorithm).

#### Text / Reference Book

- 1- Xiong Jin, Essential Bioinformatics, Wiley-Blackwell Publisher, 2007
- 2- S.C. Rastogi, N. Mendiratta and P. Rastogi, Bioinformatics- Methods and Application, 2010,
- 3- R. Amjesh and S.S. Vinodchandra, Bioinformatics for Beginners, Lambert Publisher, 2019,
- 4- Stephen Misener, Stephen A. Krawetz, Bioinformatics- Methods and Protocols, Humana Press, 2010

#### Open Elective- 2

Course Code: BBI037B

Course Name: Medical Biotechnology

UNIT 1	Gene therapy
UNIT 2	Stem cell culture technology
UNIT 3	Xenotransplantation
UNIT 4	Disease diagnosis techniques

#### Course outcome

CO-1 Students will be able to explain basic concepts of gene therapy. Describe the expression of cloned proteins in animal cells. Explain methods and various types of gene delivery models.

CO-2 Students will be able to explain the concept of stem cell culture technology and tissue engineering. Describe application of stem cell culture in modern medical science.

CO-3 Students will be able to explain xenotransplantation technique and production.

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	2	1	2

  
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124




CO2	3	3	3	2	3	3	2
CO3	3	3	3	1	1	2	1
CO4	3	3	3	2	2	2	2

1 – LOW, 2- MEDIUM, 3-HIGH

## BBI037B: Open Elective-2 (Medical Biotechnology)

Credit(s): 3

### Unit-I

Gene therapy-background, types of gene therapy (*ex vivo* & *in vivo*), choosing targets for gene therapy, vectors in gene therapy, retroviruses, adenoviruses, adeno-associated viruses, types of gene delivery, Weismann barrier (soma-to-germ line barrier), epigenetic inheritance, problems & ethics. Gene Delivery methods-Viral delivery (through Retroviral vectors, through Adenoviral vectors), Non-viral delivery,

### Unit-II

Stem cell culture technology- introduction to stem cell types of stem cells, application of stem cells in modern medical science. Tissue Engineering – Skin, Liver, Pancreas, therapeutic Ribozymes, synthetic drugs.

### Unit-III

Xenotransplantation – terminology, technology behind it, organ donors, social & ethical issues; Production of artificial tissues or organs; Cell Adhesion-based therapy- integrins, inflammation, cancer & metastasis; Drug designing, Drug delivery and targeting: conventional & new approaches to drug delivery.

### Unit-IV

Disease diagnosis technique; ELISA, RIA, RIEP, ODD, RID, FISH, GISH, IMMUNO FLUORESCENCE

### Text / Reference Book

1. R. Ananthanarayanan and C. K. JayaramPaniker; Text Box of Microbiology, Orient Longman.
2. Baron EJ, Peterson LR and Finegold SM Mosby; Bailey and Scott's Diagnostic Microbiology.
3. Roitt, I. M.; Essential immunology, 1995, Blackwell Scientific Publications Oxford.
4. W.E. Paul; Fundamental immunology, 1984, Raven Press, New York.
5. R.M. Coleman, M.F. Lombord and R.E. Sicarc; Fundamentals of immunology, 1992, 2nd Edition, C. Brown publishers.
6. D.M. Weir and J Steward; Immunology, 7<sup>th</sup> Edition, 1993.

  
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125





7. Broude A.I.; Medical Microbiology and Infectious Diseases, W.B. Saunders & Co. Philadelphia.
8. Ian R. Tizzard ; An Introduction to Immunology, 4<sup>th</sup> Edition, Brooks/Cole.

Open Elective- 3

Course Code: BBI092

Course Name: Molecular Marker Technology

UNIT 1	Molecular Markers Types
UNIT 2	Mapping Population
UNIT 3	Application of Molecular marker in breeding

#### Course outcome

- CO-1 Students will be able to explain different types of molecular markers  
 CO-2 Students will be able to describe the usage of molecular marker in gene mapping  
 CO-3 Students will be able to explain application of molecular markers

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	1	1
CO2	3	3	3	1	2	2	2
CO3	3	3	3	2	1	2	3

1 – LOW, 2- MEDIUM, 3-HIGH

Course- Open Elective-3 (Molecular Marker Technology- BBI092)

Credits-3

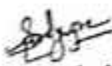
#### UNIT I

Types of molecular markers- RFLP; PCR based markers like RAPD, SCAR, SSR, STS, CAPS, AFLP, SNP and their variants

#### UNIT-II

Uses of molecular markers: Application as a genetic tool for genotyping and gene mapping; Mapping populations: F<sub>2</sub>, DH, RILs, NILs; Bulk segregant analysis; Linkage maps; Physical maps.

#### UNIT III

  
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126









Application of molecular markers: Assessing genetic diversity, variety protection; Marker assisted breeding for accelerated introgression of trait/transgene and quantitative traits; Human and animal health: Association with genetic-based diseases, Paternity determinations; Forensic studies.

#### Text / Reference Books

1. H. C. Chawla. An Introduction to Plant Biotechnology, Oxford and IBH, 2002.
2. S. Srivastava and A. Narula. Plant Biotechnology and Molecular markers, Springer, 2005.
3. Robert J. Henry. Molecular Markers in Plants, John Wiley & Sons, 2012
4. B.D. Singh. Biotechnology- Expanding Horizons, Kalyani

#### Open Elective- 4

Course Code: BBI093

Course Name: Biotechnology and Business management

UNIT 1	Fundamental of Biotechnology and Genetic Engineering
UNIT 2	Drug discovery and Vaccine production
UNIT 3	Entrepreneurship and Commercialization

#### Course outcome

CO-1 Students will be able understand the overview Biotechnology and Genetic engineering process

CO-2 Students will be able to acquaint with various drug discovery processes

CO-3 Student will be able to explain the entrepreneurship process and commercialization of product

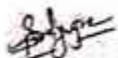
#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	1	1	2
CO2	3	3	3	2	2	2	2
CO3	3	3	3	2	3	2	1

1-LOW, 2-MEDIUM, 3-HIGH

BBI093- Biotechnology and Business Management

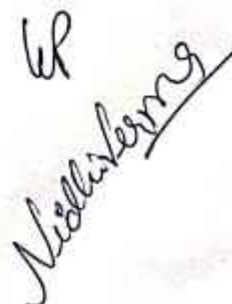
Credit- 3

  
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127







## Unit 1

Basics of Biotechnology technology in plants, animals and medical field; Industrial Fermentation technology- definition, stages of fermentation, designing of bioreactors, fermentation products, amino acids, alcohols, organic acids, polysaccharides, Biofuels.

Application of rDNA technology, Human genome project and its application, Gene therapy prospect and future, DNA vaccine, Transgenic plants, Current production of rDNA products

## Unit 2

Drug designing, Drug delivery and targeting: conventional & new approaches to drug delivery, Gene therapy- background, types of gene therapy (ex vivo & in vivo), choosing targets for gene therapy, vectors in gene therapy, retroviruses, adenoviruses, adeno-associated viruses, types of gene delivery.

## Unit 3

Worldwide market scenario of Biotechnology based business, Biobusiness prospective in India, Management process & organization, general analysis of Indian Biobusiness, Project formulation and selection based on size, Technological assessment, Technical report, feasibility and commercial viability of project

## Books/ References

- 1- A.L. Demain and N.A. Solomon, Manual of Industrial Microbiology and Biotechnology, 2008.
- 2- Craig Shimasaki, Biotechnology Entrepreneurship and Management, Academic Press.
- 3- Florentina Matei and Daniela Zirra, Introduction to Biotech Entrepreneurship: From Idea to Business, Springer
- 4- Benjamin E. Blass, Basic Principles of Drug Discovery and Development, Academic Press

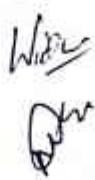
## Open Elective- 5

Course Code: BBI094

Course Name: Herbal Diet and Lifestyle

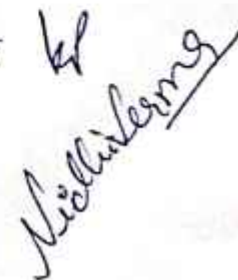
UNIT 1	Introduction to Traditional system of medicine
UNIT 2	Health and Medicine
UNIT 3	Life Style with Herbs

  
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### Course outcome

CO-1 Students will be able understand the overview Indian traditional medicine system

CO-2 Students will be able to acquaint with the relation with health and nutrition

CO-3 Student will be able to explain the importance of herbs in maintaining good life style

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	H	M	L	M	L	M	M
CO2	H	L	H	L	L	L	L
CO3	M	M	M	L	M	M	M

L-LOW, M-MEDIUM, H-HIGH

BBI094- Herbal Diet and Life Style

Credit- 3

### Unit 1

Introduction to Plants: Plants, India traditional system of medicine, classification, history, AYUSH and features, Indian Scenario, Global requirement and demand, Ayush industries in Rajasthan.

### Unit 2

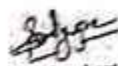
Usages and its application in human health: Health and Nutrition, Classification, benefits and uses, Yoga and Meditation, Food Habits values and supplements

### Unit 3

Life style with Herbs: Nutritional supplements, Fruits/food supplement, Importance of balanced nutrition and diet. Vocal for local



### Reference Books

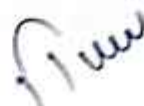
1. Thirugnanasambantham, et al. (2012). Introduction to Herbal Entrepreneurship, Rohini Institute of Alternative Medicine, 40/41, Spartan Avenue, Mugappair East, Chennai

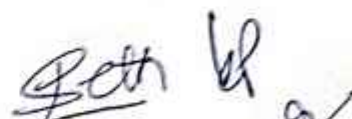
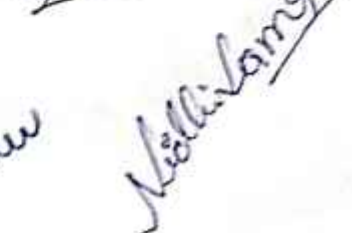
  
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129



**Course Name : Web Development**  
**Course Code DCA001A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
2	0	2	3

**Course Objectives:**

1. Students will be able to understand and be familiar with client server architecture.
2. Students will be able to understand and able to develop a web application using java technologies.
3. Students will be able to learn the skills and project-based experience needed for entry into web application.
4. Students will be able to learn the concepts of developing a dynamic webpage by the use of java script and CSS
5. Students will be able to learn the concept of XML, MySql and server side scripting.

**Syllabus**

**Unit -1**

HTML5 and CSS3 HTML5- Basic Tags, Tables, Forms, HTML5 Tags, HTML Graphics, HTML media, HTML Graphics, HTML APIs. CSS - Background, Borders, margin, Box model. Styling text, fonts, list, links, tables. CSS overflow, float, inline blocks, pseudoclasses, pseudoelements. CSS border images, rounded corners

**Unit-2**

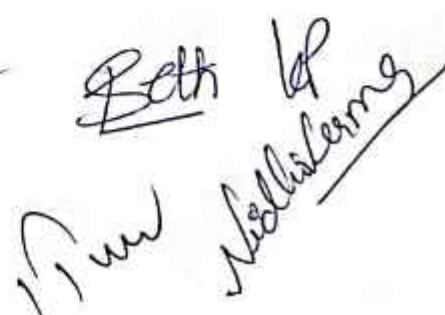
Java Script Client side scripting using java script, Introduction to java script, internal and external Java script files, variables, control statements, loops, Arrays, string handling, How to

  
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130







write functions in JavaScript, inputting and outputting from form elements to JavaScript. DOM concept, creating html elements using java script. Drawing 2D shapes, handling events. Introduction to AJAX

### Unit-3

Building Single page applications with Angular JS Single page application – Introduction , two way data binding, MVC in angular JS, controllers, getting user inputs , loops , Client side routing – accessing URL data , various ways to provide data in angular JS.

### Unit -4

Server Side Programming Server side scripting, Difference between client side and server side scripting languages. Introduction to PHP, variables, control statements, loops, Arrays, string handling, PHP forms, Global variables in PHP, Regular expression and pattern matching, Database programming: inputting and outputting data from MySQL using PHP, insertion , deletion and updating data. State management in web applications, cookies, Application and session state.

### Unit-5

Introduction to Xml, usage of XML, XML tags, elements and attributes, attribute type, XML validation: DTD and XSD, XML DOM Case study:-Application Development using Laravel framework

Textbook/Reference:

- The Complete Reference, HTML and CSS by Thomas A Powell latest edition

### Course Outcomes (CO)

After the completion of the course the student will be able to:

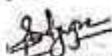
CO1: To create a dynamic webpage by the use of java script and DHTML.

CO2: To create a well formed / valid XML document.



CO3: To connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.

CO4. To create a server side java application called JSP to catch form data sent from client and store it on database.

CO5. To write a server side java application called servlet to catch form data sent from client, process it and store it on database

  
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Dr.

   
Nishikant



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2						
CO2	3						
CO3	2						
CO4	3						
CO5	2						

3 = Highly Related; 2 = Medium; 1 = Low

**Course Name : Web Development Lab**  
**Course Code DCA002A**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	1

**Course Name: Project Management Lab**  
**Course Code (DCA003A)**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	1

**Course Objective**

1. To learn to Create the project
2. To learn the Task Breakdown, and utilization of resources
3. To learn how to Assign resources, calculating costs

**Lab Exercise based on given topic**

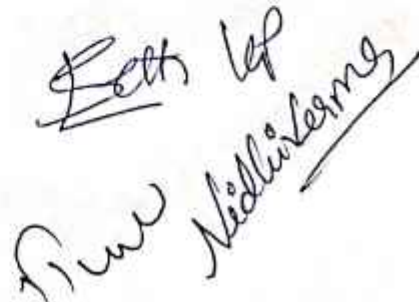
1. Introduction to Project Libre and Project Management
2. Overview of Project Libre
3. Introduction to Project Management terminology

  
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132





4. Tasks, Resources, and Costs
5. Installing Project Libre
6. Starting and Saving Projects
7. Navigation
8. Create a Project
9. Tasks
10. Resources
11. Cost
12. Calendars
13. WBS
14. RBS
15. Task Usage
16. Resource Usage
17. Baselines
18. Earned Value
19. Printing
20. Reporting

#### Course Outcome (CO)

After the completion of the course the student will be able to

CO1 Students will be able to identify basic concepts of Project Libre

CO2 Students will learn to describe the project, its cost etc.

CO3 Students will be able to create installing, creating a project.

CO4 Students will be able to identify task, and resource usages.

CO5 Students will be able to combine Project Libre tasks and will be efficiently use cost and effects.

**Course Name: Advanced Spread Sheet Lab**

**Course Code (DCA004A)**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	1



  
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133





## Course Objective:

1. Students will be able to understand the basics of Excel.
2. Students will be able to understand the concepts of working with the functions of advanced excel.

## Syllabus

### Advanced Excel Course - Overview of the Basics of Excel

Customizing common options in Excel, Absolute and relative cells, Protecting and un-protecting worksheets and cells

### Advanced Excel Course - Working with Functions

Writing conditional expressions (using IF), Using logical functions (AND, OR, NOT), Using lookup and reference functions (VLOOKUP, HLOOKUP, MATCH, INDEX), Vlookup with Exact Match, Approximate Match, Nested Vlookup with Exact Match, Vlookup with Tables, Dynamic Ranges, Nested Vlookup with Exact Match, Using Vlookup to consolidate Data from Multiple Sheets

### Advanced Excel Course - Data Validations

Specifying a valid range of values for a cell, Specifying a list of valid values for a cell, Specifying custom validations based on formula for a cell

### Advanced Excel Course - Working with Templates

Designing the structure of a template, Using templates for standardization of worksheets

### Advanced Excel Course - Sorting and Filtering Data

Sorting tables, Using multiple-level sorting, Using custom sorting, Filtering data for selected view (AutoFilter), Using advanced filter options

### Advanced Excel Course - More Functions

Date and time functions, Text functions, Database functions, Power Functions (CountIf, CountIFS, SumIf, SumIFS)

### Advanced Excel Course - Formatting

Using auto formatting option for worksheets, Using conditional formatting option for rows, columns and cells

### Advanced Excel Course - Macros

Relative & Absolute Macros, Editing Macro's



### Advanced Excel Course - WhatIf Analysis

  
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Goal Seek, Data Tables, Scenario Manager

### Advanced Excel Course - Charts

Using Charts, Formatting Charts, Using 3D Graphs, Using Bar and Line Chart together, Using Secondary Axis in Graphs, Sharing Charts with PowerPoint / MS Word, Dynamically, (Data Modified in Excel, Chart would automatically get updated)

### Advanced Excel Course - Working with Reports

Creating subtotals, Multiple-level subtotals, Creating Pivot tables, Formatting and customizing Pivot tables, Using advanced options of Pivot tables, Pivot charts, Consolidating data from multiple sheets and files using Pivot tables, Using external data sources, Using data consolidation feature to consolidate data, Show Value As ( % of Row, % of Column, Running Total, Compare with Specific Field), Viewing Subtotal under Pivot, Creating Slicers ( Version 2010 & Above), Designing the structure of a template, Print Titles Repeat Rows /Columns

### Analysis ToolPak

Use of the Analysis ToolPak to perform complex data analysis

### Course Outcome( CO's)

- CO1. Students will learn to use spreadsheet concepts and explore the Microsoft Office Excel environment.
- CO2. Students will apply the concepts of to create, open and view a workbook.
- CO 3. Students will Illustrate different advanced excel formatting.
- CO 4. Students will be apply date and time functions
- CO 5. Students will learn to describe basic uses of advanced excel functions

Course Name : Python programming

Course Code (DCA005A)

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
2	0	2	3

### Course Objectives:

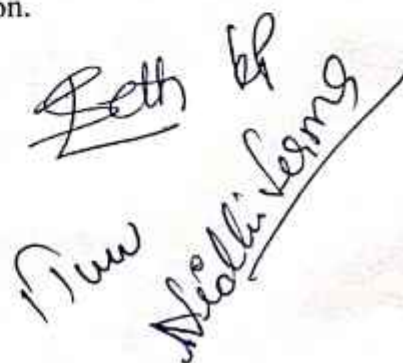
1. Student will be able to understand the basics concepts of Python.

  
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135







2. Student will be able to learn the concepts of programming by using loops and conditional blocks.
3. Student will be able to demonstrate the use of complex data types , dictionary and codes.
4. Student will be able to describe the concepts of database.
5. Student will be able to understand the basics of python programming and packages.

## Syllabus

### Unit 1

Introduction to Python: Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc.

### Unit 2

Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.

### Unit 3

Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.

### Unit 4

Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations. Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, Exception Handling in Databases.

### Unit 5

Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc. GUI Programming: Tkinter introduction, Tkinter and Python Programming, Tk Widgets, Tkinter examples. Python programming with IDE.

## Text Book :

  
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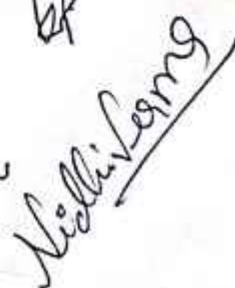
136











- Introduction to Computing and Problem Solving Using Python, E. Balagurusamy  
McGrawHill Publication

### Reference Books:

- Wesley J. Chun, "Core Python Applications Programming", 3rd Edition ,  
Pearson Education, 2016
- Charles Dierbach, "Introduction to Computer Science using Python",  
Wiley, 2015
- Jeeva Jose & P. Sojan Lal, "Introduction to Computing and Problem Solving  
with PYTHON", Khanna Publishers, New Delhi, 2016
- Downey, A. et al., "How to think like a Computer Scientist: Learning with  
Python", John Wiley, 2015
- Mark Lutz, "Learning Python", 5th edition, Orelly Publication, 2013,  
ISBN 978- 1449355739

### Course Outcomes (CO)

After the completion of the course the student will be able to:

CO1. To understand python variables, operators and data types

CO2. To apply python control structures

CO3. To use python complex data types

CO4. To apply Python files and databases

CO5. Student will apply python packages and GUI programming

**Course Name: Python programming Lab**  
**Course Code (DCA006A)**

L (Hr.)	T (Hr.)	Pr (Hr.)	Credits
0	0	2	1

### Course Objectives:

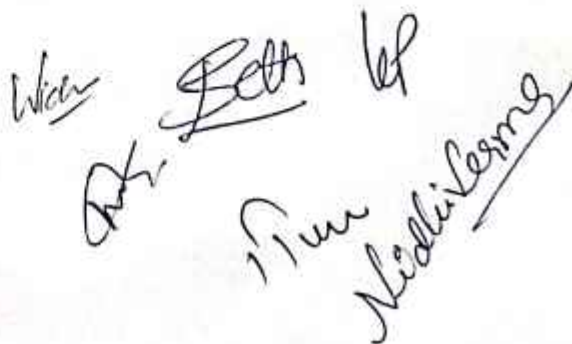
The purpose of this course is to enhance the practical knowledge based on prescribed theory course. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

### List of Experiment

1. Write a program to display data of different types using variables and literals constants.
2. Write a program to reassign values to a variable.
3. Write a program to read variables from the user.
4. Write a program to exhibit indentation errors.

  
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5. Write a program to enter a number and display its hex and octal equivalent and its square root.
6. Write a program to read and print values of variables of different data types.
7. Write a program to calculate area of triangle using Heron's formula.
8. Write a program to calculate the distance between two points.
9. Write a program to perform addition, subtraction, division and multiplication on two floating point numbers.
10. Write a program to perform addition, subtraction, division and multiplication on two integer point numbers.
11. Write a program to calculate average of two numbers. Print their deviation.
12. Write a program to calculate the total amount of money in the piggy bank given the coins of Rs 10, 5, 2, 1.
13. Write a program to convert degrees Fahrenheit into degrees Celsius.
14. Write a program to count all the prime and composite numbers entered by the user.
15. Write a program to find the greatest number from 3 numbers.
16. Write a program to take input from the user and then check whether it is a number or a character.
17. Write a program to separate two values printed on the same line using a tab.
18. Write a program to calculate the sum and average of first 10 numbers.
19. Write a program to find whether the given number is an Armstrong number or not.
20. Write a program to enter a number and then calculate the sum of its digits.
21. Write a program to enter a binary number and convert it into decimal number.
22. Write a program to calculate GCD of 2 numbers.
23. Write a program to print the reverse of a number.
24. Write a program to print the multiplication table of n, where n is entered by the user.
25. Write a program using for loop to calculate the average of first n natural numbers.
26. Write a program using for loop to calculate factorial of a number.
27. Write a program to classified a given number as prime or composite.
28. Write a program to sum the series---  $1 + 1/2 + \dots + 1/n$ .
29. Write a program using while loop to read the numbers until -1 is encountered. Also count the numbers of prime numbers and composite numbers entered by the user.
30. Write a program to demonstrate the continue statement.
31. Write a program to write a function that displays a string repeatedly.
32. Write a program to demonstrate the mismatch between function parameters and arguments.
33. Write a program to demonstrate the use global statement.
34. Write a program to demonstrate name clash of local and global variable.
35. Write a program to demonstrate access of variables in inner and outer functions.
36. Write a program to demonstrate flow of control after the return statement.
37. Write a program to write another function which returns an integer to the caller.
38. Write a program that adds two numbers using the syntax of lambda functions.
39. Write a program to use a lambda function with an ordinary function.
40. Write a program to add two numbers using lambda function.







**JECRC University**  
**School of Science**  
**Course Structure and Syllabus**  
**M. Sc. Biotechnology**  
**2022-24**

**Dr. Shamkant B. Badgujar**

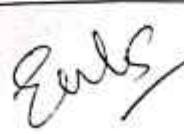


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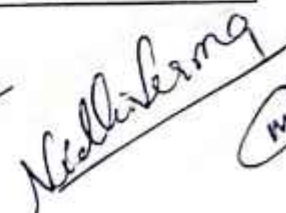



## M.Sc BIO-TECHNOLOGY

<b>SEMESTER – I</b>		
<b>Code</b>	<b>Title of Course</b>	<b>Credits</b>
MBI001A	Biochemistry	4
MBI002A	Microbiology	4
MBI003A	Immunology	4
MZO009B	Molecular Biology and Biotechnology	4
MBI005A	Laboratory Exercises of Biochemistry, Microbiology and Immunology	6
	<b>Total Credits</b>	<b>22</b>
<b>SEMESTER – II</b>		
MBI006A	Biotechniques and Bioinformatics	4
MBI007A	Biosafety, Bioethics and IPR, Biostatistics	4
	<b>Any two from the following</b>	
MBI008A	Genetic Engineering	4
MBI009A	Bioprocess Engineering	
MBI019A	Agriculture Microbiology	4
MBI020A	Structural Informatics	
MBI010A	Laboratory Exercises of Genetic and Bioprocess Engineering	6
	<b>Total Credits</b>	<b>22</b>
<b>SEMESTER – III</b>		
MBI011A	Environmental Biotechnology	4
MBI012A	Plant Biotechnology	4
	<b>Any one from the following:</b>	
MBI013A	Immuno-technology and Animal Biotechnology	4
MBI014A	Research Methodology	4
MBI021A	Biostatistics	
MBI022A	Nanoscience and Nanotechnology	
MBI015A	Environmental, Plants, Animals and Immunological Techniques Practical's	6
	<b>Total Credits</b>	<b>22</b>
<b>SEMESTER –IV</b>		
MBI016A	Review Writing	4
MBI017A	Dissertation	18
MBI018A	Seminar	2
	<b>Total Credits</b>	<b>24</b>
	<b>Total Credits of All Four Semesters</b>	<b>90</b>

  
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## PROGRAM OUTCOMES

**PO 1. Disciplinary Knowledge and Skills:** Good knowledge and understanding of major concepts, theoretical principles in Biotechnology and its allied fields. The knowledge about the experimental findings in Biotechnology and its different subfields like Biochemistry, Microbiology, Bio-techniques and Bioinformatics, Bioethics, IPR, Biosafety, Biostatistics, Genetic Engineering, animal biotechnology, environmental biotechnology, plant biotechnology, molecular biology, industrial biotechnology and immunology including detailed and recent update knowledge about the tools and techniques used in Biotechnology.

**PO 2. Skilled communicator:** Ability to transmit complex technical information relating all areas in Biotechnology in a clear and concise manner in writing and oral ability to present complex and technical concepts in a simple language for better understanding. Able to describe the Biotechnological applied solutions.

**PO 3. Critical thinker and problem solver:** Ability to employ critical thinking and efficient problem solving skills in all the basic and advanced areas of Biotechnology.

**PO 4. Sense of inquiry:** Capability for asking relevant/appropriate questions relating to the issues and problems in the field of Biotechnology, and planning, executing and reporting the results of a theoretical or experimental investigation.

**PO 5. Skilled project manager:** Capable of identifying/mobilizing appropriate resources required for a project, and manage a project through to completion, while observing responsible and ethical scientific conduct; and safety and laboratory hygiene regulations and practices. Also acquaint with the instruments used in Biotechnology field.

**PO 6. Ethical awareness / reasoning and Environmental Sustainability:** The graduate should be capable of demonstrating ability to think and analyze rationally with modern and scientific outlook and identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights, and adopting objectives, unbiased and truthful actions in all aspects of work. Understand the issues of environmental contexts and sustainable development.

**PO 7. Self-directed, Team player and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context social technological changes. Capable of working effectively in diverse teams in both classroom, laboratory, Biotechnology projects and workshop and in industry and field-based situations.

  
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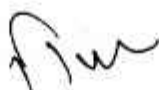


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## M. Sc BIOTECHNOLOGY

SEMESTER – I		
Code	Title of Course	Credits
MBI001A	BIOCHEMISTRY	4
MBI002A	MICROBIOLOGY	4
MBI003A	IMMUNOLOGY	4
MZO009B	MOLECULAR BIOLOGY AND BIOTECHNOLOGY	4
MBI005A	Laboratory Exercises of Biochemistry, Microbiology and Immunology	6
	<b>Total Credits</b>	<b>22</b>

**Course – Biochemistry**  
**Course Code – MBI001A**  
**Lectures: 4 Hrs/week**

### Course outcome

CO-1 Students will be able to describe the basics of biomolecules and carbohydrates

CO-2 Students will be able to illustrate basis of lipids and its metabolism

CO-3 Students will be able to recognize amino acid structures and illustrates the function and metabolism of proteins.

CO-4 Students will be able to describe nucleic acids, DNA, RNA and enzymes.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	2
CO2	3	2	3	1	2	2	1
CO3	3	2	2	1	2	2	2
CO4	2	3	3	2	2	1	2

1-LOW, 2-MEDIUM, 3-HIGH

### **MBI001A: BIOCHEMISTRY**

**Credit(s):4**

#### **Unit 1**

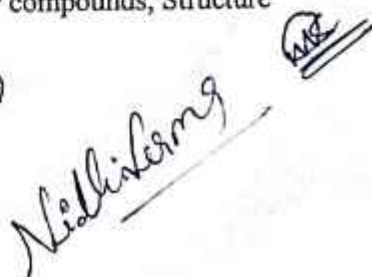
**Chemical foundation of biology:** pH, acids, bases, Buffers, Henderson and Hasselbach equation, pKa, pKb. Preparation of buffers. chemical bonding, properties of water, Gibbs free energy, High energy compounds, ATP Cycle, classification of high energy compounds, Structure of ATP, ATP Production, Chemoosmotic theory

  
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## Unit 2

**Carbohydrates:** Classification and properties of carbohydrates, mono (glucose, galactose and fructose) di (lactose, maltose, and sucrose), poly (starch, glycogen, cellulose). Physical and chemical properties of carbohydrates. Carbohydrate derivatives: mucins, glycoproteins, glycolipids, peptidoglycan. Mutarotation, Ozone formation etc. Role of carbohydrates in signaling, glycosylation of other biomolecules. Metabolism of carbohydrates, Glycolysis, TCA, Gluconeogenesis, Glycogenesis, Glycogenolysis, glyoxalate cycle and their regulations, anaerobic oxidation of glucose, alternative oxidation pathway of glucose (HMP, PPP pathway etc.)

## Unit 3

**Lipids:** Classification, Structure and biological function of fatty acids, triacylglycerols, phospholipids, steroids. Physico-chemical properties and analysis of fats and oils, Structure and functions of prostaglandins, thromboxanes, cholesterol, properties of oil and fats, acid value, iodine number, Saponification number, beta, alpha, and omega oxidation of fatty acids, cholesterol biosynthesis, fatty acids synthesis, oxidation of odd chain fatty acids, Ketone bodies production and degradation

## Unit 4

**Amino acids:** Classification; Structure and physicochemical properties; Peptides Peptide bonds, Proteins—Classification. Primary structure of proteins and its sequence determination

**Proteins:** Secondary (Ramachandran plot), tertiary and quaternary structural features of proteins; Primary structure, Bonds responsible for protein stability. Myoglobin, hemoglobin, fibrous proteins (collagen, keratins, silk fibroin), transamination, urea cycle, deamination oxidative and non-oxidative, regulation of urea cycle. Vitamins and Co-enzyme (biological and biochemical functions).

## Unit 5

**Nucleic Acids:** Structure of purines, pyrimidine, nucleosides, and nucleotides. Structure, properties and functions of nucleic acids (DNA, RNA), Different forms of DNA and RNA. Three dimensional structure of tRNA, De novo synthesis of purine and pyrimidine and its degradation. Salvage pathway.

**Enzymes-** Nomenclature, Holoenzyme, Apo enzyme, Co enzyme, Kinetics of Enzyme, Mechanism of their action, MM equation, Line Weaver Burk Plot, Inhibition of Enzyme, Reversible, Irreversible and Feed Back

### Suggested Readings

1. Textbook of Biochemistry. 1968 by West and Todd (MacMillan)
2. Principles of Biochemistry. 1993 by A.L. Lehninger, Nelson and Cox (C.B.S., India).
3. Principles of Biochemistry General Aspects. 1983 by Smith et al., (McGraw Hill)
4. Biochemistry (2nd edition) by Donald Voet and Judith Voet.
5. Biochemistry (4th edition) by L. Stryer (Free man).
6. Textbook of Biochemistry with Clinical Correlation (4th edition) by Thomas M. Devlin.
7. Biochemistry by Zubay.
8. Nucleic acid Biochemistry and Molecular Biology by Main Waring et al., (Blackwell).
9. Biochemistry, 2nd edition by Albert L. Lehninger. 1978. Kalyani Publishers, New Delhi.
10. Biochemical calculations, Irwin H. Segel, John Wiley and sons Inc
11. Organic Chemistry, DJ Cram and GS Hammond



**Course – Microbiology**  
**Course Code – MBI002A**  
**Lectures: 4 Hrs/week**

**MBI002A: MICROBIOLOGY**

**Credit(s): 4**

**Course outcome**

CO-1 Students will be able understand the difference between prokaryotic cell and eukaryotic cell and classification of bacterial cell.

CO-2 Students will be able to describe and identify different microbial genetic recombination- Transformation, transduction, conjugation and microbial growth curve.

CO-3 Students will be distinguish the different media and its preparation and will also understand different sterilization techniques.

CO-4 Students will able to acquire skills to analyze host-parasite relationships and microbial diseases.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	0	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	3	2	3	2	1	0	0
CO4	3	2	3	2	1	1	1

1-LOW, 2-MEDIUM, 3-HIGH

**MBI002A: MICROBIOLOGY**

**Credit(s): 4**

**Unit-1**

**Introduction to Microbiology:** Historical background & scope, Prokaryotic and Eukaryotic cell structures, Difference between prokaryotic and eukaryotic organisms.



**Classification of microorganism:** Classification of Bacteria: Basic principle and techniques used in bacterial classification. The five-kingdom concept of classification, archaeobacteria, eubacteria and eukaryotes; Morphology and fine structure of bacteria, General structure and features

**Unit-2**

**Microbial genetics recombination:** Transformation, transduction, conjugation, Nutritional requirements and nutritional classification of microorganisms: principle of microbial nutrition, Nitrogen fixation, Photosynthesis

**Microbial Growth:** The definition of growth, growth curve, bacterial generation time, Synchronous growth curve, Continuous culture; Growth as affected by environmental factors like temperature, acidity, alkalinity, water availability and oxygen, Different effects of physical and chemical factors on microbial growth.

  
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### Unit-3

**Methods in Microbiology:** Sterilization techniques- Physical and chemical methods; Preparation of culture media, Different types of media- simple, complex and defined, Pure culture techniques- isolation, cultivation, enumeration and preservation of microbes.

**Chemotherapeutic agents:** Antimicrobial agents; Sulfa drugs; Antibiotics - Penicillin and Cephalosporin; Classification of Antibiotics, Broad and narrow spectrum antibiotics; Antibiotics from prokaryotes; Antifungal and antiviral antibiotics, mode of action of antibiotics; Resistance to antibiotics, origin of drug resistance, mechanism of drug resistance, antimicrobial susceptibility test.

### Unit-4

**Host-Parasite Relationships:** Normal micro flora of skin, oral cavity, Gastrointestinal tract; Entry of pathogens into the host; colonization and factors predisposing to infections; types of toxins and their structure; Mode of actions; Virulence and Pathogenesis.

**Microbial Diseases:** Respiratory infections caused by bacteria and viruses; Tuberculosis; Sexually transmitted diseases including AIDS; Diseases transmitted by animals, insects and ticks, food and water borne diseases; Pathogenic fungi; Emerging and resurgent infectious diseases.

### Unit-5

**Viruses:** Discovery, General characteristics, Morphology, Classification and structure of plant, animal and bacterial viruses, Structure and morphology of bacteriophage, lytic and lysogenic cycle various Plant and Animal Virus

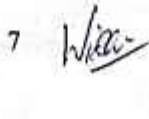
### Suggested Readings

1. Alcamo 's Fundamental of Microbiology, (2004); Pommerville et al.
2. Microbiology (2004); Tortora, F.
3. Foundation in Microbiology (1996); Talaro & Talora.
4. Food Microbiology (2004); Adam, M.R.
5. Principles of Microbiology (1994); Atlas, R.M.
6. Pharmaceuticals Microbiology (2003); Purohit & Saluja.
7. Brock Biology of Microbiology, Martinko, M.T & Parker, J.
8. Microbiology, L.M. Prescott, J.P. Harley and D.A. Klein, 7/e, 2007. McGraw Hill, Boston.
9. Fundamental Principles of Bacteriology, A.J. Salle, 1999. Tata McGraw – Hill Publishing Company Limited, New Delhi.
10. Medical Microbiology, D. Greenwood, R. Slack and J. Peutherer, 1997. ELST with Churchill Livingstone, Hong Kong.
11. Microbial Ecology. Fundamentals and Applications, R. M. Atlas and R. Bartha, 2000.
12. Microbiology, M.J. Pelzer Jr., E.C.S. Chan and N.R. Kreig, 1993. McGraw Hill Inc., New York.
13. Microbial Functional Genomics, J. Zhou, D.K. Thomson. Y. Xu. J.M. Tiedje. J. Wiley, 2004.
14. General microbiology, R.Y. Ingraham, J.L. Wheelis, M.L. and Painter, P.R. The MacMillian Press Ltd.
15. Brock Bio logy of microorganism, M.T. Martinko, J.M. and Parker, J. Prentice- Hall.
16. Microbial Genetics, Malo y, S.R., Cronan, J.E. Jr and Freifelder, D.Jones, Bartlett Publishers.
17. Microbiology-A Laboratory Manual, cappuccino, J.G. Sherman, N. Addison Wesley.
18. Microbiological Applications (A Laboratory Manual in General microbiology) Benson, H.J. WCB: Wm C Brown Publishers

  
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19. General Microbiology, Stainer, RY, Ingraham, JL, Wheelis, ML., and Painter, PR. The Macmillan Press Ltd., (2000).
20. Microbiology, Davis BD et al., Harper and Row, (1990).
21. Microbiology-Principles and exploration, Black JG, Prentice Hall, (1999).
22. Microbial Biotechnology, Glazer AN, Nikaido H, WII Freeman and Company, (1995).

**Course – Immunology**  
**Course Code – MBI003A**  
**Lectures: 4 Hrs/week**

**MBI003A: IMMUNOLOGY**

**Credit(s): 4**

**Course outcome**

CO-1 Students will demonstrate a basic concept of immunology at the cellular and molecular level, define central principles and concepts, outline, compare, contrast innate and adaptive immunity, and describe the different cell types and organs that make up the immune response.

CO-2 Students will illustrate various mechanisms that regulate immune responses and maintain tolerance; elucidate the genetic basis for immunological diversity and the generation of adaptive immune responses. They will outline key events and cellular players in antigen presentation and how the nature of the antigen will shape resulting effector responses and be able to apply basic techniques for identifying antigen-antibody interactions.

CO-3 Students will understand the principles governing vaccination and the mechanisms of protection against infectious diseases and will be able to elucidate the reasons for immunization and aware of different vaccination.

CO-4 Students will be able to communicate effectively in both oral and written formats, using appropriate vocabulary for immunology, response mechanisms, regulation, and genetic basis; apply scientific principles in interpreting responses and data; and understand immunology's roles in disease protection.

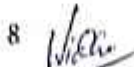
**Mapping of PO/CO**

CO/ PO	PO 1	PO2	PO 3	PO 4	PO 5	P O 6	PO 7
CO1	3	1	1	2			
CO2	3	1	2	3		1	
CO3	3	2	2	3			
CO4	3	3	3	2			

1-LOW,2-MEDIUM,3-HIGH

  
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8 







## Unit-1

**Introduction:** Scope of immunology, Types: Innate and acquired immunity. Features of immune response: Memory, Specificity and recognition of self and non-self, Clonal nature of immune response,

**Humoral and Cell mediated immune responses, Cells of the immune system:** Hematopoiesis and differentiation, B-lymphocytes, T-lymphocytes, mononuclear phagocytes, macrophages, dendritic cells, natural killer cells and lymphocyte activated killer cells, neutrophils, eosinophils, basophils, mast cells & dendritic cells, lymphocyte trafficking.

**Organs of the immune system:** Primary and secondary lymphoid organs: Thymus, Bone marrow, lymphatic system, lymph nodes, spleen, Mucosal Associated Lymphoid Tissue (MALT), Cutaneous-Associated Lymphoid Tissues.

## Unit-2

**Antigen:** Immunogenicity v/s antigenicity, factors affecting immunogenicity, nature of immunogen, biological system, epitopes, haptens and antigenicity, pattern recognition receptors, super antigens.

**Immunoglobulins:** Structure of antibody, function and synthesis, antibody mediated effectors functions, antibody classes and biological activities, antigenic determinants on Immunoglobulins, Immunoglobulins super families. Production and applications of monoclonal antibodies (by hybridoma technology).

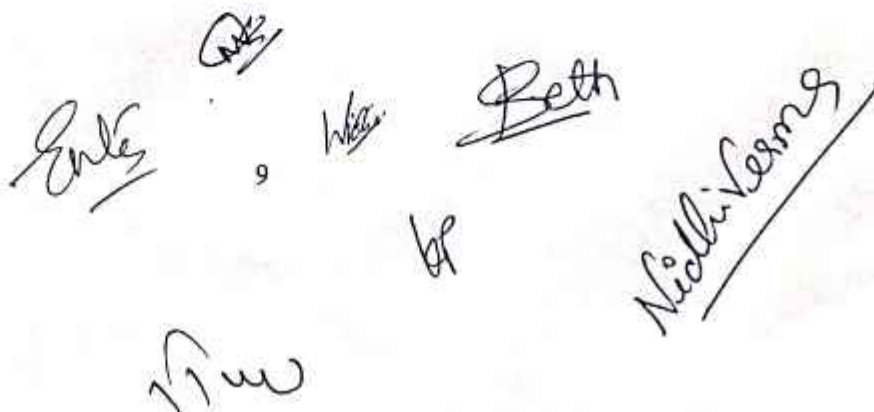
**Antigen-Antibody interactions:** Strength of interaction, cross reactivity, precipitate, reaction, agglutination reaction, radio immunoassay, Enzyme Linked Immunosorbent Assay, chemiluminescence, ELISPOT assay, western blot, immunoprecipitation, immunofluorescence, flow cytometry and fluorescence. Surface plasmon resonance and Epitope mapping

## Unit-3

**Major histocompatibility complex:** General organization, MHC molecules: structure & genes, their mode of antigen presentation and interaction, cellular distribution of MHC, regulation of MHC expression and disease susceptibility. Antigen Processing and Presentation: role of antigen presenting cells, endogenous antigens: cytosolic pathway; exogenous antigens: endocytic pathway. T-Cell receptor complex, T- Cell accessory membrane molecules, activation of T-cells, organization and arrangement of T-receptor genes B-cell receptor complex, activation and proliferation of B-cells, regulation of B- cell development.

**Cytokines:** Structure and functions, cytokine receptors, signal transductions mediated by cytokine receptors, cytokine regulation of immune responses, cytokine related diseases and therapeutic applications of cytokines.

**Complement system:** Function, components, activation, regulation and deficiencies of complement. Cytotoxic T-cell and their mechanism of action, NK cell and mechanism of target cell destruction. Antibody dependent cell mediated cytotoxicity. **Inflammation:** its mediator and





the process, cell-adhesion molecules and their role in inflammation, lymphocyte homing, tissue injury and immune response leading to an inflammatory reaction, role of anaphylatoxins, granulocyte in inflammatory process. Hypersensitivity reaction: Definition, IgE mediated hypersensitivity, mechanism of mast cell degranulation, mediators of type I reactions and consequences. Type II reactions, immune complex mediated hypersensitivity and delayed type hypersensitivity.

#### Unit-4

**Immune response to infectious diseases:** Bacteria, viruses and intracellular parasites. **Vaccines:** Active and Passive Immunization Types of Vaccines- Inactivate Attenuated, Purified macromolecules and Recombinant-vector, DNA, Synthetic peptide, Multivalent subunit Vaccines. **Immunodeficiency Syndrome:** Primary Immunodeficiency and Second ary Immunodeficiency and their diagnosis and therapeutic approaches. **Autoimmunity:** Organ specific diseases, systemic disease, mechanism of autoimmunity, treatment of autoimmune diseases.

#### Unit-5

**Transplantation immunology:** immunologic basis of graft rejection, immune suppression and immune tolerance. **Tumor immunology:** cancer definition, malignant transformation of cells, oncogenes and cancer induction, tumor antigens, tumor evasion of the immune system, cancer immunotherapy.

#### Suggested Readings

1. Molecular biology of the Cell, Alberts B., Bray D., Lewis J., Ralf M., Roberts K. and Watson J.D., Garland Publishing Inc. (2001).
2. Kuby Immunology, Goldsby R.A., Kindt Thomas J., Osburne B.A., WH Freeman & Company, (2000).
3. Immunology-Understanding the Immune System Elgert K.D, Wiley Liss, (1996).
4. Roitt's essential Immunology, Roitt I.M. and Delves P.J., Blackwell Science Ltd., (2001).
5. Immunology 6th Edition, Roitt I., Brostoff J. and Male D., Mosby Harcourt Publishers, (2001).
6. Immuno-biology, Janeway CA and Paul Travers 1994.
7. Immunological techniques, D.M. Weir, 1992.
8. Current Protocols in Immunology 3 Volumes, Wiley Publications 1994.
9. Monoclonal Antibodies: Principles and Practice, J. W. Goding, 1983. Academic Press
10. Hybridoma Technology in the Biosciences and medicine, T.A. Springer, 1985. Plenum Press NY.
11. Vaccines, New Approaches to immunization, F.Brown, R.M.Chanock, KA Lerner, 1986. Coldspring Harborlab.
12. Topley and Wilson principles of bacteriology, Virology and immunology, G. Wilson, A. Miles, M.T. Paker, 1984. Arnold, Heineman.
13. Basic and Clinical Immunology, D.P. Stities and J.D. Stobo
14. Immunology- A short Course, Eli Benamini, Richard Coico, Geoffrey Sunshine.
15. Immunology by Tizzard
16. Fundamentals of Immunology, William Paul.
17. Immunology by Abbas.

**Course – Molecular Biology**  
**Course Code – MZO009B**  
**Lectures: 4 Hrs/week**

**MZO009B: Molecular Biology and Biotechnology**

**Course outcome**

- CO-1 Students will be able to describe about structure of nucleic acid, replication process and mutation.
- CO-2 Students will be able to learn the transcription in prokaryotes and eukaryotes.
- CO-3 Students will be able to explain the translational process for prokaryotes and eukaryotes.
- CO-4 Students will be able to analyze the regulation of gene expression in living organisms.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	1	2	2
CO2	3	3	3	2	1	1	1
CO3	3	3	3	1	2	1	1
CO4	3	3	3	2	1	2	1

1 – LOW ,2- MEDIUM , 3-HIGH

**MZO009B: Molecular Biology and Biotechnology**

**Credit(s): 4**

**Unit I**

Nucleic acids –DNA & RNA, DNA replication: modes of replication, Prokaryotic and eukaryotic DNA replication, Mechanics of DNA replication, Enzymes and Accessory proteins involved in DNA replication, Models of DNA replication, Inhibitors of DNA replication, DNA repair mechanisms

**Unit II**

Transcription in prokaryotes and eukaryotes: Structural organisation and life span of mRNA; rRNA & tRNA, Mechanism of transcription in prokaryotes and eukaryotes. Post transcriptional modification of RNA- Capping, Polyadenylation , Splicing, RNA editing.

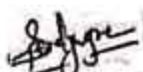
**Unit III**

Genetic code: Characteristics of genetic code, Start codons and stop codons, Degeneracy of the code: Wobble hypothesis

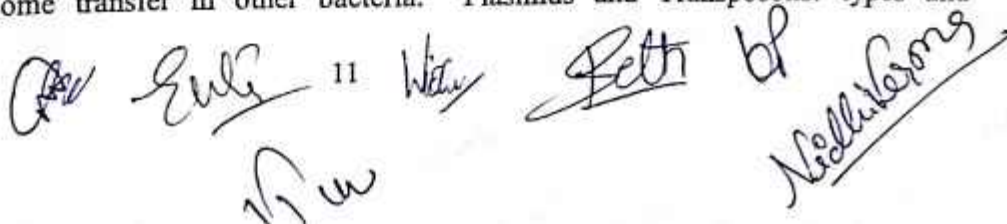
Translation in prokaryotes and eukaryotes: Aminoacylation of tRNA & initiation, elongation and termination of protein synthesis, Translational inhibitors, Post- translational modification of proteins: protein folding (role of chaperones) and biochemical modifications.

**Unit IV**

Bacterial genetics: Molecular mapping of genome, genetic and physical mapping. Gene transfer mechanisms-Transformation- molecular mechanism, mapping and other uses of transformation, Transduction- generalized transduction, co-transduction and specialized transduction. Bacterial conjugation, Chromosome transfer in other bacteria. Plasmids and Transposons: types and



Dr. Shamkant B. Badgujar





properties.

### Unit V

Molecular markers in genome analysis (RFLP, RAPD and AFLP). Transgenesis & Transgenic animals: Production, Applications, Animal Cloning. Stem cell: types and applications.

**Course outcome (CO) :** On completion of the course, students are able to:

CO1 Understand the structure of nucleic acid, replication process and DNA repair mechanism.

CO2 Analyze the mechanism of transcription in prokaryotes and eukaryotes.

CO3 Explain the translational process for prokaryotes and eukaryotes.

CO4 Understand about Bacterial genetics and Gene transfer mechanisms.

CO5 Understand the concept of Molecular markers in genome analysis, transgenesis and stem cells.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	3	1	0	0	2
CO2	3	0	3	1	0	0	2
CO3	3	0	3	1	0	0	2
CO4	3	0	3	1	0	0	2
CO5	3	0	3	1	0	0	2

3 = Highly Related, 2 = Medium, 1 = Low

### Suggested Readings

- Benjamin Lewin : Genes, Vol. VIII, Pearson Prentice Hall, Singapore
- Elliott, W. H and Elliott, D. C. : Advanced molecular Biology, Viva Books, New Delhi
- Freifelder, D. : Molecular Biology, Narosa Publishing House, New Delhi
- Russel, P. J. : Cell and Molecular Biology, Cengage learning
- Molecular Biology of the Gene. L.D Watson, N.H. Hopkins, J.W. Roberts, J.A. Steiz and AM Weiner The Benjamin/Cummings Pub. Co., Inc., California.
- De Robertis E.D.P. and De Robertis Jr, E.M.F., Cell and Molecular Biology. K. M. Varghese Cop. Bombay.

### MBI005A: Laboratory Exercises of Biochemistry, Microbiology and Immunology

Credit(s): 6

- To determine  $\lambda_{max}$  of Protein
- $\lambda_{max}$  of DNA
- Separation of Amino acids using paper chromatography
- Qualitative analysis of carbohydrates
- Qualitative analysis of Fats and Oil
- Qualitative analysis of Protein
- Preparation of Buffers
- Verification of Lambert and Beer law
- Calibration of Spectrometer
- Sterilization and preparation of media, Enumeration of bacteria and fungi from soil, water.



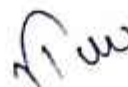
  
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11. Environmental samples - soil, water and air. Techniques for pure culture - streaking, pour plate and spread plate.
12. Isolation and maintenance of organisms by plating, streaking and serial dilution method, slant and stab cultures, storage of microorganisms.
13. Preparation of Liquid and Solid media for growth of microorganisms.
14. Stains and staining techniques, simple staining, negative staining, acid fast, spore, endospore staining, capsule staining & differential staining Techniques.
15. Bacterial growth - Growth curve, factors affecting bacterial growth - pH, Temperature, Carbon and Nitrogen source and Salinity.
16. Measurement of bacteria population by turbidometry and serial dilution methods.
17. Biochemical tests for identification of bacteria.
18. Antimicrobial assay, phenol coefficient, agar plate sensitive method.
19. Cultivation and morphology of molds and yeast
20. Assay of antibiotics and demonstration of antibiotic resistance
21. Bacterial transformation.
22. One Step growth curve of coli phage.
23. Antimicrobial activity of certain plant extracts.
24. Effect of UV radiation on bacteria.
25. Cell counting and cell viability.
26. Blood cell analysis
27. Lymphocyte subset identification and enumeration
28. Separation of serum components by electrophoresis
29. Immunodiffusion
30. Radial immunodiffusion test
31. Immuno electrophoresis
32. ELISA
33. Differential WBC count.
34. The effect of hypertonic, hypotonic and isotonic environment on human RBC
35. Ouchterlony technique

SEMESTER – II		
MBI006A	BIOTECHNIQUES AND BIOINFORMATICS	4
MBI007A	BIOSAFETY, BIOETHICS AND IPR, BIOSTATISTICS	4
	Any one from the following:	
MBI008A	GENETIC ENGINEERING	4
MBI009A	BIOPROCESS ENGINEERING	
MBI019A	AGRICULTURAL MICROBIOLOGY	4
MBI020A	STRUCTURAL BIOINFOMATICS	
MBI010A	Laboratory Exercises of Genetic and Bioprocess Engineering	6
	Total Credits	22

Course – Bio-techniques and Bioinformatics  
 Course Code – MBI006A  
 Lectures: 4 Hrs/week

  
 Dr. Shamkant B. Badgujar

 13   




### Course outcome

CO-1 Students will be able understand different analytical techniques for identification of biomolecules in Biotechnology

CO-2 Students will be able to describe and compare different types of chromatographic, electrophoresis, centrifugation and spectrometric techniques

CO-3 Students will be able to distinguish different software, databases and types of networks. Student will also acquaint with bioinformatics tools for analyzing proteomics and genomics

CO-4 Student will able to acquire skills to analyze the critical problems related to instruments used in biology

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	2	2	0	1
CO2	3	2	2	1	3	0	1
CO3	3	1	2	2	2	0	2
CO4	3	2	3	2	2	0	1

### **MBI006A: BIOTECHNIQUES AND BIOINFORMATICS**

**Credit(s): 4**

#### **Unit-1**

**Laboratory instrumentation:** principle, components, assembly, working and applications of: Laminar clean air flow bench, autoclave, incubators, weighing balances, pH meter, water bath, hot air oven, colony counter and microtome. Laboratory safety measures.

**Basic knowledge of the principles and applications of Microscopy:** Simple microscopy, Phase contrast microscopy and electron microscopy (TEM and SEM). Sedimentation- Sedimentation velocity, preparative and analytical ultracentrifugation techniques

**Electrophoresis-** General principle, 2D gel electrophoresis, paper electrophoresis, SDS PAGE, application and types, Spectroscopic methods: Principle and applications of UV-visible, IR, X-ray, Red and Blue shift, basic structure of spectrophotometer, B bands and R bands, various transitions in compounds, vibrational spectroscopy, different types of vibrations

#### **Unit-2**

**Chromatography-** General principles and applications of – Adsorption chromatography, Ion-exchange chromatography, Thin-layer chromatography, Hydrophobic chromatography, Gas-liquid chromatography, HPLC, Affinity chromatography, Paper chromatography.

**Radioisotopic Techniques:** Types of radioisotopes used in Biochemistry, units of radioactivity measurements,

isotopes commonly used in biochemical studies –  $^{32}\text{P}$ ,  $^{35}\text{S}$ ,  $^{14}\text{C}$  and  $^3\text{H}$ ), application of isotopes, Autoradiography: Biological hazards of radiation and safety measures in handling radioisotopes; Biological applications

### Unit-3

**Centrifugation:** Basic principles; Mathematics & theory (RCF, Sedimentation coefficient etc); Types of centrifuge Microcentrifuge, High speed & Ultracentrifuges; Preparative centrifugation; Differential & density gradient centrifugation; Applications (Isolation of cell components); Analytical centrifugation; Determination of molecular weight by sedimentation velocity & sedimentation equilibrium methods.

### Unit-4

**Computer Architecture** Internal and External devices, computer software, operating system windows, Unix, Application software like word processor, spread sheet, Database, RDBMS. **Computer Network-** Advantages of network, types of network (LAN, WAN & MAN), Network protocols, Internet protocol (TCP, IP), and File transfer protocol (FTP), WWW, HTTP, HTML, VRL. **Concept of database management:** brief idea of data types, data structures, searching, sorting, designing a database, genomic, proteomic, and metabolic pathways databases.

### Unit-5

**Proteomics and Genomics:** Computer analysis of genetic sequences: general concepts of sequence analysis, identification of functional sequences, homology, brief idea of BLAST, ENTREZ, and PubMed. Basic issues and concepts, protein sequences and alignment, protein structure prediction. Bioinformatics tools in drug design

### *Suggested Readings*

1. Textbook of optics and atomic physics – P.P. Khandelwal (Himalaya Publishing House)
2. Nuclear physics an introduction – S.B. Patel (New Age International) Biophysics – Patabhi and Gautham (Narosa Publishing House)
3. Instrumentation measurements and analysis – Nakara, Choudhari (Tata Mc Graw Hill)
4. Handbook of analytical instruments – R.S. Khandpur (Tata Mc Graw Hill)
5. Perspectives of modern physics – Arthur Beiser (Mc Graw Hill)



6. Introduction to atomic spectra – H.E. White (Mc Graw Hill)
7. Molecular cell biology – Ladish, Berk, Matsudara, Kaiser, Krieger, Zipursky, Darnell (W.H. Freeman and Co.)
8. Biophysics - Cotrell (Eastern Economy Edition)
9. Clinical Biophysics –Principles and Techniques- P. Narayanan (Bhalani Pub., Mumbai)

**Course – Biosafety, Bioethics and IPR Biostatistics**  
**Course Code – MBI007A**  
**Lectures: 4 Hrs/week**

**MBI007A: BIOSAFETY, BIOETHICS AND IPR BIOSTATISTICS**

**Credit(s):**

**4**

**Course outcome**

- CO-1 Students will be able understand biosafety guidelines by DBT.
- CO-2 Students will be able to describe IPR and will be able to identify different forms of IPR system.
- CO-3 Students will be able to distinguish the mean, mode, median, correlation and regression in biostatistics.
- CO-4 Students will able to acquire skills to analyze the problems on probability and different models of data presentation.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	1	1	1
CO2	3	3	2	2	3	0	1
CO3	3	2	3	2	0	0	2
CO4	3	2	3	2	0	0	2

1-LOW, 2-MEDIUM, 3-HIGH

**MBI007A: BIOSAFETY, BIOETHICS AND IPR BIOSTATISTICS**

**Credit(s): 4**

**Unit-1**

**Biosafety-** definitions - DBT guidelines on biosafety in conducting research in biology/biotechnology - Regulations of Genetically modified Organisms in India- Biosafety regulation for transgenic plants and animals - labeling of GM foods

**Unit-2**

**IPR-** -Different forms of IPR - Benefits of IPR system; WTO - Definition, GATT - Definition -

  
**Dr. Shamkant B. Badgujar**

 16 May 2016

Objectives - Structural format of WTO - Economic Impact of WTO  
Bioethics - definition - Bioethics of IPR - ethical criteria in biotechnology

#### Unit-3

**Definitions and scope of Biostatistics:** Variable in biology, collection, classification and tabulation of data. Graphical and diagrammatic representation, histogram, frequency polygon, frequency curve; Importance and applications Tabulation and Classification of data, Frequency distribution and Graphical distribution of data Measure of Central tendencies Mean, Media, mode and their properties. Measures and Dispersion, Mean deviation, Variance, Standard deviation and Coefficient of Variation. Correlation and regression

#### Unit-4

**Elements of probability theory-** Probability distributions-binominal, Poisson and normal distribution, Correlation coefficient; Simple linear regression, Probit and logit analysis Hypothesis Testing Student T,  $r$  and Chi-square test; Probability and Distribution, Skweness and Kurtosis

#### Unit-5

Concepts and problems on probability, Binomial, Poisson, Normal Distribution and their Applications, Different Models of data presentation with special reference to biological samples.

#### Suggested Readings

1. Bernhard Palsson and Sangeeta N Bhatia, Tissue Engineering, 2nd Edition, Prentice Hall, 2004.
2. Pamela Greenwell, Michelle McCulley, Molecular Therapeutics: 21st century medicine, 1st Edition, Sringer, 2008.

**Course: GENETIC ENGINEERING**

**Course Code: MBI008A**

**Lectures: 4 Hrs/week**

#### Course outcome

CO-1 Students will be able to explain different tools and techniques involved in r-DNA technology.

CO-2 Students will be able to describe different vector and probe.

CO-3 Students will be able to explain different nucleic acid technology, mapping and molecular markers.

CO-4 Students will be able to acquire skills to understand application of genetic engineering techniques in basic and applied experimental biology.

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	2	2	2
CO2	3	3	3	2	1	2	1
CO3	3	3	3	1	2	2	2
CO4	3	3	3	2	1	2	1

1 - LOW, 2- MEDIUM, 3-HIGH



## MBI008A: GENETIC ENGINEERING

Credit(s) 4

### Unit-1

Concept and emergence of r-DNA technology, preparation and purification of total cell DNA, plasmid DNA and bacteriophage DNA; Basic techniques involved in rDNA technology: Enzymes involved in RDT (Klenow fragment, Taq DNA, Ribonucleases, Alkaline phosphatase, Nuclease, T4 DNA ligase) Restriction enzymes, Preparation of Desired Gene from genome, reverse transcription and gene machine. Generation of genomic and cDNA libraries; Methods of Ligation linkers, polylinker, adapter, Shot Gun cloning

### Unit-2

Vectors-Plasmids, cosmids,  $\lambda$ , phagemids, yeast artificial chromosomes. Introduction of DNA/RNA in bacteria, yeast, fungi and in other eukaryotic host systems; Selection and screening of recombinant clones: Direct and indirect methods. Probe preparation (radio labeling and non- radio labeling), Lac Z gene, Reporter Gene, Marker Gene

### Unit-3

Methods based on Nucleic acid homology (Southern, northern, western, southern- western, subtractive, colony and plaque hybridization, in situ chromosomal hybridization, chromosomal walk, etc.)

### Unit-4

Characterization of cloned DNA: Restriction mapping. DNA sequencing: Polymerase Chain Reaction and its variations. DNA fingerprinting, Molecular Markers (RAPD, SSR, VNR, RFLP, AFLP etc.)

### Unit-5

Expression of cloned DNA: Expression vectors. Modification of cloned DNA (Site directed mutagenesis) Secretion of cloned product; Applications of recombinant DNA technology: Transgenic animals. Transgenic plants; Pharmaceutical products and Health care products

### *Suggested Readings*

1. Recombinant DNA: Watson
2. Genetic engineering: Sandya Mitra
3. Principles of gene manipulation: Old & Primrose
4. Gene cloning: T. A. Brown
5. Molecular Bio logy Lab fax I & II: T. A. Brown

Course – Bioprocessing Engineering

Course Code – MBI009A

Lectures: 4 Hrs/week

## MBI009A: BIOPROCESSING ENGINEERING

Credit(s): 4

### Course outcome

CO-1 Students will use correct biological terms to describe and analyze phenomena/problems in bioprocesses, describe and explain the principles and processes involved in fermentation technology, investigate properties of microbes for product formation and their improvement.

CO-2 Students will analyze the characteristic of suitable media for product formation, formulation of media, selection of appropriate bioreactor models based upon bioproducts and cell lines, and other process criteria

CO-3 Students will be able to apply the concept in the field of industrial biotechnology and design a suitable scheme of bioproduct separations based upon the molecular characteristics of the product and other process criteria

CO-4 Students will be able to simplify the concepts and explain them through oral presentations

#### Mapping of PO/CO

CO/ PO	PO 1	PO2	PO 3	PO 4	PO 5	P O 6	PO 7
CO1	3					1	
CO2	3		2		1	3	
CO3	3	2	2	2	3	1	
CO4	1	3					2

1-LOW,2-MEDIUM,3-HIGH

#### **MBI009A: BIOPROCESSING ENGINEERING**

**Credit(s): 4**

##### **Unit-1**

**Historical background-** Composition of food, Growth of microorganisms in food: Intrinsic and extrinsic factors. Characterization and Techniques of fermentation systems. Role of Fermentation; Biochemistry of Fermentation, Fermentation of Carbohydrates, Protein, Lipid Metabolism, Formation of flavour. Advanced continuous fermentation for anaerobic microorganisms, Fermentation process development of carbohydrate based therapeutics,

##### **Unit-2**

**Bioprocess development for Validation-** detoxification and decolorization, Fermentation process validation. Genetic manipulation of industrially important microorganisms: Methods of reproduction, recombination, strain modification, stabilization of transformants, autonomous replication. Production of foreign protein, Commercial production of plant proteins in microorganisms. Economics of fermented products

##### **Unit-3**

**Microorganisms involved in natural fermentation-** Microbial succession. Composition and nutrition of fermented products Traditional fermented foods: Bread, cocoa, coffee, tea, sauerkraut, cheese, butter, yoghurt, meat, fish, etc. Alcoholic beverages: Beer, wine and whisky. Value addition products: High fructose syrup, invert sugars etc. Edible fungus: Mushrooms. Bioreactors in food fermentation; Packaging of fermented food products Biosensors; Bio logical monitoring of foods, waste management and food processing; HACCP and hurdle technology. Protein engineering in food technology: methods, targets and applications in foods.

##### **Unit-4**



**Fermentation Technology-** The component parts of a fermentation process range of fermentation processes, chronological development of fermentation industry. Isolation, Preservation and strain improvement of industrially-important microorganisms. Fermentation media for industrial fermentation Design of Fermentor- Basic functions of a Fermentor for microbial culture, aseptic operation and containment, Aeration and Agitation, valves and steam traps; Types of fermentation, Types of fermentation vessels

### Unit-5

**Fermentation Processes-** Batch, fed-batch and continuous fermentations, Solid-state fermentations, Dual or multiple fermentations; Recovery and purification of fermentation products (down-stream processing) - Recovery of microbial cells, cell disruption. Chromatography, membrane processes, drying and crystallization ion. Fermentation Enzyme and cell immobilization and their industrial applications; Industrial Production of Antibiotics- Penicillin, Streptomycin, Tetracyclines Organic acids-Citric acid, Lactic acid, Acetic acid; Enzymes- Amylases, Proteases, lipases acids-Lysine, Glutamic acid. Beverages-Wine, Beer, alcohol Microbial leaching-Organisms involved in leaching, Chemistry of microbial leaching and commercial process. Mushroom cultivation

### Suggested Readings

1. Microbial Biotechnology – Glazer and Nikaido 1995
2. Biotechnology-A Text Book of Industrial Microbiology-Crueger and Crueger, 2000.
3. Principles of Fermentation Technology- Stanbury, Whitaker and Hall 1997.
4. Microbial Technology. Vol. I and II - Pepler and Perlman (Eds).
5. Prescott and Dunn's Industrial Microbiology – Reed (Ed).
6. Concepts in Biotechnology- Balasubramanian, Bryce, Dharmalingam, Green and Jayaraman
7. Industrial Microbiology- A.H. Patel.
8. Industrial Microbiology- Casida.

Department Elective- 1

Course Code: MBI019A

Course Name: Agriculture Microbiology

### Course outcome

- CO-1 Students will be able to understand the basics agricultural microbiology  
 CO-2 Students will be able to illustrate different type of metabolism in bacteria  
 CO-3 Students will be able to explain soil microflora useful for crops  
 CO-4 Students will be able to evaluate the uses of different types of biofertilizer

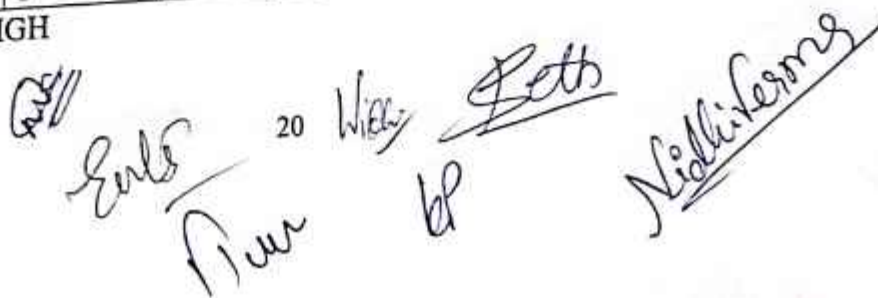
### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

Unit 1

  
 Dr. Shamkant B. Badgujar



History of Microbiology: Spontaneous generation theory, Role of microbes in fermentation, Germ theory of disease, Protection against infections, Applied areas of Microbiology

## Unit 2

Metabolism in bacteria: ATP generation, chemoautotrophy, photo autotrophy, respiration, fermentation. Bacteriophages: structure and properties of Bacterial viruses – Lytic and Lysogenic cycles: viroids, prions.

## Unit 3

Microbial groups in soil, microbial transformations of carbon, nitrogen, phosphorus and sulphur, Biological nitrogen fixation. Microflora of Rhizosphere and Phyllosphere microflora, microbes in composting. Microbiology of food: microbial spoilage and principles of food preservation.

## Unit 4

Beneficial microorganisms in Agriculture: Biofertilizer (Bacterial Cyanobacterial and Fungal), microbial insecticides, Microbial agents for control of Plant diseases, Biodegradation, Biogas production, Biodegradable plastics, Plant – Microbe interactions.

## Unit 5

**Biodegradation of natural compounds:** (cellulose, hemicelluloses, lignin, chitin,). Biodegradation of xenobiotics in environment – Organisms involved in degradation of chlorinated hydrocarbons, substituted simple aromatic compounds, polyaromatic hydrocarbons, pesticides, synthetic polymers, detergents and hydrocarbons Bioremediation- *ex situ* and *in situ*. bioaccumulation, biomagnifications.

## Reference Books

1. Agricultural Microbiology. 1998. G. Rangaswani and D.J. Bagyaraj. Prentice Hall of India. , New Delhi.
2. An Introduction to Microbiology. 1996. P. Tauro, K.K. Kapoor and K.S. Yadav. Wiley Eastern Ltd. , New Delhi.
3. Microbiology, 1986. M. J. Pelczar, E.C.S. Chan and N.L. Krieg. Mc Graw Hill 5th Edition, New York, USA.
4. Soil microorganisms and plant growth. 1977. N. S. . Subbarao Oxford & IBH Publ. Co. , New Delhi.

## Department Elective- 2

Course Code: MBI020A




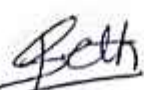

Course Name: Structural Bioinformatics

## Course Outcomes:

- CO-1: Student will be able to understand the basic concept of protein structures.  
CO-2: Student will be able to acquire the basic concepts of protein databases and their file format.  
CO3: Student will be able to determine homology between the biological sequences by similarity alignments.  
CO4: Students will be able to understand the structural features of RNA of the organisms.

Mapping of PO/CO

  
Dr. Shamkant B. Badgujar

  21   



CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	0	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	0
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

## BBI159 Structural Bioinformatics

### Unit I

Fundamentals of X-ray diffraction, NMR spectroscopy of macromolecules, Protein Structure: Primary, Secondary, Super Secondary, Domains, Tertiary, Quaternary, Ramachandran plot.

### Unit II

Protein secondary structure classification databases: HSSP, FSSP, CATH, SCOP, Protein secondary structure prediction methods: GOR, Chou-Fasman, PHD, PSI-PRED, J-Pred.

### Unit III

Protein Tertiary structure prediction methods: Homology Modeling, Fold Recognition, Ab-initio Method, Protein folding, Molecular Dynamics of Protein, Molecular Docking of Protein, Small molecule and Nucleotide, Concepts of Force Field

### Unit IV

Motif and Domain: Motif databases and analysis tools, Domain databases (CDD, SMART, ProDom) and Analysis tools. HMM (Hidden Markov Model): Introduction to HMM, its application in Sequence alignment and Structure prediction, HMM based Softwares (HMMER and HMMSTR)

### Unit V

Structural features of RNA: Primary, Secondary, Tertiary. Introduction to RNA Secondary structure prediction, Methods for RNA Secondary structure prediction, Limitation of RNA Secondary structure prediction.

### References:

1. David W. Mount - Bioinformatics: Sequence and Genome Analysis, Cold Spring Harbor Laboratory, 2004.

## MBI010A: Laboratory Exercises of Genetic engineering and Bioprocess

### Engineering Credit(s): 6

1. Estimation of carbohydrate by Anthrone reagent

2. Estimation of Glycogen
3. Estimation of Protein by Lowry's, Barford and Biurette method
4. Saponification value of oil
5. Acid number of oil and fats
6. Iodine number
7. Estimation of DNA by DPA Method
8. Estimation of RNA by Orcinol Method
9. Restriction digestion
10. Ligation
11. Isolation of Bacterial DNA
12. Quantification of bacterial DNA using spectrophotometer
13. Isolation of RNA and quantification by a spectrophotometric method
14. Separation of plant protein by SDS PAGE and visualization
15. Demonstration of PCR technique
16. Isolation of genomic DNA from plant and bacteria
17. Isolation of plasmid
18. Agarose gel electrophoresis
19. Restriction Digestion DNA/plasmid
20. Isolation of RNA
21. Southern Blotting
22. Ligation
23. Conjugation
24. Transformation
25. PCR
26. Microbial analysis of food samples, methylene blue reduction test for milk.
27. Microbial production of food and beverages by fermentation-wine and yogurt
28. Isolation of industrially important microbes from the environment
29. Microbial Production of citric acid and antibiotics
30. Comparative studies of Ethanol production using different substrates
31. Production and assay of Alkaline Protease
32. Isolation of casein from milk
33. Microbial Production of antibiotics
34. Microbial Production of vitamin B12
35. Isolation of Ascorbic acid producing bacteria
36. Determination of TDP and TDT of microorganisms for design of a sterilizer
37. Microbial production of citric acid using *Aspergillus niger*.
38. Isolation and study of fungus responsible for food spoilage
39. Quality testing of milk by MBRT test
40. Determination of phosphates activity in butter, whey, milk powder
41. Microbiological analysis of food production
42. Analysis of mycotoxin in fungal contaminated food materials.

SEMESTER – III		
MBI011A	ENVIRONMENTAL BIOTECHNOLOGY	4
MBI012A	PLANT BIOTECHNOLOGY	4



	Any one from the following:	
MBI013A	IMMUNOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY	4
MBI014A	RESEARCH METHODOLOGY	4
MBI021A	Biostatistics	
MBI022A	Nanoscience and Nanotechnology	
MBI015A	Environmental, Plants, Animals and Immunological Techniques Practicals	6
	<b>Total Credits</b>	<b>22</b>

**Course: ENVIRONMENTAL BIOTECHNOLOGY**

**Course Code: MBI011A**

**Lectures: 4 Hrs/week**

**Course Outcomes:**

- CO-1 Students will be able to understand air pollution and water pollution.  
CO-2 Students will be able to describe different methods of waste water treatments.  
CO-3 Students will be able to explain different xenobiotic compounds.  
CO-4 Students will be able to acquire skills to analyze biological monitoring of hazardous waste

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	2
CO2	3	3	3	2	1	2	1
CO3	3	3	3	2	1	2	2
CO4	3	3	3	2	2	2	2

1 – LOW , 2- MEDIUM , 3-HIGH

**MBI011A-ENVIRONMENTAL BIOTECHNOLOGY**

**Credit(s): 4**


**Unit-1**

Air pollution: definition of air pollution, Sources of air pollution, acid rain, global warming, air pollution control through biotechnology. Biofuels: plant derived fuels, biogas, landfill gas, bioethanol, biohydrogen; biogas production, methogenic bacteria,

**Unit-2**

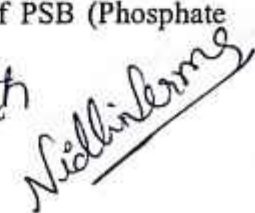
Water pollution and its control: Water as a scarce natural resource, Need for water management, Measurement of water pollution, Sources of water pollution. Solid Waste management, Composting, vermi composting and vermi culture. Microbial biofertilizers: types, sources, manufacture and significance. Green manuring, Mycorrhizae as fertilizers: Rhizobia and other symbiotic and non symbiotic nitrogen fixing microbes as biofertilizer. Application of microbes as biofertilizers. Significance and application of PSB (Phosphate

  
**Dr. Shamkant B. Badgujar**

 24  




Solubilizing Bacteria) and PGPR (Plant Growth Promoting Rhizobacteria). Waste Water Treatment, Biomining and Bioleaching,

### Unit-3

Microbiology of waste water treatments: Aerobic process: Activated sludge, Oxidation ditches, Trickling filters, towers, rotating discs, rotating drums, oxidation ponds. Anaerobic processes: Anaerobic digestion, Anaerobic filters, Up flow anaerobic sludge blanket reactors. Sewage and waste water treatment and solid waste management, BOD, COD. Biotechnological approaches to water conservation.

### Unit-4

Degradation of Xenobiotic Compounds in Environment: Microbiology of degradation of Xenobiotics in environment: Ecological considerations, decay behavior & derivative plasmids; Hydrocarbons, substituted hydrocarbons, oil pollution, surfactants, pesticides. Bioremediation ion: In-situ and ex-situ techniques, advantages and disadvantages of bioremediation ion, GEMs in environment, applications of genetically engineered microbes (GEM) in bioremediation.

### Unit-5

Phytoremediation: Types and its applications, phytoremediation of soil metals; Environmental monitoring: Bioindicators Integrated pest management- An ecological approach, Biosensors, Plant biomass, Biological monitoring of hazardous waste, Superbug, Modification of bacterial strength, Bioleaching, Microbial involvement in bioleaching, Removal of metals from water, Microbial enrichment of oil recovery, Oil recovery by injecting microbial products

### Suggested Readings

1. Carl, Branden and Tooze, John. Introduction to Protein Structure, Garland Publishing (Taylor and Francis Group). New York.
2. Yada, R.Y.; Jackman, R.L.; Smith, J.L. Protein Structure-Function Relationships Blakie Academic and Professional: London
3. Clark, R.J.H and Hester, R. E. Spectroscopy of Biological Systems, John Wiley and Sons, New York.
4. Nakai, S. and Modler, H.W. Food Proteins: Properties and Characterization, VCH Publishers, New York.
5. Waste water treatment for pollution control. 2<sup>nd</sup> Edition. Arceivala.
6. Environmental Microbiology. R. M. Maier, I. L. Pepper & G. P. Gerba
7. Comprehensive Biotechnology Vol.-4. Murray Moo Young.
8. Biotechnology. Rehm and Reid.
9. Wastewater Engineering-Treatment, Disposal and Reuse, Metcalf and Eddy. Inc. Tata McGraw Hill, New Delhi. 1991
10. Environmental Science (5th Edition) by WP Cunningham & BW Saigo., Mc Graw Hill. 1999.
11. Introduction to Biodeterioration, D Allsopp and K.J Seal, ELBS/Edward Arnold. Cambridge Univ Press. 2004.
12. Biotechnology for Wastewater Treatment. P Nicholas Cheremisinoff. Prentice Hall Of India. 2001
13. Biotechnological Methods of Pollution Control. S.A Abbasi and E.Ramaswami. Universities Press 1999.
14. Environmental Biotechnology, Concepts and Applications. Hans-Joachim Jordening and



Josef Winter. Winter-VCH. 2005

15. Bio logy of wastewater Treatment. N F Gray. Mc Graw Hill . 2004.

16. Fundamentals of ecology (5th Edition) by EP Odum and GW Barrett, Thomson Books/Cole, 2005.

17. An Introduction to Environmental Biotechnology by Milton Wain Wright. Kluwar Acad Publ. Group, Springer, 1999.

**Course: PLANT BIOTECHNOLOGY**

**Course Code: MBI012A**

**Lectures: 4 Hrs/week**

**Course outcome**

CO-1 Students will be able understand different plant tissue culture and sterilization techniques

CO-2 Students will be able to describe and compare different type's tissue culture media, cell and suspension cultures, genetic transformation and micro-propagation techniques

CO-3 Students will be able to distinguish different plant tissue culture techniques used for molecular farming and able to grow callus and understand the genetic engineering for crop manipulation

CO-4 Student will able to acquire skills to analyze the critical problems related to plant tissue culture

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	2	1	2
CO2	3	2	3	2	2	1	1
CO3	3	3	3	2	2	2	2
CO4	3	3	3	1	3	1	2

1 – LOW , 2- MEDIUM , 3-HIGH

**MBI012A: PLANT BIOTECHNOLOGY**

**Credit(s):4**

**Unit-1**

Concepts & basic techniques in tissue culture; Conventional breeding v/s tissue culture. Tissue culture media (composition & preparation), sterilization techniques, tissue culture as a technique to produce novel plants & hybrids, green home and Green house technology; Initiation and maintenance of callus and suspension cultures, single cell clones, nurse culture technique, differentiation, organogenesis & somatic embryogenesis, Production and application of artificial seeds.

**Unit-2**

Shoot tip culture for rapid clonal propagation & production of virus-free plants, stages of micropropagation, propagation by direct and indirect organogenesis, micro grafting, physiological nature/abnormalities of micro propagated plants. Transfer and establishment of whole plants in soil, in situ and ex situ rooting & difference; Changes during hardening of micropropagated plants

### Unit-3

Protoplast isolation, fusion & culture, somatic hybridization, selection of hybrid cells and regeneration of hybrid plants, symmetric and asymmetric hybrids, cybrids and role of protoplast culture and somatic hybridization in improvement of crop plants. Haploid production and its significance, anther, pollen culture, monoploid production through bulbosum method, Embryo culture/embryo rescue and ovary culture; Endosperm culture, production of triploids, Role of haploids, monoploids and triploids in agriculture

### Unit-4

Basic concepts and genetic engineering for increasing crop productivity by manipulation of Photosynthesis, Nitrogen fixation, Nutrient uptake efficiency, biotic Insects, fungi, bacteria, viruses, weeds, Abiotic stress-drought, flooding, salt and temperature and for quality improvement- Protein, lipids, carbohydrates, vitamins & mineral nutrients.

### Unit-5

Plants as bioreactor or Molecular farming- value added crops, edible vaccines, industrial enzymes, antibodies, medicines. Cell cultures for secondary metabolites production.

#### *Suggested Readings*

1. J Hammond, P Mc Garvey and V Yusibov (Eds): Plant Biotechnology. Springer Verlag, 2000
2. TJ Fu, G Singh and WR Curtis (Eds): Plant Cell and Tissue Culture for the Production of Food Ingredients. Kluwer Academic Press 1999
4. HS Chawla: Biotechnology in Crop Improvement. International Book Distributing Company 1998
5. RJ Henry: Practical Application of Plant Molecular Biology. Chapman and Hall 1997
6. PK Gupta: Elements of Biotechnology. Rastogi and Co. Meerut 1999.

Department of Biotechnology,  
M.Sc. Semester – III  
Course – Animal Biotechnology  
Course Code – MBI0013B  
Lectures: 4 Hrs/week

### **MBI013B: ANIMAL BIOTECHNOLOGY**

**Credit(s):4**

#### **Course outcome**

CO-1 Students will be able to understand the term animal tissue culture- its history and development, gene therapy and transgenic animals.

CO-2 Students will be able to describe cell lines, cell culture media its components and role of antibiotics in media.

CO-3 Students will be able to learn how to measure the cell number and parameters of growth- growth curves

CO-4 Students will be able to acquire skills to analyze the applications of gene therapy and genetic engineering in animal tissue culture.

  
Dr. Shamkant B. Badgujar





**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	1	1	1
CO2	3	3	2	2	0	0	1
CO3	3	2	3	2	1	0	2
CO4	3	2	3	2	1	0	2

1-LOW, 2-MEDIUM, 3-HIGH

## **MBI013A: IMMUNOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY**

### **Unit-1**

**Credit(s):4**

History and development of animal tissue culture; Equipment and materials (culture vessels, CO<sub>2</sub> incubator, inverted microscope, cell counters). Principles of sterile techniques; Sources of tissues, types of tissues-epithelial, muscle, connective, nerve and blood; Introduction to balanced salt solutions.

### **Unit-2**

Cell culture media-components of the medium, physical, chemical and metabolic functions of media; Role of serum and supplements, serum-free media, features and specifications of MEM, DMEM, RPMI and Ham's medium. Role of antibiotics in media; Primary culture-Mechanical and enzymatic mode of desegregation, establishment of primary culture; Subculture-passage number, split ratio, seeding efficiency, criteria for subculture; Cell lines-definite and continuous cell lines, characterization, authentication, maintenance and preservation of cell lines.

### **Unit-3**

Measurement of cell number- hemocytometer, coulter counter; Measurement of cell viability and cytotoxicity; Dye exclusion and inclusion tests, colonogenic assay, macro molecular estimation, MTT based assay. Measuring parameters of growth-growth curves, PDT, Plating efficiency and factors influencing growth.

### **Unit-4**

Gene therapy-ex vivo and in vivo gene therapy methods, applications; Application of animal cell culture - Vaccine production, specialized cell types. Concepts of tissue engineering - skin, liver, kidney, bladder and heart



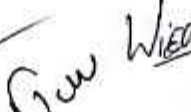


### **Unit-5**

Transgenic animals-retroviral, micro injection, and engineered embryonic stem cell method of transgenesis; Application of transgenic animal's biopharming, disease models, functional knockouts.

### **Suggested Readings**

1. Culture of Animal Cells, (3rd Edn) R Ian Fredhney. Wiley-Liss
2. Animal Cell Culture – Practical Approach, Ed. John RW. Masters, Oxford

  
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*Handwritten signatures and initials:*  
  
  
  
  


3. Cell Growth and Division: A Practical Approach Ed. R. Basega, IRL Press
4. Cell Culture Lab Fax. Eds. M Butler & M Dawson, Bios Scientific Publications, Ltd. Oxford
5. Animal Cell Culture Techniques Ed Martin Clynes, Springer
6. Methods in Cell Biology, Vol. 57, Animal Cell Culture Methods Ed. Jenni P Mather
7. David Bames. Academic Press
8. Animal Cell Technology, Principles and practices, 1987, Butter, M Oxford press
9. Animal Cell Biotechnology, 1990- Spier, RE and Griffith, JB Academic Press, London.

Course: **RESEARCH METHODOLOGY**

Course Code: MBI014A

Lectures: 4 Hrs/week

**MBI014A: RESEARCH METHODOLOGY**

**Credit(s): 4**

**Course outcome**

CO-1 Students will be able understand the basics of research objectives and methodology.

CO-2 Students will be able to describe research problem, hypothesis and its testing

CO-3 Students will be able to learn how to collect primary and secondary data, its organization

CO-4 Students will able to acquire skills to analyze the applications of data in different research work

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	1	1	1
CO2	3	3	2	2	0	0	1
CO3	3	2	3	2	1	0	2
CO4	3	2	3	2	1	0	2

1-LOW, 2-MEDIUM, 3-HIGH

**MBI014A: RESEARCH METHODOLOGY**


**Credit(s): 4**




**Unit-1**

Understanding Research: Introduction, definition and meaning of research, characteristics of research, objective of research, motivation in research, types of research, research approaches, significance of research, research methods versus methodology, research in decision making, role of research in various areas, limitations of research, what constitutes a good research.

**Unit-2**

Scientific Methods and Research: Scientific method, definitions of scientific method, characteristics of scientific method, basis of scientific method, scientific methods and

  
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scientific research, components of scientific approach, bias and prejudice in scientific research  
Formulating Research Problem and Hypothesis: Introduction, Research process/planning process, research problem-need for defining, pre-requisites for formulating research problem, selection of the research problem, points to ponder on research problem, units of analysis, time and space co-ordination, characteristics of interest, environmental conditions, technique involved in defining a problem, formulation of a research problem and hypothesis testing

### Unit-3

Hypothesis Testing: Introduction, Hypothesis: definition and meaning, role of hypothesis, source of hypothesis, kinds of hypothesis, characteristics of hypothesis, formulation of hypothesis, importance of hypothesis, difficulties in formulating hypothesis, means to overcome difficulties, testing of hypothesis, steps in testing hypothesis, flow diagram for hypothesis testing, measuring the power of a hypothesis test, statistical hypothesis/tests of significance, limitations of tests of significance

Testing of Hypothesis-I (Parametric or Standard Tests of Hypothesis): Tests of hypothesis, important parametric tests, hypothesis testing of means, hypothesis testing for differences between means, hypothesis testing for comparing two related samples, hypothesis testing of proportions, hypothesis testing for difference between proportions, hypothesis testing for comparing a variance to some hypothesized population variance, testing the equality of variances of two normal populations, hypothesis testing of correlation coefficients.

### Unit-4

Research Design: Introduction, Meaning and definition of research design, need for research design, relation between problem formulation and research design, factors affecting research design, advantages of research design, steps in research design, various types of research design, basic principles of experimental designs. Data Collection and Management: Introduction, Meaning and importance of data, Sources of data, choosing the method for data collection, methods of collection of primary data: definition and meaning, types, importance, advantages and disadvantages; methods of collection of secondary data, scrutiny of secondary data, merits and demerits of different methods of collection of primary data.

### Suggested Readings

1. S. C. Gupta. Fundamentals of Statistics. Himalaya Pub. House.
2. J. Medhi. Statistical Methods: An introductory text. New Age International (P) Ltd. Publishers.
3. P.S.S. Sudar Rao & J. Richard. An introduction to biostatistics. Prentice Hall of India. N. Delhi.

MBI021A	Biostatistics
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Department Elective

Course Code: MBI021A

Course Name: Biostatistics

### Course outcome

CO-1 Students will be able to exposed to concepts of statistical methods and statistical inference that would help them in understanding the importance of statistics

CO-2 Students will be able to describe and understand the concepts involved in data presentation, analysis and interpretation.

CO-3 Students will get the exposure to presentation of data, probability distributions, parameter estimation and test of significance, regression and multivariate analytical techniques

CO-4 Student will able to acquire skills to analyze the critical problems related to statistics, hands on experience in the analysis of their research data.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	2	0	1	1
CO2	3	3	2	1	1	0	1
CO3	2	2	3	2	1	0	2
CO4	3	2	3	2	3	1	1

1-LOW, 2-MEDIUM, 3-HIGH

### **Biostatistics (MBI021A)**


**UNIT 1.** Elementary concepts in Statistics: Concepts of statistical population and sample from a population; qualitative and quantitative data; nominal, ordinal, ratio, interval data; cross sectional and time series data; discrete and continuous data. Collection and scrutiny of data: Primary data; designing a questionnaire and a schedule; secondary data and sources of secondary data.

**UNIT 2.** Probability: Random Experiment; sample point; sample space; events; mutually exclusive and exhaustive events; frequency and classical definitions of probability. Axiomatic definition of probability; addition and multiplication theorems; conditional probability and independence; Bayes' theorem. Discrete and continuous random variables.

**UNIT 3.** Standard Univariate Distributions: Standard univariate discrete and continuous distributions- uniform; binomial; Poisson; geometric; negative binomial and

  
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31  








hyper-geometric distributions. Uniform; exponential; normal; Laplace, gamma, beta, lognormal, logistic and Weibull distributions. (elementary properties and applications only)

**UNIT 4.** Sampling Distributions, Law of large numbers and Central Limit Theorem: Concepts of random sample and statistic; distribution of sample mean from a normal population; chi-square distribution; F and t statistics, distributions (no derivations) and their applications. Chi-square test.

#### References:

1. Dutta, N. K. (2004). Fundamentals of Biostatistics, Kanishka Publishers.
2. Gurumani N. (2005) . An Introduction to Biostatistics, MJP Publishers.
3. Daniel, W. W. (2007). Biostatistics- A Foundation for Analysis in the Health Sciences, Wiley.
4. Rao, K. V. (2007). Biostatistics – A Manual of Statistical Methods for use in Health Nutrition and Anthropology.
7. Pagano, M.& Gauvreau, K. (2007). Principles of Biostatistics.
8. Rohatgi, V.K.& Saleh, A.K.Md. (2001). An Introduction to Probability and Statistics, John Wiley & Sons.
9. Sundaram, K.R.(2010) Medical Statistics-Principles & Methods, BI Publications, New Delhi

#### **MBI015A: Environmental, Plants, Animals and Immunological Techniques Practical** **Credit(s): 6**

1. Water quality analysis - MPN method
2. Determination of dissolved oxygen concentration of water sample
3. Determination of bio logical oxygen demand (BOD) of sewage sample
4. Determination of Chemical oxygen demand (COD) of sewage sample
5. Isolation of xenobiotic degrading bacteria by selective enrichment technique
6. Test for the degradation of aromatic hydrocarbons by bacteria
7. Detection of coliforms for determination of the purity of potable water
8. Estimation of nitrate in drinking water
9. Isolation of VAM from soil by wet sieving and decanting method
10. Isolation and cultivation of mushroom
11. Introduction to tissue culture laboratory
12. Preparation of M.S. media
13. Growth regulator concentration maintenance
14. Anther culture
15. Apical meristem culture
16. Leaf culture
17. Artificial seed preparation
18. Preparation of Media
19. Window making
20. Blood Analysis (RBC, WBC, Differential Staining of WBC, Hemoglobin estimation, Blood Grouping, Clotting Time)
21. Production of Ginger wine
22. Production of Grape wine
23. Citric acid production by *Aspergillus* and its estimation
24. Estimation of alcohol content

25. Saurkraut production
26. Production of antibiotic
27. Introduction to graphical presentation data
28. Computations of Mean, Media and Mode.
29. Computation of Geometric Mean and Harmonic Mean
30. Computation of Mean Deviation.
31. Computation of Quartile deviation.
32. Computation of Variance.
33. Computation of Coefficient of Variation
34. To check the symmetry of the distribution by coefficient of Skewness.
35. To check the Shape of the distribution by coefficient of Kurtosis.

### Department Elective

Course Code: MBI022A

Course Name: Nanoscience and NanoTechnology

### Course outcome

CO-1 Students will be able to understand the basics nanotechnology

CO-2 Students will be able to illustrate the historical aspects of nanomaterials uses, discoveries, and involvement of various scientists.

CO-3 Students will be able to explain the importance of physicochemical parameters of nanoparticles and their characterization.

CO-4 Students will be able to evaluate the uses of nanotechnology in all the area.

### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	2	1
CO2	3	3	3	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	3	3	1	2	2	2

1-LOW, 2-MEDIUM, 3-HIGH

### Nanoscience and Nanotechnology

#### Unit 1

Basic nanotechnology: definition of nanomaterials, differences between bulk form of materials and nanomaterials, unique properties of nanomaterials.

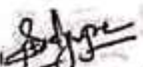
#### Unit 2

Historical aspects of nanomaterials: uses since centuries, contribution of different scientists, Classifications and types of nanomaterials as nano particles and 1D, 2D, and, 3D nanomaterials.

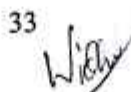
#### Unit 3

Synthesis of nanomaterials: 'Top down' vs. 'Bottom up' approaches, physicochemical properties of nanomaterials, understanding of physicochemical properties, (Size, shape, surface charge, hydrophobicity, hydrophilicity. Impact in toxicological studies,

#### Unit 4

  
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33  








Nanomaterials characterization: UV-vis spectroscopy, TEM, SEM, FTIR, DLS, Zeta, XRD, Biomedical applications of nanoparticles.

SEMESTER -IV		
MBI016A	Review Writing	4
MBI017A	Dissertation	18
MBI018A	Seminar	2
	Total Credits	24
Total Credits of All Four Semesters		90

#### MBI016A Review Writing

Credit(s): 4

Student will compile the review of literature (at least a ten year data) on any topic related to the importance of Biotechnology and its applied fields. The review matter will be supported by the publication in indexed Journal of National/International repute and/or submission of manuscript.

#### MBI017A: Dissertation

Credit(s):18

Project: The students of M.Sc. Biotechnology should carry out a dissertation work for at least 16 weeks in a National Lab/Private industry/reputed lab/institute. Dissertation will be based upon research and actual bench work. It will begin from the end of III semester and will continue through the IV semester. Dissertation report will be submitted and evaluated at the end of IV semester and students should defend their work in front of a selected committee in their last semester.

#### MBI018A: Seminar

Credit(s):2





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**UNIVERSITY**

BUILD YOUR WORLD

**School of Sciences**  
**Syllabi and Course Structure**  
**B. Sc (Botany)**  
**(2022-2025)**

**Academic Programme**

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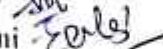
**JECRC University**  
**School of Sciences**  
**Minutes of Meeting**


The Board of Studies Meeting was conducted on 28 Dec 2022 in the chamber of Deans, School of Sciences at 2.30PM regarding the revisions in Syllabus and change in Course code and subject code for the session 2022-23.

Following members attended the meeting

1. Prof Widhi Dubey 

2. Prof Sonali Pandey 

3. Prof Ekta Menghani 

4. Prof K.P Sharma Professor & Head, Botany Deptt, University of Rajasthan, Jaipur   
The chairman, BOS welcomed the external expert and briefed about the agenda of the meeting.

Following revisions were made in the Scheme for the Session 2022-23.

1. The credits of the subjects in each semester was revised to 27, 21, 22,21, 21,21 and 21 in the I,II,III,IV,V and VI Semester respectively. The Course offers degree of B. Sc to the students after attaining total of 133 credits in three years.
2. The subject code was revised across all the Schools in JECRC University.
3. The Subject codes including theory and Lab was reframed and revised from BSB001A to BSB013A across all semesters with respect to the BBO001B to BBO013B code given in Previous Sessions.
4. There was addition of Web Development and Web development Lab , Project Management Lab, Advanced Spread Sheet Lab, Python Programming and Python Programming Lab for the inculcation of Computer related learning and enhanced upskills in students in First, Second, Third and Fourth Semester respectively.
5. There was addition of two new Subject viz Culture Education -I and II in the First and Second Semester respectively with a view to promote awareness about our Indian Culture and Personalities among the new generation of students.
6. An Addition of two subjects named Life Skills -I and II was added in the Semester III and IV for the Personality Development and Aptitude enhancement.
7. Focusing on the NEP2020 three open electives in the III and VI Semesters were offered to the students to upgrade their knowledge while offering the students with the subjects of their interest across the different schools.
8. In each semester the Department of Botany offers one theory and one Practical lab of 4 and 1 credits respectively, thus a sum total of 30 credits( 24 credits of Theory and 6 credits of Lab) is offered to the students pursuing B.Sc Pass Course Degree in School of Sciences.
9. The Scheme of Pass Course and Syllabus of the Botany Subjects was shared to the External Member and the suggestions given by them was incorporated in the Syllabus and final approval of them was received.
- 10 The meeting ended with Vote of Thanks to the chair.

**JECRC UNIVERSITY**  
**FACULTY OF SCIENCE**  
**SESSION 2022-2023**

Details of Scheme for B.Sc. (Passcourse) with various Courses and their credits with contact hours are given below:  
**Semester I**

S.No.	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
1.	Subject A Cell Biology & Thallophytes (BSB001A) Practical Lab of Algae, Fungi and Basics of Cell Biology (BSB002A)	4	-	2	4		1	5	Core
2.	Subject B (Course 1)	4	-	2	4		1	5	Core
3.	Subject C (Course 1)	4	-	2	4		1	5	Core
4.	Web Development	2	-		2			2	Fundamental
5.	Web Development Lab			2			1	1	Fundamental
6.	Environment Studies	3		2*	3		1	4	Fundamental
7.	Communication Skills	2	0	2	2	0	1	3	Foundation
8.	Culture Education I	2	-		2			2	Foundation
		21		12	21		6	27	

\*Field/ Project Work and Report

**Semester II**

Subject Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
1.	Subject A (Bryophyta, Pteridophyta And Lichens BSB003A) Practical Lab of Cryptogams and Lichens (BSB004A)	4	-	2	4		1	5	Core
2.	Subject B (Course 2)	4	-	2	4		1	5	Core
3.	Subject C (Course 2)	4	-	2	4		1	5	Core
4.	Project Management Lab		-	2			1	1	Fundamental
5.	Professional Skills	2	0	2	2	0	1	3	Foundation

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6.	Culture Education-2	2	0	0	2	0	0	2	Foundation
		16		10	16		5	21	

## Semester III

S.No	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)		Credits			Total Credits	Paper Category
					L	T	P			
1.	Subject A Genetics And Plant Breeding (BSB005A)  Practical Lab on basics of Plant Breeding and Genetics (BSB006A)	4	-	2	4		1		5	Core
2.	Subject B (Course3)	4	-	2	4		1		5	Core
3.	Subject C (Course3)	4	-	2	4		1		5	Core
4.	Advanced Spread Sheet Lab		-	2			1		1	Fundamental
5.	Life Skills 1 (Personality Development)	1	0	2	1	0	1		2	Foundation
6.	Value Education & Ethics-1	1	0	0	1	0	0		1	Foundation
7.	Open Elective I	3		0	3		0		3	Interdisciplinary
		17		10	17		5		22	

## Semester IV

S.No	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)		Credits			Total Credits	Paper Category
					L	T	P			
1.	Subject A Morphology,	4	-	2	4		1		5	Core

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	Anatomy & Plant PhysiologyBSB007A)								
	Practical Lab on Fundamentals of Anatomy, Morphology and Plant PhysiologyBSB008 A								
2.	Subject B (Course4)	4	-	2	4		1	5	Core
3.	Subject C (Course 4)	4	-	2	4		1	5	Core
4.	Python Programming	2	-		2			2	Fundamenta
5.	Python Programming Lab			2			1	1	Fundamenta
6.	Life Skills-2 (Aptitude)	1	0-	2	1	0	1	2	Foundation
7.	Value Education& Ethics-2	1	0	0	1	0	0	1	Foundation
		16		10	16		5	21	

## Semester V

S.No	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
1.	Subject A Gymnosperm, Angiosperm And PaleobotanyBSB009A)  Practical Lab on Spermatophytes and PaleoBotanyBSB010A	4	-	2	4		1	5	Core
2.	Subject B(Course5	4	-	2	4		1	5	Core
3.	Subject C(Course5)	4	-	2	4		1	5	Core
4.	Project			12			6	6	Discipline Specific
		12		18	12		9	21	

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## Semester VI

S.No	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
1	Subject A Environmental Management And Economic Botany BSB012A)  Practical Exercises based on Plant Ecology and Economic BotanyBSB013A	4	-	2	4		1	5	Core
2	Subject B(Course 6	4	-	2	4		1	5	Core
3	Subject C (Course 6	4		2	4		1	5	Core
4	Open Elective- II	3			3			3	Interdisciplinary
5	Open Elective -III	3			3			3	Interdisciplinary
		18		6	18		3	21	

## Total Credits

Credits	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total
	27	21	22	21	21	21	133

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### B.Sc. Pass Course PO

**PO1 Core competency:** The graduates are expected to know the fundamental concepts of Science and other subjects. These fundamental concepts would reflect the latest understanding of the subject and in allied subject areas. Students will learn to investigate, experiment, relate information and draw logical conclusions based on scientific reasoning.

**PO2 Disciplinary knowledge and skill:** To learn and apply the knowledge in understanding research and addressing practical problems and to apply various scientific methods to address different questions by formulating the hypothesis, data collection and critically analyze the data. The student will be inquisitive about processes and phenomena happening during experiments in laboratories and seeks answers through the research path..

**PO3 Skilled communicator:** Communicate effectively on various scientific issues with the society at large. They are expected to read and understand documents with in-depth analyses and logical arguments. Graduates are expected to be well-versed in speaking and communicating their idea.

**PO4 Critical thinker and problem solver:** Critical thinking and analytical reasoning and the scientific knowledge will help to develop scientific temper that will be more beneficial for the society. The student will be able to draw logical conclusions based on a group of observations, facts and rules.

**PO5 Team player:** The course curriculum has been designed to provide opportunity to act as team player by contributing in laboratory, field based work, project and industry.

**PO6 Moral and ethical awareness:** Graduates are expected to be responsible citizen of India and be aware of moral and ethical baseline of the country and the world.. Emphasis be given on academic and research ethics, including fair Benefit Sharing, Plagiarism, Scientific Misconduct and so on.

**PO7 Skilled project manager:** Graduates are expected to be familiar with decision making process and basic managerial skills to become a better leader by acquiring knowledge about project management, writing, planning, study of ethical standards and rules and regulations pertaining to scientific project operation.

**PO8 Digitally literate:** The student will acquire knowledge in understanding and carrying out data analysis, use of library search tools, and use of software and related computational work. Students will acquire digital skills and integrate the fundamental concepts with modern tools.

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**PO9 Environment and Sustainability** Apply the knowledge of basic science and allied fields to protect environment and to prevent environmental degradation as science graduate, to stay firm on the value systems, of their culture, including their own for a healthy socio cultural environment.

**PO10 Lifelong learner:** Graduates will acquire the ability to engage independent and self-learning as well as to successfully pursue their career objectives in advanced education and in professional courses, through the use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing employability.

**Program Specific Outcome:**

PSO1: The ability to understand the nature and basic concept of origin of life, Cell biology Prokaryotes. Classification, evolution, life cycle and importance of Algae and Fungi. Bryophytes, Pteridophytes and Lichens.

PSO2: The ability to understand the mechanism of Genetics, Anatomy, Physiology and mechanism of Angiosperm Plants. Conventional and Non Conventional mode of plant breeding and their application in human welfare

PSO3: The ability to understand the classification, evolution life cycle and importance of Gymnosperms and taxonomy of Angiosperms.. Understand the issues of Environmental management and uses of plants and their parts in Economic Botany

PSO4: Perform Procedures as per laboratory standards on cell biology, Anatomy, Taxonomy and Ecology and anatomical study of Thallophytes, Bryophytes, Pteridophytes, Gymnosperms, Angiosperms.

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### B.Sc Botany

SEMESTER -I		
Code	Title of Course	Credits
BSB001A	CELL BIOLOGY AND THALLOPHYTES	4
BSB002A	Practical Lab of Algae, Fungi and Basics of Cell Biology	1
	Total Credits	5
SEMESTER -II		
BSB 003A	BRYOPHYTA, PTERIDOPHYTA AND LICHENS	4
BSB004A	Practical Lab of Cryptogams and Lichens	1
	Total Credits	5
SEMESTER -III		
BSB005A	GENETICS AND PLANT BREEDING	4
BSB006A	Practical Lab on basics of Plant Breeding and Genetics	1
	Total Credits	5
SEMESTER -IV		
BSB007A	MORPHOLOGY, ANATOMY AND PLANT PHYSIOLOGY	4
BSB008A	Practical Lab on Fundamentals of Anatomy ,Morphology and Plant Physiology	1
	Total Credits	5
SEMESTER -V		
BSB009A	GYMNOSPERM, ANGIOSPERM AND PALEOBOTANY	4
BSB010A	Practical Lab on Spermatophytes and PaleoBotany	1
BSB011A	Project (optional)	6
	Total Credits	
SEMESTER -VI		
BSB012A	ENVIRONMENTAL MANAGEMENT AND ECONOMIC BOTANY	4
BSB013A	Practical Exercises based on Plant Ecology and Economic Botany	1
	Total Credits	36

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## Semester-I

BSB001A	Cell Biology and Thallophytes	4-0-1 [5]
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## Objective

- To learn about the basic concept of cell theory and cell types
- To understand fundamental concepts of Cell Biology.
- To understand the Classification, evolution, Life cycle and economic importance of Fungal members.
- To understand the Classification, evolution, Life cycle and economic importance of Algal members.

Unit -I	Cell theory, cell size and shape, eukaryotic cell components. Cell membrane and cell wall: the function of membrane, models of membrane structure, membrane protein and their function, cell wall, structure, origin & function.
Unit-II	Nucleus- nuclear envelop, structure of nuclear pore complex, chromatin structure, DNA packaging in eukaryotes, euchromatin, heterochromatin, nucleolus and ribosome structure, mitosis, meiosis.
Unit-III	Cell organelles: Mitochondria structure, composition, semiautonomous nature, symbiont hypothesis mitochondrial nature. Chloroplast- structure, composition, semiautonomous nature and chloroplast DNA. ER, Golgi body, lysosome. Peroxisome and glyoxisome: structure, role and function.
Unit -IV	Algae- General characteristics; Ecology and distribution, Range of thallus organization and reproduction; Basic criteria used in classification (Fritsch, and Smith), <i>Spirulina</i> cultivation (SCP) Important classes in relation to applied Phycology listed below Cyanophyceae- <i>Nostoc</i> Chlorophyceae- <i>Volvox</i> , <i>Chara</i> Xanthophyceae - <i>Vaucheria</i>

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	Phaeophyceae- <i>Ectocarpus</i> Rhodophyceae – <i>Polysiphonia</i>
Unit -V	Fungi- General characteristics; Ecology and distribution; Range of thallus organization; Cell structure; Wall composition; Nutrition; Growth; Reproduction and spores; Heterokaryosis and parasexuality; Basic criteria used in classification. Mushroom cultivation. Life cycle of <i>Sclerospora</i> , <i>Aspergillus</i> , <i>Claviceps</i> , <i>Ustilago</i> and <i>Alternaria</i> .

#### Course Outcome (CO):

At the end of this course students will have:

**CO1:** An Understanding of cell theory & Compare the structure and function of cell and its types. Identify the concept that explains chemical composition and structure of cell wall and models of cell membrane.

**CO2:** An ability to analyze structure, function and importance of Nucleus, structures and chemical properties and Function of DNA and RNA through various historic experiments, Role of mitosis and meiosis in living organisms.

**CO3:** An ability to understand the origin, structure and development of double membrane and single membraned cell organelles.

**CO4:** An ability to understand the basic criteria used in classification, General characteristics, Ecology, distribution, Range of thallus organization and reproduction in different classes of algal members.

**CO5:** An ability to understand the basic criteria used in classification, General characteristics, thallus organization and reproduction in different classes of Fungal members. To Identify true fungi and demonstrate the principles and application of plant pathology. To Demonstrate skills in laboratory, field and work related to cytology, mycology and phycology.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:





Course Outcome	Programme Outcome										Programme Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	H	H			M	L	L	M	H		H	-	-	H
CO2	H	H			M	L	L	M	M		H			H
CO3	H	H			M	L	M	M	M		H			H
CO4	H	H	H		M	L	M	M	H		H			H
CO5	H	H	H		M	L	M	M	H		H			H

H = Highly Related; M = Medium L = Low

#### Suggested Books

1. Kaushik P. Microbiology, Emkay Publication, 2001.
2. Pelczar, Chan and Kruig. Microbiology. McGraw Hill Co., London, 1995.
3. De Robertis & De Robertis Cell and Molecular Biology. Lippincott Williams and Wilkins.
4. P.K. Gupta, Cell and Molecular Biology. Rastogi Publication.
5. C.B. Powar – Cell Biology, Himalaya Publishing House.
6. V.B. Rastogi – Cell Biology. Rastogi Publications.
7. Gilbert. M. Smith Cryptogamic Botany Vol I and II, 11nd Ed. Tata McGraw Hill Publishing Company Ltd. N.Delhi. 1985.
8. Ghemawat M.S., Kapoor, J.N. and Narayan H.S. : A text Book of Algae. Ramesh Book Depot. Jaipur 1976.
9. Kumar. H.D. Introductory Phycology. Affiliated East-West Press Ltd., Newyork 1988.
10. Singh V., Pande P.C. and Jain D.K. A Text BBook of Botany Rastogi and Co. Merrut, 2001.
11. Alexopolous, C.J. and Mims : Introductory Mycology, John Wiley and Sons, New York, 2000.
12. Dube, H.C. Fungi, Rastogi Publication, Merrut, 1989.
13. Sharma O.P. Fungi Today and Tomorrow Publication, 2000.

#### BSB002A: Practical Lab of Algae, Fungi and Basics of Cell Biology

1. To identify various parts of Dissecting and Compound microscope and to understand its functioning
2. To identify the different morphological forms of bacteria viz. Cocci, Bacilli under the compound microscope.
3. To prepare epidermal peel prepration of onion leaf and study internal structure of cell.
4. To draw electron microphotographs of eukaryotic cell with its various internal cell organelles.
5. To prepare and identify different stages of mitosis in root tips of onion.
6. To prepare and identify different stages of Meiosis in Onion flower bud.

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7. To prepare and identify suitable temporary slides of the algal cyanobacteria and chlorophyceae viz. *Nostoc* and *Volvox*.
8. To prepare and identify suitable temporary slides of the algal member *Vaucheria*, *Ectocarpus* and *Polysiphonia*.
9. To prepare and identify suitable temporary slides of the fungal member *Sclerospora* and *Aspergillus*.
10. To prepare and identify suitable temporary slides of vegetative, asexual and sexual stages of *Ustilago* and *Alternaria*.
11. Demonstration of Mushroom cultivation.
12. Demonstration of SCP Cultivation.

## Semester-II

BSB 003A	Bryophyta, Pteridophyta and Lichens	4-0-1 [5]
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### Objective

- To learn about general characteristic features, origin, life cycle and classification of Bryophyta.
- To understand fundamental concepts of pteridophyta, classification, life cycle and evolutionary details with the help of representative members of pteridophytes.
- To understand the distribution, classification and reproduction of lichens and Mycorrhiza.

Unit-I	Bryophyta: general characters, origin, affinities and classification & Economic Importance of Bryophyta. Life cycle of <i>Marchantia</i> , <i>Anthoceros</i> , <i>Sphagnum</i> & <i>Funaria</i>
Unit-II	General character of pteridophyta, classification by Smith and Sporne, Stear system in pteridophyta, Alteration of generation. Distribution, Structure and life history of <i>Rhynia</i> and <i>Psilotum</i> .
Unit -III	Distribution, Structure and life history of <i>Lycopodium</i> and <i>Equisetum</i>
Unit-IV	Distribution, Structure and life history of

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	<i>Selaginella</i> and <i>Marsilea</i> .
Unit-V	Lichens- distribution, nature of association of phycobiont and mycobiont, classification of lichens, structure reproduction & economic importance, Mycorrhiza – General account and its significance

### Course Outcome (CO):

At the end of this course students will have:

- CO1:** An critical Understanding of general characters, origin, classification and the life cycle of primitive and advanced Bryophytes.
- CO2:** An Understanding of general characters, origin, classification and stelar system of pteridophytes
- CO3:** Ability to understand the distribution, structure life history of some primitive and advanced members of pteridophyte
- CO4:** An understanding of distribution, nature of association and classification of lichens and understanding of General characteristics of Mycorrhizae.
- CO5:** Demonstrate an understanding & develop proficiencies in the experimental techniques and methods of identification of of Bryophytes, Pteridophytes, Mycorrhiza & Lichens

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Course Outcome	Programme Outcome										Programme Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	H	H	M	L	M	L	L	M	H	M	H	-	-	H
CO2	H	H	M	L	M	L	L	M	M	M	H			H
CO3	H	H	M	L	M	L	M	M	M	M	H			H
CO4	H	H	M	L	M	L	M	M	H	M	H			H
CO5	H	H	M	M	M	L	M	M	H	M	H			H

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

H = Highly Related; M = Medium L = Low

**Suggested Books**

1. Puri P. Bryophytes Atma Ram and Sons, Delhi, Lucknow 1985.
2. Sarabhai R.C. and Saxena R.C. Text Book of Botany Vol. I and II, Ratan Prakashan Mandir, Merrut, 1980.
3. Singh, Pandey and Jain. A text Book of Botany, Rastogi and Co. Merrut 2001.
4. Vashishta B.R. : Botany for degree students (Bryophyta.) S. Chand & Co. New Delhi 2002.
5. Sarabhai & Saxena, Text Book of Botany, Rastogi Publications, Merrut 1990.
6. Sporne. K.R. Morphology of Pteridophytes B.I. Publication Pvt. Mumbai (2002).
7. Vashishta P.C. Pteridophyta. S. Chand and Co. New Delhi

**BSB 004A: Practical Lab of Cryptogams and Lichen**

1. To examine external morphology of vegetative and reproductive parts of *Marchantia*.
2. To prepare hand cut sections of vegetative and reproductive parts of *Marchantia*.
3. To observe external morphology under dissecting microscope of *Anthoceros* and *Sphagnum*.
4. To prepare hand cut sections of vegetative and reproductive parts of *Anthoceros* and *Sphagnum*.
5. To study and prepare hand cut sections of vegetative and reproductive parts of *Fumaria*.
6. To identify various morphological forms (Crustose, Foliose and Fruticose) of lichens and comment upon their economic importance to mankind.
7. To examine external morphology of vegetative and reproductive parts of *Psilotum*.
8. To examine external morphology of vegetative and reproductive parts of *Lycopodium* and *Equisetum*.
9. To prepare hand cut and double stained sections of vegetative and reproductive parts of *Lycopodium* and *Equisetum*.

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10. To examine & prepare hand cut double stained sections of vegetative and reproductive parts of *Salvinella*
11. To examine & prepare hand cut double stained sections of vegetative and reproductive parts of *Marsilea*.
12. Isolation & Identification of Ectomycorrhiza from the plant roots.

### Semester-III

BSB005A	Genetics and Plant Breeding	4-0-1 [5]
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#### Objective

- To understand the general terminologies and laws of Genetics.
- To understand Cytoplasmic Inheritance & Multiple Allelism, Sex determination and Sex Linked inheritance in human, *Drosophila* and plants.
- To learn mechanism and role of Linkage and Crossing over, polyploidy.
- An understanding of Conventional and Non conventional mode of Plant Breeding, concept of rDNA Technology and Plant tissue culture

UNIT 1	Mendel work, (Terminologies, Laws of inheritance, Modified Mendelian Ratios, Cytoplasmic Inheritance & Multiple allelism.
UNIT 2	Sex determination in human, <i>Drosophila</i> and plants, Sex linked inheritance. Linkage: concept & history, complete & incomplete linkage, Bridges experiment, Crossing over : concept and significance.
UNIT 3	Numerical chromosomal changes, euploidy, polyploidy and aneuploidy
UNIT 4	Structural chromosomal changes : deletions, duplications, inversions and translocations Types of mutations, effects of physical and chemical mutagens.
UNIT 5	Introduction and objectives of plant breeding, general methods of plant breeding, Conventional and non conventional methods of plant breeding, hybrid vigour, inbreeding depression. Introduction to the concept of Recombinant DNA Technology & Plant tissue culture

#### Course Outcome (CO):

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**MAPPING COURSE OUTCOMES LEADING TO THE  
ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM  
SPECIFIC OUTCOMES:**

Course Outcome	Programme Outcome										Programme Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	H	H	M	H	M	H	L	M	H	M		H	-	H
CO2	H	H	M	H	M	H	L	M	H	M		H		H
CO3	H	H	M	H	M	H	M	M	M	M		H		H
CO4	H	H	M	M	M	H	M	M	H	M		H		H
CO5	H	H	M	M	M	H	M	M	H	M		H		H

H = Highly Related; M = Medium L = Low

**Suggested Books**

1. Rastogi V.B. Genetics, Rastogi Publications.
2. Gupta P K. Classical to Modern Genetics, Rastogi Publications.
3. Sandu and Arora, Genetics, Himalaya Publishing House
4. Miglani G.S. Advanced Genetics, Narosa Publishing House, New Delhi (2000).
5. Gardner, Principles of Genetics, Wiley India
6. Choudhary H.K. Elementary Principles of Plant Breeding, Oxford and IBH Publishing Co. N.D. 1989.
7. Shukla R.S. and Chandel P.S. Cytogenetics, Evolution and Plant Breeding S Chand and Co. Ltd. New Delhi (2000).
8. Singh R.B. Text Book of Plant Breeding Kalyani Publishers, Ludhiana.
9. Plant tissue culture by H.S Chawla
10. Bhojwani, S.S & Razdan, M.K (1996) Plant Tissue Culture, Theory & Practice, Elsevier Science Amsterdam, The Netherlands
11. Bhojwani, S.S & Bhatnagar S.P (2011) The Embryology of Angiosperms Vikas Publication House Pvt. Ltd. New Delhi, 5th Edition

**BSB006A: Practical Lab on basics of Plant Breeding and Genetics**

1. To prepare note and understand the terminologies proposed by Mendel.
2. To solve numerical problems based on Mendel's Law of Inheritance (Monohybrid and Dihybrid Crosses).
3. To analyse numerical problems based upon modified Mendelian Laws through Punnett square method.
4. To perform the numericals based on sex determination in Drosophila & Humans
5. To comment upon the types of cloning vectors used in genetic engineering.
6. To comment upon the types of enzymes used in rDNA technology.
7. To prepare temporary slide and comment upon Bar Body.
8. To perform emasculation of anther in a bisexual cross pollinated flower.

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9. To perform various methods of vegetative propagation found in plants.
10. Familiarization of basic equipment in tissue culture, composition of MS media.
11. Demonstration of *in vitro* sterilization and inoculation methods using leaf & nodal explants of dicot plant.

### Semester-IV

BSB 007A	Morphology, Anatomy and Plant Physiology	4-0-1 [5]
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#### Objective

- To learn about types of tissues and their organization in stem root and leaf.
- To understand the concept of stelar evolution and basic body plan, modular type of growth in Seed bearing plants.
- To understand fundamental concepts of shoot and root system and theories related to them.
- To understand the morphology, anatomy & embryology of seeds and vegetative propagation methods in seed bearing plants.
- To learn about and understanding the physiology of plant water relationship.
- Understanding the physiology of Mineral Nutrition in plants.
- Understanding the role of growth regulators and light in plants.
- Understanding the physiology of Photosynthesis in plants.

Unit-I	Different types of tissues, their organization into root, stem and leaf (monocot & dicot), Concept of stele and its evolution, meristematic, simple and complex secretory tissue. Basic Body plan of flowering plants, modular type of growth, diversity of plant forms: annual, biennials and perennials.
Unit-II	Shoot and root system: shoot and root apical meristem and its histological organization, vascularisation of primary shoot and root in monocot and dicots, monopodial and sympodial growth. Morphology and anatomy of seed (monocot and dicot), significance of seed. Microsporogenesis, Megasporeogenesis, Double fertilization & triple fusion.

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Unit-III	Plant water relationship: Significance of water, water potential, water absorption and transport, transpiration, mechanism of opening and closing to stomata. Mineral Nutrition: Essential elements, micro and macro nutrients, soil factors affecting their availability, Physiological basis of deficiency, symptoms, ion uptake. Transport of inorganic and organic component, transport pathway Xylem and Phloem.
Unit-IV	Role of physical factors in growth of plants: Response to light, photomorphogenesis, Role of growth regulators: Auxin, Gibberelins, Cytokinins, ABA, Ethylene
Unit-V	Photosynthesis: Brief history, pigments, mechanism of light, absorption and energy transfer PSI and PSII e-transport, ATP synthesis C3, C4 and CAM photorespiration.

### Course Outcome (CO):

At the end of this course students will have:

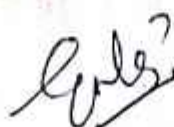



**CO1:** An Understanding of Plant tissue system their composition of different parts of plants and relationships and organization in plants, to understand the modular and basic body plan of plants.

**CO2:** Develop an conceptual understanding of concepts and fundamentals of plant anatomy to examine the internal anatomy and embryology of plant systems and organs. Develop critical understanding on the evolution of concept of organization of shoot and root apex.

**CO3:** Ability to understand the mechanism and physiology of water relations and mineral nutrition in higher plants with respect to various physiological processes. And chemical deficiency symptoms in plants.

**CO4:** An understanding of role of physical factors and light in plant growth and mode of action of growth regulators in plants. Able to understand the mechanism of Photosynthesis in plants

**CO5:** Apply practical skills in science courses with the understanding of general laboratory practices to study plant tissues and understand various vital physiological activities in plants and also able to explore various research issues and their solutions

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**MAPPING COURSE OUTCOMES LEADING TO THE  
ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM  
SPECIFIC OUTCOMES:**

Course Outcome	Programme Outcome										Programme Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	H	H	M	H	M	H	L	M	H	M		H	-	H
CO2	H	H	M	H	M	H	L	M	H	M		H		H
CO3	H	H	M	H	M	H	M	M	M	M		H		H
CO4	H	H	M	M	M	H	M	M	H	M		H		H
CO5	H	H	M	M	M	H	M	M	H	M		H		H

H = Highly Related; M = Medium L = Low

**Suggested Books**

1. Cutter E.G. 1969. Part I Cells and Tissues, Edward Arnold, London.
2. Cutter E.G. 1971. Plant Anatomy: Experiment and Interpretation Part-II, Organs, Edward Arnold, London.
3. Esau, K. 1977. Anatomy of seed Plants 2nd Eds. John Wiley & Sons, New York.
4. Fahn A. 1985. Plant Anatomy, Pergamon Press, Oxford.
5. Salisbury and Ross. Plant Physiology.
6. Teiz and Zeiger Plant Physiology.
7. V. Verma. Plant Physiology.
8. Bhojwani. S.S & Bhatnagar S.P(2011) The Embryology of Angiosperms Vikas Publication House Pvt. Ltd. New Delhi, 5th Edition

**BSB008A: Practical Lab on Fundamentals of, Anatomy, Morphology and Plant Physiology**

1. To use any commonly occurring dicotyledonous plant as a model to understand the basic body plan and modular type of growth.
2. To prepare hand cut section and stained preparation of L.S. of shoot tip.
3. To understand the difference between Monopodial and Sympodial types of branching.
4. To prepare transverse hand cut sections of monocot and dicot stem and root of sunflower, nerium, and maize for anatomical study.
5. To perform hand cut sections of monocot and dicot stem and roots having secondary growth in sunflower, nerium and maize.
6. To Examine structure of monocot and dicot seed.
7. Specimen study for modifications of plant parts for vegetative reproduction.
8. To study the permeability of plasma membrane using different concentration of solvent.
9. To separate chlorophyll pigment by solvent method.

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10. To study the apical growth of plant by Are Auxanometer.
11. To study photosynthesis by inverted funnel method and Moll's half leaf method.
12. To study the demonstration of stomatal transpiration by four leaf method.
13. To demonstrate the phenomenon of osmosis by potato osmometer.
14. To calculate % germinated pollen in given medium
15. Demonstration of Hydroponics System.
- 16 Plant Adaptation Hydrophyte & Xerophytes.

## Semester-V

BSB 009A	Gymnosperm, Angiosperm and Paleobotany	4-0-1 [5]
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### Objective

- To learn about classification and characteristic features of gymnosperms.
- To understand the distribution, morphology, reproduction and life cycle of important representative members of Gymnosperm.
- To understand the origin, evolution and examples of primitive Angiosperm.
- To learn about the principles of taxonomy, classification and binomial system of nomenclature.
- Understanding the identification criteria of important angiospermic families in the surroundings.
- Understanding the detail of paleobotany including fossil types, formation of fossils, applied aspect of paleobotany and important members of fossil plants.

Unit-I	Classification and characteristic features of different groups of Gymnosperm. Distribution, morphology, vegetative and reproductive parts, anatomy and life cycle of <i>Cycas</i> .
Unit-II	Distribution, Morphology of vegetative and reproductive parts, anatomy, reproduction and life cycle of <i>Pinus</i> and <i>Ephedra</i> , Economic Importance of Gymnosperm.
Unit-III	Angiosperm – origin and evolution. Some examples of primitive angiosperm.

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	Introduction, Principles of taxonomy, units of classification, Concept of Genus and species, Binomial nomenclature, ICBN, Botanical gardens and Herbaria.
Unit-IV	Classification of angiosperm Linnaeus, Bentham and Hooker's system, Engler and Prantle system of classification. Diversity of flowering plants as illustrated by members of the families, Brassicaceae, Malvaceae, Fabaceae, Solanaceae, Apocynaceae, Asclepiadaceae, Euphorbiaceae, Liliaceae and Poaceae, Asteraceae.
Unit-V	Fossilization, types of fossils, technique to study fossils, geological time scale, Applied aspect of PaleoBotany (use in coal and petroleum exploration). Fossil Pteridophyta - <i>Lepidodendron</i> , <i>Calamites</i> Fossil Gymnosperms - <i>Williamsonia</i>

#### Course Outcome (CO):

At the end of this course students will have:

- CO1: An Understanding of general characters, distribution, morphology, reproduction and life cycle of important representative members of Gymnosperm. and classification of Gymnosperms.
- CO2: To understand the evolution of Angiosperm. Classify Plant systematics and recognize the importance of herbarium and Virtual herbarium Evaluate the Important herbaria and botanical gardens
- CO3: Interpret the rules of ICBN in botanical nomenclature principles of taxonomy and interpret terms and concepts related to Phylogenetic Systematics
- CO4: Generalize the characters of the families according to Bentham & Hooker's system of classification Able to identify and recognize the important angiospermic families in the surroundings.
- CO4: An understanding of, classification and binomial system of nomenclature.
- CO5: Able to predict the mechanism of evolution in Plant groups understand the branch of paleobotany and important representative members of Paleobotany.

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# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Course Outcome	Programme Outcome										Programme Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	H	H	M	H	M	H	L	M	H	M			H	H
CO2	H	H	M	H	M	H	L	M	H	M			H	H
CO3	H	H	M	H	M	H	M	M	M	M			H	H
CO4	H	H	M	M	M	H	M	M	H	M			H	H
CO5	H	H	M	M	M	H	M	M	H	M			H	H

H = Highly Related; M = Medium L = Low

## Text Books:

1. Vashishtha P.C. Gymnosperm, S. Chand Company.
2. Biswas C and Johari B M. The Gymnosperm. Narosa Publishing house.
3. Wilson N.S., Rothwell G.W. PaleoBotany and Evolution of Plants. 11nd Ed. Cambridge. Univ. Press, U.K. (1990).
4. Willis K.J and McElwain J.C. The Evolution of Land Plants. Oxford University Press.
5. V.V. Shivrajan. Introduction to Principles to the Plant Taxonomy, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Angiosperm Taxonomy, Singh, Pandey, Jain Rastogi Publishers, Meerut.
7. Gurucharan Singh, Plant Systematics (2001). Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

## BSB010A: Practical Lab on Spermatophytes and PaleoBotany

1. To understand terminology used for the plant description and their identification.
2. To study Key for the identification of angiospermic plant families.
3. To perform description of some important angiospermic plant families:  
 Brassicaceae – *Brassica campestris*  
 Malvaceae – *Hibiscus rosasinensis*, *Abutilon*  
 Fabaceae – *Pisum sativum*, *Cassia*, *Acacia*  
 Solanaceae – *Datura*, *Withania*  
 Apocynaceae – *Vincetoxicum*, *Thevetia*  
 Asclepeideaceae – *Calotropis*  
 Euphorbiaceae – *Euphorbia*, *Ricinus*  
 Liliaceae – *Onion*, *Asphodelus*  
 Poaceae – *Triticum*  
 Esteraceae – *Helianthus*, *Tridax*
4. To study the external morphology of vegetative and reproductive parts of *Cycas*.
5. To prepare suitable double stained preparation of T.S of root, stem, rachis, leaflet and microsporophyll of *Cycas* and assign them to their respective systematic position.
6. To study the external morphology of vegetative and reproductive parts of *Pinus*.

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7. To prepare suitable double stained preparation of T.S of root, stem and foliage leaf of *Pinus*.
8. To study reproductive structure (Male cone and Female cone) of *Pinus* and identify and assign them to their respective systematic position.
9. To study the external morphology of vegetative and reproductive parts of *Ephedra*.
10. To prepare suitable double stained preparation of T.S of stem (node and internode) of *Ephedra*.
11. To study reproductive structure (Male Strobilus and Female strobilus) of *Ephedra* and identify and assign them to their respective systematic position.
12. To Study types of fossils. Fossil Pteridophyta – *Leplodendron*, *Calamites*. Fossil Gymnosperms – *Williamsonia*.
13. To prepare a properly dried and pressed specimen of any wild plants with herbarium label (Submitted in record book)

### Semester-VI

BSB012A	Environmental Management and Economic Botany	4-0-1 [5]
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### Objective

- To learn about basic concept of ecology and interrelationship of living and nonliving components of the environment.
- To understand the concept of ecosystem, Biosphere and biomes of the world.
- To understand fundamental concepts of Biogeochemical cycles, population and community ecology.
- To understand the Biodiversity and conservation strategies for wild life management. plants.
- To learn about and understanding of economic importance of cultivated plants for food, oils, beverages and fibres.
- Understanding the importance of Medicinal plants of Rajasthan.
- Understanding the wood, rubber and sugar yielding plants for the human welfare.

Unit-I	Introduction to Ecology, Community and Ecosystem Inter-relationships between living world and environment, Biosphere, biomes, ecosystem and its components (abiotic and biotic) Bioenergetics.
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Unit-II	Biogeochemical cycles, Hydrologic cycle. Concept of habitat and niche. Population and Community Ecology (Part Population attributes, density, natality, mortality, age ratio, sex ratio, dispersal and dispersion of population, exponential and logistic growth, life history strategies, population interactions).
Unit-III	Biodiversity and regional conservation strategies success stories with reference to India and sustainable utilization. Principles of wildlife management, wildlife sanctuaries, parks and biosphere reserves in India, endangered and threatened species of plants and animals in India, germplasm banks.
Unit-IV	Basic concept of center of origin of cultivated plants. Food plants – rice, wheat, maize, potato and sugarcane. Vegetable oils: coconut, groundnut and mustard. Spices: General account with an emphasize on those plants cultivated in Rajasthan (cumin, capsicum, coriander) Beverages: tea and coffee. Fibers: cotton and jute.
Unit-V	Medicinal plants: General account with an emphasize on those cultivated in Rajasthan (senna, isabgol, safed musli). Wood: General account of sources of firewood, timber and bamboos; Rubber. Legumes or pulses, starch or sugar yielding plants. EthnoBotany: a general account.

### Course Outcome (CO):

At the end of this course students will have:

**CO1:** Able to understand the meaning of Ecology, Community and Ecosystem as well and their role in existence of Biosphere and biomes of the world

**CO2:** An Understanding of biogeochemical cycle, factors affecting population and community ecology and their interrelationship to the society.

**CO3:** strategies and importance of wild life protection by humans and their need for the survival of living beings.

**CO4:** Understand core concepts of Economic Botany and relate with environment, Develop a basic knowledge of taxonomic diversity and important families of useful

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Plants and their products in human use.

CO5: Develop critical understanding on economically important plants for medicines and beverages and to appreciate the diversity of plants and the plant products in human

Course Outcome	Programme Outcome										Programme Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	H	H	M	H	M	H	L	M	H	M			H	H
CO2	H	H	M	H	M	H	L	M	H	M			H	H
CO3	H	H	M	H	M	H	M	M	M	M			H	H
CO4	H	H	M	M	M	H	M	M	H	M			H	H
CO5	H	H	M	M	M	H	M	M	H	M			H	H

use etc

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

H = Highly Related; M = Medium L = Low

#### Text Books:

1. P.D. Sharma. Ecology and utilization of plants. Rastogi publication.
2. Odum E P., and Barrett G.W., Fundamentals of Ecology. Thomson Asia Pvt. Ltd.
3. Rajagopalan R. Environmental Studies Oxford University Press.
4. P.D. Sharma. Ecology and utilization of plants. Rastogi Publication.
5. S.L. Kochar., Economic Botany in Tropics. McMillan Publishing House.
6. B.P. Pandey Economic Botany in Tropics.
7. Sambhamurthy. Economy Botany.

#### **BSB013A: Practical Exercises based on Plant Ecology and Economic Botany**

1. To study plant communities by quadrat methods so as to determine percentage frequency and density of plant species.
2. To determine chloride, carbonate, organic matter in given sample.
3. To find out the porosity of grassland and wood land soil sample.
4. To determine the moisture content of grassland soil.
5. To study morphological adaptation of hydrophytes & Xerophytes.
6. To measure water holding capacity of soil.
7. To study the basic concept of center of origin of cultivated plants proposed by Vavilov.

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8. To study the common name, botanical name, family, part used and economic importance of plants used as cereals (rice, wheat, maize).
9. To study the common name, botanical name, family, part used and economic importance of sugar yielding plants (potato and sugarcane).
10. To study the common name, botanical name, family, part used and economic importance of Vegetable oils yielding plants (coconut, groundnut and mustard).
11. To study the common name, botanical name, family, part used and economic importance of fiber yielding plants (cotton and jute) and types of wood.
12. To study the common name, botanical name, family, part used and economic importance of plants used as spices and beverages (tea and coffee).
13. To study general account with an emphasize on medicinal plants cultivated in Rajasthan (senna, isabgol, safed musli).
14. To check the adulteration in the commonly available spices, edible oil, Milk and Ghee.
15. Visit to any herbal garden in near vicinity.

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**UNIVERSITY**  
BUILD YOUR WORLD

**Department of Chemistry**  
**Course Structure and Syllabi**

**Session 2020-21**

JECRC University

Department of Chemistry

B.Sc. Chemistry Course Scheme 2020-21

Summary Sheet Category Wise-Credit Wise

S.No.	Category of Courses	Credits			Total Credits
		L	T	P	
1	Foundation Course	32	3	4	39
2	Core Course	60	-	21	81
3	Departmental Elective	26	-	7	33
4	Open elective	-	-	-	-
	Total	118	3	32	153

B.Sc. Chemistry

Summary Sheet

S.No.	Category of Courses
1	Foundation Course
2	Core Course
3	Departmental Elective
4	Open elective
	Total

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Minutes of Meeting

A meeting of Board of Studies of Chemistry was conducted on 29 May 2020 at 5.30 pm on Zoom app during work from home.


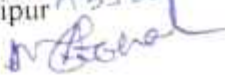
The agenda of meeting was to **Revise the syllabi of UG and PG courses in Chemistry.**

**Members BOS**

Prof. Sonu Pareek  
Prof. K.N. Prasad  
Prof. S.K. Sharma  
Prof. Sapna Sharma  
Dr. Swapna Santra  
Dr. Saurabh Dave  
Dr. Nidhi Bansal

Chairperson   
Member   
Member   
Member   
Member   
Member 

**External Members:**

1. Prof. Pahup Singh, Ex-Professor & Head, University of Rajasthan, Jaipur 
2. Prof. M.P. Dhobal, Ex-Professor University of Rajasthan, Jaipur 

The recommendations of the members are as follows-

1. The suggestions to revise the syllabus of B.Sc. Chemistry Major, M.Sc. Chemistry, which were proposed by the BOS members were discussed.
2. On the basis of the suggestions and feedback given by faculty and students, revisions in syllabus of all the courses was reviewed, relevance of revisions was also discussed in detail.
3. The syllabus of B.Sc. (Minor Chemistry) was approved without any change.
4. A minor revision was approved in paper BCE007B of B.Sc. II Semester by adding few new topics and by removing few common topics.
5. On the basis of the suggestions of faculty and other stake holders, minor revisions were proposed in M.Sc. Chemistry syllabus of paper MCE001C, MCE009B and MCE10B, all the changes were approved by BOS.

At the end of meeting chairperson expressed gratitude to external members and thanked all the members of Board of Studies.



**Prof. Sonu Pareek**  
**HOD Chemistry**



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BUILD YOUR WORLD

**Department of Chemistry**  
**Course Structure and Syllabi**  
**B.Sc. Course**  
**(Chemistry Major)**

**Session 2020-21**

**Scheme of Teaching: B.Sc. Chemistry (MAJOR)**

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Old Code	NewCode	Subject	Lecture (Hr.)	Tutorials (Hrs.)	Practical (Hrs.)	Credits		Total Credits
						L	P	
BCE 005A	BCE 005A	<b>Major-1:</b> Thermodynamics, Electrochemistry and Chemical Kinetics	4	-		4		5
BCE 006A	BCE 006A	Mixture Analysis and Kinetic Studies (Practicals)			2		1	
BCE 007B	BCE 007C	<b>Major-2:</b> Industrial Chemistry	4	-		4		5
BCE	BCE	Lubricants Testing			2		1	

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James J. Smith

008B	008B	and Analysis (Practicals)						
		Minor-1	4	-	2	4	1	5
		Minor-2	4	-	2	4	1	5
BMC 003A		Computer Application II (Advanced MS-Excel)	-	-	2		1	1
BMC 102A		Communication Skills	2	1	-	3	-	3
Total Credits = 24								

## Semester III

Old Code	New Code	Subject	Lecture (Hr.)	Tutorials (Hrs.)	Practical (Hrs.)	Credits		Total Credits
						L	P	
BCE 009B	BCE 009B	Major-1: Alcohols, Aldehydes and Ketones	4	-		4		5
BCE 039A	BCE 039A	Organic analysis and preparation			2		1	
BCE 011B	BCE 011B	Major-2: Non-aqueous Solvents and Transition Metals	4	-		4		5
BCE 012B	BCE 012B	Titrimetric Analysis (Practicals)			2		1	
		Minor-1	4	-	2	4	1	5
		Minor-2	4	-	2	4	1	5
BMC 004A		Computer Application-III(MS-Projects)	-	-	2	-	1	1
BMC 105A		Communication Skills	3	-	-	3	-	3
Total Credits = 24								

## Semester IV

Old Code	New Code	Subject	Lecture (Hr.)	Tutorials (Hrs.)	Practical (Hrs.)	Credits		Total Credits
						L	P	
BCE 013B	BCE 013B	Major-1: Phase Equilibria and Surface Chemistry	4	-		4		5
BCE	BCE	Acid-Base Analysis			2		1	

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014A	014A	(Practicals)						
BCE	BCE	Major-2: Analytical Chemistry	4	-		4		5
015B	015B	Estimations, Calibration			2		1	
BCE	BCE	s & Chromatographic analysis (Practicals)						
040A	040A	Minor-1	4	-	2	4	1	5
		Minor-2	4	-	2	4	1	5
BMC		Computer Application- IV (Web Designing)	2	-	-	2	-	2
005A		Computer Application- IV (Web Designing Lab)	-	-	2	-	1	1
BMC		Communication Skills	2	1	-	3	-	3
006A								
BMC								
111A								
Total Credits = 26								

## Semester V

Old Code/Old Paper	New Code/New Paper	Subject	Lecture (Hr.)	Tutorials (Hrs.)	Practicals (Hrs.)	Credits		Total Credits
						L	P	
BCE 019A	BCE 019A	Coordination Compounds and Organometallic Chemistry	4	-		4		5
BCE 020A	BCE 020A	Inorganic Preparations and Estimation of Metal ions (Practicals)			2		1	
BCE024 B	BCE024 B	Major-2: Spectroscopy	4	-		4		5
BCE 037B	BCE 037B	Spectroscopic Determination of Compounds (Practicals)			2		1	
		Minor-1	4	-	2	4	1	5
		Minor-2	4	-	2	4	1	5
BMC 109A		Value Education	3	-	-	3	-	3
BMC 113A		Communication Skills	2	1	-	3	-	3
Total Credits = 26								

21 - 

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**P96: Environment and Sustainability** Understand the issues of environmental contexts and sustainable development

Fig. 17. Self-directed and life-long learning: Arguing the ability to engage in independent and life-long learning in the broadest context sociotechnological changes

**Program Specific Outcome (PSO)**

(SK3) The ability to demonstrate knowledge and understanding of essential facts, concepts, principles and theories relating to the subject areas identified (learning skills)

(S6) The ability to recognise and analyse problems and plan strategies for their solution (problem solving skills)

(S23 Skills in the evaluation, interpretation and synthesis of chemical information and skills in the practical application of theory and skills in communicating scientific material and arguments) (interpretation skills)

## SEMESTER – I

## BCE 001A: Hydrocarbons, Reaction Mechanisms and Stereochemistry

**Course Outcomes(CO):** At the end of this course student will be able to understand-CO1: the structure and bonding involved in hydrocarbon. CO2: the reaction mechanism of various organic reactions CO3: the stereochemistry of hydrocarbons.CO4: the nomenclature of alkanes and cycloalkanes, their properties, method of formation and reactions they generally undergo. CO5 the nomenclature of Alkenes, Cycloalkenes, Dienes and alkynes,their properties, method of formation and reactions they generally undergo.

## Unit-1

## Structure and Bonding

Bond lengths and bond angles, bond energy, localized and delocalized chemical bond, hybridization, vander waals interactions, inclusion compounds, clathrates, charge transfer complexes, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

## Unit-II

## Mechanism of Organic Reactions

Curved arrow notation, drawing electron movements with arrows, half headed and double headed arrow, homolytic and heterolytic bond breaking. Types of reagents, electrophiles and nucleophiles. Types of organic reactions, Energy considerations. Reactive intermediates- carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (With examples). Assigning formal charges on intermediates and other ionic species.

### Unit-III

## Stereochemistry of Organic Compounds

Concept of isomerism, types of isomerism. Optical isomerism: elements of symmetry, molecular chirality enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and



absolute configuration: sequence rules, D&L and R&S systems of nomenclature. Geometrical isomerism: determination of configuration of geometrical isomers, E&Z systems of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformational isomerism: conformational analysis of ethane and n-butane, conformations of cyclohexane, axial and equatorial bond, conformation of mono substituted cyclohexane derivatives. Newmann projection and sawhorse formulae. Difference between configuration and conformation.

#### Unit-IV

##### Alkanes and Cycloalkanes

II PAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes, Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids). Physical properties and chemical reaction of alkanes. Mechanism of free radical halogenations of alkanes, orientation, reactivity and selectivity. Cycloalkanes nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strains in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring; banana bonds.

#### Unit-V

##### Alkenes, Cycloalkenes, Dienes and Alkynes

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halide, regioselectivity in alcohol dehydration The Saytzeff rule, Hofmann's elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikof's rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with  $\text{KMnO}_4$ . Polymerization of alkenes. Substitution at the allylic and vinylic-positions of alkenes. Industrial applications of ethylene and propene. Methods of formation, conformation and chemical reactions of cycloalkenes. Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions-1,2- and 1,4- additions, Diels-alder reaction. Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes.

#### Books Suggested :

1. A Text Book of Organic Chemistry : K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi
2. Modern Principles of Organic Chemistry : M. K. Jain and S. C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I & II) O. P. Agarwal
4. A Text Book of Organic Chemistry : B. S. Bahl and Arun Bahl
5. A Text Book of Organic Chemistry : P. L. Soni
6. Organic Chemistry : (Vol. I, II & III) S. M. Mukherji, S. P. Singh and R. P. Kapoor, Wiley Eastern Ltd. (New Age International)
7. Organic Chemistry : Morrison & Boyd, Prentice Hall

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**BCE 002A: Element and Functional Group Detection (Practicals)**

1. To purify the impure sample of organic compounds by sublimation .
2. To separate the mixture (1 solid+1 liquid) by distillation .
3. To detect the elements (N and S) from the given organic compound.
4. To detect the element (halogen) from the given organic compound.
5. To purify the impure sample of organic compound by crystallization and decolourised the compound by charcoal.
6. To detect the functional group (alcoholic and phenolic) from the given organic compound.
7. To detect the functional group (Carboxylic) from the given organic compound.
8. To detect the functional group ( Ester) from the given organic compound.
9. To detect the functional group (Carbonyl) from the given organic compound.
10. To detect the functional group (Amine and Aniline) from the given organic compound.
11. To detect the functional group (Carbohydrate And Nitro) from the given organic compound.
12. To detect the functional group (Amide) from the given organic compound

**BCE 003A: Chemistry of s and p-block elements****Course outcome**

On completion of the course, B.Sc. student will be able to understand:

**CO-1** about the atomic structure, Quantum numbers and electronic configuration of elements based on respective rules. **CO-2** the periodic properties like Atomic and ionic radii, ionization energy, ionization potential and electron negativity and their determinations and applications. **CO-3** different types of bonding like ionic bonding, covalent bonding, metallic bonding and hydrogen bonding and also molecular geometry based on VBT, VSEPR and MOT to know structure of different molecules and ions. **CO-4** s-block Elements of alkali metals and Alkaline earth metals and their industrial & biological applications. **CO-5** p- block Elements and their different compounds having the applications at industrial and biological applications.

**Unit-I**

**Atomic Structure** : Defects in Bohr Model, Idea of de Broglie matter waves. Heisenberg's uncertainty principle. Schrodinger wave equation, wave functions and their significance. Atomic orbitals. Quantum numbers. Aufbau Principle, Hund's multiplicity rule and Pauli's exclusion principles. Variation of orbital energies with atomic number and energy level diagram, electronic configuration of elements, effective nuclear charge and shielding; radial and angular wave functions and distribution curves, shape of s, p, d orbitals and their characteristics.

**Unit-II**

**Periodic Properties** : Atomic and ionic radii, ionization energy, electrode potential (use of redox potential-reaction feasibility), electron affinity and electronegativity – definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behavior, electronic configuration.

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**BCE 004B: Mixture Analysis (Practicals)**

**Prerequisites:** Theoretical basis of qualitative analysis; Systematic analysis of Acidic and Basic radicals (including interfering radicals). Chemical reactions involved. Common-ion effect, solubility product & their applications. Oxidizing and reducing agents and buffers used in analysis.

1. To identify carbonate, Sulphite, Sulphide of dilute  $H_2SO_4$  group.
2. To identify Nitrite and Acetate of dilute  $H_2SO_4$  group.
3. To identify Chloride, Bromide and Iodide of concentrated  $H_2SO_4$  group.
4. To identify Nitrate and Oxalate of concentrated  $H_2SO_4$  group.
5. To identify acidic radicals not identified with dilute or concentrated  $H_2SO_4$  group.
6. To analyze basic radicals of group I and II.
7. To analyze basic radicals of group III and IV.
8. To analyze basic radicals of group V, VI and VII.
9. To calibrate pipettes.
10. To calibrate burettes.
11. To prepare standard solution and dilution - 0.1 M to .001 M solution.
12. To standardize a secondary standard solution

**SEMESTER –II****BCE005A: Thermodynamics, Electrochemistry and Chemical Kinetics**

**Course Outcome:** After the completion of this course student will be able to-

CO-1 understand the principles of liquid state. CO-2 analyze the basic knowledge of solid state.

CO-3 describe the basic concept of kinetic theory of gaseous state. CO-4 think critically on different terms and process of thermodynamics. CO-5 understand practical aspects of different theories of electrochemistry and chemical kinetics

**Unit-I**

**Solid State :** Crystal structure of NaCl, KCl, Graphite, and Diamond. Types of crystals (molecular, covalent, metallic, ionic). Imperfections in crystals : point defect, Schottky defect, Frankel defect, metal excess defect (colour centre), line defect (dislocations), edge and screw dislocations. Imperfection due to transient atomic displacement. Indexes.

**Unit-II**

**Liquid State :** Surface tension of liquids, capillary action, surface tension and temperature, interfacial tension, surface active agents, the Parachor and chemical constitution (atomic and structural parachors). Viscosity of liquids, experimental determination of viscosity coefficient, its variation with temperature. Intermolecular forces of liquids. Liquid Crystals and thermography.

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**Unit-III**

**Gaseous State** : Kinetic theory of gases, ideal gas laws and kinetic theory. Collision in a gas-mean free path, collision diameter, collision number. Behaviour of real gases - the van der Waal's equation, brief mention of other equations of state. Critical phenomena - critical constants of a gas and their determination, continuity of state, the Vander Waals equation and critical state. Principle of corresponding states, liquefaction of gases.

**Unit-IV**

**Thermodynamics** : Introduction of different terms and processes in thermodynamics : [Systems (isolated, closed, open) and surroundings, macroscopic properties (extensive and intensive), kinds of processes], First Law of thermodynamics and internal energy, state and state functions (exact and inexact differential), path dependence of work and heat. Enthalpy, heat changes at constant volume and constant pressure, heat capacities ( $C_v$ ,  $C_p$ ) and relation between them for ideal gases. Joule-Thomson effect, Joule-Thomson coefficient in ideal and real (van der Waal) gases, inversion temperature, Variation of heat of reaction with temperature (Kirchhoff's equation).

**Unit-V**

**Electrochemistry** : Arrhenius theory of electrolytic dissociation, classification of electrolytes; buffer solutions. Migration of ions : transference number and its determination (Hittorf and Moving Boundary methods). Conductance of solutions- equivalent, molecular and specific conductance, ionic conductance, relationship between ionic conductance and ionic mobility, Kohlrausch law and its applications.

**Chemical Kinetics** : Introduction, order and molecularity of a chemical reactions, integrated rate equations for zeroth, first, second and third order reactions, effect of temperature on reaction rates (Arrhenius equation), collision theory and transition state theory (derivation thermodynamically), deviations from collision theory.

**Books Recommended**

1. "Physical Chemistry", P. C. Rakshit, 5th Edition (1988), 4th Reprint (1997), Sarat Book House, Calcutta.
2. "Principles of Physical Chemistry", B. R. Puri, L. R. Sharma, and M. S. Pathania, 37th Edition (1998), Shoban Lal Nagin Chand & Co., Jalandhar.
3. "Physical Chemistry", K. J. Laidler and J. M. Meiser, 3rd Edition
4. Text Book of Physical Chemistry by Samuel Glasstone

**BCE 006A: Mixture Analysis and Kinetic Studies (Practicals)**

1. To prepare standard 0.1 N NaOH solution using 0.1 N Oxalic acid as primary standard solution.
2. To determine strength of unknown  $\text{CH}_3\text{COOH}$  using 0.1 N NaOH as intermediate solution.

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3. To determine the percentage composition of a given mixture (non interacting system) by viscosity method.
4. To determine the percentage composition of a given mixture (non interacting system) by surface tension method.
5. To determine the partition coefficient of Iodine between water and carbon tetrachloride (or chloroform, carbon disulphide etc) at room temperature.
6. To determine the specific reaction rate of the hydrolysis of methyl or ethyl acetate catalysed by HCl at room temperature.
7. To determine the specific reaction rate of the hydrolysis of methyl or ethyl acetate catalysed by  $H_2SO_4$  at room temperature and compare the relative strength of acids.
8. To determine the specific reaction rate of the hydrolysis of methyl or ethyl acetate catalysed by HCl at  $40^\circ C$ ,  $45^\circ C$  and  $50^\circ C$  and calculate energy of activation graphically as well as employing the rate constant relationship with energy of activation.
9. To prepare colloidal solution of arsenious sulphide.
10. To study the reaction rate of decomposition of iodide by  $H_2O_2$  Kinetically.
11. To study the hydrolysis of methyl acetate catalysed by HCl solution and equinormal solution of urea hydrochloride and determines the degree of hydrolysis of the salt.
12. To determine the relative strength of acids ( $HCl, H_2SO_4$ ) during hydrolysis of an ester.

## BCE007C: Industrial Chemistry

On completion of the course, B.Sc. student will be able to understand: **CO-1** about the various types, theories and mechanism of corrosion and various prevention methods. **CO-2** about the various types of lubricants and its mechanism with various types of properties of lubricants. **CO-3** about the various types of fuel, its calorific values and its determination along-with carbonization process and synthetic fuel with manufacturing process. **CO-4** about various types of dyes and its classification and types. **CO-5**, about composition and manufacturing of cement, glass and ceramics and also principles and applications of green chemistry.

### Unit-I

**Water and its Treatment :** Types of impurities in Water, Hardness of Water, Disadvantages of Hard Water, Temporary and Permanent hardness. Units and inter conversions of Units. Estimation of hardness by EDTA Methods.. Methods of Treatment of Water for Domestic Purposes - Sedimentation, Coagulation, Filtration, Disinfection, Sterilization, Chlorination. Break point chlorination, Ozonization. Brief introduction of softening processes.

### Unit-II

#### Corrosion

Definition, Examples, Types of Corrosion: Theories of Corrosion and Mechanism - Dry Corrosion, (Direct Chemical attack), Wet Corrosion, (Electro Chemical Theory) .Principles of Corrosion, Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Mechanism of Wet Corrosion. Factors Influencing Corrosion. Control of Corrosion; Modification of Design, Cathodic Protection, Sacrificial anodic and Impressed Current cathodic protection. Protective Coatings; Metallic coating and non metallic coating.

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**Unit-III****Lubricants and Cement**

Lubricants, Types of lubricants oils, greases and solid lubricants, Synthetic lubricants, Functions and Mechanism of lubricants, Properties of lubricants- Saponification and Iodine value, Cloud and Pour point, Flash and Fire point, Aniline Point and Viscosity.

**Cement:** Types of cement, composition, manufacturing process, setting and hardening of cement

**Unit-IV****Fuel**

Classification of Fuels, Calorific value, Gross and Net calorific values (SI units), Determination of calorific value of a solid and liquid fuel, Carbonization, Petroleum, Cracking- fluidized catalytic cracking, Reforming of petrol, Knocking, Octane number, Cetane number, prevention of knocking, anti-knocking agents, Synthetic petrol, Bergius process and Fischer Tropsch process.

**Unit-V****Green Chemistry**

Introduction, Significance and principles, Industrial applications of green chemistry; R4M4 (Reduce, Reuse, Recycle, Redesign; Multipurpose, Multidimensional, Multitasking, Multi-tracking;) model with special reference of survimeter, econoburette; Safer Technique for Sustainable development. Concept of molecular and atomic economy & its use in green chemistry.

**REFERENCE BOOKS:**

1. B.K. Sharma, "Industrial Chemistry", Krishna Prakasam Media (P) Ltd., Meerut, 2001.
2. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi (15 Edition) (2006).
3. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd. 2007.
4. Engineering Chemistry by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004)
5. Organic Chemistry by Morrison & Boyd, Prentice Hall.

**BCE008B: Lubricants Testing and Analysis (Practicals)**

1. To determine the hardness of Water by complexometric method.
2. To determine the hardness of Water by HCl method.
3. To determine the amount of free chlorine in given water sample.
4. Determination of Total residual Chlorine in water sample.
5. To standardize pH by buffer solution and determine pH of different given water samples.
6. Determination of Viscosity of a given lubricant by Redwood Viscometer No.1.
7. Determination of Flash and Fire Points of a given lubricant by Pensky Martin Apparatus.
8. Determination of Cloud and Pour Points of a given lubricant.

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9. To determine moisture, volatile and ash content in a given coal sample by proximate analysis.
10. To determine the calorific value of Solid Fuel by Bomb's Calorimeter.
11. To measure dissolved oxygen in water.
12. To measure Total Solid in sewage.

## SEMESTER -III

### BCF009B: Alcohols, Aldehydes and Ketones

On completion of the course, B.Sc. student will be able to understand:

**CO-1** The preparations, reactions and properties of Arenes, their use as solvent and important synthetic reagents. Student will also learn about the aromaticity and aromatic character.

**CO-2** The preparations, reactions and properties of alkyl and aryl halides and their derivatives and various reactions of synthetic applications like  $SN^1/SN^2/SN^3$  etc.

**CO-3** The synthesis and reaction of alcohols and their synthetic and industrial applications. Student will also learn about their use as solvent and important synthetic reagents.

**CO-4** The synthesis and reaction of phenols and their synthetic and industrial applications. Student will also learn about their use as solvent and important synthetic reagents.

**CO-5** The synthesis and reaction of Carbonyl compounds (aldehydes and ketones) along with industrial applications of various condensation and polymerization reactions.

#### Unit-I

**Arenes & Aromaticity:** Nomenclature of benzene derivatives. The aryl group, aromatic nucleus and side chain structure of benzene, molecular formula and Kekule structure, stability. Aromaticity: Huckle's rule, aromatic ions.

Aromatic electrophilic substitution-general pattern of the mechanism, role of  $\sigma$  and  $\pi$  complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction, energy profile diagrams. Activating & deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction.

#### Unit-II

**Alkyl & Aryl Halides:** Nomenclature of alkyl halides, methods of preparation, chemical reactions. Mechanism of nucleophilic substitution reactions of alkyl halides,  $SN^2$  and  $SN^1$  reactions with energy profile diagrams. Polyhalogen compounds, chloroform, carbon tetrachloride. Methods of formation of aryl halides, nuclear and side chain reactions. The addition-elimination and the elimination-addition mechanism of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl, allyl, vinyl and aryl halides. Synthesis and use of D.D.T. and B.H.C.

#### Unit-III

**Alcohols:** Classification and nomenclature. Monohydric alcohols - Nomenclature, Method of formation by Reduction of aldehydes, Ketones, Carboxylic acids and esters, Hydrogen bonding. Acidic nature. Reactions of alcohols. Dihydric Alcohols - Nomenclature, methods of formation, Chemical reaction of vicinal glycols. Oxidative-Cleavage [ $Pb(OAc)_4$  and  $HIO_4$ ] and pinacol-

pinacolone rearrangement Trihydric Alcohols - Nomenclature and methods of formation, chemical reactions of glycerol.

#### Unit-IV

**Phenols** :Nomenclature, Structure and bonding, Preparation of Phenols, Physical properties and acidic character, Comparative acidic strengths of alcohols and phenols, Resonance stabilization of phenoxide ion, Reactions of phenols: electrophilic aromatic substitution, acylation and carboxylation Mechanism of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesch Reaction, Lederer-Manasse reaction and Reimer-Tiemann Reaction.

#### Unit-V

**Aldehydes And Ketones** :Nomenclature and structure of the carbonyl group, Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-Dithianes, synthesis of ketones from nitriles and from carboxylic acids, Physical properties, Mechanism of Nucleophilic additions to carbonyl, Aldol, Perkin and Knoevenagel condensations, Condensation with ammonia and its derivatives, Wittig reaction, Mannich reaction, Use of acetals as protecting group, Oxidation of aldehydes, Baeyer-Villiger oxidation of ketone, Cannizzaro's reaction, MPV, Clemmensen, Wolff-Kishner,  $\text{LiAlH}_4$  reductions.

#### Books Suggested :

1. A Text Book of Organic Chemistry : K. S. Tiwari, S. N. Mehrotra and N. K. Vishnoi
2. Modern Principles of Organic Chemistry : M. K. Jain & S. C. Sharma
3. A Text Book of Organic Chemistry: (Vol. I & II) O. P. Agarwal
4. A Text Book of Organic Chemistry : B. S. Bahl and Arun Bahl
5. Organic Chemistry by Morrison & Boyd, Prentice Hall
6. A Text Book of Organic Chemistry : P. L. Soni
7. Organic Chemistry: (Vol. I, II & III) S. M. Mukherji, S. P. Singh and R. P. Kapoor

#### BCE 039A: Organic analysis and Preparation

1. To identify an organic compound through the functional group analysis, determine its M.P and prepare its suitable derivative.
2. To identify an organic compound number 1 through the functional group analysis, determine its M.P and prepare its suitable derivative.
3. To identify an organic compound number 2 through the functional group analysis, determine its M.P and prepare its suitable derivative.
4. To identify an organic compound number 3 through the functional group analysis, determine its M.P and prepare its suitable derivative.
5. To identify an organic compound number 4 through the functional group analysis, determine its M.P and prepare its suitable derivative.
6. To identify an organic compound number 5 through the functional group analysis, determine its M.P and prepare its suitable derivative.
7. To identify an organic compound number 6 through the functional group analysis, determine its M.P and prepare its suitable derivative.

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pinacolone rearrangement Trihydric Alcohols - Nomenclature and methods of formation, chemical reactions of glycerol.

#### Unit-IV

**Phenols** :Nomenclature, Structure and bonding, Preparation of Phenols, Physical properties and acidic character, Comparative acidic strengths of alcohols and phenols, Resonance stabilization of phenoxide ion, Reactions of phenols: electrophilic aromatic substitution, acylation and carboxylation, Mechanism of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesch Reaction, Lederer-Mannich reaction and Reimer-Tiemann Reaction.

#### Unit-V

**Aldehydes And Ketones** :Nomenclature and structure of the carbonyl group, Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3-Dithianes, synthesis of ketones from nitriles and from carboxylic acids, Physical properties, Mechanism of Nucleophilic additions to carbonyl, Aldol, Perkin and Knoevenagel condensations, Condensation with ammonia and its derivatives, Wittig reaction, Mannich reaction, Use of acetals as protecting group, Oxidation of aldehydes, Baeyer-Villiger oxidation of ketone, Cannizzaro's reaction, MPV, Clemmensen, Wolff-Kishner,  $\text{LiAlH}_4$  reductions.

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4. A Text Book of Organic Chemistry : B. S. Bahl and Arun Bahl
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2. To identify an organic compound number 1 through the functional group analysis, determine its M.P and prepare its suitable derivative.
3. To identify an organic compound number 2 through the functional group analysis, determine its M.P and prepare its suitable derivative.
4. To identify an organic compound number 3 through the functional group analysis, determine its M.P and prepare its suitable derivative.
5. To identify an organic compound number 4 through the functional group analysis, determine its M.P and prepare its suitable derivative.
6. To identify an organic compound number 5 through the functional group analysis, determine its M.P and prepare its suitable derivative.
7. To identify an organic compound number 6 through the functional group analysis, determine its M.P and prepare its suitable derivative.

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8. To identify an organic compound number 7 through the functional group analysis, determine its M.P and prepare its suitable derivative
9. To identify an organic compound number 8 through the functional group analysis, determine its M.P and prepare its suitable derivative
10. To identify an organic compound number 9 through the functional group analysis, determine its M.P and prepare its suitable derivative

## BCE 011B: Non-aqueous Solvents and Transition Metals

**Course outcome:** On completion of this course student will be able to: CO-1 Students will be able to explain the unique characteristics of different types of acid and base. CO-2 Students will be able to analyze the chemical reaction in different non-aqueous solvents and advantages, limitations of various solvents CO-3 Students will be able to explain the trends in atomic and physical properties of group 15, 16, 17 & 18 elements CO-4 Students will be able to identify common organic ligands used to construct coordination complexes, and learn how certain ligands interact with transition metal ions CO-5 Students will be able to understand practical aspects of separation of different lanthanides

### Unit-I

**Acids and Bases:** Acid and base, pH and hydrolysis of salts, Arrhenius, Brønsted-Lowry, Lux flood, Solvent System and Lewis concepts of acids and bases. Factors affecting strengths of Lewis acids and bases.

### Unit-II

**Non-aqueous Solvents:** Physical properties of a solvent for functioning as an effective reaction medium. Types of solvents and their general characteristics. Reactions in liquid ammonia and liquid sulfur dioxide.

### Unit-III







**Chemistry of P-block elements (Groups 15, 16, 17 and 18) :** Group trend in periodic properties, hydrides, oxides, oxyacids and halides. Structures of oxides and oxyacids of nitrogen, phosphorus, sulphur, selenium, tellurium and halogens. Chemistry of cyclophosphazenes and tetrasulphur tetranitride. Basic properties of iodine, structure and bonding of interhalogens and polyhalides, compounds of xenon.

### Unit-IV

**Transition Metals:** Characteristic properties of 3d elements – ionic radii, oxidation states, complexation tendency, magnetic behaviour and electronic spectral properties. Spectrophotometric estimation of metal ions.

### Unit-V

**Lanthanides & Actinides :** Comparative study of lanthanide elements with respect to electronic configuration, atomic and ionic radii, oxidation state and complex formation. Lanthanide contraction. Occurrence and principles of separation of lanthanides. Actinides: electronic configuration, atomic and ionic radii, oxidation state, Magnetic and spectral properties.

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**Books Recommended**

1. "Concise Inorganic Chemistry", J. D. Lee, 5th Edition (1996), Chapman & Hall, London.
2. "Modern Inorganic Chemistry", R. C. Aggarwal, 1st Edition (1987), Kitab Mahal, Allahabad.
3. "Basic Inorganic Chemistry", F. A. Cotton, G. Wilkinson, and Paul L. Gaus, 3rd Edition (1995), John Wiley & Sons, New York.

**BCE 012B: Titrimetric Analysis (Practicals)**

1. To determine alkali content in antacid tablet using HCl.
2. To estimate copper using thiosulphate.
3. To determine acetic acid in commercial vinegar using NaOH solution.
4. To prepare Tetraammine copper (II) sulphate.
5. To prepare Ni-DMG complex.
6. To determine the amount of Na and K in a given sample by Flame Photometer.
7. Analysis of the mixture number 1 containing three acidic and three basic radicals.
8. Analysis of the mixture number 2 containing three acidic and three basic radicals.
9. Analysis of the mixture number 3 containing three acidic and three basic radicals.
10. Analysis of the mixture number 4 containing three acidic and three basic radicals.
11. Analysis of the mixture number 5 containing three acidic and three basic radicals.
12. Analysis of the mixture number 6 containing three acidic and three basic radicals.

**SEMESTER –IV****BCE 013B: Phase Equilibria and Surface Chemistry**

**Course Outcome:** On completion of this course student will be able to- CO-1 understand the principles of laws of thermodynamics. CO-2 analyze the basic knowledge of phase equilibrium. CO-3 describe the basic principles and concept of electrochemical cell. CO-4 think critically on different terms and process of surface chemistry. CO-5 understand Schrodinger wave equation and its importance

**Unit-I**

**Thermodynamics :** Second law of thermodynamics and spontaneous processes, Carnot Cycles, entropy, entropy changes in reversible and irreversible processes and of universe, physical concept of entropy, entropy changes of an ideal gas in different processes, entropy of an ideal gas. Third Law of thermodynamics. The concept of residual entropy. Applications of Third Law. Free energy and its concept, Gibbs and Helmholtz free energies and their relationship, variation of free energy with temperature and pressure. Maxwell's relations, Gibbs-Helmholtz equations, its application for the determination of  $\Delta G$ ,  $\Delta H$ ,  $\Delta S$  of a reversible cell reaction. Thermodynamics of phase transition, Clapeyron-Clausius equation and its applications.

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**Unit-II**

**Phase Equilibria** : Phase rule, phase, component, degree of freedom, thermodynamic derivation of phase rule, phase diagrams of one component systems (water and sulfur), two component systems (phenol-water, lead-silver, tin-magnesium).

**Unit-III**

**Electrochemical Cells** : Galvanic cells, reversible and irreversible cells, cell emf and its measurement, Reactions in reversible cells, free energy and emf of reversible cell, Single electrode potential (Nernst equation), its measurement and sign convention, Standard electrode potential, Emf of reversible cell from electrode potentials, Types of reversible electrode, reference electrodes, Applications of emf measurements/determination of ionic activities, pH, potentiometric titrations (acid-base, redox, precipitation type reactions), equilibrium constant, Basic Idea of Concentration cells with and without transference, Liquid junction potential and its elimination.

**Unit-IV**






**Surface and Colloids Chemistry** : Adsorption, absorption and sorption, Freundlich isotherm, its demerits and Langmuir Adsorption isotherm, Multi layer adsorption-BET equation (no derivation) and its application to surface area measurement, Sols (reversible and irreversible), emulsions and emulsifiers, association colloids (micelles), gels, Applications of colloids.

**Unit-V****Elementary quantum Mechanics**

Black-body, radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Compton effect, De-Broglie hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box.

**Books Recommended**

1. "Physical Chemistry", **P. C. Rakshit**, 5th Edition (1985), 4th Reprint (1997), Sarat Book House, Calcutta.
2. "Principles of Physical Chemistry", **B. R. Puri, L. R. Sharma, and M. S. Pathania**, 37th Edition (1998), Shoban Lal Nagin Chand & Co., Jalandhar.
3. "Physical Chemistry", **K. J. Laidler and J. M. Meiser**, 3rd Edition, Houghton Mifflin Comp., New York, International Edition (1999).
4. An Introduction of Electrochemistry by S. Glasstone
5. D A McQuarrie, Introduction to Quantum Chemistry
6. Introduction to Quantum Mechanics by Pauling and Wilson
7. Quantum Mechanics by Griffiths.

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**BCE 014A: Acid-Base Analysis (Practicals)**

1. To determine the solubility of benzoic acid at different temperatures and to determine  $\Delta H$  of the dissolution process.
2. To determine the water equivalent of the thermos flask or calorimeter.
3. To determine the enthalpy of neutralization or heat of neutralization for a strong acid and strong base.
4. To determine heat of neutralization of a weak acid say acetic acid and to calculate its heat of ionization or enthalpy of ionization.
5. To determine heat of neutralization of a weak base say  $\text{NH}_4\text{OH}$  and to calculate its heat of ionization or enthalpy of ionization.
6. To determine the strength of given acid pH metrically. For this you are provided with standard  $\text{NaOH}$  solution.
7. To draw the solubility curve of phenol-water system and to determine critical solution temperature of the system and the composition of phenol-water system at C.S.T.
8. To determine the C.S.T of phenol-water system in presence of 1%  $\text{NaCl}$  solution and 1% succinic acid solution.
9. To determine the dissociation constant of a weak acid conductometrically and verify Ostwald's dilution law.
10. To determine the transition temperature of the given substance by thermometric method ( $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$ )
11. To determine enthalpy of solution of solid  $\text{CaCl}_2$  and calculate lattice energy of  $\text{CaCl}_2$ .
12. To determine the heat of reaction involving precipitation of a salt say  $\text{BaSO}_4$ .

**BCE015B: Analytical Chemistry**

**Course outcome:** On completion of the course, B.Sc. student will be able to understand:

**CO-1** about the various types of error with curves and methods of minimizing errors with significant figures and computation rules. **CO-2** about the Properties and formation of precipitates, contamination and methods of removing impurities in precipitates. **CO-3** about the theoretical and practical aspects of various analytical reagents and their applications. **CO-4** about the solvent extraction systems, distribution laws and Craig concept also with Radioanalytical Methods and their applications. **CO-5** about classification of chromatographic methods and applications and Elementary idea of HPLC, GC, TGA, DTA.

**Unit-I**

**Statistical Evaluation :** Determinate and Indeterminate errors. Normal error curve. Accuracy and Precision, relative and standard deviation. Methods for minimizing errors. Criteria for rejection of an observation. Significant figures and computation rules.

**Unit-II**

**Precipitation:** Desirable properties of gravimetric precipitates. Formation of gravimetric precipitates. Conditions for quantitative precipitation. Contamination in precipitates. Methods for

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removing impurities in precipitates. Organic precipitants (oxime, dithiozone,  $\alpha$ -nitroso-( $\beta$ -naphthol, cupferron, dimethyl glyoxime) in chemical analysis.

### Unit-III

**Analytical Reagents** : Principles of qualitative and quantitative analysis; acid-base, oxidation-reduction and complexometric titrations using EDTA; Karl Fischer reagent and periodate in chemical analysis. precipitation reactions; use of indicators; use of organic reagents in inorganic analysis.

### Unit-IV

**Solvent Extraction** : Distribution law, solvent extraction, equilibrium constant from distribution coefficient ( $K_1 + I_2 = KI_3$ ). Craig concept of counter-current distribution, Important solvent extraction systems.

**Radioanalytical Methods** : Elementary theory, isotope dilution and Neutron activation methods and applications, applications of isotopes.

### Unit-V

**Chromatography** : Classification of chromatographic methods, general principle and application of adsorption, partition, ion-exchange, thin layer, column and paper chromatography. Elementary idea of HPLC, GC, GSC. TGA & DTA analysis.

### Books Recommended

1. "Modern Methods of Chemical Analysis", R. L. Peacock, L. D. Shields, T. Cairns, and I. C. McWilliam, 2nd Edition (1976), John Wiley, New York.
2. "Basic Concepts of Analytical Chemistry", S. M. Khopkar, 2nd Edition (1998), New Age International Publications, New Delhi.
3. "Environmental Chemistry", A. K. De, 3rd Edition (1994), Wiley Eastern, New Delhi.
4. "Instrumental Methods of Analysis", H. H. Willard, L. L. Merritt, and J. A. Dean, 6th Edition (1986), CBS Publishers & Distributors, Shahdara, Delhi.
5. "Analytical Chemistry", G. D. Christian, 4th Edition (1986), John Wiley & Sons, New York.
6. "Principles and Methods of Chemical Analysis", H. F. Walton, 2nd Edition (1966), Prentice Hall, New Delhi.

### BCE 040A: Estimations, Calibrations and Chromatographic analysis

#### (Practicals)

1. Calibration of weights and calculation of errors in it.
2. Prepare a standard solution of  $Na_2CO_3$  and standardize the given solution of  $HCl/H_2SO_4$
3. Prepare a standard solution of sodium oxalate and standardize given solution of  $KMnO_4$
4. Determine percentage purity of commercial sample of  $NaOH$
5. Prepare a standard solution of  $K_2Cr_2O_7$  and standardize given solution of  $Na_2S_2O_3$
6. Estimation of Barium as  $BaSO_4$  gravimetrically

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7. Preparation of 0.1 N solution of  $\text{HCl}$  /  $\text{HNO}_3$  using density and percentage by weight and their standardization by using  $\text{Na}_2\text{SO}_3$
8. Prepare a calibration curve using  $\text{KMnO}_4$  and determine concentration in unknown given sample solution.
9. Prepare a calibration curve using  $\text{K}_2\text{Cr}_2\text{O}_7$  and determine concentration in unknown given sample solution.
10. Preparation of 0.05 N  $\text{H}_2\text{SO}_4$  using density and weight percentage and its standardization.
11. To separate the mixture of Methyl Orange and Methylene Blue by using cyclohexane and ethyl acetate (8.5:1.5) as solvent system by TLC.
12. To separate the mixture of Aldehyde and Ketones by TLC.
13. To separate the pigments from spinach leaves by column Chromatography.
14. Preparation and separation of 2,4-dinitro Phenylhydrazones of acetone, 2-butanone using toluene and petroleum ether (40:60).
15. To separate the mixture of D,L-alanine, glycine and L-leucine using n-butanol : acetic acid : water (4:1:5). Spray reagent- Ninhydrin.
16. To separate monosaccharides - a mixture of D-galactose and D-fructose using n-butanol : acetone : water (4:1:5). Spray reagent - aniline hydrogen phthalate

## SEMESTER -V

### BCE 019A: Coordination Compounds and Organometallic Chemistry

**Course outcome:** Students will be able to-

CO-1 identify common organic ligands used to construct coordination complexes, and learn how certain ligands interact with transition metal. CO-2 explain the formation of different types of bonds, predict the geometry of simple molecules, explain the different types of hybridisation and draw shapes of simple covalent molecules. CO-3 relate electronic configurations to the basic magnetic properties of coordination complexes, Calculate the "spin-only" magnetic moment of simple coordination complexes. CO-4 understand practical aspects of separation of different lanthanides. CO-5 understand the classification, properties and applications of organometallic compounds, study the methods of preparation, properties, structure and bonding of metal carbonyls and metal clusters and understand the role of metals in biological systems.

#### Unit-I

**Coordination Compounds :** Werner's theory, nomenclature, chelates, stereo-chemistry of coordination numbers 4, 5 and 6. Various types of isomerism in coordination complexes. Important applications of coordination compounds. Theories of metal-ligand bonding in transition metal complexes- Sidgwick effective atomic number concept, valence bond theory of coordination compounds.

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**Unit-II**

**Theories of Metal-Ligand bonding :** Limitations of valence bond theory; Crystal-field theory and crystal-field splitting in octahedral and tetrahedral complexes; factors affecting the crystal-field parameters.

**Unit-III**

**Magnetic Properties of Transition Metal Complexes :** Types of magnetic behaviour, methods of determining magnetic susceptibility, L-S and J-J coupling, orbital contribution to magnetic moments. Correlation of magnetic moment data and stereochemistry of Co(II) and Ni(II) complexes; anomalous magnetic moments.

**Unit-IV**

**Chemistry of f-block Elements :** Comparative study of lanthanide elements with respect to electronic configuration, atomic and ionic radii, oxidation states and complex formation; occurrence and principles of separation. General features and chemistry of actinides, principles of separation of Np, Pu and Am from U. Trans-Uranium elements.

**Unit-V**

**Organometallic Chemistry :** Definition, nomenclature and classification of organometallic compounds. Preparation, properties, bonding and applications of alkyl and aryls of Li, Al, Hg, Sn, Ti. A brief account of metal-ethylenic complexes and homogeneous hydrogenation. Essential and trace element in biological process, oxygen transport with reference to haemoglobin, biological role of alkali metals.

**Books Recommended**

1. "Concise Inorganic Chemistry", J. D. Lee, 5th Edition (1996), Chapman & Hall, London.
2. "Modern Inorganic Chemistry", R. C. Aggarwal, 1st Edition (1987), Kitab Mahal, Allahabad.
3. "Basic Inorganic Chemistry", F. A. Cotton, G. Wilkinson, and Paul L. Gaus, 3rd Edition (1995), John Wiley & Sons, New York.
4. "Inorganic Chemistry", A. G. Sharpe, 3rd International Student Edition (1999), ELBS / Longman, U.K.
5. "Inorganic Chemistry", D. F. Shriver and P. W. Atkins, 3rd Edition (1999), ELBS, London.

**BCE 020A: Inorganic Preparations and Estimation of Metal ions (Practicals)**

1. To prepare cis-potassium-dioxalatodiaquachromate (III).
2. To prepare trans-potassium-dioxalatodiaquachromate (III).
3. To prepare sodium trioxalatoferrate (III).
4. To estimate Ni as Ni-DMG in given solution.
5. To estimate Cu as CuSCN in given solution.

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**Raman Spectra**

Basic principal, Instrumentation, Application of Raman spectra, Comparison of IR and Raman Spectra

**Unit-IV**

**Nuclear Magnetic Resonance:** Principle, Magnetic and non magnetic nuclei, absorption of radio frequency, Equivalent and non equivalent protons, chemical shifts, shielding and De-shielding effects, anisotropic effect, relative strength of signals, spin-spin coupling, long range coupling, coupling constant, applications to simple structural problems, Phenomenon of Chemical Exchange.

**Unit-V****Rotational Spectroscopy**

Diatomic molecules, energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length; qualitative description of non-rigid rotor, isotope effect.

**Reference Books**

1. Spectrometric Identification of Organic Compounds: Robert M. Silverstein, Francis X. Webster, David Kiemle Wiley; 7<sup>th</sup> Edition.
2. Applications of spectroscopic techniques in Organic Chemistry: P.S. Kalsi, New Age International; 6th Edition.
3. Elementary Organic Spectroscopy; Principles And Chemical Applications: Y. R. Sharma, S. Chand & Co Pvt Ltd.
4. Fundamentals of Molecular Spectroscopy: C. M. Banwell and E. McCash, Tata McGraw Hill, 4<sup>th</sup> Edition.
5. Organic spectroscopy by William Kemp

**BCE 037B: Spectroscopic Determination of Compounds(Practicals)** All experiments will be based on problem solving technology by interpreting various types of spectrographs and subsequent discussion. The list of compounds may vary by keeping representation of each category of organic and inorganic compounds.

1. To identify the following functional group in the given compounds by IR spectroscopy: – OH, –NH<sub>2</sub> –NO<sub>2</sub> –COOH; Hydrogen Bonding (Intermolecular and Intramolecular)
2. To Identify the compound by U.V Spectroscopy containing:  $\pi$  –Bonding;  $\pi$  –Conjugation; Aromaticity
3. Elucidate the structure of given unknown organic compound by NMR spectroscopy.
4. To calculate the molecular mass of unknown organic molecules.
5. To draw spectral absorption curve for given substance (K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>) using spectrophotometer and determine the wavelength for maximum absorption.

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- To draw spectral absorption curve for given substance ( $\text{KMnO}_4$ ) using spectrophotometer and determine the wavelength for maximum absorption.
- To determine the concentration of unknown solution by verifying Lambert Beer's Law for  $\text{K}_2\text{Cr}_2\text{O}_7$ .
- To determine the concentration of unknown solution by verifying Lambert Beer's Law for  $\text{KMnO}_4$ .
- To determine the percentage of two optically active substances say sucrose and tartaric acid in given solution polarimetrically.
- To determine the specific rotation of a given optically active compound (cane sugar).
- To determine the specific rotation of a given optically active compound tartaric acid.
- To determine the molecular weight of non volatile substance glucose using water as solvent by cryoscopic method.

## SEMESTER-VI

### BCE 017B Acid Derivatives and Heterocyclic Chemistry

**Course outcome:** On completion of the course, B.Sc. student will be able to understand:

**CO-1** The preparations, reactions and properties of Ethers and Epoxides, their use as solvent and important synthetic reagents.

**CO-2** The preparations, reactions and properties of carboxylic acid and its derivatives and various reactions of synthetic applications.

**CO-3** The synthesis and reaction of Nitrogen containing compounds and their synthetic and industrial applications.

**CO-4** The synthesis and reaction of 5, 6 member and condensed heterocyclic systems along with their industrial and medicinal applications.

**CO-5** The types of Carbohydrates and sugars, their occurrence, structure, configuration and properties. Student will also get the knowledge of the role of these bio-molecules in biological system and day to day life. Student will also learn to analyse adulteration of food and its prevention.

#### Unit-I

**Ethers and Epoxides :** Nomenclature of ethers and methods of formation, physical properties. Chemical reaction, cleavage and autoxidation, Ziesel's method of synthesis of epoxides. Acid and Base catalyzed ring opening, Reactions of Grignard and organolithium reagents with epoxides.

#### Unit-II

**Carboxylic Acids :** Nomenclature structure and bonding, Physical properties, Acidic nature of carboxylic acids, Effect of substituents on acid Strength, preparation of carboxylic acids. Reactions of carboxylic acids, Hell-Volhard Zelinsky reaction.

**Carboxylic Acid Derivatives :** Structure and nomenclature of acid chlorides, esters, amides and acid-anhydrides. Relative stability and reactivity of acid derivatives. physical properties, Inter conversion of acid derivatives by nucleophilic acyl substitution. preparation of carboxylic acid derivatives, chemical reactions, mechanism of esterification and hydrolysis (Acidic and Basic)

#### Unit-III

**Organic Compounds of Nitrogen :** Preparation of nitro alkanes and nitro arenes. Chemical Reactions of Nitro alkanes. Mechanism of nucleophilic substitution in nitro arenes and their

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reduction in acidic, neutral and alkaline media. Reactivity, Structure and nomenclature of amines. Stereochemistry of amines. Separation of a mixture of primary, secondary and tertiary amines. Amine salts as phase transfer catalysts. Gabriel-Phthalimide reaction, Hofmann bromamide Reaction. Reactions of amines. Electrophilic Aromatic substitution in arylamines. Reactions of amines with nitrous acid. Synthetic transformations of aryl-diazonium salts, azo coupling.

#### Unit-IV

**Heterocyclic Compounds :** Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions, with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole. Introduction to condensed five and six-membered heterocycles. Preparation and reactions of indole, quinoline and isoquinoline. Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

#### Unit-V

**Carbohydrates :** Classification and nomenclature of monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers and esters. Determination of ring size of monosaccharides. Cyclic structure of D(+) glucose.

#### Books Suggested :

1. Organic Chemistry, Morrison and Boyd, Prentice Hall.
2. Organic Chemistry, L.G. Wade Jr. Prentice Hall.
3. Fundamentals of Organic Chemistry, Solomons, John Wiley.
4. Organic Chemistry Vol. I, II, III S.M. Mukerji, S.P. Singh and R.P. Kapoor, Wiley Eastern Ltd. (New Age International)
5. Organic Chemistry, F.A. Carey, McGraw Hill, Inc.
6. Introduction to Organic Chemistry, Streitwieser, Heathcock and Kosover. Macmillan.31
7. Organic Chemistry (Vol. I & II) : S. M. Mukherji, S. P. Singh and R. P. Kapoor, Wiley Eastern Ltd.
8. A Text Book of Organic Chemistry (Vol. I & II) : K. S. Tiwari, S. N. Mehrotra & N. K. Vishnoi
9. Organic Chemistry : M. K. Jain and S. Sharma
10. A Text Book of Organic Chemistry (Vol. I & II) : O. P. Agarwal
11. A Text Book of Organic Chemistry : R. K. Bansal
12. Organic Chemistry (Vol. I & II) : I. L. Finar
13. Organic Reaction and Their Mechanisms : P. S. Kalsi
14. Introduction of Petrochemicals : Sukumar Maiti.
15. Organic Chemistry : P. L. Soni
16. A Text Book of Organic Chemistry: V. K. Ahluwalia and Maduri Foyal, Narosa Publishing House Pvt. Ltd.

#### BCE 018B: Organic Preparations and Mixture Separation (Practicals)

24-  




1. To separate and identify the organic mixture containing two solid components using water and prepare their suitable derivatives.
2. To separate and identify the organic mixture containing two solid components using water and prepare their suitable derivatives.
3. To separate and identify the organic mixture containing two solid components using hot water and prepare their suitable derivatives.
4. To separate and identify the organic mixture containing two solid components using NaOH and prepare their suitable derivatives.
5. To separate and identify the organic mixture containing two solid components using NaOH and prepare their suitable derivatives.
6. To separate and identify the organic mixture containing two solid components using  $\text{NaHCO}_3$  and prepare their suitable derivatives.
7. To separate and identify the organic mixture containing two solid components using  $\text{NaHCO}_3$  and prepare their suitable derivatives.
8. (a) To prepare acetanilide from aniline (Acetylation).  
(b) To prepare phenylbenzoate from phenol (Benzoylation).
9. To prepare Iodoform from ethanol and acetone. (Aliphatic Electrophilic Substitution ).
10. To prepare m-dinitro benzene from nitro benzene .
11. To prepare p-nitro acetanilide from acetanilide.
12. To prepare Benzoic acid from toluene.

**BCE 022B: Photochemistry and Nuclear Chemistry**

**Course Outcome:** On completion of this course student will be able to-

CO-1 understand the kinetics of unimolecular and bimolecular reactions.

CO-2 analyze the basic knowledge of laws of photochemistry.

CO-3 describe the basic principles of laws of thermodynamics and colligative properties.

CO-4 think critically on different terms of electrochemistry of strong and weak electrolytes.

CO-5 understand practical aspects and applications of nuclear chemistry.

## Unit-I

**Chemical Kinetics:** Heterogeneous catalysis (surface reactions): Kinetics of unimolecular reactions- inhibition and activation energy. Bimolecular surface reactions - reactions between a gas molecule and an adsorbed molecule, reaction between two adsorbed molecules. Nature of surface, concept of active centres. Kinetics of enzymatic reactions: Michaelis-Menten's equation, significance of Michaelis constant, effect of temperature and pH in enzyme catalyzed reactions.

## Unit-II

**Photochemistry:** Law of photochemical equivalence, quantum efficiency, reasons for low and high quantum efficiency. Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized Reactions.

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Kinetics of thermal and photochemical reactions ( $\text{H}_2 + \text{Br}_2 = 2\text{HBr}$ ,  $\text{H}_2 + \text{Cl}_2 = 2\text{HCl}$ ,  $2\text{HI} = \text{H}_2 + \text{I}_2$ ), photostationary state, Chemical actinometers (ferri-oxalate, uranyl oxalate).

### Unit-III

**Thermodynamics of Solutions :** Partial molal quantities, chemical potential, the Gibbs-Duhem equation, fugacity, activity and activity coefficient (concept and physical significance), reference and standard states, Variation of fugacity with temperature and pressure, Lewis-Randall rule, thermodynamic functions of mixing ( $\Delta G_{\text{mix}}$ ,  $\Delta S_{\text{mix}}$ ,  $\Delta V_{\text{mix}}$ ,  $\Delta H_{\text{mix}}$ ), ideal solutions and their characteristic properties, Duhem-Margules equation and its application, Henry and Raoult's law. Thermodynamics of colligative properties : Freezing point depression, elevation of boiling point, osmotic pressure, Van't Hoff equation. Measurement of osmotic pressure and determination of molecular weight of macromolecules.

### Unit-IV

**Electrochemistry :** Theory of strong electrolytes :- Qualitative idea of Debye-Huckel theory of ion-ion interactions, Debye-Huckel limiting law for activity coefficient of ions in electrolyte solution (derivation not required), its modification for concentrated solutions. Debye-Huckel-Onsager (D-H-O) theory of electrolytic conductance : qualitative idea of electrophoretic and relaxation effects, D-H-O equation for conductance of electrolyte solutions.

### Unit-V

**Nuclear Chemistry :** Isotopes, their separation and applications. Nuclear forces, nuclear binding energy, stability of nucleus, energy changes in nuclear reactions, nuclear fission and fusion. Uses of nuclear radiations (radiation, sterilization, radiation energy for chemical synthesis). Radio isotopes as a source of electricity.

### Books Recommended

1. "Physical Chemistry", **P. C. Rakshit**, 5th Edition (1988), 4th Reprint (1997), Surat Book House, Calcutta.
2. "Physical Chemistry", **K. J. Laidler and J. M. Meiser**, 3rd Edition (International Edition, 1999), Houghton Mifflin Co., New York.
3. "Physical Chemistry", **I. N. Levine**, 4th Edition (International Edition, 1995), Mc Graw-Hill Inc., New York.
4. "Essentials of Nuclear Chemistry" **H. J. Arnikar**, 4th Edition (1995), New Age International (p) Ltd., Wiley Eastern Ltd., New Delhi.
5. *Physical Chemistry*, IIIrd Year, P.D. Sharma and P.S. Verma, Ramesh Book Depot

### BCE 023A: Conductometric Analysis (Practicals)

1. To determine the strength of the given acid (HCl) conductometrically using standard alkali solution.
2. To determine the strength of the given acid ( $\text{CH}_3\text{COOH}$ ) conductometrically using standard alkali solution.
3. To determine the solubility and solubility product of a sparingly soluble salt conductometrically.

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4. To determine the dissociation constant of a weak acid conductometrically and verify Ostwald's dilution law.
5. To draw spectral absorption curve for given substance ( $K_2Cr_2O_7$  or  $KMnO_4$ ) using spectrophotometer and determine the wavelength for maximum absorption for each of them. Also verify the Lambert-Beer's Law and determine the concentration of unknown solution.
6. To investigate the adsorption of oxalic acid from aqueous solution by activated charcoal and examine validity of Freundlich and Langmuir adsorption isotherm.
7. To determine the specific rotation of a given optically active compound.
8. To determine the equivalent conductance of a strong electrolyte KCl or NaCl at several concentrations and verify the applicability of Debye Huckel Onsager equation.
9. To determine the equivalent conductance of a strong electrolyte HCl at several concentrations and verify the applicability of Debye Huckel Onsager equation.
10. To study saponification of ethyl acetate conductometrically.
11. To determine conductometrically the concentration of KCl and KI in a given solution.
12. To determine the concentration of salt of a weak acid and strong base like sodium acetate conductometrically.

## BCE038A: Project

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**Department of Chemistry**  
**JECRC University**  
**B.Sc. (Major Chemistry) 2020-21**  
**Mapping of CO-PO - PSO**

Semester-I

**BCE 001A Hydrocarbons, Reaction Mechanisms and Stereochemistry**

S.No.	
UNIT 1	Structure and Bonding
UNIT 2	Mechanism of Organic Reactions
UNIT 3	Stereochemistry of Organic Compounds
UNIT 4	Alkanes and Cycloalkanes
UNIT 5	Alkenes, Cycloalkenes, Dienes and alkynes

**Course Outcomes(CO)**

CO1: Understanding the structure and bonding involved in hydrocarbon.

CO2: Understanding the reaction mechanism of various organic reactions

CO3: Understanding the stereochemistry of hydrocarbons.

CO4: Understanding the nomenclature of alkanes and cycloalkanes, their properties, method of formation and reactions they generally undergo.

CO5: Understanding the nomenclature of Alkenes, Cycloalkenes, Dienes and alkynes, their properties, method of formation and reactions they generally undergo.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES and PROGRAM SPECIFIC OUTCOME**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	L	L	L	M	H	H	H	H	M
CO2	H	M	H	M	L	L	M	H	H	M
CO3	L	H	H	H	M	H	L	H	H	M
CO4	M	M	M	H	H	M	M	H	H	M
CO5	H	L	M	H	L	L	H	H	H	M

H = 3; M = 2 L = 1

**BCE 003A: Chemistry of s and p-block elements**

UNIT 1 Atomic Structure	UNIT 2 Periodic Properties
UNIT 3 Chemical Bonding	UNIT 4 s-Block Elements
UNIT 5 p-Block Elements	

**Course outcome**

On completion of the course, B.Sc. student will be able to understand:

CO-1 about the atomic structure, Quantum numbers and electronic configuration of elements based on respective rules.

CO-2 the periodic properties like Atomic and ionic radii, ionization energy, ionization potential and electron negativity and their determinations and applications.

CO-3 different types of bonding like ionic bonding, covalent bonding, metallic bonding and hydrogen bonding and also molecular geometry based on VBT, VSEPR and MOT to know structure of different molecules and ions.



CO-4 s- block Elements of alkali metals and Alkaline earth metals and their industrial & biological applications

CO-5 p- block Elements and their different compounds having the applications at industrial and biological applications.

#### Mapping of CO-PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	L	M	M	H	H	H	H	H	M
CO2	M	H	M	M	H	H	M	H	H	M
CO3	H	L	M	L	M	H	H	H	H	M
CO4	M	M	M	M	H	H	M	H	H	H
CO5	H	L	M	M	L	L	H	H	H	H

#### Semester-II

##### BCE 005A: Thermodynamics, Electrochemistry and Chemical Kinetics

UNIT 1	Solid State
UNIT 2	Liquid State
UNIT 3	Gaseous State
UNIT 4	Thermodynamics
UNIT 5	Electrochemistry

#### Course Outcome

CO-1 Students will be able to understand the principles of solid state.

CO-2 Students will be able to analyze the basic knowledge of liquid state.

CO-3 Students will be able to describe the basic concept of kinetic theory of gaseous state.

CO-4 Students will be able to think critically on different terms and process of thermodynamics.

CO-5 Students will be able to understand practical aspects of different theories of electrochemistry and chemical kinetics.

#### Mapping of CO-PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	M	L			L	H	H	H	M
CO2	L	M				M	H	H	H	M
CO3	M	M	L			M	M	H	H	M
CO4	H	M	L	L		L	H	H	H	H
CO5	M	H	L	L		L	M	H	H	H

##### BCE 007C: Industrial Chemistry

UNIT 1 Water & its Treatment
UNIT 2 Corrosion
UNIT 3 Lubricants & Cement
UNIT 4 Fuel
UNIT 5 Green Chemistry

#### Course outcome

On completion of the course, B.Sc. student will be able to understand:

CO-1 about water related problems, their methods of analysis and different methods of treatment.

CO-2 about the various types, theories and mechanism of corrosion and various prevention methods

CO-3 about the various types of lubricants and its mechanism with various types of properties of lubricants and manufacturing process of cement.

CO-4 about the various types of fuel, its calorific values and its determination along-with carbonization process and synthetic fuel with manufacturing process.

CO-5, about principles and applications of green chemistry.

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# Mapping of CO-PO

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	L	M	M	H	H	H	H	H	H
CO2	M	M	H	H	H	M	M	H	H	H
CO3	H	L	M	M	H	H	H	H	H	H
CO4	M	M	M	M	H	H	M	H	H	H
CO5	H	M	M	M	H	H	H	H	H	H

## Semester-III

### BCE 009B: Alcohols, Aldehydes and Ketones

UNIT 1	Arenes & Aromaticity
UNIT 2	Alkyl & Aryl Halides
UNIT 3	Alcohols
UNIT 4	Phenols
UNIT 5	Aldehydes and Ketones

## Course outcome

On completion of the course, B.Sc. student will be able to understand:

- CO-1 The preparations, reactions and properties of Arenes, their use as solvent and important synthetic reagents. Student will also learn about the aromaticity and aromatic character.
- CO-2 The preparations, reactions and properties of alkyl and aryl halides and their derivatives and various reactions of synthetic applications like  $SN^1$ ,  $SN^2$ ,  $SN^i$  etc.
- CO-3 The synthesis and reaction of alcohols and their synthetic and industrial applications. Student will also learn about their use as solvent and important synthetic reagents.
- CO-4 The synthesis and reaction of phenols and their synthetic and industrial applications. Student will also learn about their use as solvent and important synthetic reagents.
- CO-5 The synthesis and reaction of Carbonyl compounds (aldehydes and ketones) along with industrial applications of various condensation and polymerization reactions.

## Mapping of CO-PO

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	L	M	M	H	H	H	H	H	M
CO2	M	M	H	H	H	M	M	H	H	M
CO3	H	L	M	M	H	H	H	H	H	H
CO4	M	M	M	M	H	L	M	H	H	H
CO5	H	L	M	M	H	H	H	H	H	H

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**BCE011B Non-aqueous Solvents and Transition Metals****UNIT 1 Acids and Bases****UNIT 2 Non-aqueous Solvents****UNIT 3 Chemistry of p-block elements (Groups 15, 16, 17 and 18)****UNIT 4 Transition Metals****UNIT 5 Lanthanides and Actinides**

**Course outcome:** On completion of this course student will be able to:

CO-1 Students will be able to explain the unique characteristics of different types of acid and base.

CO-2 Students will be able to analyze the chemical reaction in different non-aqueous solvents and advantages /limitations of various solvents

CO-3 Students will be able to explain the trends in atomic and physical properties of group 15, 16, 17 & 18 elements.

CO-4 Students will be able to learn about the vast world of transition elements and their unique properties.

CO-5 Students will be able to understand basic knowledge of lanthanides and actinide chemistry.

**Mapping of CO-PO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	M	L			L	H	H	H	M
CO2	L	M				M	H	H	H	H
CO3	M	M	L			M	M	H	H	M
CO4	H	M	L	L		L	H	H	H	H
CO5	M	H	L	L		L	M	H	H	M

**B.Sc. IV Semester****BCE 013B: Phase Equilibria and Surface Chemistry**

<b>UNIT 1</b>	<b>Thermodynamics</b>
<b>UNIT 2</b>	<b>Phase Equilibria</b>
<b>UNIT 3</b>	<b>Electrochemical Cells</b>
<b>UNIT 4</b>	<b>Surface and Colloids Chemistry</b>
<b>UNIT 5</b>	<b>Elementary Quantum Mechanics</b>

**Course Outcome**

CO-1 Students will be able to understand the principles of laws of thermodynamics.

CO-2 Students will be able to analyze the basic knowledge of phase equilibrium.

CO-3 Students will be able to describe the basic principles and concept of electrochemical cell.

CO-4 Students will be able to think critically on different terms and process of surface chemistry.

CO-5 Students will be able to understand Schrodinger wave equation and its importance

**Mapping of COs and POs**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	M	L			L	H	H	H	M
CO2	L	M				M	H	H	H	M
CO3	M	M	L			M	M	H	H	M
CO4	H	M	L	L		L	H	H	H	H
CO5	M	H	L	L		L	M	H	H	M

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**BCE 015B: Analytical Chemistry**

UNIT 1	Statistical Evaluation
UNIT 2	Precipitation
UNIT 3	Analytical Reagents
UNIT 4	Solvent Extraction Radioanalytical Methods
UNIT 5	Chromatography

**Course Outcome**

On completion of the course, B.Sc. student will be able to understand:

CO-1 about the various types of error with curves and methods of minimizing errors with significant figure and computation rules.

CO-2 about the Properties and formation of precipitates, contamination and methods of removing impurities in precipitates.

CO-3 about the theoretical and practical aspects of various analytical reagents and their applications.

CO-4 about the solvent extraction systems, distribution laws and Craig concept also with Radioanalytical Methods and their applications.

CO-5 about classification of chromatographic methods and applications and Elementary idea of HPLC, GC, TGA, DTA

**Mapping of COs and POs**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	L	M	M	H	H	H	H	H	M
CO2	M	M	H	H	H	M	M	H	H	M
CO3	H	L	M	M	H	H	H	H	H	M
CO4	M	M	M	M	H	H	M	H	H	M
CO5	H	M	M	M	H	H	H	H	H	M

**SEMESTER-V****BCE 019A Coordination Compounds and Organometallic Chemistry**

UNIT 1 Coordination Compounds
UNIT 2 Theories of Metal-Ligand bonding
UNIT 3 Magnetic Properties of Transition Metal Complexes
UNIT 4 Chemistry of f-block Elements
UNIT 5 Organometallic Chemistry

**Course outcome**

CO-1 Students will be able to identify common organic ligands used to construct coordination complexes, and learn how certain ligands interact with transition metal.

CO-2 Students will be able to explain the formation of different types of bonds, predict the geometry of simple molecules, explain the different types of hybridisation and draw shapes of

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simple covalent molecules

CO-3 Students will be able to relate electronic configurations to the basic magnetic properties of coordination complexes, Calculate the "spin-only" magnetic moment of simple coordination complexes.

CO-4 Students will be able to understand practical aspects of separation of different lanthanides and actinides

CO-5 Students will be able to understand the classification, properties and applications of organometallic compounds, study the methods of preparation, properties, structure and bonding of metal carbonyls and metal clusters and understand the role of metals in biological systems.

#### Mapping of CO-PO/PSO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	M	L	M	L	M	H	H	H	M
CO2	M	L	L			L	H	H	H	M
CO3	H	M	L	L	M	M	M	H	H	M
CO4	M	L	M			L	H	H	H	H
CO5	H	H	M	M	H	M	M	H	H	M

#### BCE 024B: Spectroscopy

UNIT 1	Atomic Spectroscopy
UNIT 2	Ultraviolet and Visible Spectrophotometry
UNIT 3	Infrared Spectroscopy, Raman Spectra
UNIT 4	Nuclear Magnetic Resonance
UNIT 5	Rotational Spectroscopy

#### Course outcome

On completion of the course, B.Sc. student will be able to understand:

CO-1 Principles of Atomic Spectroscopy, AAS, FAS etc and their instrumentation and applications in various fields like in checking of contamination of water by heavy metals and toxic substances.

CO-2 Common terms in spectroscopy. Principles of UV and Visible spectroscopy, its applications in structure determination and working method of Instrument.

CO-3 Principles of IR spectroscopy, its applications in structure determination, instrumentation, finger print region and functional group region and their role in determination of structure of organic compounds. Principle of Raman spectra, Raman and Rayleigh lines

CO-4 Principles of NMR Spectroscopy, instrumentation and applications. Student will also learn about the use of NMR technique in medical sciences.

CO-5 Energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution)

#### Mapping of PO/CO

CO/ PO	PO1	PO 2	PO3	PO 4	PO5	PO6	PO 7	PSO1	PSO2	PSO3
CO1	H	H	L	M	L	H	H	H	H	H
CO2	H	H	L	M	L	H	H	H	H	H
CO3	H	H	L	M	L	H	H	H	H	H
CO4	H	H	L	M	L	H	H	H	H	H
CO5	H	H	L	M	L	H	H	H	H	H

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UNIT-1	Ethers and Epoxides
UNIT-2	Carboxylic Acids and Carboxylic Acid Derivatives
UNIT-3	Organic Compounds of Nitrogen
UNIT-4	Heterocyclic Compounds
UNIT-5	Carbohydrates

**Course outcome**

On completion of the course, B.Sc. student will be able to understand:

CO-1 The preparations, reactions and properties of Ethers and Epoxides, their use as solvent and important synthetic reagents.

CO-2 The preparations, reactions and properties of carboxylic acid and its derivatives and various reactions of synthetic applications.

CO-3 The synthesis and reaction of Nitrogen containing compounds and their synthetic and industrial applications.

CO-4 The synthesis and reaction of 5, 6 member and condensed heterocyclic systems along with their industrial and medicinal applications.

CO-5 The types of Carbohydrates and sugars, their occurrence, structure, configuration and properties. Student will also get the knowledge of the role of these bio-molecules in biological system and day to day life. Student will also learn to analyse adulteration of food and its prevention.

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	L	M	M	H	H	H	H	H	M
CO2	H	L	M	M	H	H	H	H	H	H
CO3	H	L	M	M	H	H	M	H	H	H
CO4	H	L	M	M	H	H	H	H	H	H
CO5	H	L	M	M	H	H	M	H	H	H

**BCE 022B: Photochemistry and Nuclear Chemistry**

UNIT 1	Chemical Kinetics
UNIT 2	Photochemistry
UNIT 3	Thermodynamics of Solutions
UNIT 4	Electrochemistry
UNIT 5	Nuclear Chemistry

**Course Outcome**

CO-1 Students will be able to understand the kinetics of unimolecular and bimolecular reactions.

CO-2 Students will be able to analyze the basic knowledge of laws of photochemistry.

CO-3 Students will be able to describe the basic principles of laws of thermodynamics and colligative properties.

CO-4 Students will be able to think critically on different terms of electrochemistry of strong and weak electrolytes.

CO-5 Students will be able to understand practical aspects and applications of nuclear chemistry.

**Mapping of COs and POs**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	M	L			L	H	H	H	M
CO2	L	M				M	H	H	H	M

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CO1	M	M	L			M	M	H	H	M
CO4	H	M	L	L		L	H	H	H	H
CO5	M	H	L	L		L	M	H	H	M

### BCE 038A: Project

Students will be able to

CO-1 search and identify the relevant problems or topics of research in the field of Chemistry

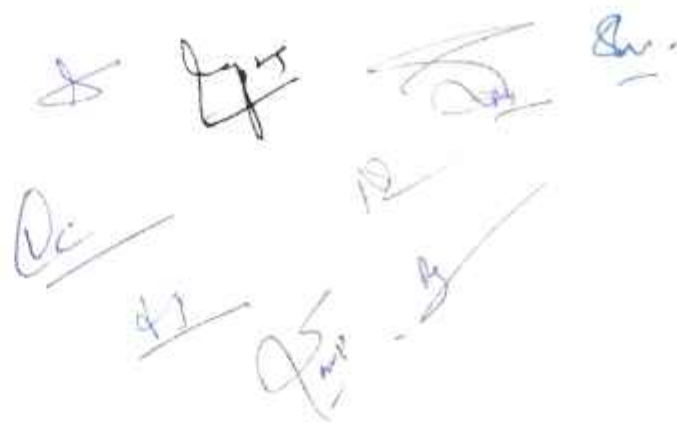
CO-2 understand the mechanism and process of data collection, review and analysis.

CO-3 correlate and analyze a current topic for innovation and for the benefits of society at large.

CO-4 understand the ethics of research, plagiarism, copyrights etc.

CO-5 develop an insight for choosing the field of specialization during higher studies.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	L	M	H	H	M	H	H	H	H
CO2	H	H	M	H	H	M	H	H	H	H
CO3	H	L	M	H	H	M	H	H	H	H
CO4	H	M	M	H	L	M	H	H	H	H
CO5	H	H	M	H	L	M	H	H	H	H


  
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**Department of Chemistry**  
**Course Structure and Syllabi**

**Session 2021-22**

*[Signature]*



**PO10 Lifelong learner:** Graduates will acquire the ability to engage in independent and self-learning as well as to successfully pursue their career objectives in advanced education and in professional courses, through the use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing employability.

## SEMESTER – I

### MCH 001A: Compounds of Different Elements

After the completion of the course, student will be able to understand the:

CO-1: Basics of stereochemistry and bonding in different compounds and reactions. CO-2 The knowledge of metal- ligand bonding in complexes. CO-3 Preparation, structure, bonding, reactions and applications of Hydrogen, Alkali and Alkaline Earth Metals. CO-4 Preparation, structure and bonding of compounds of Carbon and Silicon group elements. CO-5 Types of nuclear reactions

#### Unit-I

##### Stereochemistry and Bonding in Main group compounds

VSEPR Theory, Walsh diagram. Hybridization including energetic of hybridization, Bent's rule,  $d\pi-p\pi$  bond. Some simple reactions of covalently bonded molecules (i) Atomic inversion (ii) Bery pseudo rotation (iii) Nucleophilic displacement (iv) Free radical mechanism

#### Unit-II

##### Metal-Ligand bonding

Valence Bond Theory (VBT), Crystal field theory (CFT) for octahedral, trigonal bipyramidal, square pyramidal, tetrahedral and square planar complexes. Crystal field stabilization energy (CFSE), Factor affecting the crystal field parameters, weak and strong field complexes, spectrochemical series, John-Teller effect. Thermodynamic and related aspects of crystal fields - ionic radii, heats of ligation, lattice energy, site preference energy. Merits and limitations of CFT. Molecular orbital theory of octahedral, tetrahedral and square planar complexes.  $\pi$  bonding in bonding in octahedral complexes.

#### Unit-III

##### Hydrogen, Alkali and Alkaline Earth Metals

Classification of hydrides; e-deficient, e-precise & e-rich hydrides. Applications of crown ethers in extraction of alkali and alkaline earth metals.

##### Boron compounds

Preparation, structure, bonding, reactions and applications of boranes, carboranes, metalloboranes, metallocarboranes, borazines.

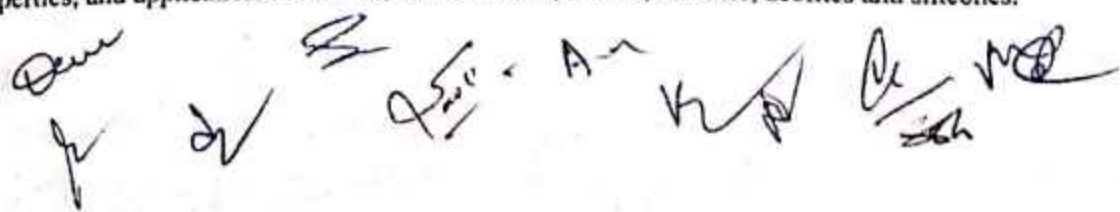
##### Noble gases

Isolation and properties. Preparation and structure of noble gas compounds

#### Unit-IV

##### Compounds of Carbon and Silicon

Fullerenes and their compounds, Intercalation compounds of graphite, Synthesis, structure, properties, and applications. Carbides, fluorocarbons, silanes, silicates, zeolites and silicones.



## Compounds of Nitrogen, Oxygen and Halogen group elements Compounds of Nitrogen , Oxygen and Halogen group elements

Nitrogen activation. Oxidation states of nitrogen and their interconversion. BN, PN and SN Synthesis, properties, bonding, and applications of interhalogens, pseudohalogens, polyhalides, oxyacids and oxoanions of halogens.

### Unit-V

**Nuclear Chemistry:** Types of radioactive decay, units of radioactivity, Nuclear reaction – evaporation, spallation, fragmentation, transfer reactions (Buckshot hypothesis), nuclear fission; Theory of nuclear fission, fission fragments, their mass and charge distribution, fission energy, compound nucleus theory for nuclear reaction, Photonuclear reaction and nuclear fusion (thermonuclear reaction), nuclear reactors Interaction of radiation with matter. Counters – Geiger counter, scintillation counter, proportional counter, semi conductor detector. Analytical applications (neutron activation analysis and isotope dilution analysis)

**Self Study:** Sub-nucleons, classification of nuclides, nuclear stability, binding energy, nuclear radius, nuclear models – liquid drop model, shell model. Applications of radio isotopes as tracers: chemical investigations (structure determinations, reaction mechanism, isotope exchange reactions), age determination, medical, agricultural and industrial applications.

### Suggested Books & References

1. Advanced Inorganic Chemistry, Cotton F.A. and Wilkinson G, John Wiley.
2. Inorganic Chemistry, Huhey J.E., Harper & Row.
3. Chemistry of the Elements, Greenwood N.N. and Earnshaw A., Pergamon
4. Inorganic Chemistry: A unified Approach, Porterfiels W. W., Elsevier
5. Inorganic Chemistry, Sharpe Alan G., Pearson Education Ltd.
6. Inorganic Chemistry, Shriver D.F., Atkins, P.W. and Langford C.H., Oxford University Press, 1998
7. Inorganic Chemistry, Miessler G. L. and Tarr D. A., Pearson Publications
8. Inorganic Chemistry, Wulfsberg, G, University Science Books, Viva Books.

### MCH 002A: Reaction Mechanism: Structure and Reactivity

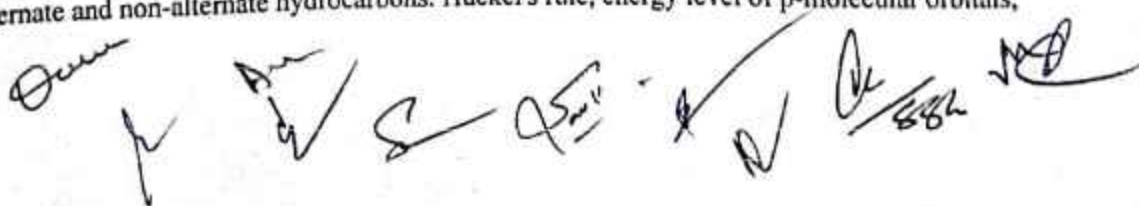
**Course Outcomes:** On the completion of this course student will be able to-

- CO1: Understand the nature of different types of bonding associated with organic molecules.  
CO2: Understand the different stereo isomers of a particular organic molecule, will be able to identify the chiral centre present in a molecule and will be able to communicate the different optical isomers with universal notation. CO3: Understand the reaction mechanism and the impact of structure on reactivity.  
CO4: Understand the aliphatic nucleophilic substitution and its mechanism. CO5: Understand the photochemical reactions.

### Unit-I

#### Nature of Bonding in Organic Molecules

Delocalized chemical bonding-conjugation, cross conjugation, resonance hyperconjugation, bonding in fullerenes, tautomerism. Aromaticity in benzenoid and non-benzenoid compounds, alternate and non-alternate hydrocarbons. Huckel's rule, energy level of p-molecular orbitals,





annulenes, anti-aromaticity, homo-aromaticity, PMO approach. Bonds weaker than covalent bond, addition compounds, crown ether complexes and cryptands, inclusion compounds, catenanes and rotaxanes.

## Unit-II

### Stereochemistry

Conformational analysis of cycloalkanes, decalines, effect of conformation on reactivity, conformation of sugars, strain due to unavoidable crowding. Elements of symmetry, chirality, molecules with more than one chiral center, threo and erythro isomers, methods of resolution, optical purity, enantiotopic and diastereotopic atoms, groups and faces, stereospecific and stereoselective synthesis, asymmetric synthesis. Optical activity in the absence of chiral carbon (biphenyls, allenes and spirane chirality due to helical shape). Stereochemistry of the compounds containing nitrogen, sulphur and phosphorus.

## Unit-III

### Reaction Mechanism : Structure and Reactivity

Type of mechanisms, types of reactions, thermodynamic and kinetic requirements, kinetic and thermodynamic control, Hammond's postulate, Curtin-Hammett principle. Potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects. Generation, structure, stability and reactivity of carbocations, carbanions, free radicals, carbenes and nitrenes. Effect of structure on reactivity, resonance and field effects, steric effect, quantitative treatment. The Hammett equation and linear free energy relationship, substituent and reaction constants, Taft equation.

## Unit-IV

### Aliphatic Nucleophilic Substitution

The  $SN_1$ ,  $SN_2$ ,  $SN_i$  and SET mechanism. The neighbouring group participation mechanism, neighbouring group participation by p and s bonds, anchimeric assistance. Classical and nonclassical carbocations, phenonium ions, norbornyl systems, common carbocation rearrangements.

### Allylic Nucleophilic Substitution

Nucleophilic substitution at an allylic, aliphatic trigonal and a vinylic carbon. Phase transfer catalysis and ultrasound, ambident nucleophile,

## Unit-V

**Photochemistry:** Photochemical reaction, principle, types of excitations, Jablonskii diagram, energy dissipation, fate of excited molecule, energy transfer, quantum yield, photochemistry of dienes and carbonyl compounds, Photo-Fries rearrangement, photochemistry of vision.

### Suggested Books & References:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Plenum.
3. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
4. Structure and Mechanism in Organic Chemistry, C.K. Ingold, Cornell University Press.
5. Organic Chemistry, R.T. Morrison and R.N. Boyd, Prentice-Hall.

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6. Modern Organic Reactions, H.O. House, Benjamin.
7. Principles of Organic Synthesis, R.O.C. Norman and J.M. Coxon, Blackie Academic & Professional.
8. Reaction Mechanism in Organic Chemistry, S.M. Mukherji and S.P. Singh, Macmillan.
9. Pericyclic Reactions, S.M. Mukherji, Macmillan, India
10. Stereochemistry of Organic Compounds, D.Nasipuri, New Age International.
11. Stereochemistry of Organic Compounds, P.S. Kalsi, New Age International.

### MCH 003A: Quantum Chemistry and Electro Chemistry

**Course Outcome:** On completion of this course student will be able to-

- CO-1 understand the postulates of quantum mechanics and derivation of Schrodinger wave equation.
- CO-2 apply and analyze the basic knowledge of various adsorption isotherms.
- CO-3 describe the basic concept of surfactants and their applications.
- CO-4 think critically on electrified double layer and different models.
- CO-5 understand practical aspects of polarography

#### Unit-I

##### Introduction to Exact Quantum Mechanical Results

The Schrodinger equation and the postulates of quantum mechanics. Operators, Hamiltonian and Hermitian operator, Discussion of solutions of the Schrodinger equation to some model system viz., particle in a box, quantization of energy levels, degeneracy, zero point energy and justification for Heisenberg uncertainty principle, the harmonic oscillator, the rigid rotor, the hydrogen atom.

##### Approximate Methods

The variation theorem, linear variation principle. Perturbation theory (First order and nondegenerate). Applications of variation method and perturbation theory to the Helium atom.

#### Unit-II

Molecular Orbital Theory, LCAO Concept, Extension of MO theory to homonuclear and heteronuclear diatomic molecules, Qualitative MO theory and its applications to  $AH_2$  type molecule, Huckel theory of conjugate systems, bond order and charge density calculations. Applications to ethylene, butadiene, cyclobutadiene, benzene, allyl system and cyclopropenyl system. Introduction to extended Huckel theory.

#### Unit-III

##### Surface Chemistry

Surface tension, capillary action, pressure difference across curved surface (Laplace equation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm, estimation of surface area (BET equation), Surface films on liquids (Electro-kinetic phenomenon).

##### Micelles

Surface active agents, classification of surface active agents, micellization, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants,

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counter ion binding to micelles, thermodynamics of micellization-phase separation and mass action models, solubilization, micro emulsion, reverse micelles.

#### Unit-IV

##### Electrochemistry

Electrochemistry of solutions. Debye-Huckel-Onsager treatment and its extension, ion solvent interactions. Thermodynamics of electrified interface equations. Derivation of electrocapillarity, Lippmann equations (surface excess), methods of determination. Structure of electrified interfaces. Gouy-Chapman, Stern, Grahm Devanathan-Mottwatts, Tobin, Bockris, Devanathan model.

#### Unit-V

##### Overpotential

Introduction, types of overpotential, theories, exchange current density, introduction of Butler Volmer equation, Tafel plot. Semiconductor interfaces-theory of double layer at semiconductor, electrolyte solution interfaces, Effect of light at semiconductor solution interface. Polarography theory, Ilkovic equation; half wave potential and its significance.

##### Suggested Books & References:

1. Physical Chemistry, P.W. Atkins, ELBS.
2. Introduction to Quantum Chemistry, A.K. Chandra, Tata Mc Graw Hill.
3. Quantum Chemistry, Ira N. Levine, Prentice Hall.
4. Coulson's Valence, R. Mc Weeny, ELBS.
5. Chemical Kinetics. K.J. Laidler, McGraw-Hill.
6. Kinetics and Mechanism of Chemical Transformation J. Rajaraman and J. Kuriacose, Mc Millan.
7. Micelles, Theoretical and Applied Aspects, V. Moraoi, Plenum.
8. Modern Electrochemistry Vol. I and Vol II J.O.M. Bockris and A.K.N. Reddy, Plenum.
9. Introduction to Polymer Science, V.R. Gowarikar, N.V. Vishwanathan and J. Sridhar, Wiley Eastern.

#### MCH 004A: Mathematics and Computers for Chemists

Course Objectives: This course has the following objectives:

CO1 To teach students the addition and multiplication; inverse, adjoint and transpose of matrices, special matrices and their properties. Homogeneous, non-homogeneous linear equations and conditions for the solution, linear dependence and independence. eigenvalues and eigenvectors, diagonalization, determinants.

CO2 To expose students to the Functions, continuity and differentiability, rules for differentiation, applications of differential calculus including maxima and minima, Integral calculus, basic rules for integration.

CO3 To expose students basics of First-order and first degree differential equations and their applications. Second order differential equation and their solutions.

CO4 To teach students 'Introduction to computers, Basic structure and functioning of computer with a PC as illustrative example. Memory I/O devices. Secondary storage Computer languages. Operating systems.

CO5 To teach students Computer Programming in C, History of "C", operators and expression, input & output operation, decision making and branching looping, arrays, function, structures and unions.

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## Unit-I

### Matrix Algebra.

Addition and multiplication; inverse, adjoint and transpose of matrices, special matrices (Symmetric, skew-symmetric, Hermitian, Skey-Harmitian, unit, diagonal, unitary etc.) and their properties. Matrix equations: Homogeneous, non-homogeneous linear equations and conditions for the solution, linear dependence and independence. Introduction to vector spaces, matrix eigenvalues and digenvetors, diagonalization, determinants (examples from Juckel theory).

## Unit-II

### Differential Calculus

Functions, continuity and differentiability, rules for differentiation, applications of differential calculus including maxima and minima (examples related to maximally populated rotational energy levels, Bohr's radius and most probable velocity from Maxwell's distribution etc.).

Integral calculus, basic rules for integration, integration by parts, partial fractions and substitution. Reduction formulae, applications of integral calculus.

Functions of several variables, partial differentiation, co-ordinate transformations (e.g. cartesian to spherical polar).

## Unit-III

### Elementary Differential equations

First-order and first degree differential equations, homogenous, exact and linear equations. Applications to chemical kinetics, secular equilibria, quantum chemistry etc. second order differential equation and their solutions.

## Unit-IV

### Introduction to computers

Basic structure and functioning of computer with a PC as illustrative example. Memory I/O devices. Secondary storage Computer languages. Operating systems Introduction to UNIX and WINDOWS. Principles of programming Alogrithms and flow-charts.

## Unit-V

### Computer Programming in C

History of "C" constants, variables and data types, operators and expression, input & output operation, decision making and branching looping, arrays, function, structures and unions, Program with data preferably from physical chemistry Laboratory. Introduction of working of LOTUS/EXCEL/FOXPRO/MOPAC and word processing softwares.

### Suggested Books & References:

1. The chemistry Mathematics Book, E.Steiner, Oxford University Press.
2. Mathematifs for chemistry, Doggett and Suiclific, Logman.
3. Mathematical for Physical chemistry : F. Daniels, Mc. Graw Hill.
4. Chemical Mathematics D.M. Hirst, Longman.
5. Applied Mathematics for Physical Chemistery, J.R. Barante, Prenice Hall.
6. Basic Matchematics for Chemists, Tebbutt, Wiley
7. Fundamentals of Computer : V. Rajaraman (Prentice Hall)
8. Computers in Chemistry : K.V. Raman (Tata Mc Graw Hill)
9. Computer Programming in FORTRAN IV-V Rajaraman (Prentice Hall)

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## Inorganic Chemistry

1. To identify acidic radicals of dilute  $\text{H}_2\text{SO}_4$  group.
2. To identify acidic radicals of concentrated  $\text{H}_2\text{SO}_4$  group.
3. To identify acidic radicals not identify with dilute or concentrated  $\text{H}_2\text{SO}_4$  group.
4. To analyze basic radicals of group I and II.
5. To analyze basic radicals of group III and IV.
6. To analyze basic radicals of group V, VI and VII.
7. To analyze less common metal ions : Ti, MO, W, Ti, Zr, Th, V, U
8. Analysis of the mixture number 1 containing four acidic and four basic radicals.
9. Analysis of the mixture number 2 containing four acidic and four basic radicals.
10. Analysis of the mixture number 3 containing four acidic and four basic radicals.
11. Analysis of the mixture number 4 containing four acidic and four basic radicals.
12. Qualitative Analysis: Separation and determination of two metal ions Cu-Ni involving volumetric and gravimetric methods.
13. Qualitative Analysis: Separation and determination of two metal ions Ni-Zn involving volumetric and gravimetric methods.
14. Qualitative Analysis: Separation and determination of two metal ions Cu-Fe etc. involving volumetric and gravimetric methods.

### Organic Chemistry

1. To separate and identify the organic mixture containing two solid components using water and prepare their suitable derivatives.
2. To separate and identify the organic mixture containing two solid components using hot water and prepare their suitable derivatives.
3. To separate and identify the organic mixture containing two solid components using NaOH and prepare their suitable derivatives.
4. To separate and identify the organic mixture containing two solid components using  $\text{NaHCO}_3$  and prepare their suitable derivatives.
5. To separate and identify the organic mixture number 1 containing one solid and one liquid components and prepare their suitable derivatives.
6. To separate the mixture of Methyl Orange and Methylene Blue by using cyclohexane and ethyl acetate (8.5:1.5) as solvent system.
7. Preparation and separation of 2,4-dinitro Phenylhydrazone of acetone, 2-butanone using toluene and petroleum ether (40:60).
8. Preparation and separation of 2,4-dinitro Phenylhydrazone of hexane-2-one and hexane-3-one using toluene and petroleum ether (40:60).
9. To separate the mixture of phenylalanine and glycine. Alanine and aspartic acid. Leucine and glutamic acid. Spray reagent - Ninhydrin.
10. To separate the mixture of D,L-alanine, glycine and L-leucine using n-butanol : acetic acid : water (4:1:5). Spray reagent - Ninhydrin.
11. To separate monosaccharides - a mixture of D-galactose and D-fructose using n-butanol : acetone : water (4:1:5). Spray reagent - aniline hydrogen phthalate.
12. Determination of DO, COD and BOD of water sample.

12. Determination of DO, COD and BOD of water sample.

## Physical Chemistry

1. Calibration of volumetric apparatus, burette, pipette and standard flask.
2. To investigate the adsorption of oxalic acid from aqueous solution by activated charcoal, and examine the validity of Freundlich and Langmuir adsorption isotherm.
3. To investigate the adsorption of acetic acid from aqueous solution by activated charcoal, and examine the validity of Freundlich and Langmuir adsorption isotherm.
4. Determination of congruent composition and temperature of a binary system (e.g. diphenylamine-benzophenone system).
5. Determination of glass transition temperature of given salt (e.g.,  $\text{CaCl}_2$ ) conductometrically.
6. To construct the phase diagram for three component system (e.g. chloroform-acetic acid-water).
7. To construct the phase diagram for three component system (e.g. alcohol-benzene-water).
8. To determine CST of phenol and water in presence of 1.0% NaCl, 0.5% naphthalene, 1% succinic acid.
9. Determination of the velocity constant, order of the reaction and energy of activation for saponification of ethyl acetate by sodium hydroxide conductometrically.
10. Determination of solubility and solubility product of sparingly soluble salts e.g.  $\text{PbSO}_4$ ,  $\text{BaSO}_4$ ) conductometrically.
11. Determination of the strength of strong and weak acid in a given mixture conductometrically.
12. To study of the effect of solvent on the conductance of  $\text{AgNO}_3$ /acetic acid and to determine the degree of dissociation and equilibrium constant in different solvents and in their mixtures (DMSO, DMF, dioxane, acetone, water) and to test the validity of Debye-Huckel-Onsager theory.
13. Determination of the activity coefficient of zinc ions in the solution of 0.002 M zinc sulphate using Debye Huckel's limiting law.

### **Books Suggested**

1. Vogel's Textbook of Quantitative Analysis, revised, J. Bassett, R.C. Denney, G.H. Jeffery and J. Mendham, ELBS.
2. Synthesis and Characterization of Inorganic Compounds, W.L. Jolly. Prentice Hall.
3. Experiments and Techniques in Organic Chemistry, D.P. Pasto, C. Johnson and M. Miller, Prentice Hall.
4. Macroscale and Microscale Organic Experiments, K.L. Williamson, D.C. Heath.
5. Systematic Qualitative Organic Analysis, H. Middleton, Adward Arnold.
6. Handbook of Organic Analysis-qualitative and Quantitative. H. Clark, Adward Arnold.
7. Vogel's Textbook of Practical Organic Chemistry, A.R. Tatchell, John Wiley.
8. Practical Physical Chemistry, A.M. James and F.E. Prichard, Longman.
9. Findley's Practical Physical chemistry, B.P. Levitt, Longman.
10. Experimental Physical Chemistry, R.C. Das and B. Behera, Tata McGraw Hill.

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## SEMESTER II

### MCH 006A: Chemistry of Transition Metals

**Course Outcome:** After the completion of the course, student will be able to understand:

CO1: metal-ligand bonding through different theories and metal-ligand equilibria in solution and their relative stability.

CO2 electronic spectra and calculation of different parameters.

CO3 energy profile and reaction mechanism of transition metal complexes and different types of reactions like substitution, redox etc. and related theories.

CO4 Symmetry, symmetry elements, orthogonality theorem and group theory of molecules.

CO5 to apply the knowledge of group theory on different molecules and systems..

#### Unit-I

##### Metal ligand Equilibria in solution

Stepwise and overall formation constants and their interaction, trends in stepwise constants.

Factors affecting stability of metal complexes with reference to the nature of metal ion and ligand chelate effect and its thermodynamic origin. Determination of binary formation constant by pHmetry and spectrophotometry.

#### Unit-II

##### Electronic spectra of transition metal complexes

Types of electronic transition, selection rules for d-d transitions. Spectroscopic ground states, correlation. Orgel and Tanabe-Sugano diagrams for transition metal complexes. Calculation of Racah parameters. Charge transfer spectra.

#### Unit-III

##### Reaction mechanism of transition metal complexes

Energy profile of a reaction, reactivity of metal complex, inert and labile complexes, kinetics of octahedral substitution, acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis, conjugate base mechanism, direct and indirect evidences in favour of conjugate mechanism, anation reactions, reactions without metal ligand bond cleavage.

**Substitution reactions** in square planar complexes, the trans effect, mechanism of the substitution reaction. Redox reaction, electron transfer reactions, mechanism of one electron transfer reactions, outer sphere type reactions, cross reactions and Marcus-Hush theory, inner sphere type reactions.

#### Unit-IV

##### Symmetry and Group Theory

Symmetry elements and symmetry operations, definition of group and subgroup, conjugacy relation and classes, product of symmetry operations, relation between symmetry elements and symmetry operations, orders of a finite group and its subgroup, point group symmetry, Schoenflies symbols, representations of groups by reducible and irreducible representations and relation between them (representation for the  $C_n$ ,  $C_{nv}$ ,  $D_{nh}$  etc. groups to be worked out explicitly), character of a representation, the great orthogonality theorem (without proof) and its importance, character tables of  $C_{2v}$  and  $C_{3v}$  and their use.

#### UNIT V

##### Applications of Group Theory in Chemistry

Formation of hybrid orbitals; sigma bonding in linear structure ( $\text{BeCl}_2$ ), trigonal planar ( $\text{BF}_3$ ), tetrahedral ( $\text{CH}_4$ ), square pyramid ( $\text{BrF}_5$ ) and square planar ( $\text{XeF}_4$ ), octahedral and square planar complexes,  $\pi$  bonding in complex compounds: square planar molecule and tetrahedral molecule. Molecules with delocalized- $\pi$  orbitals, cyclopropenyl system, cyclobutenyl system, cyclopentadienyl system and benzene.

#### Suggested Books & References:

1. Advanced Inorganic Chemistry, Cotton F.A., Wilkinson G., Murillo C.A. Bochmann M., John Wiley
2. Inorganic Chemistry, Huheey J.E., Harper & Row.
3. Chemistry of the Elements. Greenwood N.N. and Earnshaw A., Pergamon.
4. Inorganic Electronic Spectroscopy, Lever A.B.P., Elsevier.
5. Magnetochemistry, Carlin R.I., Springer Verlag.
6. Inorganic Chemistry, Wilksberg G, University Science Books.
7. Chemical Bonding by Patel & Patel, Vallabh Vidyanagar
8. Chemical Applications of Group Theory by F. Albert Cotton, Wiley.
9. Symmetry and Structure: Readable Group Theory for Chemists By Sidney F. A. Kettle, Wiley
10. Molecular symmetry and group theory by Robert L. Carter, Wiley
11. Introduction to the Chemical Applications of Group Theory by L E Laverman
12. Group Theory Applied to Chemistry (Theoretical Chemistry and Computational by Arnout Jozef Ceulemans
13. Group Theory and its Chemical Applications by Bhattacharya P.K., Himalaya Publishing House

#### MCH 007A: Reaction mechanism: Addition, Elimination and Pericyclic Reactions

**Course Outcome:** After the completion of the course, student will be able to understand:

CO-1: different aromatic nucleophilic substitution and free radical reactions. CO-2 aliphatic and aromatic electrophilic substitution reactions. CO-3 mechanistic and stereochemical aspects of addition to C-C multiple bonds. CO-4 mechanism of C-hetero multiple bonds and elimination reactions. CO-5 symmetry, types and rearrangement of pericyclic reactions.

#### Unit - I

##### Aromatic Nucleophilic Substitution

The  $\text{S}_{\text{N}}\text{Ar}$   $\text{S}_{\text{N}}1$ , benzyne and  $\text{S}_{\text{N}}1$  mechanism, Reactivity effect of substrate structure, leaving group and attacking nucleophile. The Von Richter, Sommelet-Hauser, and Smiles rearrangements.

##### Free Radical Reactions

Types of free radical reactions, free radical substitution mechanism, mechanism at an aromatic substrate, neighbouring group assistance. Reactivity for aliphatic and aromatic substrates at a bridgehead. Reactivity in the attacking radicals. The effect of solvents on reactivity. Allylic halogenation (NBS), oxidation of aldehydes to carboxylic acids, auto-oxidation, coupling of alkynes and arylation of aromatic compounds by diazonium salts, Sandmeyer reaction. Free radical rearrangement. Hunsdiecker reaction

#### Unit - II

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### Aliphatic Electrophilic Substitution

Bimolecular mechanisms  $SE_2$  and  $SE_1$ , The  $SE_1$  mechanism, electrophilic substitution accompanied by double bond shifts. Effect of substrates, leaving groups and the solvent polarity on the reactivity.

### Aromatic Electrophilic Substitution

The arenium ion mechanism, orientation and reactivity, energy profile diagrams. The ortho/para ratio, ipso attack, orientation in other ring systems. Quantitative treatment of reactivity in substrates and electrophiles. Diazonium coupling, Vilsmeier reaction, Gatterman-Koch reaction

### Unit - III

#### Addition to Carbon-Carbon Multiple Bonds :

Mechanistic and stereochemical aspects of addition reactions involving electrophiles, nucleophiles and free radicals, regio- and chemoselectivity, orientation and reactivity. Addition to cyclopropane ring. Hydrogenation of double and triple bonds, hydrogenation of aromatic rings. Hydroboration, Michael reaction, Sharpless asymmetric epoxidation.

### Unit-IV

#### Addition to Carbon-Hetero Multiple bonds

Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds, acid esters and nitriles. Addition of Grignard reagents, Organozinc and Organolithium reagents to carbonyl and unsaturated carbonyl compounds. Wittig reaction. Mechanism of condensation reactions involving enolates-Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides, ammonolysis of esters.

#### Elimination Reactions

The  $E_2$ ,  $E_1$  and  $E_1cB$  mechanisms and their spectrum. Orientation of the double bond. Reactivity-effects of substrate structures, attacking base, the leaving group and the medium. Mechanism and orientation in pyrolytic elimination.

### Unit-V

#### Pericyclic Reactions

Molecular orbital symmetry, Frontier orbitals of ethylene, 1,3-butadiene, 1,3,5-hexatriene and allyl system. Classification of pericyclic reactions. Woodward-Hoffmann correlation diagrams. FMO and PMO approach. Electrocyclic reactions-conrotatory and disrotatory motions,  $4n$ ,  $4n+2$  and allyl systems. Cycloadditions-antarafacial and suprafacial additions,  $4n$  and  $4n+2$  systems,  $2+2$  addition of ketenes, 1,3 dipolar cycloadditions and cheletropic reactions. Sigmatropic rearrangements-suprafacial and antarafacial shifts of H, sigmatropic involving carbon moieties, 3,3- and 5,5 sigmatropic rearrangements. Claisen, Cope and aza-Cope rearrangements. Fluxional tautomerism. Ene reaction.

#### Suggested Books & References:

1. Advanced Organic Chemistry-Reactions, Mechanism and Structure, Jerry March, John Wiley.
2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Plenum.
3. A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
4. Structure and Mechanism in Organic Chemistry, C.K. Ingold, Cornell University Press.
5. Organic Chemistry, R.T. Morrison and R.N. Boyd, Prentice-Hall.
6. Modern Organic Reactions, H.O. House, Benjamin.
7. Principles of Organic Synthesis, R.O.C. Norman and J.M. Coxon, Blackie Academic & Professional.
8. Reaction Mechanism in Organic Chemistry, S.M. Mukherji and S.P. Singh, Macmillan.

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9. Pericyclic Reactions, S.M. Mukherji, Macmillan, India  
10. Stereochemistry of Organic Compounds, D.Nasipuri, New Age International.  
Stereochemistry of Organic Compounds, P.S. Kalsi, New Age International.

### **MCH 008A: Thermodynamics and Chemical Kinetics**

**Course outcomes:** After the completion of the course, student will be able to understand the:

CO-1: concepts of classical thermodynamics.

CO-2 criteria for statistical and non equilibrium thermodynamics.

CO-3 translation, rotational, vibrational and electronic partition functions and molar quantities.

CO-4 rate laws, collision theory of reaction rates, Arrhenius equation and the activated complex theory.

CO-5 kinetics of enzyme catalyzed reactions, fast and unimolecular reactions.

#### **Unit I**

##### **Classical Thermodynamics**

Concepts of laws of thermodynamics, free energy, chemical potential and entropies. Partial molar free energy, partial molar volume and partial molar heat content and their significance. Determinations of these quantities. Concept of fugacity and determination of fugacity, activity, activity coefficient, determination of activity and activity coefficients.

#### **Unit II**

##### **Statistical Thermodynamics and Non equilibrium thermodynamics**

Concept of distribution, thermodynamic probability and most probable distribution. Ensemble averaging, postulates of ensemble averaging. Canonical, grand canonical and microcanonical ensembles, corresponding, distribution laws (using Lagrange's method of undetermined multipliers). Thermodynamic criteria for non equilibrium states, entropy production and entropy flow, transformation of generalized fluxes and forces, non equilibrium stationary states, phenomenological equations, Onsager's reciprocity relations.

#### **Unit III**

##### **Partition Functions**

Partition functions-translation, rotational, vibrational and electronic partition functions, Fermi-Dirac Statistics, Maxwell distribution law and applications to metal. Bose-Einstein statistics distribution Law and application to helium, Partition molar quantities in term of thermodynamic functions.

#### **Unit IV**

##### **Chemical Dynamics-I**

Methods of determining rate laws, collision theory of reaction rates, steric factor, activated complex theory, Arrhenius equation and the activated complex theory; ionic reactions, kinetic salt effects, steady state kinetics, kinetic and thermodynamic control of reactions, Dynamic chain reaction (hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane), photochemical reaction (hydrogen-bromine and hydrogen-chlorine reactions), Oscillatory reactions: Belousov-Zhabotinsky reaction.

#### **Unit V**

##### **Chemical Dynamics-II**

Kinetics of enzyme catalyzed reactions, general features for fast reactions, study of fast reactions by flow method, relaxation method, flash photolysis and the nuclear magnetic resonance method,

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dynamics of unimolecular reactions (Lindemann Hinshelwood, Rice-Ramsperger and Kassel theories and Marcus (RRKM) theories for unimolecular reactions).

#### **Suggested Books & References:**

1. Physical Chemistry, P.W. Atkins, ELBS.
2. Introduction to Quantum Chemistry, A.K. Chandra, Tata Mc Graw Hill.
3. Quantum Chemistry, Ira N. Levine, Prentice Hall.
4. Coulson's Valence, R. Mc Ween y, ELBS.
5. Chemical Kinetics, K.J. Laidler, McGraw-Hill.
6. Kinetics and Mechanism of Chemical Transformation J.Rajaraman and J. Kuriacose, Mc Millan.
7. Micelles, Theoretical and Applied Aspects, V. MORAoi, Plenum.
8. Modern Electrochemistry Vol. I and Vol II J.O.M. Bockris and A.K.N. Reddy, Plenum.
9. Introduction to Polymer Science, V.R. Gowarikar, N.V. Vishwanathan and J. Sridhar, Wiley Eastern.

#### **MCII 009A: Spectroscopic Techniques**

**Course Outcomes:** After the completion of the course, student will be able to-

CO1 Understand the common terms and principles in spectroscopy. Principles of UV spectroscopy, its applications in structure determination and working method of Instrument. CO2 Understand the Principles IR spectroscopy and Raman spectroscopy, their applications in structure determination and working method of Instrument. CO3 Understand the principles of Rotational spectroscopy, ESR spectroscopy, their applications in structure determination and working method of Instrument. CO4 Understand the basic principle Principles of NMR Spectroscopy, instrumentation and applications. Student will also learn about the use of NMR technique in medical sciences. CO5 Understand the basic principles of Photoelectron spectroscopy, Electron microscopy and their applications in structure determination and working method of Instrument. Student will also learn about chromatographic techniques.

##### **Unit-I**

##### **Basic Elements of Spectroscopy**

Uncertainty relation and natural line width, natural line broadening, doppler line broadening, pressure broadening, saturation broadening, removal of line broadening. signal-to-noise ratio, resolving power, intensity of spectral lines – transition probability, population of states, path length of sample. General components of an absorption experiment in various regions, dispersing elements, basic elements of practical spectroscopy, Born-Oppenheimer approximation: derivations, Fourier Transform methods (IR and NMR)

##### **Ultraviolet and Visible spectroscopy**

Various electronic transitions (185-800 nm) Beer-Lambert law, effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes, Fiesher -Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic compounds. Steric effect in biphenyls.

##### **Unit-II**

##### **Infrared Spectroscopy**

Instrumentation and Sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ether's, phenols and amines, and carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl

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compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance.

### Raman Spectroscopy

Principle, Stokes-Antistokes lines, Raman effect, applications, Coherent Antistokes Raman Spectroscopy CARS (an elementary idea), Raman spectroscopy particularly for the study of active sites of metalloproteins

### Unit-III

**Rotational Spectroscopy.** Classification of molecules, linear triatomic molecule, intensities, energy levels and rotational spectra of symmetric top molecules, Stark effect, nuclear and electron spin interaction, effect of external field, applications.

### Electron Spin Resonance Spectroscopy

Some basic elements of ESR spectroscopy, relaxation processes: spin-lattice relaxation, spin-spin relaxation and exchange interaction. Zero field splitting and Kramer's degeneracy, 'g' value and factors affecting ESR lines.

### Unit-IV

**Nuclear Magnetic Resonance Spectroscopy** General introduction and definition, chemical shift, spin-spin interaction, shielding mechanism of measurement, chemical shift values and correlation for protons bonded to carbon and other nuclei, chemical exchange, effect of deuteration, complex spin-spin interaction between two, three, four and five nuclei (first order spectra). NMR shift reagents, solvent effects, Nuclear Overhauser effect (NOE). Introduction of Mass Spectrometry, NQR Spectroscopy, Introduction of Mössbauer spectroscopy.

### Unit-V

#### Photoelectron Spectroscopy

Basic principle, ionization process, Koopman's theorem, photoelectron spectra of simple molecules, ESCA and its applications, Auger electron spectroscopy (basic idea), spectra of transition metal complexes, charge transfer spectra.

#### Electron Microscopy

Basic principles of Electron Microscopy: SEM, TEM and their applications in structural analysis

#### Suggested Books & References:

1. Physical Methods for Chemistry, R.S. Drago, Saunders Compnay.
2. Structural Methods in Inorganic Chemistry, E.A.V. Ebsworth, D.W.H. Rankin and S. Craddock, ELBS.
3. Infrared and Raman Spectral : Inorganic and Coordination Compounds K. Nakamoto, Wiley.
4. Progress in Inorganic Chemistry vol., 8, ed., F.A. Cotton, vol., 15 ed. S.J. Lippard, Wiley.
5. Transition Metal Chemistry ed. R.L. Carlin vol. 3 dekker.
6. Inorganic Electronic Spectroscopy, A.P.B. Lever, Elsevier.
7. NMR, NQR, EPR and Mossbauer Spectroscopy in Inorganic Chemistry, .V. Parish, Ellis Haywood.
8. Practical NMR Spectroscopy, M.L. Martin. J.J. Deepish and G.J. Martin, Heyden.
9. Spectrometric Identification of Organic Compounds, R.M. Silverstein, G.C. Bassler and T.C. Morrill, John Wiley.
10. Introduction to NMR spectroscopy, R.J. Abraham, J. Fisher and P. Loftus, Wiley.
11. Application of Spectroscopy of Organic Compounds, J.R. Dyer Prentice Hall.
12. Spectroscopic Methods in Organic Chemistry D.H. Williams, I. Fleming, Tata McGraw-Hill.

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## INORGANIC CHEMISTRY

### A. Chromatography Separation of cations and anions by

1. Paper Chromatography.
2. Chromatography : Ion exchange.

### B. Chromatographic Separations

3. Cadmium and zinc
4. Zinc and magnesium.
5. Thin-layer chromatography-separation of nickel, manganese, cobalt and zinc.  
Determination of Rf values.
6. Separation and identification of the sugars present in the given mixture of glucose, fructose and sucrose by paper chromatography and determination of Rf values.

### C. Preparations(Any 6x)

Preparation of selected inorganic compounds and their studies by I.R. electronic spectra, Mossbauer, U.V.R. and magnetic susceptibility measurements. Handling of air and moisture sensitive compounds.

1. VO(acac)<sub>2</sub>
2. TiO (C<sub>9</sub>H<sub>8</sub>NO)<sub>2</sub>H<sub>2</sub>O
3. cis-K<sub>2</sub>[Cr(C<sub>2</sub>O<sub>4</sub>)<sub>2</sub>(H<sub>2</sub>O)<sub>2</sub>]
4. Na[Cr(NH<sub>3</sub>)<sub>2</sub>(SCN)<sub>4</sub>]
5. Ni(acac)<sub>2</sub>
6. K<sub>3</sub>[Fe(C<sub>2</sub>O<sub>4</sub>)<sub>3</sub>]
7. Prussian Blue, Turnbull's Blue.
8. [Co(NH<sub>3</sub>)<sub>6</sub>] [Co(NO<sub>2</sub>)<sub>6</sub>]
9. cis-[Co(Trien) (NO<sub>2</sub>)<sub>2</sub>] Cl.H<sub>2</sub>O
10. Hg[Co(SCN)<sub>4</sub>]
11. [Co(Py)<sub>2</sub>Cl<sub>2</sub>]
12. [Ni(NH<sub>3</sub>)<sub>6</sub>]Cl<sub>2</sub>
13. Ni(dmg)<sub>2</sub>
14. [Cu(NH<sub>3</sub>)<sub>4</sub>]SO<sub>4</sub>H<sub>2</sub>O

## ORGANIC CHEMISTRY

### Organic Synthesis

1. Acetylation : Acetylation of cholesterol and separation of cholesteryl acetate by column chromatography.
2. Oxidation : Adipic acid by chromic acid oxidation of cyclohexanol
3. Grignard reaction : Synthesis of triphenylmethanol from benzoic acid
4. Aldol condensation : Dibenzal acetone from benzaldehyde.
5. Sandmeyer reaction : p-Chlorotoluene from p-toluidine.
6. Acetoacetic ester Condensation : Synthesis of ethyl-n-butylacetoacetate by A.E.E. condensation.
7. Cannizzaro reaction : 4-Chlorobenzaldehyde as substrate.
8. Friedel Crafts reaction : n-Benzoyl propionic acid from succinic anhydride and benzene.
9. Aromatic electrophilic substitutions : Synthesis of p-nitroaniline and p-bromoaniline.
10. Estimation of amines/phenols using bromate bromide solution/or acetylation method.

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11. Determination of the percentage or number of hydroxyl groups in an organic compound by acetylation method
12. Determination of Iodine and Saponification values of an oil sample.

### PHYSICAL CHEMISTRY

1. Determination of the effect of (a) Change of temperature (b) Change of concentration of reactant and catalyst and (c) Ionic strength of the media on the velocity constant of hydrolysis of an ester/ionic reaction.
2. Determination of the velocity constant of hydrolysis of an ester/ionic reaction in miscellar media.
3. Determination of the velocity constant for the oxidation of iodide ions by hydrogen peroxide study the kinetics as an iodine clock reactions.
4. Flowing clock reactions (Ref: Experiments in Physical Chemistry by Sherrinford)
5. Determination of the primary salt effect on the kinetics of ionic reaction and testing of the Bronsted relationship (iodide ion is oxidised by persulphate ion).
6. To determine the relative strength of the acids by studying the hydrolysis of an ester (at room and at any higher temperature)
7. Determine the energy of activation for the hydrolysis of an ester.
8. Determination of molecular weight of non-volatile and electrolyte/electrolytes by cryoscopic method and to determine the activity coefficient of an electrolyte.
9. Determination of the degree of dissociation of weak electrolyte and to study the deviation from ideal behaviour that occurs with a strong electrolyte.
10. Determination of strengths of halides in a mixture potentiometrically.
11. Determination of the strength of strong and weak acids in a given mixture using a potentiometer/pH meter.
12. Determination of temperature dependence of EMF of a cell.
13. Determination of the formation constant of silver-ammonia complex and stoichiometry of the complex potentiometrically.
14. Determination of rate constant for hydrolysis/inversion of sugar using a polarimeter.

### Books Suggested

1. Vogel's Textbook of Quantitative Analysis, revised, J. Bassett, R.C. Denney, G.M. Jeffery and J. Mendham, ELBS.
2. Synthesis and Characterization of Inorganic Compounds, W.L. Jolly, Prentice Hall.
3. Experiments and Techniques in Organic Chemistry, D.P. Pasto, C. Johnson and M. Miller, Prentice Hall.
4. Macroscale and Microscale Organic Experiments, K.L. Williamson, D.C. Heath.
5. Systematic Qualitative Organic Analysis, H. Middleton, Edward Arnold.
6. Handbook of Organic Analysis-qualitative and Quantitative, H. Clark, Edward Arnold.
7. Vogel's Textbook of Practical Organic Chemistry, A.R. Tatchell, John Wiley.
8. Practical Physical Chemistry, A.M. James and F.E. Prichard, Longman.
9. Findley's Practical Physical chemistry, B.P. Levitt, Longman.
10. Experimental Physical Chemistry, R.C. Das and B. Behera, Tata McGraw Hill.



## Semester III

### MCH 011A: Green Chemistry

**Course Outcomes:** After the completion of the course, student will be able to-

- CO1 Understand the twelve principles of green chemistry with their explanations and examples.
- CO2 Understand the Prevention of waste /byproducts, Prevention/Minimization of hazardous/toxic products.& designing safer chemicals - different basic approaches, Designing biodegradable products.
- CO3 Understand the Introduction of microwave induced organic and inorganic synthesis; microwave activation equipment ;time and energy benefits;limitations;
- CO4 Understand the use Ionic liquids as green solvents, Electrochemical synthesis.
- CO5 Understand Oxidation-reduction reagents and catalysts; multifunctional reagents; Combinatorial green chemistry, solventless reactions, Noncovalent derivatization.Biomass conversion, emission control. Biocatalysis.

#### Unit-I

##### INTRODUCTION ,PRINCIPLE AND CONCEPTS OF GREEN CHEMISTRY:

What is green chemistry?Need for green chemistry;inception and evolution of green chemistry;twelve principles of green chemistry with their explanations and examples; designing a green synthesis using these principles ;green chemistry in day to day life.

#### Unit II

**Basic principles of Green Chemistry and their illustrations with examples.**

- (i) Prevention of waste/byproducts.
- (ii) Maximum Incorporation of the materials used in the process into the final product (Atom Economy): Green metrics
- (iii) Prevention/Minimization of hazardous/toxic products.
- (iv) Designing safer chemicals - different basic approaches
- (v) Selection of appropriate auxiliary substances (solvents, separation agents etc)
- (vi) Energy requirements for reactions—use of microwave, ultrasonic energy
- (vii) Selection of starting materials—use of renewable starting materials.
- (viii) Avoidance of unnecessary derivatization—careful use of blocking/protection groups.
- (ix) Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents.
- (x) Designing biodegradable products.
- (xi) Prevention of chemical accidents.
- (xii) Strengthening/development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes. Development of accurate and reliable sensors and monitors for real time in process monitoring.

#### Unit-III

**Application of non conventional energy sources :Microwave induced and ultrasound assisted green synthesis.**

Introduction of microwave induced organic and inorganic synthesis; microwave activation – equipment ;time and energy benefits;limitations;

- (a) Synthesis of nitrogen-oxygen /sulphur donor ligands and their coordination complexes ;synthetic organic transformations under microwaves.
- (b) Reactions in organic solvents –esterifications ;Fries rearrangement;Diels alder reaction and decarboxylation.

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(a) Solvent free reactions (solid state reactions); decylylation; deprotection; saponification of ester; alkylation of reactive methylene compounds; synthesis of nitriles from aldehydes; heterocyclic synthesis -  $\beta$ -lactams, pyrrole, quinoline, Ultrasound assisted green synthesis; introduction; instrumentation; physical aspects; oxidation; reduction; addition, substitution reactions and synthesis of chromenes.

#### Unit-IV

**Environmentally benign solutions to organic solvents (focus on water and ionic liquids).**

(a) Ionic liquids as green solvents - Introduction; properties and types of ionic liquids; synthetic applications - Diels-Alder reaction; epoxidation; Heck reaction; preparation of pharmaceutical compounds; enzyme catalysed synthesis.

(b) Aqueous phase reactions - Introduction; Pseudo organic solvent

(1) Application in oxidation of nitro; aromatic and carbonyl compounds; reduction of carbon-carbon multiple bond, Benzoin condensation; Michael reaction; Claisen rearrangement; Knoevenagel reaction.

(2) Electrochemical synthesis - Introduction, synthesis of sebacic acid, adiponitrile  
Introduction on role of fluorine solvents and supercritical carbon dioxide in green chemistry.

#### Unit-V

**Hazard assessment and mitigation in chemical industry**

**Future trends in Green Chemistry:** Oxidation-reduction reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solventless reactions; Noncovalent derivatization. Biomass conversion, emission control. Biocatalysis

#### Suggested Books References:

1. Organic synthesis in water, Paul A. Grieco Blackie.
2. Green Chemistry, theory and practice, Paul T. Anastas and John C. Warner.
3. New Trends in Green Chemistry, V.K. Ahluwalia and M. Kidwai.
4. Green Chemistry For Sustainability, Sanjay K. Sharma and A. Mudhoo, CRC Taylor & Francis, USA
5. Organic synthesis: Special techniques, V.K. Ahluwalia and Renu Aggarwal.
6. A Handbook of Applied Biopolymer Technology, Sanjay K. Sharma and A. Mudhoo, RSC Publishing, UK
7. Lancaster, M. Green chemistry; An Introductory Text; the Royal Society of Chemistry: Cambridge, UK, 2002.
8. Green Corrosion Chemistry & Engineering, Sanjay K. Sharma, Wiley Publications, UK
9. Chem, Rev. 2007, 107, 2167-2820 (special issue on green chemistry).

**Specialization: Inorganic Chemistry**



## MCH 012A: Inorganic Elective 1: PHOTOINORGANIC CHEMISTRY AND X-RAY DIFFRACTION

**Course outcome:** After the completion of the course, student will be able to-

- CO1 understand basics of photochemistry including various excitations and energy dissipation.
- CO2 articulate the photochemical kinetics for radiative processes and deactivation of molecules by quenching.
- CO3 understand the different photochemical reactions viz. reduction, oxidation, substitution at ground and excited level.
- CO4 understand the mechanisms of electron relay, water photolysis, nitrogen fixation and CO<sub>2</sub> reduction.
- CO5 understand the applications of XRD, methods of structural analysis of crystal, diffraction pattern etc.

### Unit-I

#### Basics of Photochemistry

Absorption, excitation, photochemical laws, quantum yield, electronically excited states-life times-measurements of the times. Flash photolysis, Energy dissipation by radiative and non-radiative processes, absorption spectra, Frank-Condon principle, photochemical stages-primary and secondary processes.

### Unit-II

#### Properties of Excited States

Structure, dipole moment, acid-base strengths, reactivity. Photochemical kinetics-calculation of rates of radiative processes, bimolecular deactivation-quenching.

#### Excited States of Metal Complexes

Excited states of metal complexes; Comparison with organic compounds, electronically excited states of metal complexes, charge transfer spectra.

### Unit-III

#### Ligand Field Photochemistry

Photosubstitution, photooxidation and photoreduction, lability and selectivity, zero vibrational levels of ground state and excited state.

### Unit-IV

#### Metal Complex Sensitizers

Metal complex sensitizer, electron relay, metal colloid systems, water photolysis, nitrogen fixation and carbon dioxide reduction.

### Unit-V

#### X-RAY DIFFRACTION

Bragg condition, Miller indices, Laue Method, Bragg method, Debye Scherrer method of X-ray structural analysis of crystals, index reflections, identification of unit cells from systematic absences in diffraction pattern, Structure of simple lattices and X-ray intensities, structure factor and its relation to intensity and electron density, phase problem. Description of the procedure for an X-ray structure analysis, absolute configuration of molecules.

#### Suggested Books References:

1. Concepts of Inorganic Photochemistry, A.W. Adamson and P.D. Fleischauer, Wiley.
2. Inorganic Photochemistry, J.Chem. Educ. vol. 60 No. 10, 1983.
3. Progress in Inorganic Chemistry, Vol. 30ed. S.J. Lippard, Wiley.

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4. Coordination Chem. Revs. 1981, vol. 39, 121, 1231, 1975, 14, 321; 1990 97, 313.
5. Photochemistry of Coordination Compounds, V. Balzani and V. Carassiti, Academic Press.
6. Elements in Inorganic Photochemistry, G.J. Ferraudi, Wiley.

### **MCH 013A: Inorganic Elective II: BIOINORGANIC CHEMISTRY**

**Course outcome:** On completion of this course student will be able to-

CO-1 analyze the structure and function of metal ion containing biomolecules.

CO2 explain principle and mechanism of various cycles involved in energy production and structure and functions of DNA, RNA.

CO3 explain Haem proteins and oxygen uptake structure and function of haemoglobin's, myoglobin, haemocyanins and hemerythrin, model synthetic complexes of iron, cobalt and copper.

CO4 explain Metal deficiency and disease, toxic effects of metals, metals used for diagnosis and chemotherapy. Biological and Chemical nitrogen fixation.

CO5

#### **Unit-I**

##### **Metal Ions in Biological Systems**

Bulk and trace metals with special reference to Na, K, Mg, Ca, Fe, Cu, Zn, Co, and  $K^+/Na^+$  pump.

##### **Metal Storage and Transport**

Ferritin transferrin, and siderophores.

#### **Unit-II**

##### **Bioenergetics and ATP Cycle.**

DNA polymerisation, glucose storage, metal complexes in transmission of energy; chlorophyll's, photosystem I and photosystem II in cleavage of water.

##### **DNA and RNA**

Metal complexes of polynucleotide, nucleosides and nucleic acids (DNA and RNA)

Template temperature stability of DNA.

#### **Unit-III**

##### **Transport and Storage of Dioxygen**

Haem proteins and oxygen uptake structure and function of haemoglobin's, myoglobin, haemocyanins and hemerythrin, model synthetic complexes of iron, cobalt and copper.

#### **Unit-IV**

##### **Metals in Medicine**

Metal deficiency and disease, (Iron, Zinc, Copper) toxic effects of metals, metals used for diagnosis and chemotherapy with particular reference the anticancer drugs.

##### **Nitrogen fixation**

Nitrogen in biosphere, nitrogen cycle, nitrification role microorganism, nitrogen fixation in soils. Biological nitrogen fixation, and its mechanism, nitrogenase, Chemical nitrogen fixation

#### **Unit-V**

Origin of supramolecular chemistry - "Chemistry beyond the molecules". Concepts and terminology of supramolecular chemistry. Nature and types of supramolecular interactions



(Hydrogen bonding, van der Waal interactions,  $\pi$ -stacking, C-H... $\pi$  interactions etc.). Molecular recognition- Information and complementarity. Different types of receptors with special reference of Crown ethers, cryptates and Calix[4]arene. Molecular self-assembly formation and examples. Supramolecular chemistry of life, application of supramolecular chemistry in drug design. Application in material science-molecular machines.

#### Suggested Books References:

1. Principles of Bioinorganic Chemistry. S.J. Lippard and J.M. Berg University Science Books.
2. Bioinorganic Chemistry, I Bertini, H.B. Gray. S.J. Lippard and Jon Valentine, University Science Books.
3. Inorganic Biochemistry Vols I and II Ed.
4. Progress in Inorganic Chemistry Vols. 11 18 Ed J.J. Lippard Wiley.
5. Principles of Bioinorganic Chemistry, S.J. Lippard and J.M. Berg, University Science Books.
6. Bioinorganic Chemistry, I. Bertini, H.B. Gray, S.J. Lippard and J.S. Valentine, University Science Books.
7. Inorganic biochemistry vol. I and II ed. G.L. Eichhorn, Elsevier.
8. Progress in Inorganic Chemistry, Vol 18 and 38 ed J.J. Lippard, Wiley.
9. Supramolecular Chemistry: Concepts and Perspectives; First Edition; J.M. Lehn; VCH Publishers, 2014.
10. Supramolecular Chemistry; Second Edition; J. W. Steed, J. L. Atwood; Wiley, New York, 2009.

#### MCH014A :Inorganic Elective III: ORGANOTRANSITION METAL CHEMISTRY-I

**Course outcome:** After the completion of course students will be able to learn about the CO1- types, routes of synthesis, stability and decomposition pathways organo-copper in organic synthesis. CO2- Compounds of Transition Metal-Carbon Multiple Bonds alkylidenes, alkylidynes and their synthesis. CO-3 Compounds of low valent carbenes and carbynes-synthesis CO-4 Transition metal p-Complexes with unsaturated organic molecules, alkenes, alkynes, allyl complexes. CO-5 Transition metal p-Complexes with unsaturated organic molecules, diene, dienyl, arene and trienyl complexes,

#### Unit-I

##### Alkyls and Aryls of Transition Metals

Types, routes of synthesis, stability and decomposition pathways organocopper in organic synthesis.

#### Unit-II

##### Compounds of Transition Metal

Carbon Multiple Bonds alkylidenes, alkylidynes, synthesis, nature of bond, structural characteristics, nucleophilic and electrophilic reactions on the ligands, role in organic synthesis.

#### Unit-III

##### Compounds of low valent carbenes and carbynes

Synthesis, nature of bond, structural characteristics, nucleophilic and electrophilic reactions on the ligands, role in organic synthesis.

#### Unit-IV

##### Transition Metal $\pi$ -Complexes I

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Transition metal  $\pi$ -Complexes with unsaturated organic molecules, alkenes, alkynes, allyl, complexes, preparation, properties, nature of bonding and structural features. Important reactions relating to nucleophilic and electrophilic attack on ligands and to organic synthesis.

#### Unit-V

##### Transition Metal $\pi$ -Complexes II

Transition metal  $\pi$ -Complexes with unsaturated organic molecules, diene, dienyl, arene and trienyl complexes, preparation, properties, nature of bonding and structural features. Important reactions relating to nucleophilic and electrophilic attack on ligands and to organic synthesis

##### Suggested Books References:

1. Principles and Application of Organotransition Metal Chemistry, J.P. Collman, L.S. Hegsdus, J.R. Norton and R.G. Finke, University Science Books.
2. The Organometallic Chemistry of the Transition Metals, R.H. Crabtree. John Wiley.
3. Metallo-organic Chemistry, A.J. Pearson, Wiley.
4. Organometallic Chemistry, R.C. Mehrotra and A. Singh New Age International

#### MCH 015A: Spectrophotometric Analysis (Practical)

##### Preparation (Any Six)

Preparation of selected inorganic compounds and their study by IR, electronic spectra, Mossbauer, ESR and magnetic susceptibility measurements. Handling of air and moisture sensitive compounds involving vacuum lines. Selection can be made from the following :

1. Sodium amide.
2. Synthesis and thermal analysis of group II metal oxalate hydrate.
3. Atomic absorption analysis of Mg and Ca.
4. Preparation of Tin (IV) iodide, Tin (IV) chloride and Tin (II) iodide.
5. Preparation of ammonium hexachlorostannate  $(\text{NH}_4)_2 \text{SnCl}_6$  ammonium hexachlorophosphate  $(\text{NH}_4)_2 \text{PbCl}_6$ .
6. Hexa-bis (4,nitrophenoxy) cyclotriphosphazene.
7. Synthesis of trichlorodiphenylantimony (V) hydrate.
8. Sodium tetrathionate  $\text{Na}_2\text{S}_4\text{O}_6$ .
9. Synthesis of metal acetylacetonate .
10. Bromination of Cr (acac) $_3$ .
11. Magnetic moment of Cu (acac) $_2 \cdot 2\text{H}_2\text{O}$ .
12. Cis and Trans  $[\text{Co}(\text{en})_2\text{Cl}_2]^+$ .
13. Separation of optical isomer of cis- $[\text{Co}(\text{en})_2\text{Cl}_2]$ .
14. Ion exchange separation of oxidation state of vanadium.
15. Preparation and use of Ferrocene.
16. Preparation of copper glycine complex-cis and trans bis (glycinato Copper (II)
17. Preparation of phosphine  $\text{Ph}_3\text{P}$  and its transition metal complexes.
18. Preparation of  $[\text{Co}(\text{phenanthroline-5,6 quinone})]$ .

##### Spectrophotometric Determinations

1. Manganese/Chromium/Vanadium in steel sample.
2. Nickel/molybdenum/tungsten/vanadium/uranium by extractive spectrophotometric method.
3. Fluoride/nitrite/phosphate.
4. Zirconium-alizarin Red-S complex : Mole-ratio method.

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5. Copper-Ethylene diamine complex : Slope-ratio method.
6. Iron-phenanthroline complex : Job's method of continuous variations.

## Specialization: Organic Chemistry

### MCH 016A: Organic Elective I: ORGANIC SYNTHESIS

**Course Outcome:** After the completion of course, student will be able to

- CO1:- Understand the nature of different oxidation process.  
 CO2:- Understand the various steps involved in the reduction process of organic molecules.  
 CO3:- Understand the specific reaction mechanism in the process of hydrogenolysis.  
 CO4:- Understand the basic principle involved in various rearrangement processes.  
 CO5:- Understand the various steps involved in different rearrangement reactions.

#### Unit-I

##### Oxidation

Introduction, Different oxidative processes. Hydrocarbons-alkenes, aromatic rings, saturated C-H groups (activated and unactivated) Alcohols, diols, aldehyde's, ketones, ketals and carboxylic acids. Amines, hydrazines, and sulphides. Oxidations with ruthenium tetroxide, iodobenzene diacetate and thallium. (III) Nitrate.

#### Unit-II

##### Reduction-I

Introduction, Different reductive processes. Alkanes, alkenes, alkynes, and aromatic rings. Carbonyl compounds-aldehydes, ketones, acids and their derivatives. Epoxides.

#### Unit-III

##### Reduction-II

Introduction, Different reductive processes, Nitro, nitroso, azo and oxime groups. Epoxide, Nitro, Nitroso, azo and oxime groups. Hydrogenolysis.

#### Unit-IV

##### Rearrangements - I

General mechanistic considerations-nature of migration, migratory aptitude, memory effects. A detailed study of the following rearrangements. Pinacol-pinacolone, Wagner-Meerwein.

#### Unit-V

##### Rearrangements - II

Demjanov, Benzil-Benzilic acid. Favorskii, Arndt-Eister synthesis, Neber, Beckmann, Hotmann Curtius, Schmidt, Baeyer-Villiger, Shapiro reaction. Schmidt, Baeyer-Villiger. Shapiro reaction

#### Suggested Books References:

1. Modern Synthetic Reactions. H.O. House, W.A. Benjamin.
2. Some Modern Methods of Organic Synthesis, w. Carruthers, Cambridge Univ. Press.
3. Advanced Organic Chemistry, Reactions Mechanisms and Structure, J. March, John Wiley.
4. Principles of Organic synthesis, R.O.C. Norman and J.M. Coxon, Blackie Academic & Professional.

*[Handwritten signatures and initials are present at the bottom of the page, including "Dem", "An", "Fav", "SR", "De", and "MD".]*

5. Advanced Organic Chemistry Part B.F.A. Carey and R.J. Sundberg Plenum Press.
6. Rodd's Chemistry of Carbon Compounds. Ed. S. Coffey, Elsevier.

## MCH 017A: Organic Elective II: Heterocyclic Chemistry

**Course Outcome:** After the completion of syllabus, student will be able to learn the

- CO-1 Nomenclature patterns of heterocyclic compounds, aromaticity and chemical behaviour
- CO-2 Nature, confirmation and stability of non aromatic heterocycles
- CO-3 Synthesis and reaction of small ring (3,4,5) membered heterocycles.
- CO-4 The synthesis and reaction of benofused and meso-ionic heterocycles.
- CO-5 The synthesis and reaction of six membered with one heteroatom and more than one heteroatom

### Unit-I

#### Nomenclature of Heterocycles

Replacement and systematic nomenclature (Hantzsch-Widman system) for monocyclic fused and bridged heterocycles.

#### Aromatic Heterocycles

General chemical behaviour of aromatic heterocycles, classification (structural type), criteria of aromaticity (bond lengths, ring current and chemical shifts in  $^1\text{H}$  NMR-spectra. Empirical resonance energy, delocalization energy and Dewar resonance energy, diamagnetic susceptibility exaltations). Heteroaromatic reactivity and tautomerism in aromatic heterocycles.

### Unit-II

#### Non-aromatic Heterocycles

Strain-bond angle and torsional strains and their consequences in small ring heterocycles. Conformation of six-membered heterocycles with reference to molecular geometry, barrier to ring inversion, pyramidal inversion and 1,3-diaxial interaction. Stereo-electronic effects anomeric and related effects, Attractive interactions-hydrogen bonding and intermolecular nucleophilic electrophilic interactions. Heterocyclic Synthesis. Principles of heterocyclic synthesis involving cyclization reactions and cycloaddition reactions.

### Unit-III

#### Small Ring Heterocycles

Three-membered and four-membered heterocycles-synthesis and reactions of aziridines, oxiranes, thiranes, azetidines, oxetanes and thietanes.

### Unit-IV

**Benzo-Fused Five-Membered Heterocycles and Meso Ionic** Synthesis and reactions including medicinal applications of benzopyrroles, benzofurans and benzothiophenes Meso-ionic heterocycles: classification, chemistry of some important meso-ionic heterocycles of type-A and B and their applications. Sydnones.

### UNIT-V

**Six Membered Heterocycles with one heteroatom:** synthesis and reactions of pyrilium salts and pyrones and their comparison with pyridinium and thiopyrylium salts and pyridones; synthesis and reactions of quinolinium and benzopyrylium salts, coumarins and chromones.

**With two or more heteroatoms:** synthesis and reactions of diazines, triazines, tetrazines and thiazines. Some important macroheterocycles.

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### Suggested Books References:

1. Heterocyclic Chemistry Vol. 1-3, R.R. Gupta, M. Kumar and V. Gupta, Springer Verlag.
2. The Chemistry of Heterocycles, T. Eleber and S. Hauptmann, Thieme.
3. Heterocyclic chemistry J.A. Joule, K. Mills and G.F. Smith, Chapman and Hall.
4. Heterocyclic Chemistry, T.L. Gilchrist, Longman Scientific Technical.
5. Contemporary Heterocyclic Chemistry, G.R. Newkome and W.W. Paudler, Wiley-Interscience.
6. An Introduction to the Heterocyclic Compounds, R.M. Acheson, John Wiley.
7. Comprehensive Heterocyclic Chemistry, A.R. Katritzky and C.W. Rees, eds. Pergamon Press.
8. I.L. Finar Organic Chemistry vol 2 (3rd ed.) Longmans Green & Co.
9. Organic Chemistry by Morrison & Boyd.

### MCH 018A: Organic Elective III: NATURAL PRODUCTS-I

**Course outcome:** On completion of the course, M.Sc. student will be able to understand:

**CO-1** Physical properties, chemical properties, synthesis and uses of terpenoids. It found in various citrus fruits and herbs and is known to have antioxidant properties and is also used in various household products such as detergents and soaps.

**CO-2** Classification, nomenclature, isolation and uses of carotenoids. The health benefits of carotenoids generally derive from their vitamin A activity in the body. These benefits include support for the skin, immune system, heart and eyes.

**CO-3** Students gain specific knowledge necessary for understanding the structure, isolation and physiological action of alkaloids, their structures, functions, as well as their possible use in human.

**CO-4** The general properties of the alkaloids, importance of these compounds to humans. Synthesis and biosynthesis of these natural products are also discussed.

**CO-5** Nomenclature, basic skeleton, isolation, structure determination and health benefits of steroids.

#### Unit - I

##### Terpenoids

Classification, nomenclature, occurrence, isolation, general methods of structure determination, isoprene and biogenic isoprene rules. Structure and synthesis of the following representative molecules: Citral, Geraniol,  $\alpha$ -Terpineol, Zingiberene, Santonin, abietic acid, biogenesis of terpenes.

#### Unit-II

##### Carotenoids

Introduction, nomenclature, occurrence, isolation, general methods of structure determination, structure and synthesis of  $\beta$ -Carotene, Vitamin-A, Capsorubin, Kuhn-Roth methyl side-chain determination.

#### Unit-III Alkaloids-I

Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation, degradation (Hofmann's exhaustive, Emde and Von Braun's method), classification based on nitrogen heterocyclic ring, structure and synthesis of D-ephedrin, Coniine.

#### Unit-IV

##### Alkaloids-II

Structure, stereochemistry, synthesis and biosynthesis of the following: Nicotine, Atropine, Cocaine, Quinine and Morphine.

#### Unit-V

##### Steroids

### Suggested Books References:

- MCH 019A: Multi-step Synthesis (Practical)**

Separation, purification and identification of the components of a mixture of three organic compounds (three solids or two liquids and one solid or two solids and one liquid), using TLC for checking the purity of the separated compounds, chemical analysis, IR, PMR and Mass spectral data.

The exercise should illustrate the use of organic reagents and may involve purification of the products by chromatographic techniques.

- ## Paper Chromatography

## Spectroscopy

**Spectroscopy**  
Identification of organic compounds by the analysis of their spectral data (UV, IR, PMR,  $C^{13}$ NMR & MS) Spectrophotometric (UV/VIS) Estimations -

- ### 1. Amino acids

Scanned by CamScanner



2. Proteins
3. Carbohydrates
4. Cholesterol
5. Ascorbic acid
6. Aspirin
7. Caffeine

#### Books Suggested

1. Inorganic Experiments, J. Derek Woolings, VCH.
2. Microscale Inorganic Chemistry, Z. Szafran, R.M. Pike and M.M. Singh, Wiley.
3. Practical Inorganic Chemistry, G. Marr and B. W. Rockett, Van Nostrand.
4. The systematic Identification of Organic Compounds, R.L. Shriner and D.Y. curlin.

### Specialization: Physical Chemistry

#### MCH 020A: PHYSICAL ELECTIVE I: ELECTROANALYTICAL TECHNIQUES

**Course outcome:** On completion of the course, M.Sc. student will be able to understand:

- CO-1 Introductory idea of analytical methods and laboratory operations.
- CO-2 Errors and evaluation of statistical data and methods of reporting analytical data
- CO-3 Conductometric titrations and measurements.
- CO-4 Potentiometric methods, pH determination by instruments and its applications
- CO-5 principle and applications of colorimetry

#### Unit I

##### Introduction

Role of analytical chemistry Classification of analytical methods classical and instrumental. Types of instrumental analysis. Selecting an analytical method. Neatness and cleanliness. laboratory operations and practices. Analytical balance. Techniques of weighing, errors. Volumetric glassware cleaning and calibration of glassware. Cleaning and Calibration of glassware. Sample preparation-dissolution and decompositions.

#### Unit II

##### Errors and Evaluation (Statistical Analysis)

Definition of terms in mean and median. Precision-standard deviation, relative standard deviation. Accuracy-absolute error, relative error. Types of error in experimental data determinate (systematic), indeterminate (or random) and gross. Sources of error and the effects upon the analytical results. Methods for reporting analytical data. Statistical evaluation of data-indeterminate errors. The uses of statistics.

#### Unit III

##### Conductometry

Important laws, definitions, relations, effect of dilution on conductivity, measurement of conductivity, types of conductometric titrations, its applications and limitations.

#### Unit IV

##### Potentiometry

Principle instrumentation, types of potentiometric titrations and its applications, pH measurements, determination of pH, ion selective electrodes, instrumentation and its applications

#### Unit V

##### Coulometry

Introduction, principle, experimental details of coulometry at constant current and constant potential, titrational applications.

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### Suggested Books References:

1. Principles of Instrumental analysis D.A. Skoog and J.L. Loary, W.B. Saunders.
2. Principles of Instrumental Analysis D.A. Skoog W.B. Saunders.
3. Handbook of Instrumental Techniques for Analytical Chemistry, F. Settle, Prentice Hall

### MCH 021A: PHYSICAL ELECTIVE II : ELECTROCHEMISTRY-I

**Course outcome:** On completion of the course, student will be able to understand about the

- CO-1 Electrochemical batteries
- CO-2 role of electrochemical reactions in biological processes.
- CO-3 details of the process of corrosion.
- CO-4 corrosion inhibition methods
- CO-5 Kinetics of electrode process

#### Unit I

##### Electrochemical Energy Storage

Properties of Electrochemical energy storers : Measure of battery performance, Charging and discharging of a battery, Storage Density, Energy Density. Classical Batteries : (i) Lead Acid (ii) Nickel-Cadmium, (iii) Zinc manganese dioxide. Modern Batteries : (i) Zinc-Air (ii) Nickel-Metal Hydride, (iii) Lithium Battery, Future Electricity storers : Storage in (i) Hydrogen, (ii) Alkali Metals, (iii) Non aqueous solutions.

#### Unit II

##### Bioelectrochemistry

Membrane Potentials, Simplistic theory, Modern theory, Electrical conductance in biological organism: Electronic, Protonic electrochemical mechanism of nervous systems, enzymes as electrodes.

#### Unit III

##### Corrosion and Stability of Metals :

Civilization and Surface mechanism of the corrosion of the metals; Thermodynamics and the stability of metals, Potential -pH (or Pourbaix) Diagrams; uses and abuses, Corrosion current and corrosion potential -Evans diagrams. Measurement of corrosion rate : (i) Weight Loss method, (ii) Electrochemical Method.

#### Unit IV

##### Inhibiting Corrosion

Cathodic and Anodic Protection. (i) Inhibition by addition of substrates to the electrolyte environment, (ii) by changing the corroding method from external source, anodic Protection, Organic inhibitors, The fuller Story Green inhibitors.

##### Passivation

Structure of Passivation films, Mechanism of Passivation, Spontaneous Passivation Nature's method for stabilizing surfaces.

#### Unit V

##### Kinetic of Electrode Process :

Essentials of Electrode reaction. Current Density, Overpotential, Tafel Equation, Butler Volmer equation. Standard rate constant ( $K_0$ ) and Transfer coefficient ( $\alpha$ ), Exchange Current.

##### Irreversible Electrode processes

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Criteria of irreversibility, informatino from irreversible wave. Methods of determining kinetic parameters for quasi-rversible and irreversible waves, Koutecky's methods, Meits Israel Method, Gellings method

#### Suggested Books References:

1. Modern Electrochemistry Vol. I, Ila, Vol. IIB J'OM Bockris and A.K.N. Reddy, Plenum Publication, New York.
2. Polarographic Techniques by L. Meites, Interscience.
3. "Fuel Cells : Thjeir electrochemistry". McGraw Hill Book Company, New York.
4. Modern Polarographic Methods by A.M. Bond, Marcell Dekker.
5. Polarography and allied techniques by K. Zutshi, New age International publicatin. New Delhi.
6. "Electroanalytical Chemistry by Basil H. Vessor & Galen W. ; Wiley Interscience.
7. Electroanalytical Chemistry by Basil H. Vessor & alen w. ; Wiley Interscience.
8. Topics in pure and Applied Chemistry, Ed. S. K. Rangrajan, SAEST Publication, Karaikudi (India)

### MCH 022A: PHYSICAL - ELECTIVE III :CHEMICAL KINETICS I

**Course outcome:** On completion of the course, M.Sc. student will be able to understand:

CO-1 kinetics of oscillatory reactions

CO-2 Kinetics of enzyme inhibition reactions

CO-3 Adsorption-desorption kinetics and importance of Industrial catalysts

CO-4 statistical mechanics and transition state theory, applications in calculation of the second order rare constant for reactions.

CO-5 mechanism of metal ion catalysis

#### Unit I

##### Oscillatory Reactions

Autocatalysis and oscilatory reactions, Kinetics and mechanism of Belousov-Zhabotinski (B-Z) reactions.

#### Unit II

##### Enzymes and Inhibitions

Kinetics of one enzymes-Two substrate systems and their experimental characteristics, Kinetics of enzyme inhibited reactions, Enzyme inhibitions and their experimetnal characteristics.

#### Unit III

##### Dynamics of Gas-surface Reactions

Adsorption/desorption kinetics and transition state theory. Dissociative adsorption and precursor state. Mechanism of Langmur's adsorption of the oxidation of carbon monoxide to carbon dioxide. True and apparent activation energies. Industrial importance of heterogeneous catalysis.

#### Unit IV

##### Transition State

A brief aspect of statistical mechanics and transition state theory. Application in calculation of the second order rare constant for reactions with collision for (1) atom + atom, (2) atom + molecule (linear), (3) atom + non linear molecule, (4) linear and linear molecule, (5) linear molecule + non linear molecule reactions. Static solvent effects and thermodynamics formulations. Adiabatic electron transfer reactions, energy surfaces.

#### Unit V

### Metal ion catalysis

Kinetics and mechanism of following reaction-

- (a) i. When reaction rate is independent of one of the reactants in presence of metal ion catalyst.
  - ii. When reaction rate is retarded of one of the products in the presence of metal ion catalyst.
  - iii. When metal ion catalysis indicates an intermediate complex.
- (b) (i). Cyclodextrines and their mode of catalysis, a case study.

### Suggested Books References:

1. Progress in Inorganic Chemistry, Vol. 30 1967.
2. R. Lumry and R.W. Raymond, Electron Transfer Reactions, Interscience.
3. N.L. Bender, Mechanism of Homogeneous Catalysis from protein to protein, Wiley.
4. A.G. Sykes, Kinetics of Inorganic reactions, Pergamon.
5. S.W. Benson, Mechanism of Inorganic Reactions, Academic Press.
6. Physical Chemistry Vol. 2, Ed. Prof Ya Grashinov, Mir publisher.
7. Basolo and Pearson, Inorganic Reaction Mechanisms, Wiley.
8. H. Taube, Electron Transfer Reactions, Oxford Press.

### MCH 023A: Thermodynamical Studies (Practical)

1. Determination of partial molar volume of solute (e.g. KCl) and solvent in a binary mixture.
2. Determination of the temperature dependence of the solubility of a compound in two solvents having similar intramolecular interactions (benzoic acid in water and in DMSO water mixture and calculate the partial molar heat of solution.
3. Determination of Pka of an indicator (e.g. methyl red) in (a) aqueous and (b) micellar media.
4. Determination of stoichiometry and stability constant of Ferricisothiocyanate complex ion in solution.
5. Determination of rate constant of alkaline bleaching of Malachite green and effect of ionic strength on the rate of reaction.
6. Verify Beer's law for solution of  $\text{KMnO}_4$  and determine concentration of given aqueous solution of unknown concentration of this salt.
7. Determine the solubility and solubility product of a sparingly soluble salt conductometrically.
8. Determine the dissociation constant of a weak acid conductometrically and verify Ostwald's dilution law.
9. Study the hydrolysis of methyl acetate catalysed by HCl solution and equinormal solution of urea hydrochloride and determines the degree of hydrolysis of the salt.
10. Study saponification of ethyl acetate conductometrically.
11. Oscillatory reaction(demonstration) and note down the time for damping of oscillation.
12. Study the reaction rate of decomposition of  $\text{H}_2\text{O}_2$  Kinetically in presence of iodide in acid solution.

### Books Suggested

- i. Inorganic Experiments, J. Derek Woolings, VCH.
- ii. Microscale Inorganic Chemistry, Z. Szafran, R.M. Pike and M.M. Singh, Wiley.
- iii. Practical Inorganic Chemistry, G. Marr and B. W. Rockett, Van Nostrand.
- iv. The systematic Identification of Organic Compounds, R.L. Shriner and D.Y. Curtin.

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## Semester IV

### Specialization: Inorganic Chemistry

#### MCH 024A: Inorganic Elective I: ORGANOTRANSITION METAL CHEMISTRY-II

**Course outcome:** After the completion of course

- CO-1 Students will be able to understand the transition metal compounds with bonds to hydrogen.
- CO-2 Students will be able to apply and analyze the basic knowledge of stoichiometric reactions for catalysis.
- CO-3 Students will be able to describe the basic concept of catalytic reactions involving carbon monoxide.
- CO-4 Students will be able to explain reactions involving activation of C-H bond.
- CO-5 Students will be able to understand fluxional Organometallic Compounds and their properties.

##### Unit-I

##### Transition metal compounds with bonds to hydrogen

Transition metal compounds with bonds to hydrogen.

##### Unit-II

##### Homogeneous Catalysis

Stoichiometric reactions for catalysis, homogeneous catalytic hydrogenation, Zeigler-Natta polymerization of olefins,

##### Unit-III

##### Reactions of CO

Catalytic reactions involving carbon monoxide such as hydrocarbonylation of olefins (oxoreaction), explanation reactions,

##### Unit-IV

##### Activation of C-H bond

Reactions involving activation of C-H bond

##### Unit-V

##### Fluxional Organometallic Compounds

Flexionality and dynamic equilibrium in compounds such as  $\eta^2$  olefine,  $\eta^3$ -allyl and dieny complexes.

##### Suggested Books References:

1. Principles and Application of Organotransition Metal Chemistry, J.P. Collman, L.S. Hegsdus, J.R. Norton and R.G. Finke, University Science Books.
2. The Organometallic Chemistry of the Transition Metals, R.H. Crabtree. John Wiley.
3. Metallo-organic Chemistry, A.J. Pearson, Wiley.
4. Organometallic Chemistry, R.C. Mehrotra and A. Singh New Age International.

#### MCH 025A: Inorganic Elective II: INORGANIC POLYMERS

**Course Outcome:** After the completion of this course

- CO-1 Students will be able to understand the basic concept of polymers.
- CO-2 Students will be able to explain basic knowledge of polymer characterization and poly dispersion concept.
- CO-3 Students will be able to describe the structure, properties and applications of polymers based on boron.
- CO-4 Students will be able to explain the structure, properties and applications of polymers based on silicon.
- CO-5 Students will be able to explain the structure, properties and applications of polymers based on phosphorous.

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## Unit-I

### Basics

Importance of polymers. Basic concepts : Monomers, repeat units, degree of polymerization  
Linear, branched and network polymers. Classification of polymers. Polymerization :  
condensation, addition/radical chain-ionic and co-ordination and copolymerization.  
Polymerization conditions and polymer reactions. Polymerization in homogeneous and  
heterogeneous systems.

## Unit-II

### Polymer Characterization

Polydispersion-average molecular weight concept. Number, weight and viscosity average  
molecular weights. Polydispersity and molecular weight distribution.

## Unit-III

### Polymers of Boron

Structure, Properties and Applications of Polymers based on boron-borazines, boranes and  
carboranes.

## Unit-IV

### Polymers of silicon

Structure, Properties and Applications of Polymers based on Silicon, silicone's polymetalloxanes  
and polymetallosiloxanes, silazanes.

## Unit-V

### Polymers of Phosphorous and sulphur

Structure, Properties and Application of-

- i. Polymers based on Phosphorous-Phosphazenes, Polyphosphates
- ii. Polymers based on Sulphur -Tetrasulphur tetranitride and related compounds.

### Suggested Books References:

1. Inorganic Chemistry, J.E. Huheey, Harper Row.
2. Developments in Inorganic polymer Chemistry, M.F. Lappert and G.J. Leigh.
3. Inorganic polymers- N.H. Ray.
4. Inorganic polymers, Graham and Stone.
5. Inorganic Rings and Cages : D.A. Armitage.
6. Textbook of Polymers Science, F.W. Billmeyer Jr. Wiley.
7. Contemporary Polymer Chemistry, H.R. Allcock and F.W. Lambe, Prentice Hall

## MCH 026A: Inorganic Elective III: MINERAL BASED INDUSTRIAL CHEMISTRY

Course Outcome: After the completion of this course:

- CO-1 Students will be able to understand general principles applied in studying an industry and manufacture of iron, steels etc.  
CO-2 Students will be able to explain classification of cement and manufacture of portland cement.  
CO-3 Students will be able to describe the classification of ceramics and basic raw materials.  
CO-4 Students will be able to explain the solid industrial poisons and their classification.  
CO-5 Students will be able to explain the liquid and gaseous industrial poisons and their classification.

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### Unit-I

### INDUSTRIAL CHEMISTRY

Ferrous and non-ferrous industries-quality, control methods, general principles applied in studying an industry - manufacture of iron, steels metallurgy of gold and silver.

### Unit-II

### CEMENT

Classification of cement, manufacture of Portland cement - setting and hardening of cement, chemical constitution of Portland cement and their characteristics - special cement and their characteristics - special cements and their uses.  
Cermics

### Unit-III

### Ceramics

Classification of ceramics, basic raw materials-application of colours to pottery porcelain and china ware-manufacture, glass-raw materials, manufacture of special glass-optical, borosilicate, flint and coloured glass.

### Unit-IV

**Main group elements and their compounds:** Allotropy, synthesis, structure and bonding, industrial importance of the compounds.

### Unit-V

**Classification of pollutants :** Their sources, Sewage water treatment, waste water treatment - domestic and industrial.

### Suggested Books References:

1. Chemical Process Industries; N.D. Shreeve.
2. Applied Chemistry for Engineer; Diamont.
3. Chemistry of engineering materials; Jain & Jain
4. Engineering chemistry; B.K. Sharma.

### MCH 027A: Flame Photometric and Flame Photometric Determination (Practical)

#### Flame Photometric Determinations

1. Sodium.
2. Potassium
3. Sodium and potassium when present together
4. Lithium
5. Calcium
6. Barium
7. strontium.
8. Cadmium
9. Magnesium in tap water.

#### Quantitative determinations of a two component mixture

One Volumetrically and one gravimetrically

1.  $\text{Cu}^{+2}$ ,  $\text{Ni}^{+2}$

#### Quantitative determinations of a three component mixture :

One Volumetrically and two gravimetrically

1. Cu+2, Ni+2, Zn+2
2. Cu+2, Ni+2, Ng+2

## Specialization: Organic Chemistry

### MCH 028A: Organic Elective I: Disconnection Approach

**Course Outcome:** On completion of the course, M.Sc. student will be able to understand:

- CO-1 Synthons and synthetic equivalents, disconnection approach, chemo selectivity, Order of Reactions etc.
- CO-2 Principle of protection of alcohol, amine, carbonyl and carboxyl groups, Alcohols and carbonyl compounds, regioselectivity, alkene synthesis, use of acetylenes and aliphatic Nitro compounds in organic synthesis.
- CO-3 Diels-Alder Reaction, 1,3-difunctionalised compounds,  $\alpha,\beta$ -unsaturated carbonyl compounds, control in carbonyl condensations, 1,5-difunctionalised compounds. Micheal addition and Robinson annelation.
- CO-4 Retrosynthesis of Saturated heterocycles, synthesis of 3,4,5 and 6 membered rings, aromatic heterocycles in organic synthesis. General strategy and stereoselectivity, Cyclisation and insertion reaction rearrangement in synthesis,
- CO-5 Retrosynthesis in Photocycloaddition and use of ketenes, Pericyclic rearrangement and special methods, carbonyl condensation, Diels -Alder reaction and reduction of aromatic compounds as a tool for retrosynthetic analysis.

#### Unit-I

##### Disconnection Approach

An introduction to synthons and synthetic equivalents. Disconnection approach, functional group inter-conversions, the importance of the order of events in organic synthesis, one group C-X and two group C-X disconnections, Chemoselectivity, reversal of polarity, cyclisation reaction, amine synthesis.

#### Unit-II

##### Protecting Groups

Principle of protection of alcohol, amine, carbonyl and carboxyl groups.

#### One Group C-C Disconnections

Alcohols and carbonyl compounds, regioselectivity, alkene synthesis, use of acetylenes and aliphatic Nitro compounds in organic synthesis.

#### Unit-III

##### Two Group C-C Disconnections

Diels-Alder Reaction, 1,3-difunctionalised compounds,  $\alpha,\beta$ -unsaturated carbonyl compounds, control in carbonyl condensations, 1,5-difunctionalised compounds. Micheal addition and Robinson annelation.

#### Unit-IV

##### Ring Synthesis-I

Saturated heterocycles, synthesis of 3,4,5 and 6 membered rings, aromatic heterocycles in organic synthesis. General strategy and stereoselectivity, Cyclisation and insertion reaction, rearrangement in synthesis,

#### Unit-V

##### Ring Synthesis-II

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Photocycloaddition and use of ketenes, Pericyclic rearrangement and special methods, carbonyl condensation, Diels-Alder reaction and reduction of aromatic compounds.

### Suggested Books References:

1. Designing Organic Synthesis, S. Warren. Wiley.
2. Organic Synthesis-Concept, Methods and Starting Materials, J. Fuhrhop.
3. Some Modern Methods of Organic Synthesis. W. Carruthers, Cambridge Univ. Press.
4. Modern Synthetic Reactions H.O. House, W.A Benjamin.
5. Advanced Organic Chemistry : Reactions, Mechanisms and Structure, J. March. Wiley.
6. Principles, of Organic Chemistry Part B. F.a. Carey and R.J. Sundberg, Plenum Press.

## Organic Elective-II: MCH029A Advanced Organic Spectroscopy

**Course Outcomes:** After the completion of the course, student will be able to-

- CO1 Understand the advanced Proton magnetic resonance spectroscopy, complex splitting patterns etc.
- CO2 Understand the Principles  $^{13}\text{C}$  spectroscopy, their applications in structure determination and working method of Instrument and two dimensional spectroscopy, 2DNMR inadequate - COSY, NOESY, HETCOR.
- CO3 Understand the mass spectrometry in detail.
- CO4 Understand the UV spectra of heterocyclic, azulenes and acetylinic compounds, optical rotation, optical rotatory dispersion (ORD), circular dichroism (CD), octant rule and axial halo ketone rule.
- CO5 apply the knowledge of various spectroscopic techniques in structure identification of organic compounds.

### UNIT-I

#### Proton magnetic resonance spectroscopy

Nuclear properties, Pulse techniques, Fourier Transform technique and its advantages, complex splitting patterns ( $\text{AX}$ ,  $\text{AB}$ ,  $\text{AB}_x$ ,  $\text{AM}_x$ ,  $\text{ABC}$ ,  $\text{AM}_3$ ,  $\text{A}_2\text{X}_2$ ,  $\text{A}_2\text{X}_3$ ), coupling constant [geminal, vicinal, long range (allylic, homoallylic), coupling through space].

Hindered rotation, Karplus equation and curve variation of coupling constant with dihedral angle, simplification of complex spectra: nuclear magnetic double resonance, contact shift reagents, variable temperature dynamic NMR spectroscopy.

Effect of quadrupolar nuclei (10B) on the  $^1\text{H}$  NMR spectra, Satellite spectra -examples for different spin systems -Systems with chemical exchange -study of fluxional behavior of molecules.

A brief introduction of compounds carrying NMR active nuclei like  $\text{N}^{15}$ ,  $\text{F}^{19}$ ,  $\text{P}^{31}$ .

### UNIT- II

$^{13}\text{C}$  NMR spectroscopy  $^{13}\text{C}$  NMR spectroscopy: Basic principles Carbon- 13 NMR spectroscopy, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon). Two dimension NMR spectroscopy.

proton ( $^1\text{H}$ ) coupled  $^{13}\text{C}$  NMR spectrum, off-resonance and noise decoupled  $^{13}\text{C}$  NMR spectrum, DEPT . 2DNMR inadequate - COSY, NOESY, HETCOR.

### Unit-III

#### Mass Spectrometry

Introduction, ionization methods EI, CI, FD and FAB, Fragmentation: basic fragmentation types and rules, factors affecting fragmentation, ion analysis, ion abundance, Mass spectral

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fragmentation of organic compounds (hydrocarbons, alcohols, ethers, ketones, aldehydes, carboxylic acids, amines, nitriles, nitro and halogenated compounds), common functional groups, molecular ion peak, meta stable peak. Mc-Lafferty rearrangement. Nitrogen rule, HRMS.

#### Unit-IV

##### UV-Visible spectroscopy and ORD

Determination of configuration of E/Z isomer, steric effect, UV spectra of heterocyclic, azulenes and acetylenic compounds, optical rotation, optical rotatory dispersion (ORD), circular dichroism (CD), octant rule and axial halo ketone rule.

#### Unit-V

##### Structure Elucidation of complex organic molecules

Structure elucidation of organic compounds by combined applications of UV, IR, NMR and mass spectrometry

##### Suggested Books References:

1. Spectrometric Identification of Organic Compounds; Sixth Edition; R.M. Silverstein and F.X. Webster; John Wiley and Sons, 2002.
2. Organic Spectroscopy; Third Edition; W. Kemp; Palgrave Publisher Ltd., New York, 2004.
3. Spectroscopic Methods in Organic Chemistry; Sixth Edition; D. H. Williams and I. Fleming; Tata McGraw Hill Publishing Company Ltd, New Delhi, 2002.
4. Spectral Analysis of Organic Compounds; Second Edition; C.J. Creswell and M.M. Campbell; Burgess Publishing Company, Great Britain, 1972.

### MCH 030A: Organic Elective III: NATURAL PRODUCTS-II

#### Course Outcome: After the completion of this course

- CO-1 Students will be able to understand primary function of pigments in plants and general methods of structure determination.
- CO-2 Students will be able to describe biosynthesis of plant pigments and gain knowledge about Acetate pathway and Shikimic acid pathway.
- CO-3 Students will be able to describe the Structure, synthesis and binding of Haemoglobin and Structure, synthesis of light absorbing pigment Chlorophyll.
- CO-4 Students will be able to explain isolation, nomenclature, classification, biogenesis and physiological effects of Prostaglandins.
- CO-5 Students will be able to understand synthesis and structure elucidation of Pyrethroids and Rotenones. Student will also be able to understand the concepts of medicinal chemistry.

#### Unit-I

##### Plant Pigments-I

Occurrence, nomenclature and general methods of structure determination, structure and synthesis of cyanidin chloride, pelargonidin chloride, delphinidin and hirsutidin chlorides.



## Unit-II

### Plant Pigments-II

Occurrence, nomenclature, structure and synthesis of flavonol (3-hydroxy flavone), quercetin, isoflavone, daidzein, butin and aureusin, butein, Aureusin, Biosynthesis of flavonoids.

## Unit-III

### Prophyrins

Haemoglobin, degradation products of haemoglobin and synthesis of haemin, porphyrins, spectral properties, structure elucidation and synthesis of Chlorophyll.

## Unit-IV

### prostaglandin

Occurrence, nomenclature, classification, biogenesis and physiological effects. Synthesis of PGE<sub>2</sub> and PGF<sub>2a</sub>.

## Unit-V

### Pyrethroids and Rotenones

Synthesis and reactions of Pyrethroids and Rotenones. (For structure elucidation, emphasis is to be placed on the use of spectral parameters wherever possible).

### Medicinal Chemistry:

Drugs and their Classification, Drug-target interactions, Therapeutic action of a new important class of drugs (antacids, antihistamines), neurologically active drugs, (tranquilizers, analgesics), antimicrobials (antibiotics, antiseptics & disinfectants), anticancer drugs; Taxol, Artemisinin antifertility drugs, artificial sweetening agents (sucralose, rotenoid) and food preservatives. New development in Drug research. Drug designing.

### Suggested Books References:

1. Natural Products : Chemistry and Biological Significance, J. Mann, R.S. Davidson, J.B. Hobbs, D.V. Banthorpe and J.B. Harborne, Longman, Essex.
2. Organic Chemistry : Vol. 2 I.L. Finar, ELBS
3. Stereoselective Synthesis : A Practical Approach, M. Norgard, VCH.
4. Rodd's Chemistry of Carbon Compounds, Ed. S. Coffey, Elsevier.
5. Chemistry, Biological and Pharmacological Properties of Medicinal Plants from the Americas, Ed. Kurt Hostettmann, M.P. Gupta and A. Marston. Harwood Academic Publishers.
6. Introduction to Flavonoids, B.A. Bohm. Harwood Academic Publishers.
7. New Trends in Natural Product chemistry, Ata-ur-Rahman and M.L. Choudhary, Harwood Academic Publishers.

### MCH 031A: Chromatography and Spectroscopy (Practical)

#### Thin Layer Chromatography

1. To separate the mixture of Methyl Orange and Methylene Blue by using cyclohexane and ethyl acetate (8.5:1.5) as solvent system.
2. To Prepare and separate 2,4-dinitro Phenylhydrazone of acetone, 2-butanone, hexane-2-one and hexane-3-one using toluene and petroleum ether (40:60).

#### Paper Chromatography

3. To separate the mixture of phenylalanine and glycine. Alanine and aspartic acid. Leucine and glutamic acid. Spray reagent - Ninhydrin.

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4. To separate the mixture of D,L-alanine, glycine and L-leucine using n-butanol : acetic acid : water (4:1:5). Spray reagent- Ninhydrin.
5. To separate monosaccharides - a mixture of D -galactose and D-fructose using n-butanol : acetone: water (4:1:5). Spray reagent -aniline hydrogen phthalate.
6. To Separate and identify sugars present in the given mixture of glucose, fructose and sucrose by paper chromatography and determination of Rf values.

### Spectroscopy

Identification of organic compounds by the analysis of their spectral data (UV, IR, PMR, CMR & MS) Spectrophotometric (UV/VIS) Estimations-

- i. Amino acids
- ii. Proteins
- iii. Carbohydrates
- iv. Cholesterol
- v. Ascorbic acid
- vi. Aspirin
- vii. Caffeine

### Specialization: Physical Chemistry

#### MCH 032A: PHYSICAL ELECTIVE I: CHEMICAL ANALYSIS

**Course Outcome:** After the completion of this course

CO-1 Students will be able to understand Food analysis, use of HPLC and TLC in food adulteration etc

CO-2 Students will be able to analyse soil characteristics and quality

CO-3 Students will be able to perform the analysis of solid, liquid and gaseous fuels.

CO-4 Students will be able to perform the analysis of water, various parameters and impurities present in water. CO-5 Students will be able to understand clinical analysis and drug analysis by various physical methods.

#### Unit I

##### Food analysis

Moisture, ash, crude protein, fat crude fibre, carbohydrates, calcium, potassium, sodium and phosphate. Food adulteration-common adulterants in food, contamination of food stuffs. Microscopic examination of foods for adulterants. Pesticide analysis in food products. Extraction and purification of sample. HPLC. Gas chromatography for organophosphates. Thin-layer chromatography for identification of chlorinated pesticides in food products.

#### Unit II

##### Analysis of soil

Analysis of Soil, moisture pH total nitrogen, phosphorus, silica, lime, manesia, manganese, sulphur and alkali salts.

#### Unit III

##### Analysis of Fuel

Fuel analysis : liquid and gas. Ultimate and proximate analysis-heating values-grading of coal. Liquid fuels-flash point, aniline point, octane number and carbon residue. Gaseous fuels-produced gas and water gas-calorific value

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#### Unit IV

##### Analysis of Water

Objectives of analysis-parameter for analysis-colour, turbidity, total solids, conductivity, acidity, alkalinity, hardness, chloride, sulphate, fluoride, silica, phosphates and different forms of nitrogen, Heavy metal pollution-public health significance of cadmium, chromium, copper, lead, zinc, manganese, mercury and arsenic.

#### Unit V

##### Clinical Chemistry

Composition of blood-collection and preservation of samples. Clinical analysis. Serum electrolytes, blood glucose, blood urea nitrogen, uric acid, albumin, globulins, barbiturates, acid and alkaline phosphates. Immuno assay : principles of radio immunoassay (RIA) and applications. The blood gas analysis trace elements in the body.

##### Drug analysis

Narcotics and dangerous drug. Classification of drugs. Screening by gas and thin-layer chromatography and spectrophotometric measurements.

#### Suggested Books References:

1. Analytical Chemistry, G.D. Christian, J.Wiley.
2. Fundamentals of analytical Chemistry. D.A. Skoog, D.M. West and F.J. Hooler, W.B. Saunders.
3. Analytical Chemistry-Principles. J.H. Kennedy. W.B. Saunders.
4. Analytical Chemistry-Principles and Techniques. L.G. Hargis. Prentice Hall.
5. Principles of Instrumental analysis D.A. Skoog and J.L. Loary, W.B. Saunders.
6. Principles of Instrumental Analysis D.A. Skoog W.B. Saunders.
7. Quantitative Analysis, R.A. Day, Jr. and A.L. Underwood, Prentice Hall.
8. Environmental Solution, S.M. Khopkar, Wiley Eastern.
9. Basic Concepts of Analysis Chemistry, S.M. Khopkar, Wiley Eastern.
10. Handbook of Instrumental Techniques for Analytical Chemistry, Settle, Prentice Hall.

#### MCH 033A : PHYSICAL ELECTIVE II: ELECTRO CHEMISTRY-II

**Course Outcome:** After the completion of this course

CO-1 Students will be able to understand the formation and working of fuel cells

CO-2 Students will be able to understand the electrocatalysis in simple redox reactions and biological systems. CO-3 Students will be able to understand the principles and applications of

voltametry. CO-4 Students will be able to understand the types of electro organic reaction and their applications in sewage water treatment. CO-5 Students will be able to understand controlled current techniques.

#### Unit I

##### Fuel cell

Electrochemical Generators (Fuel Cells) : Hydrogen oxygen cells, Hydrogen Air cell, Hydrocarbon air cell, Alkaline fuel cell, Phosphoric acid fuel cell, direct NaOH fuel cells, applications of fuel cells.

#### Unit II

##### Electrocatalysis

Chemical catalysts and Electrochemical catalysts with special reference to porphyrins, oxides of rare earths. Electrocatalysis in simple redox reactions, in reaction involving adsorbed species. Influence of various parameters.

### Unit III

#### Voltammetry

General principle and applications, linear sweep voltammetry (LSV), cyclic voltammetry (CV), square wave voltammetry, stripping voltammetry, cathodic and anodic adsorptive stripping voltammetry (CAAdSV and AAAdSV).

### Unit IV

#### Electro-organic synthesis

Types of electro organic reaction, constant current and constant potential electrolysis, cell design, effect of variable, nature of medium, nature of electrode materials, over voltage, effect of redox couple, application of sewage waste water treatment.

### Unit V

#### Controlled Current Techniques

Introduction, general theory, Sand equation, programmed current chronopotentiometry, Quasireversible waves, reversal techniques, galvanostatic double pulse method.

#### Suggested Books & References:

1. Electrochemical methods by Allen J. Bard and Larry R. Faulkner, John Wiley. Pub.
2. Electrochemistry by Carl H. Hamann, Andrew Hammett and Wolfgang Vielstich.
3. Modern Polarographic Methods by H. Vossler & Galen W. Wiley Interscience.
4. Topics in pure and applied chemistry Ed. S.K. Rangrajan SAEST Pub., Karaikudi, (India).
5. Techniques of electro-organic synthesis Part I, II & III by N.L. Weinberg John Wiley Pub.

### MCH 034A: PHYSICAL ELECTIVE III : CHEMICAL KINETICS-II

**Course Outcome:** After the completion of this course

CO-1 Students will be able to understand the kinetics and mechanism of micelle catalyzed reactions

CO-2 Students will be able to understand the radiation chemistry and photochemistry. Kinetics and mechanism of photochemical and photosensitized reactions, electron transfer reactions.

CO-3 Students will be able to understand the kinetics and mechanism of induced reactions.

CO-4 Students will be able to understand the electron transfer reactions in metal complexes.

CO-5 Students will be able to understand bridged outer-sphere electron transfer mechanism, Nucleophilic and electrophilic catalyst and their mode of action.

### Unit I

#### Micelles catalysis and inhibition

Kinetics and mechanism of micelle catalyzed reactions (1st order and second order) Various type of micelle catalyzed reactions. Micelle inhibited reactions.

#### Kinetics and Mechanism of Substitution Reaction

Classification of ligand substitution mechanism. Anation and base catalyzed kinetics of anation reactions. Aquation and acid catalyzed kinetics of aquation reactions (octahedral complexes).

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## Unit II

### Radiation Chemistry

Radiation chemistry and photochemistry. Radiation chemistry of water and aqueous solutions. Hydrogen atom and hydroxyl radical-oxidizing and reducing conditions. Kinetics and mechanism of photochemical and photosensitized reactions (One example in each case). Stern-Volmer equation and its application. Hole-concept in the presence of semiconductor type photocatalysts. Kinetics and mechanism of electron transfer reaction in the presence of visible light. Kinetics of exchange reactions (Mathematical analysis)

## Unit III

### Induced Phenomenon

Induced reactions concept and their characteristics, Induction factor, Mechanism of (i) Fe (II) induced oxidation of iodine by Cr(VI) in weak acid medium, (ii) As (III) induced oxidation of Mn(II) by chromate in acid solutions. Kinetics and mechanism of induced reactions in metal complexes (octahedral complexes of Cobalt (III) only)-basic concepts.

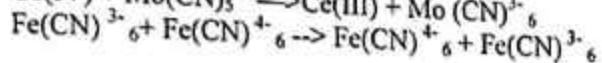
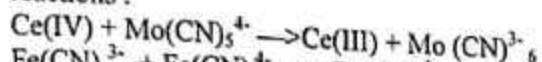
## Unit IV

### Electron Transfer Reaction in Metal Complexes

Kinetics and mechanism of 1:1, 1:2, 1:3 metal substrate complexes as intermediate, Henry Taubes classical reaction, its kinetics and mechanism, Inner-sphere and outer sphere, electron transfer reactinos and mechanism. Various types of inner sphere bridges, adjacent and remote attack. Linkage isomerism. Chemical and resonance mechanism.

## Unit V

Marcus-Cross relation in outtersphere reactions (no mathematical derivation). Its application in reactions :



Bridged outer-sphere electron transfer mechanism, Nucleophilic and electrophilic catalyst and their mode of action.

### Suggested Books References:

1. Progress in Inorganic Chemistry, Vol. 30 1967.
2. R. Lumry and R.W. Raymond, Electron Transter Reactions, Interscience.
3. N.L. Bender, Mechanism of Homogeneous Catalysis from protein to protein, Wiley.
4. A.G. Sykes, Kinetics of Inorganic reactins, Pergamon.
5. S.W. Benson, Mechanism of Inorganic Reactions, Academic Press.
6. Physical Chemistry Vol. 2, Ed. Prof Ya Grasimov, Mir publisher.
7. Basolo and pearson, Inorganic Reactino Mechaims, Wiley.
8. H. Taube, Electron Transfer Reactions, Oxford Press

### MCH 035A : Polarography and Chemical Kinetics (Practical)

1. Identification and estimation of metal ions such as  $\text{Cd}^{+2}$ ,  $\text{Pb}^{+2}$ ,  $\text{Zn}^{+2}$ , polarographically.
2. Study of a metal ligand complex polarographically (using Lingane's Method).
3. Determination of rate constant and formation constant of an intermediate complex in the reaction of Ce(IV) and Hypophosphorous acid at ambient temperature.
4. Determination of energy and enthalpy of activation in the reaction of  $\text{KMnO}_4$  and benzyl alcohol in acid medium.

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5. Determination of energy of activation of and entropy of activation from a single kinetic run.
6. Kinetics of an enzyme catalyzed reaction
7. To determine the hardness of Water by complexometric method and by HCl method.
8. To determine the amount of free chlorine in given water sample.
9. Determination of Total residual Chlorine and amount of Fluoride ion in given water samples.
10. Determination of Viscosity of a given lubricant by Redwood Viscometer No.1.
11. Determination of Flash and Fire Points of a given lubricant by Pensky Martin Apparatus.
12. Determination of Cloud and Pour Points of a given lubricant.
13. To determine moisture, volatile and ash content in a given coal sample by proximate analysis.
14. To determine the calorific value of Solid Fuel by Bomb's Calorimeter.

#### Books Suggested

1. Inorganic Experiments, J. Derek Woolings, VCH.
2. Microscale Inorganic Chemistry, Z. Szafran, R.M. Pike and M.M. Singh, Wiley.
3. Practical Inorganic Chemistry, G. Marr and B. W. Rockett, Van Nostrand.
4. The systematic Identification of Organic Compounds, R.L. Shriner and D.Y. Curtin.

**MCH 036A : Minor Project** : (Which will be done in vacations after Semester-III and will be evaluated in Semester-IV)

*Dave*

*JS*

*R*  
*SSh*

*✓*

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## Semester-I

### BSC001A: Periodic Properties, Mechanism of Organic Reactions and States of Matter

**Course Outcome** At the end of this course students will be able to:

- CO1: Evaluate the periodic properties like atomic and ionic radii, ionization energy, electron affinity and electronegativity and their applications.
- CO2: Understand the common themes running through ionic and metallic descriptions of chemical bonding.
- CO-3: Analyze and formulate mechanisms of different organic reaction including addition, Substitution, elimination and rearrangement reactions.
- CO-4 Understand various types of State of matters, imperfections in crystals and crystal structures and various properties of liquid and gaseous state and their determinations

**Mapping of PO/CO**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO-8	PO-9	PO-10	PSO-1	PSO-2	PSO-3
CO1	2	2	2	1	1	1			1	2	1	2	1
CO2	1	2	2	1	2	2	1			1	2	2	1
CO3	2	1	2		2	2		1		2	1	2	2
CO4	1	2	1	1	2	2				2	1	2	2
	1-LOW	2-MEDIUM	3-HIGH										

**Unit-I Periodic Properties :** Atomic and ionic radii, ionization energy, electrode potential (use of redox potential-reaction feasibility), electron affinity and electronegativity – definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behavior, electronic configuration.

**MIT : Principle of chemical science (fall 2008)**

### Unit-II Chemical Bonding- I

- Ionic Bond** – Types of ionic solids, radius ratio effect and coordination number, limitations of radius ratio, lattice defects, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarizability, Fajan's rules.
- Metallic Bond** : Free electron, valence bond and band theories, Weak Interactions; Hydrogen Bond – experimental evidence, van der Waal's forces.

### Unit III: Structure, Bonding & Mechanism of Organic Reactions

- Hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding. Types of organic reactions, Energy considerations.

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- (ii) Types, structure, relative stability, and reactivity of Carbocations, Carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species. Methods of determination of reaction mechanism; product analysis, intermediates, isotope effects. Kinetic and stereochemical studies.

**Unit-IV Solid State:** Types of crystals (molecular, covalent, metallic, ionic). Imperfections in crystals: point defect, Schottky defect, Frankel defect, metal excess defect (colour centre), line defect (dislocations), edge and screw dislocations, Crystal structure of NaCl, KCl, Graphite, and Diamond. Band theory of solids.

MIT- Band theory of solids

**UNIT-V Liquid State:** Surface tension of liquids, capillary action, surface tension and temperature, interfacial tension, surface active agents, Viscosity of liquids, experimental determination of viscosity coefficient, its variation with temperature, Intermolecular forces of liquids.

MIT- Band theory of solids, surface tension

#### **Suggested Books**

1. Concise Inorganic Chemistry by J.D. Lee
2. Inorganic Chemistry Principles of Structure and Reactivity-Huheey James, E. Keiter Ellen, A. Pearson, Edu. Delhi.
3. Stereochemistry of organic compounds-P.S. Kalsi, New age International
4. Organic chemistry Reaction and Reagents-O.P. Agarwal, Krishna Prakashan Meerut
5. Advanced Organic Chemistry by Bahl & Bahl, S. Chand Publications.
6. Organic Chemistry by Morrison Boyd, Pearson Publications.
7. Advanced Organic Chemistry by Bahl & Bahl, S. Chand Publications.
8. Advanced Organic chemistry-Jagdamba Singh and LDS Yadav
10. Advanced Physical chemistry -Gurdeep Raj, Goel Publication
11. Essentials of physical Chemistry-Puri, Sharma, Pathania

**BSC002A : Acid -Base Titrations and Radical identification (Practicals)**

#### **INORGANIC CHEMISTRY**

1. To analyse acidic radicals of concentrated  $\text{H}_2\text{SO}_4$  group.
2. To analyse acidic radicals of concentrated  $\text{H}_2\text{SO}_4$  group.
3. To analyse sulphate radical.
4. To analyse interfering radicals  $\text{BO}_3^{3-}$ ,  $\text{PO}_4^{3-}$ ,  $\text{C}_2\text{O}_4^{2-}$ ,  $\text{F}^-$

#### **ORGANIC CHEMISTRY**

1. To purify the impure sample of organic compounds by sublimation.
2. To separate the mixture (1 solid + 1 liquid) by distillation.

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- To detect the elements (N and S) from the given organic compound.
- To detect the element (halogen) from the given organic compound.
- To purify the impure sample of organic compound by crystallization and decolourised the compound by charcoal.

### PHYSICAL CHEMISTRY

- To prepare standard 0.1 N NaOH solution using 0.1 N oxalic acid as primary standard solution.
- To determine strength of unknown  $\text{CH}_3\text{COOH}$  using 0.1 N NaOH as intermediate solution.
- To determine the percentage composition of a given mixture (non interacting system) by viscosity method.
- To determine the percentage composition of a given mixture (non interacting system) by surface tension method
- To determine the partition coefficient of Iodine between water and carbon tetrachloride (or chloroform, carbon disulphide etc) at room temperature.

## Semester-II

### BSC003A Chemical Bonding and Hydrocarbons

#### Course Outcome

At the end of this course students will be able to:

- CO1: Analyze the structure and bonding in molecules / ions and predict the structure of molecules / ions via valence bond theory, valence shell electron pair repulsion and molecular orbital theory and its applications
- CO2: Understand the common themes running through ionic and metallic descriptions of chemical bonding.
- CO-3: understand physical properties and apply chemical properties of various hydrocarbons viz. alkanes, alkenes and cycloalkanes in different sectors.
- CO-4 Understand basic knowledge of various types properties of gaseous state and their determinations

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO-8	PO-9	PO-10	PSO-1	PSO-2	PSO-3
CO1	2	3	2	3	2		1		2	3	2	2	1
CO2	1	2	1	2	2	1	1		1	1	2	1	2
CO3	2	2		1	2	1		2		2	2	2	1
CO4	2	3	1	2	2	1		1	2	2	2	1	2

1 - LOW 2- MEDIUM 3-HIGH

### Unit - I Chemical Bonding II:

Shape of s,p,d orbitals and their characteristics, Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridizations and shapes of simple inorganic molecules and ions such as  $\text{NH}_3$ ,  $\text{H}_3\text{O}^+$ ,  $\text{SF}_4$ ,  $\text{ClF}_3$ ,  $\text{ICl}_2^-$  and  $\text{H}_2\text{O}$  by valence shell electron pair





repulsion (VSEPR) theory and Molecular Orbital Theory, bonding, nonbonding and antibonding molecular orbitals, linear combination of atomic orbitals (LCAO). Applications of MO theory.

### Unit-II s-Block Elements :

Tendencies of alkali and alkaline-earth metals, hydration energies, solvation and complexation, Hydride (classification, general methods of preparation and salient features), principle of metallurgical extraction, Chemistry of Li and Be, their anomalous behaviour and diagonal relationships, alkyls and aryls and their role in biology.

### Unit III: Alkanes & Cycloalkanes

Isomerism in alkanes, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction, and decarboxylation of carboxylic acids). Physical properties and chemical reaction of alkanes. Mechanism of free radical halogenations of alkanes, orientation, reactivity and selectivity.

Introduction and nomenclature of cycloalkanes, Baeyer's strain theory and its limitations, Ring strains in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring; banana bonds.

### Unit IV: Alkenes

Nomenclature of alkenes, methods of formation, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halide, regioselectivity in alcohol dehydration The Saytzeff rule, Hofmann's elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes-mechanisms involved in hydrogenation, electrophilic and free radical additions, Markovnikov's rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with  $\text{KMnO}_4$ . Polymerization of alkenes. Substitution at the allylic and vinylic-positions of alkenes. Industrial applications of ethylene and propene.

**Unit V: Gaseous State:** Kinetic theory of gases, transport coefficients. Collision in a gas- mean free path, collision diameter and its dynamics, collision number and effusion. Behaviour of real gases -Van der Waal's equation, Critical phenomena - critical constants of a gas and their determination, continuity of state, critical state, Principle of corresponding states, liquefaction of gases.

MIT- Kinetic theory of gases, transport coefficients, collision diameter and its dynamics, collision number and effusion.

### Suggested Books

1. Concise Inorganic Chemistry by J.D. Lee

2. Inorganic Chemistry Principles of Structure and Reactivity-Huheey James, E. Keiter Ellen, A. Pearson, Edu. Delhi.
3. Stereochemistry of organic compounds-P.S. Kalsi, New age International
4. Organic chemistry Reaction and Reagents-O.P. Agarwal, Krishna Prakashan Meerut
5. Advanced Organic Chemistry by Bahl & Bahl, S. Chand Publications.
6. Organic Chemistry by Morrison Boyd, Pearson Publications.
7. Advanced Organic Chemistry by Bahl & Bahl, S. Chand Publications.
8. Advanced Organic chemistry-Jagdamba singh and LDS Yadav
10. Advanced Physical chemistry -Gurdeep Raj, Goel Publication
11. Essentials of physical Chemistry-Puri, Sharma, Pathania

### BSC004A: Mixture Analysis and Functional Group identification (Practicals)

#### INORGANIC CHEMISTRY

1. To analyse mixture containing three acidic and three basic radicals (Group I, II and VII).
2. To analyse mixture containing three acidic and three basic radicals (Group II, III and VII).
3. To analyse mixture containing three acidic and three basic radicals (Group IV, VI and VII).
4. To analyse mixture containing three acidic and three basic radicals (Group I, II and V).
5. To analyse mixture containing three acidic and three basic radicals including  $\text{BO}_3^{3-}$  as the interfering radical.
6. To analyse mixture containing three acidic and three basic radicals including  $\text{PO}_4^{3-}$  as the interfering radical.
7. To analyse mixture containing three acidic and three basic radicals including  $\text{C}_2\text{O}_4^{2-}$  or  $\text{F}^-$  the interfering radical.
8. To analyse mixture containing three acidic and three basic radicals. Mixture contains combination of acidic radicals. (Chloride in presence of Bromide or Iodide).
9. To analyse mixture containing three acidic and three basic radicals. Mixture contains combination of acidic radicals. (Oxalate in presence of Carbonate)

#### ORGANIC CHEMISTRY

1. To detect the functional group (alcoholic and phenolic) from the given organic compound.
2. To detect the functional group (Carboxylic and ester) from the given organic compound.
3. To detect the functional group (Carbonyl and Amide) from the given organic compound.
4. To detect the functional group (Amine and Aniline) from the given organic compound.
5. To detect the functional group (Carbohydrate And Nitro) from the given organic compound.

#### PHYSICAL CHEMISTRY

1. To determine the specific reaction rate of the hydrolysis of methyl or ethyl acetate catalysed by HCl at room temperature.
2. To determine the specific reaction rate of the hydrolysis of methyl or ethyl acetate catalysed by  $\text{H}_2\text{SO}_4$  at room temperature and compare the relative strength of acids.
3. To determine the specific reaction rate of the hydrolysis of methyl or ethyl acetate catalysed by HCl at higher temperature ( $40^\circ\text{C}$ ) and also determine energy of activation for the reaction.
4. To study the effect of acid strength on the hydrolysis of ester.
5. To prepare colloidal solution of arsenious sulphide.

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### Semester-III

#### BSC005A: Stereochemistry and solutions

##### Course Outcome

At the end of this course students will be able to:

- CO1: Understand the salient features of p-block Elements (Group 13 and 14) and their different compounds having the industrial and biological applications.
- CO-2: understand physical properties and apply chemical properties of various hydrocarbons viz. alkynes and dienes in different sectors.
- CO-3: develop a sound understanding of the fundamental concepts of stereochemistry.
- CO-4 Understand basic knowledge of ideal and non ideal solutions and their properties and different types of colligative properties of dilute solution.

##### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO-8	PO-9	PO-10	PS O-1	PSO-2	PSO-3
CO1	1	3	2	3	2	1		2	2	2	2	3	1
CO2	2	2	2	1	2	2	1	1	2		2	2	1
CO3	3	2	2	1	3	1		1		2	2	2	2
CO4	2	2	2	2	1	1	1	2	2	1	2	2	2

1 - LOW 2- MEDIUM 3-HIGH

##### Unit-I p-Block Elements :

Comparative study (group-wise) of group 13 & 14 elements with respect to periodic properties. Compounds such as hydrides, halides, oxides and oxyacids; diagonal relationship; preparation, properties, bonding and structure of diborane, borazine and alkali metal borohydrides. Preparation, properties and technical applications of carbides and fluorocarbons. Silicones and structural principles of Silicates, Borazines, Phosphonitridehydrides

##### Unit II: Alkynes and Dienes

Nomenclature, structure and bonding in alkynes. Methods of preparation. Chemical reactions of alkynes, acidity of alkynes. Mechanisms of electrophilic and nucleophilic addition reactions, hydroboration-oxidation, metal-ammonia reduction, oxidation and polymerization.

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**Nomenclature and classification of dienes:** isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions-1,2- and 1,4-additions, Diels-alder reaction

### Unit III: Stereochemistry

Concept of isomerism, types of isomerism. Optical isomerism: elements of symmetry, molecular chirality enantiomers. stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers. meso compounds, resolution of enantiomers, inversion, retention and racemization. Relative and absolute configuration: sequence rules, D & L and R & S systems of nomenclature. Determination of configuration of geometrical isomers, E & Z systems of nomenclature, geometric isomerism in oximes and alicyclic compounds.

**Unit IV: Solutions:** Liquid-liquid - ideal solutions, Raoult's law. Ideally dilute solutions, Henry's law. Non-ideal solutions. Vapour pressure - composition and vapour pressure- temperature curves; Azeotropes-HCl-H<sub>2</sub>O, ethanol-water systems and fractional distillation. Partially miscible liquids-phenol-water, trimethylamine-water, nicotine-water systems. Effect of impurity on consolute temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

### Unit V: Dilute solutions:

Colligative properties. relative lowering of vapour pressure, its relation to molecular weight of non-volatile solute. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods of determination. Osmosis, osmotic pressure, experimental determination. Abnormal Colligative properties- Van't Hoff factor.

**MIT- Osmosis, osmotic pressure, Abnormal Colligative properties- Van't Hoff factor.**

#### Suggested Books

1. Concise Inorganic Chemistry by J.D. Lee
2. Inorganic Chemistry Principles of Structure and Reactivity-Huheey James, E. Keiter Ellen, A. Pearson, Edu. Delhi.
3. Stereochemistry of organic compounds-P.S. Kalsi, New age International
4. Organic chemistry Reaction and Reagents-O.P. Agarwal, Krishna Prakashan Meerut
5. Advanced Organic Chemistry by Bahl & Bahl, S. Chand Publications.
6. Organic Chemistry by Morrison Boyd, Pearson Publications.
7. Advanced Organic Chemistry by Bahl & Bahl, S. Chand Publications.

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8. Advanced Organic chemistry-Jagdamba singh and LDS Yadav  
10. Advanced Physical chemistry -Gurdeep Raj, Goel Publication  
11. Essentials of physical Chemistry-Puri, Sharma, Pathania

### BSC006A Chromatographic Analysis and Calibrations (Practicals)

#### INORGANIC CHEMISTRY

1. To calibrate fractional weights, pipettes and burettes.
2. To prepare standard solution and dilution -0.1 M to .001M solution.
3. To estimate hardness of water by EDTA.
4. To measure dissolved oxygen in water.
5. To measure Total Solid in sewage.
6. To measure chloride in water.

#### ORGANIC CHEMISTRY

##### Thin Layer Chromatography

1. To separate the mixture of Methyl Orange and Methylene Blue by using cyclohexane and ethyl acetate(8.5:1.5) as solvent system.
2. Preparation and separation of 2,4-dinitro Phenylhydrazone of acetone, 2-butanone, hexane-2-one and hexane-3-one using toluene and petroleum ether(40:60).
3. Paper Chromatography
4. To separate the mixture of phenylalanine and glycine. Alanine and aspartic acid. Leucine and glutamic acid. Spray reagent -Ninhydrin.
5. To separate the mixture of D,L-alanine, glycine and L-leucine using n-butanol : acetic acid :water (4:1:5). Spray reagent- Ninhydrin.
6. To separate monosaccharides -a mixture of D -galactose and D-fructose using n-butanol : acetone: water (4:1:5). Spray reagent -aniline hydrogen phthalate.

#### PHYSICAL CHEMISTRY

1. To determine the solubility of benzoic acid at different temperatures and to determine  $\Delta H$  of the dissolution process.
2. To determine the water equivalent of the thermos flask or calorimeter.
3. To determine the enthalpy of neutralization or heat of neutralization for a strong acid and strong base.
4. To determine heat of neutralization of a weak acid say acetic acid and hence calculate its heat of ionization or enthalpy of ionization.
5. To determine heat of neutralization of a weak base say  $\text{NH}_4\text{OH}$  and hence calculate its heat of ionization or enthalpy of ionization.

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## Semester-IV

### BSC007A: Transition & inner transition metals, aromaticity and thermodynamics

#### Course Outcome

At the end of this course students will be able to:

- CO-1: Understand the vast world of transition and inner transition elements with their basket of unique properties
- CO-2 understand the carbohydrates, their occurrence, structure, configuration, properties and also get the knowledge of the role of these bio-molecules in biological system and day to day life.
- CO-3: Interpret the concept of aromaticity, properties and the chemical reactions of aromatic compounds.
- CO-4 Understand basic knowledge of various process of thermodynamics and their properties

#### Mapping of PO/CO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO-8	PO-9	PO-10	PSO-1	PSO-2	PSO-3
CO1	2	3	2	3	2	2	2	2	2	2	3	2	2
CO2	3	2	2	2	3	2	1	2	3	1	2	3	1
CO3	2	2	1	1	3	1	1	1	1		1	2	2
CO4	2	3	2	2	1	2		1	2	1	2	1	1

1 - LOW 2 - MEDIUM 3 - HIGH

#### Unit-I Transition Metals:

Characteristic properties of 3d elements – ionic radii, oxidation states, complexation tendency, magnetic behaviour and electronic spectral properties. Spectrophotometric estimation of metal ions.

#### Unit-II Lanthanides & Actinides:

Comparative study of lanthanide elements with respect to electronic configuration, atomic and ionic radii, oxidation state and complex formation. Lanthanide contraction. Occurrence and principles of separation of lanthanides. Actinides: electronic configuration, atomic and ionic radii, oxidation state, Magnetic and spectral properties

#### Unit III: Carbohydrates

Classification and nomenclature of monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose into

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mannose. Formation of glycosides, ethers and esters. Determination of ring size of monosaccharides. Cyclic structure of D (+) glucose.

#### Unit IV: Arenes & Aromaticity

Nomenclature of benzene derivatives. The aryl group, aromatic nucleus and side chain structure of benzene, molecular formula and Kekule structure, stability.

Huckle's rule, aromatic ions, Aromatic electrophilic substitution-general pattern of the mechanism, role of  $\sigma$  and  $\pi$  complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction, energy profile diagrams. Activating & deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives. Birch reduction

#### Unit-V Thermodynamics-I:

Introduction of different terms and processes in thermodynamics : Systems (isolated, closed, open) and surroundings, macroscopic properties (extensive and intensive), kinds of processes, work, heat and First Law of thermodynamics, state and state functions (exact and inexact differential), path dependence of work and heat. Enthalpy, heat changes at constant volume and constant pressure, heat capacities ( $C_v$ ,  $C_p$ ) and relation between them for ideal gases.

MIT- First Law of thermodynamics, work and heat. Enthalpy.

#### Suggested Books

1. Concise Inorganic Chemistry 5<sup>ed</sup> - J. D. Lee
2. Advanced Inorganic chemistry-S. K Agarwal, Keemtilal
3. Organic Chemistry by Morrison & Boyd
3. Advanced Organic chemistry-Jagdamba singh and LDS Yadav
4. Reaction mechanism in Organic chemistry -S M Mukherji and S P Singh, Macmillan
5. Chemical thermodynamics-R. P. Rastogi and R.R Mishra
6. Advanced Physical chemistry -Gurdeep Raj, Goel Publication
7. Chemical thermodynamics-R. C. Srivastava, S. K. Saha and Abhay K. Jain

**BSC008A: Volumetric Analysis, Identification of Organic Compounds and Conductometric Analysis (Practicals)**

#### INORGANIC CHEMISTRY

##### Volumetric Analysis

1. To determine alkali content in anta acid tablet using HCl.
2. To estimate copper using thiosulphate.
3. To determine acetic acid in commercial vinegar using NaOH solution.

##### Synthesis

4. To prepare Tetraammine copper (II) sulphate.
5. To prepare Ni-DMG complex.

#### ORGANIC CHEMISTRY

B.Sc I year



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**Syllabi and Course Structure**

**B. Sc. (Hons.) Forensic Science**  
**(2022-2025)**

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**DEPARTMENT OF FORENSIC SCIENCE**  
**B.Sc. Honors Forensic Science Programme**

The Universal Declaration of Human Rights directs the member nations to create such conditions under which the ideals of free human beings, enjoying civil and political freedom from fear and want, can be achieved. The Constitution of India, through its various articles, strives to ensure security and safety of citizens in accordance with the principles of Universal Declaration of Human Rights. However, crime is a violation of these principles. In a country like India, where majority of population is uneducated, social set up is heterogeneous, public police relations are not very cordial, poverty is rampant and unemployment widespread, it is not surprising that crime rate is increasing exponentially.

If we have to create conditions conducive to harmonious development, we must mitigate the crime rate. This can best be achieved by relying on the support of forensic science system. Unfortunately, in our country, forensic science is not viewed as a core investigative skill in crime detection. In majority of serious crime cases, hi-tech measures are being adopted by perpetrators of crime. The counter measures have to be more sophisticated to surpass them. This calls for strengthening the foundations of forensic science at national level. It is with this aim that we wish to initiate a B.Sc. (Hons) Course in Forensic Science.

**Course Objectives**

1. To emphasize the importance of scientific methods in crime detection.
2. To disseminate information on the advancements in the field of forensic science.
3. To highlight the importance of forensic science for perseverance of the society.
4. To review the steps necessary for achieving highest excellence in forensic science.
5. To generate talented human resource, commensurating with latest requirements of forensic science.
6. To provide a platform for students and forensic scientists to exchange views, chalk out collaborative programs and work in a holistic manner for the advancement of forensic science.









**JECRC UNIVERSITY**  
**FACULTY OF SCIENCE**  
**SESSION 2022-2023**

Details of Scheme for B.Sc.(Hons.) with various Courses & their credits with contact Hours

**\*\*Note:** In 6th Semester Students have a Choice either he can go for offered Courses or he may avail

Internship in some reputed Institute / Industry or In House Dissertation

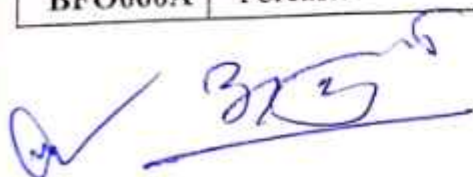
**Semester I**

Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
BFO051A	Basic Forensic Science	4	-	2	4		1	5	Core
BFO052A	Basic Forensic Science Lab								
BFO053A	Basic Forensic Chemistry	4	-	2	4		1	5	Core
BFO054A	Basic Forensic Chemistry Lab								
BFO055A	Basic Forensic Biology	4	-	2	4		1	5	Core
BFO056A	Basic Forensic Biology Lab								
	Web Development	2	0	0	2	0	0	2	Fundamental
	Web Development Lab	0	0	2	0	0	1	1	Fundamental
	Communication Skills	2	0	2	2	0	1	3	Foundation
	Culture Education -I	2	0	0	2	0	0	2	Foundation
	Environment Studies	3		2*	3	0	1	4	Fundamenta
		21		12	21		6	27	

**\*Field/ Project Work and Report**

**Semester II**

Subject Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
BFO057A	Forensic Anthropology	4	-	2	4		1	5	Core
BFO058A	Forensic Anthropology Lab								
BFO059A	Forensic Dermatoglyphics	4	-	2	4		1	5	Core
BFO060A	Forensic								







	Dermatoglyphics Lab			2	4		1	5	Core
BFO061A	Forensic Physics	4	-				1	1	Fundamen
BFO062A	Forensic Physics Lab			2	0	0			Foundati
	Project Management Lab	0	0	2	2	0	1	3	Foundati
	Professional Skills	2	0	0	2	0	0	2	Foundati
	Culture Education-2	2	0				1	5	DSE-1
BFO091A	Forensic Medicine and Pathology	4	-	2	4				
BFO092A	Forensic Medicine and Pathology Lab						6	26	
		20		12	20				

Semester III									
Subject Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
BFO065A	Criminalistics	4	-	2	4		1	5	Core
BFO066A	Criminalistics Lab								
BFO069A	Questioned Documents	4	-	2	4		1	5	Core
BFO070A	Questioned Documents Lab								
BFO110A	Digital Forensics	4	-	2	4		1	5	DSE-2
BFO132A	Digital Forensics Lab								
	Advanced Spread Sheet Lab		-	2			1	1	Fundame
	Life Skills I (Personality Development)	1	0	2	1	0	1	2	Foundat
	Value Education & Ethics -I	1	0	0	1	0	0	1	Foundat
	Open Elective-I	3	0	0	3	0	0	3	Interdiscip
	Research Methodology	3	1	0	3	1	0	4	Interdiscip
		20		10	20		5	26	

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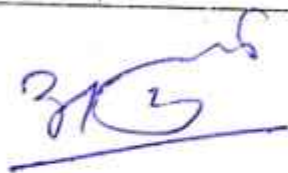
## Semester IV

Subject Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
BFO067A	Forensic Serology and DNA Profiling	4	-	2	4		1	5	Core
BFO068A	Forensic Serology and DNA Profiling Lab								
BFO071A	Forensic Ballistics	4	-	2	4		1	5	Core
BFO072A	Forensic Ballistics Lab								
BFO073A	Forensic Toxicology	4	-	2	4		1	5	Core
BFO074A	Forensic Toxicology Lab								
	Python Programming	2	0	0	2	0	0	2	Fundamental
	Python Programming Lab	0	0	2	0	0	1	1	Fundamental
	Life Skills-II (Aptitude)	1	0	2	1	0	1	2	Foundation
	Value Education & Ethics-2	1	0	0	1	0	0	1	Foundation
	Open Elective-II	3	0	0	3	0	0	3	Interdisciplinary
		19	1	10	19	1	5	24	



## Semester V

S.No	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Catego
					L	T	P		
BFO133A	Economic Offences	4	-	2	4		1	5	Core
BFO134A	Economic Offences Lab								
BFO114A	Discipline Specific Elective-II (Psychological Assessment)	4	-	2	4		1	5	DSE-3
BFO115A	Discipline Specific Elective-II Lab (Psychological Assessment Lab)								
BFO135A	Cyber Security	4		2	4		1	5	DSE-4
BFO136A	Cyber Security Lab								
	Open Elective III	3	-	-	3			3	Interdisciplin
BFO075A	Project			12			6	6	Disciplin Specific
		15		18	15		9	24	





Semester VI: \*\*Note: In 6th Semester Student have a Choice either he can go for offered Courses or he may avail Internship in some reputed Institute / Industry or In House Dissertation

S.No	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
BFO076A	Instrumentation	4	-	2	4		1	5	DSE-5
BFO077A	Instrumentation Lab								
BFO078A	Applied Forensic Biology	4	-	2	4		1	5	DSE-6
BFO079A	Applied Forensic Biology Lab								
BFO080A	Accidental Investigations	4	-	2	4		1	5	DSE-7
BFO081A	Accidental Investigation Lab								
BFO137A	Advanced Forensic Chemistry	4	-	2	4	0	1	5	Interdisciplinary
BFO138A	Advanced Forensic Chemistry Lab								
	Seminar	1		0	1		0	1	Interdisciplinary
		17		8	17		4	21	

**Total Credits**

Credits	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total
	27	26	26	24	24	21	148

**Open Electives Offered**

Subject Code	Subject	Lecture Hrs.	Credits
DFO084A	Forensic Psychology	3	3
DFO085A	Forensic Toxicology		
DFO086A	Criminology		



**Discipline Electives\*** Student can choose any one of the following tracks under discipline specific electives.

Tracks	Cours eCode	Title	L	P	T	C
Advanced Forensic Medicine	BFO087A	Forensic Pharmacology	4			4
	BFO088A	Forensic Pharmacology Lab		1		1
	BFO089A	Forensic Psychiatry	4			4
	BFO090A	Forensic Psychiatry Lab		1		1
	BFO091A	Forensic Medicine & Pathology	4			4
	BFO092A	Forensic Medicine & Pathology Lab		1		1
	BFO093A	Medico-Legal Aspects of Injuries	4			4
	BFO094A	Medico-Legal Aspects of Injuries Lab		1		1
	BFO095A	Sexual Offenses	4			4
	BFO096A	Sexual Offenses Lab		1		1
Advanced Forensic Toxicology	BFO097A	Toxic Agents	4			4
	BFO098A	Toxic Agents Lab		1		1
	BFO099A	Disposition and Translocation of Toxicants	4			4
	BFO100A	Disposition and Translocation of Toxicants Lab		1		1
	BFO101A	Agrochemical Poisons	4			4
	BFO102A	Agrochemical Poisons Lab		1		1
	BFO103A	Drugs of Abuse	4			4
	BFO104A	Drugs of Abuse Lab		1		1
	BFO105A	Analytical Toxicology	4			4
	BFO106A	Analytical Toxicology Lab		1		1
Digital & Cyber Forensics and Economic Offences	BFO133A	Economic Offences	4		1	5
	BFO134A	Economic Offences Lab				
	BFO110A	Digital Forensics	4		1	5
	BFO132A	Digital Forensics Lab	4			4
	BFO135A	Cyber Security		1		1
	BFO136A	Cyber Security Lab	4		1	5
Advanced Forensic Psychology	BFO112A	Mental Illness and criminal behavior	4			4
	BFO113A	Mental Illness and criminal behavior Lab				
	BFO114A	Psychological Assessment		1		1
	BFO115A	Psychological Assessment Lab	4			4
				1		1


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Forensic Biotechnology	BFO116A	Intelligence: Cognitive, Practical & Emotional	4			4
	BFO117A	Intelligence: Cognitive, Practical & Emotional Lab		1		1
	BFO118A	Personality: Uniqueness & Consistency in the behavior of Individuals	4			4
	BFO119A	Personality: Uniqueness & Consistency in the behavior of Individuals Lab		1		1
	BFO120A	Health, Stress & Coping	4			4
	BFO121A	Health, Stress & Coping Lab		1		1
	BFO122A	Human Biochemistry	4			4
	BFO123A	Human Biochemistry Lab		1		1
	BFO124A	DNA Fingerprinting	4			4
	BFO125A	DNA Fingerprinting Lab		1		1
	BFO126A	Forensic Nanobiotechnology	4			4
	BFO127A	Forensic Nanobiotechnology Lab		1		1
	BFO128A	Environmental Biotechnology	4			4
	BFO129A	Environmental Biotechnology Lab		1		1
	BFO130A	Population Genetics and Bioinformatics	4			4
	BFO131A	Population Genetics and Bioinformatics Lab		1		1

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**JECRC UNIVERSITY**  
**SCHOOL OF SCIENCES**  
**DEPARTMENT OF FORENSIC SCIENCE**  
**B.SC. (HONS) FORENSIC SCIENCE**

**Program Educational Objective (PEO's):**

- PEO1: To provide the basic knowledge and principles of Forensic Science.  
PEO2: To develop problem-solving skills in a stepwise manner.  
PEO3: To inculcate diverse skills and abilities involved in various fields of Forensic Science.  
PEO4: To develop laboratory skills.  
PEO5: To develop conceptual understanding of Criminal Justice System and Legal System.  
PEO6: To produce ethical and skillful graduates articulating the professional standards.

**Program Outcome (PO's)**

A graduate of the B.Sc. (Hons) in Forensic Science Program will:

- PO1: Apply the knowledge of basic and applied sciences, engineering, social sciences and arts to various forensic problems. **(Basic and Discipline specific knowledge)**  
PO2: Identify and analyze forensic problems using standard methods based on scientific approach. **(Problem Analysis)**  
PO3: Understand, select, and apply appropriate techniques, resources, and modern scientific techniques with an understanding of its merits and limitations. **(Modern tool usage)**  
PO4: Apply ethical principles and commit to professional ethics and responsibilities and norms in the forensic practices. **(Ethics)**  
PO5: Speak, read, write and listen clearly in person and through electronic media in English and one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology. **(Effective Communication)**  
PO6: Understand and analyze the impact of forensic solutions to the society and criminal justice setup. **(Forensic practices for society and criminal Justice setup)**  
PO7: Function effectively as an individual, and as a member or leader in diverse teams, and in a multidisciplinary setting. **(Individual and team work)**

**Program Specific Outcomes (PSO's)**

- In pursuit of the general objective of producing these self-reliant young Forensic Scientists and contributing to scientific knowledge, the following are the **Program Specific Outcome** of the B.Sc. (Hons) in Forensic Science degree Programme:  
PSO1: Understand the concepts of basic and applied sciences including psychology and their applications in forensics  
PSO2: Analyze the sample in field and laboratory test of crime exhibits with the latest norms and standards  
PSO3: Analyze the different crime scenario and make decision regarding analysis of crime exhibits  
PSO4: Evaluate various results and present them in the court of law on requirements
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Semester I								
Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Paper Category
					L	T	P	
BFO051A	Basic Forensic Science	4	-	2	4		1	5
BFO052A	Basic Forensic Science Lab							
BFO053A	Basic Forensic Chemistry	4	-	2	4		1	5
BFO054A	Basic Forensic Chemistry Lab							
BFO055A	Basic Forensic Biology	4	-	2	4		1	5
BFO056A	Basic Forensic Biology Lab							
	Web Development	2	0	0	2	0	0	2
	Web Development Lab	0	0	2	0	0	1	1
	Communication Skills	2	0	2	2	0	1	3
	Culture Education -1	2	0	0	2	0	0	2
	Environment Studies	3		2*	3	0	1	4
		21		12	21		6	27

\*Field/ Project Work and Report

#### SEMESTER-I

L	T	P	C
4	-	1	5

#### BFO051A: BASIC FORENSIC SCIENCE


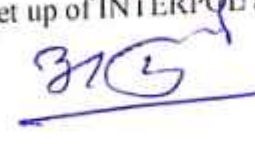


CREDIT(S)-4

##### Unit I - History and Development of Forensic Science

Functions of forensic science. Historical perspective of forensic science. Definitions and concepts in forensic science. Scope of forensic science. Need of forensic science. Basic principles of forensic science. Branches of forensic science.

##### Unit II - Organizational Set Up

Hierarchical set up and the role and functions of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, CID, CBI. Forensic science in international perspectives, including set up of INTERPOL and FBI.

**Unit III - Police and Forensic science**  
Police & Detective Training Schools, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories, Police Academies. Police dogs. Services of crime laboratories. Basic services and optional services.

**Unit IV - Physical Evidences**  
Definition, Types of Evidences, physical evidences and their importance in criminal investigation. Collection and preservation of physical evidences: Toxicological Evidences, Biological Evidences, Petroleum products, trace items, Entomological Evidences, Dental Evidences, bones, Fingerprints, Questioned Document, Diatoms, Tool Marks.

**Unit V - Crime Scene Investigation and Management**  
Types and classification of Crime Scene, Crime Scene Management, Initial response, Securing the scene of crime, Various crime scene search methods, Various methods of preservation of crime scene: Photography, Sketching, Videography, Voice Recording, Notes taking. Collection methods and labelling, packing and forwarding of evidences, documentation and chain of custody, Role of First Responding Officer and Investigating officer. Duties of forensic scientists. Code of conduct for forensic scientists. Qualifications of forensic scientists. Report writing

**Course Outcomes:** After studying this course the students will know

- CO1 The fundamental principles and functions of forensic science, its development and progress over the time  
CO2 The working of the forensic establishments in India and abroad.  
CO3 The role of police in the investigation  
CO4 The physical evidences & their methodology of collection & preservation  
CO5 Crime scene investigation and management

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	H	L	L	L	-	L	L	L	M	M	L
CO2	L	L	L	L	-	L	L	L	M	H	L
CO3	M	L	L	H	-	M	L	L	H	H	H
CO4	H	H	H	M	-	L	M	L	H	H	H
CO5	L	L	L	L	-	M	L	L	L	L	L

**Suggested Readings (Latest Editions)**

1. Crime Scene Management - A Forensic Approach by Dr. M. S. Rao and Dr. B. P. Maithil
2. Sharma, B.R., Forensic Science in Criminal Investigation & Trials, Universal Publishing Co., New Delhi, 2003
3. Nanda B.B and Tewari, R.k. Forensic Science in India- A vision for the Twenty First Century, Select publisher, N. Delhi, 2001.
4. James, SH and Nordby, J.J., Forensic Science- An Introduction to Scientific and investigative Techniques, CRC Press, USA (2003)



5. Saferstein; Criminalistics- An Introduction of Forensic Science, Prentice Hall Inc, USA, 2007.
6. Sharma, B.R. (1974) Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
7. Forensic Science in Crime Investigation by B.S. Nabar
8. Houck, M.M. & Siegel, J.A; Fundamentals of Forensic Science, Academic Press, London, 2006.

#### **BFO052A: BASIC FORENSIC SCIENCE LAB**

**CREDIT-1**

1. To study the annual reports of National Crime Records Bureau and depict the data of different type of crime cases with the help of smart art/templates.
2. To process a mock indoor crime scene
3. To perform the sketching of indoor crime scene
4. Collection, Packing, Labelling & Forwarding of the Following Physical evidences: (A) Biological Fluids (B) Soil/Dust (C) Wet Exhibits (D) Hair/Fibre (E) Glass material (F) Liquids (G) Pharmaceutical products/Drugs of Abuse (H) Botanical Material (I) Shell Case / Cartridge / Bullet /Pellets, (J) Charred Documents etc.
5. To process a mock outdoor crime scene.
6. To perform the sketching of outdoor crime scene
7. Preservation of dental evidences
8. To perform the photography of bite marks
9. To perform the photography of fingerprints
10. To perform the photography of questioned document.

#### **BFO053A: BASIC FORENSIC CHEMISTRY**

**CREDITS-4**

##### **Unit I - Periodic Properties (Chemistry of S & P – block elements)**

S Block Elements: Properties, Electronic configuration, Atomic and ionic radii, Ionization potential, oxidation states, Magnetic properties, etc.

P Block Elements: Properties, Electronic configuration, Atomic and ionic radii, Ionization potential, Variable oxidation states, Magnetic properties, Complex formation, etc.

##### **Unit II –Petroleum Products & Narcotic Drugs**

Petroleum Products - Definition, classification, distillation and fractionation of petroleum. Commercial uses of different petroleum fractions, adulteration of petroleum products.

Narcotic Drugs - Introduction, drug effects, drug hazards, tolerance and dependence of drugs, Problems of drug addiction. Identification of a drug addict, drug addicts and crimes, Classification of Narcotics and other drugs. Introduction to NDPS act.

##### **Unit III – Forensic Chemistry**

Food adulteration- Definition of food and food adulteration, food additives and food adulterants, Prevention of Food Adulteration Act, Detection of common adulterants used in food products by physical and chemical methods.

Dyes, Paints, Pesticides and Insecticides- Nature, classification, composition, uses and significance in forensic science.

##### **Unit IV – Physical Chemistry**

Free volume of liquid and density measurement, physical properties of liquid, Vapor pressure, surface tension surfactants, viscosity, molar refraction, optical activity, structure of liquid, Applications of surface tension, viscosity and refractive index. Solutions: Method of exploring concentration of solutions, binary liquids, distillation, fractional distillations, vacuum distillations.

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**Unit V – Analytical Chemistry**  
 Gravimetric Analysis-Principle, theory and types of Gravimetric analysis, properties of precipitates and precipitating agents, application of gravimetric methods  
 Volumetric Analysis- Principle, theory and types of volumetric analysis, Acid-base, complexometric, redox and precipitation titrations, applications of volumetric analysis  
 Chromatography: Principle, theory, stationary phases, mobile phases, retardation factor and applications of Paper Chromatography, Column chromatography, TLC, HPLC, etc.

**Course Outcomes:** After the completion of this course, students will be able to understand-  
 CO1 Physical and chemical behavior of elements, trends in properties and formation of different complexes.

CO2 Natural occurrence and synthesis of heterocyclic compounds, their properties, importance in formation of commercial products like dyes, drugs, paints etc.

CO3 Importance and functioning of biological system in body, cycle of oxygen, role of Iron and other metals in human body cycles.

CO4 Properties of liquids and solutions

CO5 Introductory idea and applications of various analytical methods in chemical analysis and analysis of trace elements.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	-	-	L	L	M	M	M	L
CO2	H	M	M	-	-	L	L	M	H	H	M
CO3	H	L	L	-	-	L	L	M	L	L	L
CO4	H	L	L	-	-	L	L	M	M	M	L
CO5	H	M	H	-	-	L	L	M	H	H	H

#### Suggested readings: (Latest Editions)

1. Principles of Physical Chemistry and Puri, Sharma and Pathania, Vishal Publishing Company, 46th Edition 2013
2. Organic Chemistry by Moris and Boyed, Pearson Publishing, 7th edition 2011.
3. Text book of organic chemistry by Arun Bahl and B. S. Bahl, S. Chand Publishing, 2016
4. "A New Concise Inorganic Chemistry", J. D. Lee, 5th Edition (1996), Chapman & Hall, London
5. B.K. Sharma, "Industrial Chemistry", Krishna Prakasam Media (P) Ltd., Meerut, 2001.
6. "Modern Methods of Chemical Analysis", R. L. Pecsok, L. D. Shields, T. Cairns, and I. C. McWilliam, 2nd Edition (1976), John Wiley, New York.
7. "Basic Concepts of Analytical Chemistry", S. M. Khopkar, 2nd Edition (1998), New Age International Publications, New Delhi.

#### BFO054A: BASIC FORENSIC CHEMISTRY LAB

1. Introduction to Chemistry laboratory apparatus and instruments.
2. Standardization of given liquid by primary standard.

CREDIT-1



3. To determine surface tension of the given liquid by using stalagmometer.
4. To determine relative viscosity of given organic liquids by viscometer (Four liquids)
5. Determination of functional groups
6. Analysis of acid and basic radicals.
7. Detection of elements.
8. Separation of mixture of dyes by TLC
9. Separation of mixture of two organic compounds by Column chromatography
10. Analysis of adulteration in food stuff.

**CREDITS-4**

## **BFO055A: BASIC FORENSIC BIOLOGY**

### **Unit I – Crime Scene and Biological Evidences**

Crime scene investigation with respect to biological and serological evidences, Recognition of Biological Evidence, Collection of Biological Evidence, Marking Evidence, Packaging and Transportation, Laboratory analysis, comparison, and expert testimony for biological evidences.

### **Unit II – Cell Biology and Basic Biochemistry**

Cell theory and cell as the basic unit of life, structure of prokaryotic and eukaryotic cells; cell organelles – Endoplasmic reticulum, Golgi complex, Mitochondria, Chloroplast and Lysosomes. Amino Acids, Carbohydrates and Lipids- Definition, biological and forensic importance, classification and their properties.

### **Unit III – Basics of Genetics**

Mendel's laws of inheritance, mitochondrial inheritance. Genetic material: Griffith's experiment, Avery, McCleod and McCarty, Hershey and Chase experiment, RNA as genetic material; experimental proof. Structure of DNA: X-ray crystallography, Chargaff's rule, Watson-Crick's double helical model of DNA, types of DNA. Types of RNA.

### **Unit IV – Botanical Evidences**

Identification and examination of botanical evidences - pollen, seeds, leaves, flowers, fruits and wood. Forensic examination of botanical evidences. Diatoms and their forensic significance.

### **Unit V – Forensic Entomology**

Introduction & History of forensic entomology, Identification of insects, insect growth and life cycle, Dipterans Larval Development, Successional Colonization of Body, Determination of displacement and disturbance of the body, Presence and Position of wounds, Determination of Time elapsed since death, Collection and preservation of insects, Challenges encountered in Entomology, Entomotoxicology – Definition and concept.

**Course Outcomes** -On completion of the course, students are able to:

- CO1 Understand the crime scene management of biological evidences
- CO2 Understand the basis of life through cell biology and biochemistry
- CO3 Know basic of genetics by studying the concept of DNA and RNA
- CO4 Deal with the botanical evidence in the investigation
- CO5 Understand the field of forensic entomology and forensically important insects



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PRC  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	L	L	-	-	L	L	H	M	M
CO2	H	M	H	-	-	L	L	H	M	M
CO3	H	M	M	-	-	L	L	H	H	H
CO4	H	M	L	-	-	L	L	H	H	H
CO5	H	L	L	-	-	L	L	H	M	L

**Suggested books (Latest Editions)**

1. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology: Evolution and Ecology Verma P.S. (Author), Agarwal V.K. (Author)
2. L. Stryer, Biochemistry, 3rd Edition, W.H. Freeman and Company, New York (1988).
3. R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Harper's Biochemistry APPLETON & Lange, Norwalk (1993).
4. S. Chowdhuri, Forensic Biology, BPRD, New Delhi (1971).
5. R. Saferstein, Forensic Science Handbook, Vol. III, Prentice Hall, New Jersey (1993).
6. G.T. Duncan and M.I. Tracey, Serology and DNA typing in, Introduction to Forensic Science 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997)
7. Forensic entomology: an introduction By Dorothy E. Gennard Wiley

**BFO056A: BASIC FORENSIC BIOLOGY LAB**

**CREDIT-I**

1. Introduction to instrument and Glassware of the laboratory
2. To acquaint yourself with the calibration of laboratory equipment.
3. To become aware with the laboratory safety practices
4. Hands on practice upon optical microscope- compound & dissecting
5. Microscopic examination of cell organelles
6. Crime scene investigation of different biological evidences
7. Microscopic examination of different pollen grains.
8. Identification of different types of leaves
9. Collection and preservation of forensically important insects
10. DNA extraction from detergents.

# Semester II

Subject Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
BFO057A	Forensic Anthropology	4	-	2	4		1	5	Core
BFO058A	Forensic Anthropology Lab								
BFO059A	Forensic Dermatoglyphics	4	-	2	4		1	5	Core
BFO060A	Forensic Dermatoglyphics Lab								
BFO061A	Forensic Physics	4	-	2	4		1	5	Core
BFO062A	Forensic Physics Lab								
	Project Management Lab	0	0	2	0	0	1	1	Fundamental
	Professional Skills	2	0	2	2	0	1	3	Foundation
	Culture Education-2	2	0	0	2	0	0	2	Foundation
BFO091A	Forensic Medicine and Pathology	4	-	2	4		1	5	DSE-1
BFO092A	Forensic Medicine and Pathology Lab								
		20		12	20		6	26	

## SEMESTER-II

L	T	P	C
4	-	1	5

### BFO057A: FORENSIC ANTHROPOLOGY

CREDITS- 4

#### Unit I - Introduction to Forensic Anthropology

Introduction to the field, historical perspective, Scope of forensic anthropology, significance in forensic investigation.

#### Unit II – Osteology

Osteology: structure, characteristics, types and function of bone, human skeleton-axial and appendicular with reference to skull, pelvis and long bones, centers of ossification, pre-natal and post-natal ossification, types of sutures.

#### Unit III - Personal Identification

Somatoscopy – observation of hair on head, forehead, eyes, root of nose, nasal bridge, nasal tip, chin, Darwin's tubercle, ear lobes, supra-orbital ridges, physiognomic ear breadth, circumference of head. Scar marks and occupational marks.

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Somatometry – measurements of head, face, nose, cheek, ear, hand and foot, body weight, height.  
Indices - cephalic index, nasal index, cranial index, upper facial index.

#### Unit IV – Facial Reconstruction

Portrait Parle/ Bertillon system. Facial superimposition techniques. Cranio facial superimposition techniques – photographic super imposition, Video superimposition, Roentgenogram superimposition. Use of somatoscopic and craniometric methods in reconstruction. Importance of tissue depth in facial reconstruction. Determination of age, sex, stature from skeletal material.

#### Unit V – Exhumation

Exhumation- Definition, objectives, identification methods, examination. Exhumation procedure. India; Medico-legal importance. Case studies, legal procedure and legal aspects.

**Course Outcomes-** After studying this course students will

CO1 Have familiarity with the field of forensic anthropology

CO2 Know the significance of forensic anthropology in investigation process

CO3 Have through understanding of personal identification through somatoscopy and somatometry

CO4 Have understanding of facial reconstruction techniques

CO5 Have understanding of exhumation.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	H	L	L	-	-	L	-	L	L	L	L
CO2	H	L	L	-	-	L	-	L	L	L	L
CO3	H	M	M	-	-	L	-	H	M	M	M
CO4	H	M	H	-	-	L	-	H	H	H	H
CO5	H	M	L	-	-	L	-	H	L	L	L

#### Suggested Readings: (Latest Editions)

1. M.Y. Iscan and S.R. Loth, The scope of forensic anthropology in, Introduction to Forensic Sciences, 2 nd Ed., W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
2. D. Ubelaker and H. Scammell, Bones, M. Evans & Co., New York (2000).
3. S. Rhine, Bone Voyage: A Journey in Forensic Anthropology, University of Mexico Press Mexico (1998)
4. Linda I. Klepinger: fundamentals of forensic anthropology, a John Wiley & Sons, Inc., publication
5. DFS Manuals of Forensic Science

#### BFO058A: FORENSIC ANTHROPOLOGY LAB

1. Determination of age from skull sutures.
2. To determine age from skull and teeth.

CREDIT-1

3. To determine of sex from skull.
4. To determine sex from pelvis.
5. To study identification and description of bones and their measurements.
6. To investigate the differences between animal and human bones.
7. To perform somatometric measurements on living subjects.
8. To carry out craniometric measurements of human skull.
9. To estimate stature from long bone length.
10. To conduct portrait parley.

## **BFO059A: FORENSIC DERMATOGLYPHICS**

**CREDITS: 4**

### **Unit I – Introduction to Fingerprints**

Fingerprints as evidence: Its recognition, Collection and Preservation, History and Development of fingerprints, Structure of friction skin, Formation of ridges, Fingerprints patterns, Pattern Areas, Composition of Sweat, forensic importance.

### **Unit II – Basics of Fingerprints**

Types of Fingerprints, Patterns of Fingerprints, and Characteristics of Fingerprints (Ridge Counting, Ridge Tracing, and Minutiae). Lifting & preservation of Fingerprint from various surfaces. Pores – Location & function; Poroscopy and Edgescopy & its Significance.

### **Unit III - Fingerprint Recording**

Methods of taking fingerprint from living person: Rolled & Plain. Methods of taking fingerprint from dead person in various conditions like: in case of setting-in of rigor mortis, drowning, burning and shrinking of phalanges.

### **Unit IV - Fingerprint Classification Systems**

Classification of Fingerprint: Ten-digit classification system (Primary, Secondary, Sub-secondary, Final Classification); Single digit classification, Battley single digit system; Automated Fingerprint System.

### **Unit V - Fingerprint Development Methods**

Various methods of development of latent fingerprints: Physical methods (powder, magna brush and iodine development). Chemical methods (Silver nitrate, Ninhydrin & Cynoacrylate development).

**Course Outcomes -** After studying this course students will

- CO1 Have familiarity with fingerprint science
- CO2 Have conceptual understanding of fingerprint types, patterns and examination parameters
- CO3 Know about fingerprint recording procedure
- CO4 Be able to classify fingerprints using various classification systems
- CO5 Be able to develop fingerprints by physical, chemical and fuming methods.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
						L	-	H	L	L
CO1	H	L	L	-	-	M	-	H	H	H
CO2	H	M	M	-	-	L	-	H	L	L
CO3	H	L	M	-	-	L	-	H	L	L
CO4	H	L	L	-	-	L	-	H	H	H
CO5	H	H	H	-	-	L	-	H	H	H

**Suggested Readings: (Latest Editions)**

1. Bridges, B.C; Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting expert Testimony, Opinion Evidence., Univ. Book Agency, Allhabad, 2000
2. Mehta, M.K; Identification of Thumb impression & cross examination of Fingerprints, 3. N.M. Tripathi Pub. Bombay, 1980.
4. Chatterjee, S.K; Speculation in Fingerprint Identification, Jantralekha printing Works, Kolkata 1981.
5. Cowger James F; Friction Ridge Skin- Comparison & Identification of Fingerprints, CRC Press NY, 1993
6. Cossidy, M.J; Footwear Identification, Royal Canadian, Mounted Police, 1980.
7. Iannavelli, A.V; Ear Identification, Forensic Identification Series, Paramount, 1989.
8. Henry, C.L. & Ganesslen, R.E; Advances in Fingerprint Technology, CRC Press, London, 1991.
9. Jain, A.K., Flynn, P. & Ross A.A., Handbook of Biometrics, Springer, New York 2008
10. Lee and Gaenslen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed. CRC Press, Boca Raton (2013).

**BFO060A: FORENSIC DERMATOGLYPHICS LAB**

**CREDIT-1**

1. Recording of 10 digits fingerprints (Plain and rolled prints).
2. Identification of fingerprint pattern in latent and patent fingerprint.
3. Development of latent prints using fuming method.
4. Development of latent prints from various surfaces using powder method.
5. Lifting and preservation of fingerprints from various surfaces.
6. To perform ridge counting and ridge tracing.
7. To identify the minutiae in the fingerprint.
8. Comparison of fingerprints for matching.
9. Development of fingerprint using chemical method
10. Fingerprint report writing.

**BFO061A: FORENSIC PHYSICS**

**CREDITS: 4**

**Unit I - Properties of Materials**

Elastic Properties of Materials: Hooke's Law; Young's modulus; Shear modulus; Modulus of rigidity; Strength of materials. Laws of electromagnetic induction. Electric motors. Alternating current. Electrical and magnetic properties of materials.

## Unit II – Nuclear Radiations

Properties, origin, mechanism of production, applications in forensic science. Radioactivity: Natural radioactivity; Alpha decay; Beta decay; Gamma decay. Nuclear hazards. Nuclear fission. Nuclear fusion. Nuclear reactors. Ultrasonic waves, X-rays, Nuclear radiations.

## Unit III - Forensic Glass Examination

Glass: Composition of Glass, Comparison of Glass Fragments, Measuring and Comparing Density and Refractive Index of Glass, Classification of Glass Samples, Glass Fractures. Collection, packaging, preservation of glass exhibit.

## Unit IV – Optics and LASER

Fermat's Principle, Laws of Reflection and Refraction, Electromagnetic Nature of Light, Temporal Coherence, Spatial Coherence, Coherence length, Coherence time and Spectral Purity.

LASER: Introduction, Properties, Einstein Relation and Threshold Conditions for Laser action, Types of Lasers: Ruby LASER. He-Ne LASER. Carbon Dioxide LASER. Semi-conductor (Diode) LASER. Industrial Applications of LASER.

## Unit V - Introduction to Speaker Identification and Tape Authentication

Voice Production Theory-Vocal Anatomy, Speech Signal Processing & Pattern Recognition- Basic Factors of Sound in Speech, Acoustic Characteristics of Speech Signal, Fourier Analysis, Frequency & Time Domain Representation of Speech Signal, Analogue to Digital Signal and Conversion, Fast Fourier Transform, Quantization, Digitization and Speech Enhancement, Analysis of Audio-Video Signal for Authenticity.

**Course Outcomes-** After studying this course the students will have –

CO1 Understanding of properties of materials

CO2 Thorough knowledge of various radiations

CO3 Understanding of forensic glass examination and students will have an idea how glass can play a crucial role in forensic investigation

CO4 Thorough understanding of different lasers and their action mechanisms

CO5 Conceptual knowledge of speaker identification and tape authentication and its relevance as well as importance in investigations.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	H	L	L	-	-	L	L	H	M	M	M
CO2	H	M	H	-	-	L	L	H	M	M	L
CO3	H	M	M	-	-	L	L	H	H	H	H
CO4	H	L	M	-	-	L	L	H	L	L	L
CO5	H	M	H	-	-	M	L	H	H	H	H



**Suggested Readings: (Latest Editions)**  
 1. D. K. Bhattacharya and A. Bhaskaran: Engineering Physics, Oxford University Press.  
 2. A. K. Ghatak and Thyagrajan, Fiber Optics, Oxford University Press.

3. S. O. Pillai, Solid State Physics, Wiley Eastern
4. Arthur Beiser, Perspectives in Modern Physics, McGraw Hill International.
5. Lasers: Theory and Application; Thyagrajan
6. Introduction to Lasers; Avadhanulu, Hemne
7. Text Book of sound; Khanna, Bedi
8. Fundamental of Acoustics; Kinsler
9. Basic Acoustics; D. E. Hall
10. The Physics of Speech; D. B. Fry
11. Applied Speech and Audio Processing; Ian McLoughlin
12. Fundamentals of Speech Recognition
13. Forensic Science: An Introduction to Scientific and Investigative Techniques 3rd ed. By Stuart James

CREDIT-1

### **BFO062A: FORENSIC PHYSICS LAB**

#### **Experiments on Mechanics and Optics**

1. To determine the Young's Modulus.
2. To determine the Height of a Building using a Sextant.

#### **Experiments on Electronics**

3. To test a Diode and Transistor using (a) a Multimeter and (b) a CRO.
4. To measure (a) Voltage, (b) Frequency and (c) Phase Difference using a CRO.
5. To study Diode/Zener Diode characteristics.
6. To study Transistor characteristics.

#### **Experiments on Optics and Laser**

7. To measure Numerical Aperture of an Optical Fiber.
8. To determine the Coherent Length and Coherent Time of LASER using Semiconductor
9. To determine the profile of He-Ne LASER beam.
10. To determine the Wavelength and the Angular Spread of a He-Ne Laser.
11. To acquaint with the Logic Gates and verify their truth tables.

#### **Experiments on Atomic and Nuclear Physics**

12. To understand the random characteristic of radioactivity using GM counter.

#### **Speech Identification and Tape Authentication**

13. Understanding the analysis of audio recordings with the help of suitable software.

#### **Forensic Examination of Glass**

14. To compare glass samples by refractive index method.

### **BFO091A: FORENSIC MEDICINE AND PATHOLOGY**

#### **Unit 1: Introduction**

Introduction to Forensic Medicine, Medico-legal investigation and its objectives

CREDITS: 4

#### **Unit 2: Post Mortem Changes**

Classification, Biochemical changes, Algor Mortis, Livor Mortis, Rigor Mortis, Late Changes  
 Decomposition, Skeletonization, Time since death.

(12/20)

3/5

Wice

### Unit 3: Forensic Thanatology

Determination and cause of death, Manner of Death, Exhumation, Modern techniques for estimation of time since death.

### Unit 4: Asphyxial Deaths

Classification of Asphyxial deaths, Mechanical Asphyxia- Hanging, Strangulation, Traumatic Asphyxia, Drowning, Post mortem appearances

### Unit 5: Forensic Entomology

Species of Forensic Importance and their life cycle, Estimation of time since death, Cause of death, Identification of crime of scene.

**Course Outcomes-** After studying this course student will

CO1 Be introduced with the field of Forensic Medicine

CO2 Be aware of the post mortem changes

CO3 Understand forensic Thanatology

CO4 Understand the classification of asphyxial deaths

CO5 Understand the estimation of time since death with the aid of forensically important insects

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	H	L	L	L	-	L	-	H	L	L	L
CO2	H	M	L	-	-	M	-	H	H	H	H
CO3	H	M	L	-	-	M	-	H	H	H	H
CO4	H	M	L	L	-	M	-	H	H	H	H
CO5	H	M	L	L	-	M	-	H	H	H	H

### BFO092A- FORENSIC MEDICINE AND PATHOLOGY

CREDIT 1

1. To visit the autopsy centre for the study of cause of death. ✓
2. To study the different biochemical changes after death virtually. ✓
3. To collect and preserve the forensically important insects. ✓
4. To analyze the time since death with the help of insects. ✓
5. To study the life cycle of insects. ✓
6. To identify the type of insect with the help of microscopes. ✓
7. To identify the type of drowning- ante/ post. ✓
8. To cite a drowning case. ✓
9. To identify the type of crime scene with the help of insects. ✓

*G. H. Sule*

*31/5*

*Dr. H. S. Wani*

*Wani*





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**Department of Mathematics**

**Course Structure and Syllabi**

**Session 2022-23**



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BUILD YOUR WORLD

**Department of Mathematics**  
**Course Structure and Syllabi**  
**B.Sc. Mathematics (Hons.) course**  
**Session 2022-25**

# Summary Sheet

B.Sc. Mathematics (Hons.) 2022-23			
S.No	Category of Courses	Credits (L,T,P)	Total Credits
1	Foundation Courses	12, 0, 4	16
2	Core Courses	44, 11, 11	66
3	Departmental Electives	28, 7, 0	35
4	Fundamental	7, 0, 5	12
5	Interdisciplinary	17, 2, 0	19
	<b>Total</b>	<b>109, 19, 20</b>	<b>148</b>

Note: 1. Discipline specific considered as core course.








## Semester I

S. No.	Subject code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Lecture Credit			Total Credits	Course Type
						L	T	P		
1	BMA021C	Calculus	4	1	0	4	1	0	5	Core Course 1
2	BMA041A	Algebra and Geometry	4	1	0	4	1	0	5	Core Course 2
3	BMA042A	Probability and Statistics	4	1	0	4	1	0	5	Core Course 3
4	DCA001A	Web Development	2	0	0	2	0	0	2	Fundamental
5	DCA002A	Web Development Lab	0	0	2	0	0	1	1	Fundamental
6	DEN001A	Communication Skills	2	0	2	2	0	1	3	Foundation
7	DIN001A	Culture Education -1	2	0	0	2	0	0	2	Foundation
8	DCH001A	Environment Studies	3	0	2	3	0	1	4	Fundamental
		Total	21	3	6	21	3	3	27	
Swayam Course			Student can opt any course from Swayam Portal in addition to the above course structure.							








## Semester II

S.No.	Subject code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Lecture Credit			Total Credits	Course Type
						L	T	P		
1	BMA043B	Group Theory	4	1	0	4	1	0	5	Core Course 4
2	BMA044A	Multivariable Calculus	4	1	0	4	1	0	5	Core Course 5
3	BMA006D	Real Analysis	4	1	0	4	1	0	5	Core Course 6
4	BMA045A	SCILAB-I	0	0	2	0	0	1	1	Core Course 12 (a)
5	DC0011A	Presentation Skills using Canva	0	0	4	0	0	2	2	Fundamental
6	DEN002A	Professional Skills	2	0	2	2	0	1	3	Foundation
7	DIN002A	Culture Education -2	2	0	0	2	0	0	2	Foundation
		Total	16	3	6	16	3	3	23	
Swayam Course			Student can opt any course from Swayam Portal in addition to the above course structure.							








### Semester III

S.No.	Subject code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Lecture Credit			Total Credits	Course Type
						L	T	P		
1	BMA007D	Numerical Analysis	4	1	0	4	1	0	5	Core Course 7
2	BMA014C	Complex Analysis	4	1	0	4	1	0	5	Core Course 8
3	BMA011D	Linear Algebra	4	1	0	4	1	0	5	Core Course 9
4	BMA046A	SCILAB-II	0	0	2	0	0	1	1	Core Course 12 (b)
5	DCA004A	Advanced Spread Sheet Lab	0	0	2	0	0	1	1	Fundamental
6	DEN003A	Life Skills-1 (Personality Development)	1	0	2	1	0	1	2	Foundation
7	DIN003A	Value Education and Ethics-1	1	0	0	1	0	0	1	Foundation
8		Open Elective-I	3	0	0	3	0	0	3	Interdisciplinary
9	REM001	Research Methodology	3	1	0	3	1	0	4	Interdisciplinary
		Total	20	3	6	20	3	3	27	
Swayam Course			Student can opt any course from Swayam Portal in addition to the above course structure.							








## Semester IV

S.No.	Subject code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Lecture Credit			Total Credits	Course Type
						L	T	P		
1	BMA092A	Ordinary Differential Equations	4	1	0	4	1	0	5	Core Course 10
2	Discipline Elective -1( Any One from the given Groups)		4	1	0	4	1		5	DSE-1
3	Discipline Elective -2( Any One from the given Groups)		4	1	0	4	1		5	DSE-2
4	BMA005C	MATLAB-I	0	0	2	0	0	1	1	Core Course 12 (c)
5	BMA094A	Seminar	0	0	2	0	0	1	1	Fundamental
6	DC0012A	Vlogging /Blogging/ Pod6Casting	0	0	2	0	0	1	1	Fundamental
7	DMA011A	Life Skills-2 (Aptitude)	1	0	2	1	0	1	2	Foundation
8	DIN004A	Value Education and Ethics-2	1	0	0	1	0	0	1	Foundation
9		Open Elective-II	3	0	0	3	0	0	3	Interdisciplinary
		Total	19	4	6	19	4	3	24	
Swayam Course			Student can opt any course from Swayam Portal in addition to the above course structure.							








## Semester V

S.No.	Subject code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Lecture Credit			Total Credits	Course Type
						L	T	P		
1	BMA091A	Mathematical Programming	4	1	0	4	1	0	5	Core Course 11
2	Discipline Elective -3( Any One from the given Groups)		4	1	0	4	1	0	5	DSE-3
3	Discipline Elective -4( Any One from the given Groups)		4	1	0	4	1	0	5	DSE-4
4	BMA008C	MATLAB-II	0	0	2	0	0	1	1	Core Course 12 (d)
5		Open Elective III	3	0	0	3	0	0	3	Interdisciplinary
6	BMA0016C	Project	0	0	12	0	0	6	6	Discipline specific
		Total	15	3	14	15	3	7	25	
Swayam Course			Student can opt any course from Swayam Portal in addition to the above course structure.							










## Semester VI

S.No.	Subject code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Lecture Credit			Total Credits	Course Type
						L	T	P		
1	Discipline Elective -5( Any One from the given Groups)		4	1	0	4	1	0	5	DSE-5
2	Discipline Elective -6( Any One from the given Groups)		4	1	0	4	1	0	5	DSE-6
3	Discipline Elective -7( Any One from the given Groups)		4	1	0	4	1	0	5	DSE-7
4	BMA013C	MATLAB-III	0	0	2	0	0	1	1	Core Course 12 (e)
5	BMA093A	Partial Differential Equations	4	1	0	4	1	0	5	Interdisciplinary
6	BMA090A	Seminar	1	0	0	1	0	0	1	Interdisciplinary
		Total	18	3	2	18	3	1	22	
Swayam Course			Student can opt any course from Swayam Portal in addition to the above course structure.							

### Semester VI (Note):

In 6th semester student have a choice either he can go for offered courses or he may avail Internship in some reputed Institute / Industry or In House Dissertation.

### Total Credit

Semester	1	2	3	4	5	6	Total
Credit	27	23	27	25	24	22	148

Note: The 12th Core Course is arranged as Labs i.e. 12 (a), 12 (b),12 (c),12 (d) and 12 (e).





SWAYAM is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy.

Student can choose any subject of his/her choice from “Swayam Portal” for knowledge enhancement and to earn extra credits apart from the course.

*Fig 4.58* *Praveen* *nigam* *Shiksha* *Seema* *Shiksha* *Shiksha*

## Program Educational Objectives (PEOs)

The <b>B. Sc. Mathematics</b> program describe accomplishments that graduates are expected to attain within five to seven years after graduation	
PEO1	To acquire knowledge in functional areas of Mathematics and apply in all the fields of learning.
PEO2	To employ mathematical ideas encompassing logical reasoning, analytical, numerical ability, theoretical skills to model real-world problems and solve them.
PEO3	Develop critical thinking, creative thinking, self confidence for eventual success in career effectively and also to develop their ability to collaborate both intellectually and creatively in diverse contexts.
PEO4	Rewarding careers in Education, Industry, Banks, MNCs and pursue higher studies.

## Program Outcome(PO's)

Upon completion of B.Sc. (Hons.) Mathematics programme, students will be able to acquire the following attributes.

### PO1: Disciplinary knowledge

Capability of demonstrating comprehensive knowledge of mathematics and understanding of one or more disciplines which form a part of an undergraduate programme of study.

### PO2: Communications skills

- Ability to communicate various concepts of mathematics effectively using examples and their geometrical visualizations.
- Ability to use mathematics as a precise language of communication in other branches of human knowledge.
- Ability to communicate long standing unsolved problems in mathematics.
- Ability to show the importance of mathematics as precursor to various scientific developments since the beginning of the civilization.
- Ability to explain the development of mathematics in the civilizational context and its role as queen of all sciences.

### PO3: Critical thinking and analytical reasoning

- Ability to employ critical thinking in understanding the concepts in every area of mathematics.
- Ability to analyze the results and apply them in various problems appearing in different branches of mathematics.

### PO4: Problem solving

- Capability to solve problems in computer graphics using concepts of linear algebra.
- Capability to solve various models using techniques of differential equations.

*Fig 4 98* *P. Kumar* *nigam* *J. S. J.* *S. S. S.* *Shrestha* *J. S. J.*

- (iii) Ability to solve linear system of equations, linear programming problems and network flow problems.
- (iv) Ability to provide new solutions using the domain knowledge of mathematics acquired during this programme.

**PO5: Research-related skills**

- (i) Capability for inquiring about appropriate questions relating to the concepts in various fields of mathematics.
- (ii) To know about the advances in various branches of mathematics.

**PO6: Information/digital literacy**

- (i) Capability to use appropriate software's to solve system of equations and differential equations.
- (ii) Capability to understand and apply the programming concepts of C++ to mathematical investigations and problem solving.

**PO7: Self-directed learning**

Ability to work independently and do in-depth study of various notions of mathematics.

**PO8: Moral and ethical awareness/reasoning**

Ability to identify unethical behavior such as fabrication, falsification or misrepresentation of data and adopting objective, unbiased and truthful actions in all aspects.

**PO9: Lifelong learning**

Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning.

**PO10: Professional and Employability Skills**

- (i) Completion of this programme will also enable the learners to join the teaching profession.
- (ii) The programme will also help students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

*Page 68* *Praveen* *nijam* *Shruti* *Shruti* *Shruti*

## Semester-I

BMA021C	Calculus	L-T-P:4-1-0
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### Course Objective:

- To increase the student's appreciation of the basic role played by mathematics in Basic
- Sciences.
- To find curvature, radius of curvature, Centre of curvature and Chord of curvature.
- Use Calculus to compute quantities like Points of inflexion, Asymptotes.
- To develop the concepts of Partial differentiation, Chain rule of partial differentiation.
- Total Differentiation and applications of it as maxima and minima of two variables.
- To trace curves in Cartesian, parametric and polar co-ordinates

### Unit-I

Real numbers, Sequences of real numbers, Convergence of sequences and series, Bounded and monotonic sequences; Definite integral as a limit of sum, Integration of irrational algebraic functions and transcendental functions, Reduction formulae, Definite integrals.

### Unit-II

Definition of limit of a real valued function, Limit at infinity and infinite limits;  $\delta$ - $\epsilon$  Continuity of a real valued function, Properties of continuous functions, Intermediate value theorem, Geometrical interpretation of continuity, Types of discontinuity; Uniform continuity.

### Unit-III

Differentiability of a real valued function, Geometrical interpretation of differentiability, Relation between differentiability and continuity, Differentiability and monotonicity, Chain rule of differentiation; Darboux's theorem, Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Geometrical interpretation of mean value theorems; Successive differentiation, Leibnitz's theorem.

### Unit-IV

Maclaurin's and Taylor's theorems for expansion of a function in an infinite series, Taylor's theorem in finite form with Lagrange, Cauchy and Roche-Schlomilch forms of remainder; Maxima and minima.

### Unit-V

Curvature; Asymptotes of general algebraic curves, Parallel asymptotes, Asymptotes parallel to axes; Symmetry, Concavity and convexity, Points of inflection, Tangents at origin, Multiple points, Position and nature of double points; Tracing of Cartesian, polar and parametric curves.

*Fig 4 98* *P. Kumar* *mjani* *J. J. J.* *S. S. S.* *Shrestha* *J. J. J.*

**References:**

1. Howard Anton, I. Bivens & Stephan Davis (2016). Calculus (10th edition), Wiley India.
2. Gabriel Klambauer (1986), Aspects of Calculus. Springer-Verlag.
3. Wieslaw Krawcewicz & Bindhyachal Rai (2003), Calculus with Maple Labs, Narosa.
4. Gorakh Prasad (2016), Differential Calculus (19th edition), Pothishala Pvt. Ltd.
5. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018), Thomas' Calculus (14th edition), Pearson Education.

**Course Learning Outcomes:** This course will enable the students to:

- CO1 Assimilate the notions of limit of a sequence and convergence of a series of real numbers.
- CO2 Calculate the limit and examine the continuity of a function at a point.
- CO3 Understand the consequences of various mean value theorems for differentiable functions.
- CO4 Understand the Maclaurin's and Taylor's theorems for expansion of a function in an infinite series.
- CO5 Understand the concepts of concavity and convexity, Points of inflexion, Asymptotes and tracing of curves in Cartesian, parametric and polar co-ordinates.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	H	H	M	L	H	M	M	M
CO2	H	M	H	H	L	L	M	M	M	M
CO3	H	M	M	M	L	L	H	H	M	L
CO4	H	H	M	M	L	L	M	H	M	M
CO5	H	M	M	M	L	M	L	M	L	H

H = Highly Related; M = Medium L = Low

*Fig 4.98* *Prasad* *nigam* *Sharma* *Sharma* *Sharma* *Sharma*

BMA041A	Algebra and Geometry	L-T-P:4-1-0
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#### Course Objective:

- To understand the basic theory of algebra geometry.
- To understand the roots and the coefficients of polynomial equations.
- To understand relations, matrices and applications to computer graphics

#### Unit-I

Elementary theorems on the roots of an equations including Cardan's method, The remainder and factor theorems, Synthetic division, Factored form of a polynomial, The Fundamental theorem of algebra, Relations between the roots and the coefficients of polynomial equations, Imaginary roots, Integral and rational roots; Polar representation of complex numbers, The  $n$ th roots of unity, De Moivre's theorem for integer and rational indices and its applications.

#### Unit-II

Relations, Equivalence relations, Equivalence classes; Functions, Composition of functions, Inverse of a function; Finite, countable and uncountable sets; The division algorithm, Divisibility and the Euclidean algorithm, The fundamental theorem of arithmetic, Modular arithmetic and basic properties of congruences; Principles of mathematical induction and well ordering.

#### Unit-III

Systems of linear equations, Row reduction and echelon forms, Linear independence, The rank of a matrix and applications; Introduction to linear transformations, The matrix of a linear transformation, Matrix operations, Determinants, The inverse of a matrix, Characterizations of invertible matrices; Applications to Computer Graphics; Eigenvalues and eigenvectors, characteristic equation and the Cayley-Hamilton theorem.

#### Unit-IV

Spheres: Different forms, Intersection of two spheres, Orthogonal intersection, Tangents and normal, Radical plane, Radical line, Coaxial system of spheres, Pole, Polar and Conjugacy. Space curves, Algebraic curves, Ruled surfaces, Some standard surfaces.

#### Unit-V

Classification of quadric surfaces, Cone, Cylinder, Central conicoids, Tangent plane, Normal, Polar planes, and Polar lines.

#### References:

1. Titu Andreescu, & Dorin Andrica (2014). Complex Numbers from A to...Z. (2nd edition). Birkhäuser.
2. Robert J. T. Bell (1994). An Elementary Treatise on Coordinate Geometry of Three Dimensions. Macmillan India Ltd.D. Chatterjee (2009).

*Fig 4 98* *P. Kumar* *mjani* *J. S. J.* *S. S. S.* *Shrestha* *J. S. J.*



3. Analytical Geometry: Two and Three Dimensions. Narosa Publishing House.
4. Leonard Eugene Dickson (2009). First Course in the Theory of Equations. The Project Gutenberg EBook (<http://www.gutenberg.org/ebooks/29785>)
5. Edgar G. Goodaire & Michael M. Parmenter (2015). Discrete Mathematics with Graph Theory (3rd edition). Pearson Education Pvt. Ltd. India.
6. Bernard Kolman & David R. Hill (2003). Introductory Linear Algebra with Applications (7th edition). Pearson Education Pvt. Ltd. India.
7. David C. Lay, Steven R. Lay & Judi J. McDonald (2016). Linear Algebra and its Applications (5th edition). Pearson Education Pvt. Ltd. India.

#### Course Learning Outcomes:

This course will enable the students to:

- CO1 Understand the importance of roots of real and complex polynomials and learn various methods of obtaining roots.
- CO2 Understand the Relations, Equivalence relations, Equivalence classes, Functions, Composition of functions, Inverse of a function, De Moivre's theorem.
- CO3 Understand the Systems of linear equations, Linear independence, the rank of a matrix, Eigen values and Eigen vectors and Cayley-Hamilton theorem.
- CO4 Understand the Spheres, Intersection of two spheres, Orthogonal intersection, Tangents and normal, Algebraic curves, Ruled surfaces and Some standard surfaces.
- CO5 Understand the classification of quadric surfaces, Cone, Cylinder, Central conicoids, Tangent plane, Normal, Polar planes, and Polar lines.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	M	M	L	L	M	M	M	M
CO2	H	M	M	M	L	L	M	H	M	M
CO3	M	M	M	M	L	L	H	H	M	M
CO4	H	M	M	M	L	M	M	H	M	M
CO5	H	M	M	M	L	L	L	M	L	M

H = Highly Related; M = Medium L = Low

*Fig 4.98* *Pranav* *nigam* *JTS* *Saurav* *Shrestha* *Dr. J. K. Singh*



BMA042A	Probability and Statistics	L-T-P:4-1-0
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### Course objective:

- To apply the rules of probability (addition, conditional, multiplication) and terms of probability (mutually exclusive, independent and dependent).
- To use probability distribution for discrete random variables to make prediction about the probability of certain events.
- Focus on correlation and regression techniques, the two powerful tools in statistics.
- To use convergence in probability WLLN and CLT.

### Unit-I

Basic notions of probability, Conditional probability and independence, Baye's theorem; Random variables - Discrete and continuous, Cumulative distribution function, Probability mass/density functions; Transformations, Mathematical expectation, Moments, Moment generating function, Characteristic function.

### Unit-II

Discrete distributions Uniform, Bernoulli, Binomial, Negative binomial, Geometric and Poisson; Continuous distributions: Uniform, Gamma, Exponential, Chi-square, Beta and normal; Normal approximation to the binomial distribution.

### Unit-III

Joint cumulative distribution function and its properties, Joint probability density function, Marginal distributions, Expectation of function of two random variables, Joint moment generating function, Conditional distributions and expectations.

### Unit-IV

**Principal of Least Square:** Fitting of Straight line, second degree parabola, Power curve and Exponential Curve.

**Correlation:** Correlation, Scatter Diagram, Karl Pearson's Coefficient of Correlation and its properties. Spearman's Rank Correlation Coefficient.

**Regression:** Fitting of Regression Lines, Regression Coefficients with properties.

### Unit-V

**Basic Concepts:** Sampling distribution, Sampling Distribution of sum of Binomial, Poisson and mean of Normal Distribution. Standard Error: Meaning and role of Central Limit Theorem for identically independently distributed (i.i.d) random variables.

**Convergence in Probability:** Weak Law of Large Numbers and its applications, Convergence in Distribution, De-Moivre Laplace limit theorem, Statement of Central Limit Theorem (i.i.d. case) & its applications. Chebyshev's Inequality.

*Fig 4 98* *P. Kumar* *mjani* *J. S. J.* *S. S. S.* *Shrestha* *J. S. J.*

**References:**

1. Robert V. Hogg, Joseph W. McKean & Allen T. Craig (2013). Introduction to Mathematical Statistics (7th edition), Pearson Education.
2. Irwin Miller & Marylees Miller (2014). John E. Freund's Mathematical Statistics with Applications (8th edition). Pearson. Dorling Kindersley Pvt. Ltd. India.
3. Jim Pitman (1993). Probability, Springer-Verlag.
4. Sheldon M. Ross (2014). Introduction to Probability Models (11th edition). Elsevier.
5. A. M. Yaglom and I. M. Yaglom (1983). Probability and Information. D. Reidel Publishing Company. Distributed by Hindustan Publishing Corporation (India) Delhi.

**Course Learning Outcomes:**

This course will enable the students to:

- CO1 Understanding basic concepts about probability and Random variable.
  - CO2 Learn about the discrete and continuous probability distributions.
  - CO3 Understand distributions in the study of the joint behavior of two random variables.
  - CO4 Establish a formulation helping to predict one variable in terms of the other that is, correlation and linear regression. Also understand about fitting of curves.
  - CO5 Understand central limit theorem, which establish the remarkable fact that the empirical frequencies of so many natural populations, exhibit a bell shaped curve.
- Understanding the various Laws of large numbers.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	M	H	M	M	H	H	M	M
CO2	H	M	L	H	M	L	H	H	M	M
CO3	H	L	M	H	M	L	L	M	H	M
CO4	H	M	M	M	M	M	M	H	M	M
CO5	H	H	M	M	M	M	L	M	H	L

H = Highly Related; M = Medium L = Low

*Fig 4.98* *Praveen* *nigam* *Sharma* *Sharma* *Sharma* *Sharma*

## Semester-II

BMA043B	Group Theory	L-T-P:4-1-0
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### **Course Objective:**

- Recall and use the definitions and properties of cosets and subgroups.
- Derive the existence of groups of a specified small order.
- Recall and apply Sylow's Theorems to determine the structure of certain groups of small order.

### **Unit-I**

Symmetries of a square, definition and examples of groups including dihedral, elementary properties of groups, Subgroups and examples of subgroups.

### **Unit-II**

Cyclic groups, Properties of cyclic groups, Lagrange's theorem, Euler phi function, Euler's theorem, Fermat's little theorem, cycle notation for permutations, properties of permutations, even and odd permutations, alternating groups, Cayley's theorem and its applications.

### **Unit-III**

Properties of cosets, normal subgroups, simple groups, factor groups, Cauchy's theorem for finite abelian groups, centralizer, normalizer, Center of a group, Product of two subgroups.

### **Unit-IV**

Group homomorphisms, Properties of homomorphisms, Group isomorphisms, properties of isomorphisms, First, second and third isomorphism theorems for groups.

### **Unit-V**

Introduction to Rings: examples and properties, Integral Domains, Division Rings, Fields and its Characteristics, Subrings, Ideals, Quotient Ring.

### **References:**

1. Michael Artin (2014). Algebra (2nd edition). Pearson.
2. John B. Fraleigh (2007). A First Course in Abstract Algebra (7th edition). Pearson.
3. Joseph A. Gallian (2017). Contemporary Abstract Algebra (9th edition). Cengage.
4. I. N. Herstein (2006). Topics in Algebra (2nd edition). Wiley India.
5. Nathan Jacobson (2009). Basic Algebra I (2nd edition). Dover Publications.
6. Ramji Lal (2017). Algebra 1: Groups, Rings, Fields and Arithmetic. Springer.
7. I.S. Luthar & I.B.S. Passi (2013). Algebra: Volume 1: Groups. Narosa.

### **Course Learning Outcomes:**

*Fig 4 98* *Pawan* *nigam* *Shruti* *Shruti* *Shruti* *Shruti*

The course will enable the students to:

- CO1 Link the fundamental concepts of groups and symmetries of geometrical objects.
- CO2 The student will be able to understand the theory of cyclic group and permutation group.
- CO3 Understand the concepts of Normal Subgroups.
- CO4 Learn the concept of Group homomorphisms and isomorphism.
- CO5 Learn about the concept of Ring, Integral Domain and Field.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	M	H	M	M	H	H	M	M
CO2	H	M	M	M	L	L	H	H	M	M
CO3	M	M	M	H	M	L	H	M	M	M
CO4	H	M	M	M	L	M	M	H	M	M
CO5	H	M	M	M	L	L	L	M	M	H

H = Highly Related; M = Medium L = Low

*Fig 4 68* *P. Kumar* *nigam* *J. S. S. S.* *S. S. S.* *Shrestha* *J. S. S. S.*



**References:**

1. Jerrold Marsden, Anthony J. Tromba & Alan Weinstein (2009). Basic Multivariable Calculus, Springer India Pvt. Limited.
2. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage.
3. Monty J. Strauss, Gerald L. Bradley & Karl J. Smith (2011). Calculus (3rd edition). Pearson Education. Dorling Kindersley (India) Pvt. Ltd.
4. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018). Thomas' Calculus (14th edition). Pearson Education.

**Course Learning Outcomes:**

This course will enable the students to:

- CO1 Learn conceptual variations while advancing from one variable to several variables in calculus. Apply multivariable calculus in optimization problems.
- CO2 Learn the concept of partial differentiation and Euler theorem.
- CO3 Inter-relationship amongst the line integral, double and triple integral formulations.
- CO4 Applications of multivariable calculus tools in physics, economics, optimization, and understanding the architecture of curves and surfaces in plane and space etc
- CO5 Realize importance of Green, Gauss and Stokes' theorems in other branches of mathematics.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	M	H	L	L	H	H	M	L
CO2	H	L	L	H	L	L	H	M	M	M
CO3	H	M	L	H	M	L	H	M	H	L
CO4	H	L	L	M	M	M	M	H	M	M
CO5	H	L	M	M	L	L	L	M	L	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *Pramod* *nigam* *J. K. S.* *Saurav* *Shrestha* *Dr. J. K. S.*

BMA006D	Real Analysis	L-T-P:4-1-0
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**Course objectives:**

- To understand the basic theory of real number, Cantor set and Cantor function.
- To develop an understanding of sequence and infinite series.
- To understand Riemann integrals and improper integrals.

**Unit-I**

Algebraic and order properties of  $\mathbb{R}$ , Absolute value of a real number; Bounded above and bounded below sets, Supremum and infimum of a nonempty subset of  $\mathbb{R}$ , The completeness property of  $\mathbb{R}$ , Archimedean property, Density of rational numbers in  $\mathbb{R}$ , Definition and types of intervals, Nested intervals property; Neighborhood of a point in  $\mathbb{R}$ , Open, closed and perfect sets in  $\mathbb{R}$ , Connected subsets of  $\mathbb{R}$ , Cantor set and Cantor function.

**Unit-II**

Convergent sequence, Limit of a sequence, Bounded sequence, Limit theorems, Monotone Weierstrass theorem for sequences, Monotone convergence theorem, Subsequences, Bolzano sequences, Limit superior and limit inferior of a sequence of real numbers, Cauchy sequence, Cauchy's convergence criterion.

**Unit-III**

Infinite Series Convergence and divergence of infinite series of positive real numbers, Necessary condition for convergence, Cauchy criterion for convergence; Tests for convergence of positive term series; Basic comparison test, Limit comparison test, D'Alembert's ratio test, Cauchy's nth root test, Integral test; Alternating series, Leibniz test, Absolute and conditional convergence, Rearrangement of series and Riemann's theorem

**Unit-IV**

Riemann integral, Integrability of continuous and monotonic functions, Fundamental theorem of integral calculus, First mean value theorem, Bonnet and Weierstrass forms of second mean value theorems.

**Unit-V**

Pointwise and uniform convergence of sequence and series of functions, Weierstrass's M-test, Dirichlet test and Abel's test for uniform convergence, Uniform convergence and continuity, Uniform convergence and differentiability, Improper integrals, Dirichlet test and Abel's test for improper integrals.

*Fig 4 98* *Pram* *nigam* *J. S. S.* *Seena* *Shrestha* *Dr. J. S. S.*



**References:**

1. Robert G. Bartle & Donald R. Sherbert (2015). Introduction to Real Analysis (4th edition). Wiley India.
2. Gerald G. Bilodeau, Paul R. Thie & G. E. Keough (2015). An Introduction to Analysis (2nd edition), Jones and Bartlett India Pvt. Ltd.
3. K. A. Ross (2013). Elementary Analysis: The Theory of Calculus (2nd edition). Springer.

**Course Learning Outcomes:**

This course will enable the students to:

- CO1 Understand many properties of the real line  $\mathbb{R}$  and learn to define sequence in terms of functions from  $\mathbb{R}$  to a subset of  $\mathbb{R}$ .
- CO2 Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.
- CO3 Recognize bounded, convergent and divergent sequence. Tests for convergence of positive term series
- CO4 Learn some of the properties of Riemann integrable functions, and the applications of the fundamental theorems of integration.
- CO5 Apply various tests for convergence for uniform convergence of sequence and series of functions.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	M	M	L	M	H	H	M	M
CO2	H	M	L	M	M	L	H	H	M	M
CO3	H	L	M	M	L	L	H	M	M	H
CO4	H	M	M	M	M	M	M	H	M	M
CO5	H	H	M	M	L	L	L	M	L	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *Pranav* *nigam* *Shrestha* *Shrestha* *Shrestha* *Shrestha*



BMA045A	SCILAB-I	L-T-P:0-0-1
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Students are required to familiarize themselves with software SCILAB, for numerical computation on the following topics:

1. Introduction of SCILAB.
2. Commands for managing a session, Input and output commands.
3. Some primary mathematical function (Arithmetic function, trigonometric function, logarithm and exponent function).
4. Commonly used operators and special characters.
5. Vector, matrix and array commands.
6. Construction of a vector with operations on vectors.
7. Matrix representation
8. Some operations on matrix.
9. Special matrices and element operations on matrix.
10. Eigen values and Eigen vectors.
11. Plotting commands.
12. Create 2D graph and customize line, Plot multiple graphs.
13. Scaling and coloring and Line styles in 2D graphs.
14. Add title axis labels and legend to graph.
15. 3D graph plotting, Scaling and coloring and line styles in 3D graphs. Add title axis labels and legend to graph.

#### ESSENTIAL READINGS:

Open source of SCILAB: <http://www.scilab.org>.

Scilab-6.0.2(64-bit)/Scilab-6.0.2(32-bit)

*Fig 4 98* *P. Kumar* *nijam* *J. S. S. S.* *S. S. S.* *Shrestha* *J. S. S. S.*

## Semester-III

BMA007D	Numerical Analysis	L-T-P:4-1-0
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### Course objective :

- Numerical methods, based upon sound computational mathematics, are the basic algorithms underpinning computer predictions in modern systems science.
- Such methods include techniques for simple optimisation, interpolation from the known to the unknown, linear algebra underlying systems of equations, Integrals, ordinary differential equations to simulate systems, and stochastic simulation under random influences.

### Unit-I

Round-off error and computer arithmetic, Local and global truncation errors, Algorithms and convergence; Bisection method, False position method, Fixed point iteration method, Newton's method and secant method for solving equations.

### Unit-II

Partial and scaled partial pivoting, Lower and upper triangular (LU) decomposition of a Jacobi, -matrix and its applications, Thomas method for tridiagonal systems; Gauss Seidel and successive over-relaxation (SOR) methods. -Gauss

### Unit-III

Piecewise linear interpolation, Cubic spline Newton forward and backward difference-interpolation, Finite difference operators, Gregory interpolations.

### Unit-IV

First order and higher order approximation for first derivative, Approximation for second derivative; Numerical integration: Trapezoidal rule, Simpson's rules and error analysis, Stoer extrapolation methods, Richardson extrapolation. -Bulirsch

### Unit-V

Kutta methods, Higher order one step method, Multi-step method-Euler's method, Runge Finite difference method, Shooting method, Real life examples: Google search engine, 1D and 2D simulations, Weather forecasting.

### References:

1. Brian Bradie (2006), A Friendly Introduction to Numerical Analysis. Pearson.
2. C. F. Gerald & P. O. Wheatley (2008). Applied Numerical Analysis (7th edition), Pearson Education, India.
3. F. B. Hildebrand (2013). Introduction to Numerical Analysis: (2nd edition). Dover Publications.
4. M. K. Jain, S. R. K. Iyengar & R. K. Jain (2012). Numerical Methods for Scientific and Engineering Computation (6th edition). New Age International Publishers.

*Fig 4 98* *Pram* *nigam* *J. R. S.* *Seena* *Shrestha* *J. R. S.*

5. Robert J. Schilling & Sandra L. Harris (1999). Applied Numerical Methods for Engineers Using MATLAB and C. Thomson-Brooks/Cole.

**Course Learning Outcomes:**

This course will enable the students to:

- CO1 Obtain numerical solutions of algebraic and transcendental equations.
- CO2 Find numerical solutions of system of linear equations and check the accuracy of the solutions.
- CO3 Learn about various interpolating and extrapolating methods.
- CO4 Learn the concepts of Numerical Differentiation and Integration.
- CO5 Solve initial and boundary value problems in differential equations using numerical methods. Apply various numerical methods in real life problems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	L	H	L	M	H	H	M	M
CO2	H	L	L	H	L	L	H	H	M	M
CO3	H	M	M	M	L	L	H	M	H	M
CO4	H	M	L	M	L	M	M	H	M	M
CO5	H	H	M	M	L	L	L	M	L	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *nigam* *J. S. S. S.* *S. S. S.* *Shrestha* *J. S. S. S.*

BMA014C	Complex Analysis	L-T-P:4-1-0
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**Course objective:**

- To understand the basic theory of stereographic projection.
- To understand linear transformation, contours, line integrals, Cauchy-Goursat theorem (without proof), Cauchy integral formula.
- To develop an understanding of Convergence of sequences and series, Residues, the residue theorem, the principle part of a function, poles, evaluation of improper real integrals, improper integrals.

**Unit-I**

Complex numbers and their representation, algebra of complex numbers; Complex plane, Open set, Domain and region in complex plane; Stereographic projection and Riemann sphere; Complex functions and their limits including limit at infinity, Continuity, Linear fractional transformations and their geometrical properties. Riemann Equations

**Unit-II**

Harmonic-Differentiability of a complex valued function, Cauchy functions, necessary and sufficient conditions for differentiability, Analytic functions; Analyticity and zeros of exponential, trigonometric and logarithmic functions; Branch cut and branch of multi-valued functions.

**Unit-III**

Line integral, Path independence, Complex integration, Green's theorem, Anti-derivative Goursat theorem, Cauchy integral formula, Cauchy's inequality, Derivative-theorem, Cauchy of analytic function, Liouville's theorem, Fundamental theorem of algebra, Maximum modulus theorem and its consequences.

**Unit-IV**

Sequences, series and their convergence, Taylor series and Laurent series of analytic functions, Power series, Radius of convergence, Integration and differentiation of power series, Absolute and uniform convergence of power series.

**Unit-V**

Meromorphic functions, Zeros and poles of meromorphic functions, Nature of singularities, Picard's theorem, Residues, Cauchy's residue theorem, Argument principle, Rouché's theorem, Jordan's lemma, Evaluation of proper and improper integrals.

**References:**

1. Lars V. Ahlfors (2017). Complex Analysis (3rd edition). McGraw-Hill Education.
2. Joseph Bak & Donald J. Newman (2010). Complex Analysis (3rd edition). Springer.
3. James Ward Brown & Ruel V. Churchill (2009). Complex Variables and Applications (9th edition). McGraw-Hill Education.
4. John B. Conway (1973). Functions of One Complex Variable. Springer-Verlag.
5. E.T. Copson (1970). Introduction to Theory of Functions of Complex Variable. Oxford University Press.
6. Theodore W. Gamelin (2001). Complex Analysis. Springer-Verlag.
7. George Polya & Gordon Latta (1974). Complex Variables. Wiley.
8. H. A. Priestley (2003). Introduction to Complex Analysis. Oxford University Press.
9. E. C. Titchmarsh (1976). Theory of Functions (2nd edition). Oxford University Press.

*Fig 4 98* *Pram* *nigam* *JTS* *Seenu* *Shrestha* *Dr. J. K. Singh*

**Course Learning Outcomes:**

This course will enable the students to:

Visualize complex numbers as points of  $\mathbb{R}^3$  and stereographic projection of complex plane on the Riemann sphere.

CO1 Understand the significance of differentiability and analyticity of complex functions Riemann equations.-leading to the Cauchy Goursat theorem and Cauchy integral formula in evaluation

CO2 Learn the concepts of analytic function and their properties.

CO3 Apply Liouville's theorem in fundamental theorem of algebra.

CO4 Understand the convergence, term by term integration and differentiation of a power series.

CO5 Learn Taylor and Laurent series expansions of analytic functions, classify the nature of singularity, poles and residues and application of Cauchy Residue theorem.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	M	H	L	M	H	H	M	M
CO2	H	M	L	M	L	L	H	H	M	M
CO3	H	L	L	H	L	L	H	M	H	M
CO4	H	M	M	M	L	M	M	H	M	M
CO5	H	H	M	M	L	L	L	M	L	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *nigam* *J. S. S.* *S. S. S.* *Shrestha* *J. S. S.*

BMA011D	Linear Algebra	L-T-P:4-1-0
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**Course objective:**

- To understand the basic theory of linear algebra.
- To understand the basic theory of vector space.
- To understand linear transformation and dual space.
- To develop an understanding of Cauchy-Schwarz inequality, orthogonal vectors, Orthonormal basis, Bessel's inequality.

**Unit-I**

Definition and examples, Subspace, Linear span, Quotient space and direct sum of subspaces, Linearly independent and dependent sets, Bases and dimension.

**Unit-II**

Definition and examples, Algebra of linear transformations, Matrix of a linear transformation, Change of coordinates, Rank and nullity of a linear transformation and rank-nullity theorem.

**Unit-III**

Isomorphism of vector spaces, Isomorphism theorems, Dual and second dual of a vector space, Transpose of a linear transformation, Eigen vectors and eigen values of a linear Hamilton theorem, Minimal-transformation, Characteristic polynomial and Cayley polynomial.

**Unit-IV**

Schmidt orthogonalisation, Diagonalisation of symmetric matrices.–Schwarz inequality, Gram–Inner product spaces and orthogonality, Cauchy

**Unit-V**

Adjoint of a linear operator; Hermitian, unitary and normal linear transformations; Jordan canonical form, Triangular form, Trace and transpose, Invariant subspaces.

**References:**

1. Stephen H. Friedberg, Arnold J. Insel & Lawrence E. Spence (2003). Linear Algebra (4th edition). Prentice-Hall of India Pvt. Ltd.
2. Kenneth Hoffman & Ray Kunze (2015). Linear Algebra (2nd edition). Prentice-Hall.
3. I. M. Gel'fand (1989). Lectures on Linear Algebra. Dover Publications. Nathan Jacobson (2009).
4. Basic Algebra I & II (2nd edition). Dover Publications.
5. Serge Lang (2005). Introduction to Linear Algebra (2nd edition). Springer India.
6. Vivek Sahai & Vikas Bist (2013). Linear Algebra (2nd Edition). Narosa Publishing House.
7. Gilbert Strang (2014). Linear Algebra and its Applications (2nd edition). Elsevier.

*Fig 98* *Pram* *nigam* *J. S. B.* *Saur* *Shrestha* *Dr. J. K. Bhatnagar*

**Course Learning Outcomes:**

This course will enable the students to:

Understand the concepts of vector spaces, subspaces, bases, dimension and their properties.

CO1 To understand vector space and linear dependent and independent of vectors. Relate matrices and linear transformations.

CO2 Compute eigen values and eigen vectors of linear transformations.

CO3 Learn properties of inner product spaces and determine orthogonality in inner product spaces.

CO4 Realise importance of adjoint of a linear transformation and its canonical form.

CO5 Concepts about Unitary and normal linear transformations.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	H	M	L	M	H	H	M	M
CO2	H	L	L	H	L	L	H	H	M	M
CO3	H	L	L	M	L	L	H	M	H	M
CO4	H	M	M	M	L	M	M	H	M	M
CO5	H	H	M	M	L	L	L	M	M	H

H = Highly Related; M = Medium L = Low

Fig 4.98

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BMA046A	SCILAB-II	L-T-P:0-0-1
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Students are required to familiarize themselves with software SCILAB, for Numerical Computation on the following topics:

1. Scripts files and functions files.
2. Creating and running scripts file.
3. Creating function-file
4. Use of in-build function files.
5. Programme for addition/Subtraction of numbers.
6. Programme for multiplication of numbers.
7. Programme for addition of squares of (even/odd) numbers.
8. Solution of Linear programming problems in SCILAB.
9. Ordinary differentiation
10. Integration.
11. Programme for differentiation and partial differentiation.
12. Programme for integration.
13. Programme for numerical integration.
14. Plotting in Programming.
15. Programme for numerical solution of ordinary differential equation.

**ESSENTIAL READINGS:**

Open source of SCILAB: <http://www.scilab.org>.

Scilab-6.0.2(64-bit)/Scilab-6.0.2(32-bit)

*Fig 4 98* *P. Kumar* *mijani* *J. S. J.* *Seena* *Shrestha* *J. S. J.*



## Semester-IV

BMA092A	Ordinary Differential Equations	L-T-P:4-1-0
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### Course objectives:

- To understand the concepts relating to the order and linearity of ODEs and PDEs, analytic and computational solution methods for ODEs.
- To teach students the real-world applications of ODEs.
- To teach students the series solution of ordinary differential equations.

### Unit-I

Degree and order of a differential equation. Formation of differential equations, Equations of the first order and first degree-Equations variables separable, Homogeneous equations and equations reducible to homogeneous form. Linear equations and equations reducible to linear form. Exact differential equations and equations can be made exact.

### Unit-II

Linear differential equations of higher order with constant coefficients, Complimentary functions and Particular integrals.

### Unit-III

Linear differential equations of higher order with variable coefficients, Cauchy's Homogeneous linear differential equations, Exact differential equations, One part of CF is known, Normal form, Solution by transformation of the equation by changing the independent variable, Method of variation of parameters.

### Unit-IV

Orthogonal trajectories, First order but higher degree differential equations solvable for x, y and p, Clairaut's form, Simultaneous differential equations. Applications to differential equations.

### Unit-V

Series solution at ordinary and regular singular point: Power Series solution at ordinary points, Frobenius series solution at regular singular points.

### References:

1. M. D. Raisinghanian, Ordinary and Partial Differential Equations, S. Chand & Co., 2003.
2. M. Ray, A Text Book on Differential Equations, Students and Friends Co., Agra, 1998.
3. E. A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.
4. R. S. Senger, Ordinary Differential Equations with Integration, Prayal Publ. 2000.
5. D. A. Murray, Introductory Course in Differential Equations, Orient Longman(India), 1967.
6. Frank Ayres, Theory and Problems of Differential Equations, TMH, 2002.

*Fig 4 98* *Prayal* *mjani* *Prayal* *Senger* *Prayal* *Prayal*

7. I. N. Snedon, Elements of Partial Differential Equations, TMH, 2001.

**Course Learning Outcomes:**

The course will enable the students to:

- CO1 Understand the genesis and application of ordinary differential equations. Learn various techniques of getting exact solutions of solvable first order ordinary differential equations.
- CO2 Learn various techniques of getting exact solutions of solvable linear differential equations of higher order.
- CO3 Apply a range of techniques to solve second order ordinary differential equations with variable coefficient.
- CO4 Model physical phenomena using ordinary differential equations such as the electric circuit, simple harmonic motion etc.
- CO5 Power series method for higher order linear equations, especially in cases when there is no method available to solve such equations.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	H	H	L	M	H	H	M	M
CO2	H	M	M	M	M	L	H	H	M	M
CO3	H	L	H	M	L	L	H	M	H	M
CO4	H	M	M	M	L	M	M	H	M	M
CO5	H	H	M	M	L	L	L	M	M	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *nigam* *J. K. S.* *S. S. S.* *Shrestha* *J. K. S.*

BMA005C	MATLAB-I	L-T-P:0-0-1
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Students are required to familiarize themselves with software MATLAB, for numerical computation on the following topics:

1. Introduction of MATLAB.
2. Commands for managing a session, Input and output commands.
3. Some primary mathematical function (Arithmetic function, trigonometric function, logarithm and exponent function).
4. Commonly used operators and special characters.
5. Vector, matrix and array commands.
6. Construction of a vector with operations on vectors.
7. Matrix representation and some operations on matrix.
8. Special matrices
9. element operations on matrix.
10. Some statistical function.

#### ESSENTIAL READINGS:

MATLAB- High performance numeric computation and visualization software

*Fig 4 98* *P. Kumar* *mjani* *J. J. J.* *Seena* *Shrestha* *J. J. J.*

## Semester-V

BMA091A	Mathematical Programming	L-T-P:4-1-0
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### Course objectives:

- To understand the basic concept of LPP.
- To understand Simplex and Revised Simplex algorithm.
- To understand ing Duality theory, Dual simplex method.

### Unit-I

Convexity and Basic Feasible Solutions Formulation, Canonical and standard forms, Graphical method; Convex and polyhedral sets, Hyperplanes, Extreme points; Basic solutions, Basic Feasible Solutions, Reduction of feasible solution to basic feasible solution, Correspondence between basic feasible solutions and extreme points, LPP Formulation.

### Unit-II

Optimality criterion, Improving a basic feasible solution, Graphical method for LPP, Unboundedness, Unique and alternate optimal solutions; Simplex algorithm and its tableau format.

### Unit-III

Artificial variables, Two-phase method, Big-M method. Formulation of the dual problem, Duality theorems, Complimentary slackness theorem, Economic interpretation of the dual, Dual-simplex method.

### Unit-IV

Definition and formulation, Methods of finding initial basic feasible solutions: Northwest-corner rule, Least- cost method, Vogel approximation method; Algorithm for obtaining optimal solution. Assignment Problem: Mathematical formulation and Hungarian method.

### Unit-V

Sequencing Problems: Introduction – Basic Assumptions – Sequencing n Jobs on 2 Machines – Sequencing n Jobs on 3 machines – Sequencing 2 Jobs on n Machines.

### References:

1. Mokhtar S. Bazaraa, John J. Jarvis & Hanif D. Sherali (2010). Linear Programming and Network Flows (4th edition). John Wiley & Sons.
2. G. Hadley (2002). Linear Programming. Narosa Publishing House.
3. Frederick S. Hillier & Gerald J. Lieberman (2015). Introduction to Operations Research (10th edition). McGraw-Hill Education.
4. Hamdy A. Taha (2017). Operations Research: An Introduction (10th edition). Pearson.

*Fig 4 98* *Pram* *nigam* *JTS* *Seema* *Shrestha* *Dr. J. K. Gupta*

5. Paul R. Thie & Gerard E. Keough (2014). An Introduction to Linear Programming and Game Theory (3rd edition). Wiley India Pvt. Ltd.
6. A. S. Gupta (2004). Calculus of Variations with Applications. PHI Learning

#### Course Learning Outcomes:

This course will enable the students to:

- CO1 Analyze and solve linear programming models of real life situations, and illustrate the concept of convex set and extreme points.
- CO2 Understand the theory of the Simplex method. Provide graphical solutions of linear programming problems with two variables.
- CO3 Understand the concepts of artificial variable and duality.
- CO4 Learn about the applications to transportation, assignment problem.
- CO5 Understand problems related to machine sequencing.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	M	M	L	M	H	H	M	M
CO2	H	M	M	H	L	M	H	H	M	M
CO3	H	M	M	M	L	M	H	M	H	M
CO4	H	H	H	M	L	M	M	H	M	M
CO5	H	H	M	M	L	L	L	M	M	H

H = Highly Related; M = Medium L = Low

*Fig 4.98* *Praveen* *nigam* *J. K. Singh* *Seema* *Shruti* *Dr. J. K. Singh*

BMA008C	MATLAB-II	L-T-P:0-0-1
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Students are required to familiarize themselves with software MATLAB, for numerical computation on the following topics:

1. Plotting commands.
2. Create 2D graph and customize line, Plot multiple graphs.
3. Scaling and coloring and line styles in 2D graphs.
4. Add title axis labels and legend to graph.
5. 3D graph plotting, Scaling and coloring and line styles in 3D graphs.
6. Add title axis labels and legend to graph.
7. Introduction of M-Files in MATLAB.
8. M-File scripts and M-File functions.
9. Creating and running scripts file.
10. Editing and existing M-File.

**ESSENTIAL READINGS:**

MATLAB- High performance numeric computation and visualization software

Page 68

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## Semester-VI

BMA013C	MATLAB-III	L-T-P:0-0-1
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Students are required to familiarize themselves with software MATLAB, for numerical computation on the following topics:

1. Programme for addition/Subtraction of numbers.
2. Programme for multiplication of numbers.
3. Programme for addition of squares of (even/odd) numbers.
4. Programme for numerical integration using Trapezoidal rule.
5. Programme for numerical integration using Simpson's 1/3 rule.
6. Programme for numerical integration using Simpson's 3/8 rule.
7. Programme for numerical solution of ordinary differential equation using Euler's method.
8. Programme for numerical solution of ordinary differential equation using Euler's Modified method.
9. Programme for numerical solution of ordinary differential equation using 2nd order Runge-Kutta method.
10. Programme for numerical solution of ordinary differential equation using 4th order Runge-Kutta method.

### **ESSENTIAL READINGS:**

**MATLAB- High performance numeric computation and visualization software**

*Fig 4 98* *P. Kumar* *nigam* *J. K. Singh* *Seema* *Shristi* *Jaspreet*

BMA093A	Partial Differential Equations	Credits: 5: 4+1
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## OBJECTIVE:

- To understand concept of linear and non-linear partial differential equations.
- To understand homogeneous and non homogeneous partial differential equations and their characteristic equations.
- To familiar with application of partial differential equations.

### Unit-I

Order and degree of Partial differential equations (PDE), Concept of linear and non-linear partial differential equations, Partial differential equations of the first order, Lagrange's method, Some special type of equation which can be solved easily by methods other than the general method, non-linear PDE in  $p$  and  $q$ , Charpit's general method of solution.

### Unit-II

Homogeneous and non homogeneous linear partial differential equations with constant coefficients.

### Unit-III

Cauchy's Initial value problem for Linear first order and second order Partial Differential Equations, Characteristic equation.

### Unit-IV

Classification of linear partial differential equations of second order, Reduction to canonical or normal form.

### Unit-V

Partial Differential Equation (PDE), Method of separation of variables; Boundary and initial value problems, one dimensional diffusion equation; one-dimensional wave equation, two-dimensional Laplace equation.

## References:

1. M. D. Raisinghania, Advanced Differential Equations, S. Chand & Company LTD, 2016.
2. L. C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Vol. 19, AMS, 1999.
3. J. Jost, Partial Differential Equations: Graduate Text in Mathematics, Springer Verlag Heidelberg, 1998.
4. R. C. Mcowen, Partial Differential Equations: Methods and Applications, Pearson Education Inc. 2003.
5. F. John, Partial Differential Equations, Springer-Verlag, 1986.
6. I. N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1988.

## Course Learning Outcomes:

This course will enable the students to:

- CO1 The student will able to answer about concept of linear and non-linear partial differential equations.
- CO2 The student will able to solve homogeneous and non homogeneous partial differential equations.
- CO3 The student will able to solve characteristic equations and can draw characteristic curves.
- CO4 The student will able to reduce partial differential equations into canonical form.
- CO5 The student will able to solve Heat, Wave and Laplace equations.

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	M	M	H		M			L	M	H
CO2	L	M	L	M	H	L	M	M	M	H
CO3	M	L	L	M	H			L	L	M
CO4	H	M	M	L	H	L	H		M	M
CO5	H	H	M	M	L		L	M	L	H

H = Highly Related; M = Medium L = L

Page 68 *Praveen* *nigam* *Shruti* *Seema* *Shruti* *Shruti*

Tracks	Department Elective-1		Department Elective-2		Department Elective-3		Department Elective-4	
	Applied Mathematics		Computational Mathematics		General Mathematics		Data Science	
Semester	Paper Code	Paper Name	Paper Code	Paper Name	Paper Code	Paper Name	Paper Code	Paper Name
4 <sup>th</sup>	BMA048A	Programing in C	BMA048A	Programing in C	BMA048A	Programing in C	BMA048A	Programing in C
	BMA049A	Programing in C Lab	BMA049A	Programing in C Lab	BMA049A	Programing in C Lab	BMA049A	Programing in C Lab
	BMA050A	Discrete Mathematics	BMA050A	Discrete Mathematics	BMA050A	Discrete Mathematics	BMA050A	Discrete Mathematics
5 <sup>th</sup>	BMA051A	Combinatorial Analysis	BMA051A	Combinatorial Analysis	BMA059A	Operation Research	BMA062A	Data Science using R Programming
							BMA063A	R Programming Lab
	BMA052A	Finite element analysis of solid and fluids	BMA056A	Introduction to Simulation and Modeling	BMA056A	Introduction to Simulation and Modeling	BMA064A	Python Programming
							BMA065A	Python Programming Lab
6 <sup>th</sup>	BMA053A	Mathematical Finance	BMA057A	Introduction to Algorithms	BMA053A	Mathematical Finance	BMA066A	Database Management Systems
							BMA067A	Database Management Systems Lab
	BMA054A	Fuzzy and Computational Mathematics	BMA054A	Fuzzy and Computational Mathematics	BMA060A	Applied Statistical Methods	BMA068A	Regression Analysis
							BMA069A	Statistics Lab with R
	BMA055A	Network Optimization	BMA058A	Matrix methods in data analysis signal processing and machine learning	BMA061A	Theory of Numbers	BMA070A	Data Analysis using Spread Sheet
							BMA071A	Data Analysis using Spread Sheet Lab

Page 68

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Seenu

Shristi

Dr. J. K. K. K.

Tracks	Department Elective-5		Department Elective-6		Department Elective-7	
	Engineering Mathematics		Computer Science		Statistics	
Semester	Paper Code	Paper Name	Paper Code	Paper Name	Paper Code	Paper Name
4th	BMA048A	Programing in C	BMA048A	Programing in C	BMA080A	Correlation & Regression
	BMA049A	Programing in C Lab	BMA049A	Programing in C Lab	BMA081A	Stats Lab-I
	BMA050A	Discrete Mathematics	BMA050A	Discrete Mathematics	BMA082A	Industrial Statistics and Sampling Distribution
					BMA083A	Stats Lab-II
5th	BMA059A	Operation Research	BMA075A	Operating Systems	BMA084A	Applied Statistics
			BMA076A	Operating Systems Lab		
	BMA072A	Integral Transforms and Fourier Analysis	BMA064A	Python Programming	BMA085A	Statistical Inference & Sampling
			BMA065A	Python Programming Lab		
6th	BMA073A	Wavelets and Applications	BMA066A	Database Management Systems + Lab	BMA086A	ANOVA and DOE
			BMA067A	Database Management Systems Lab	BMA087A	Stats Lab-III
	BMA054A	Fuzzy and Computational Mathematics	BMA077A	Data Structures And Algorithms	BMA088A	Stochastic Process & Queuing Theory
			BMA078A	Data Structures And Algorithms Lab		
	BMA074A	Mathematical Logic	BMA079A	Internet Technologies	BMA089A	Multivariate analysis








**Course Objective:**

- Understand all of the concepts related to basics of programming with C.
- Understand all of the concepts of Looping in C.
- Learn the concepts of Pointers in C.

**Unit-I**

Basics of Computer Architecture: processor, Memory, Input& Output devices. Application Software & System software: Compilers, interpreters, High level and low level languages, Introduction to structured approach to programming, Flow chart Algorithms, Pseudo code (bubblesort, linear search - algorithms and pseudo code)

**Unit-II**

Basic structure of C program: Character set, Tokens, Identifiers in C, Variables and Data Types, Constants, Console IO Operations, printf and scanf. Operators and Expressions: Expressions and Arithmetic Operators, Relational and Logical Operators, Conditional operator, size of operator, Assignment operators and Bitwise Operators, Operators Precedence, Control Flow Statements: If Statement, Switch Statement, Unconditional Branching using goto statement, While Loop, Do While Loop, For Loop, Break and Continue statements.(Simple programs covering control flow)

**Unit-III**

Arrays Declaration and Initialization, 1-Dimensional Array, 2-Dimensional Array String processing: In built String handling functions (strlen, strcpy, strcat and strcmp, puts, gets), Linear search program, bubble sort program, simple programs covering arrays and strings.

**Unit-IV**

Introduction to modular programming, writing functions, formal parameters, actual parameters Pass by Value, Recursion, Arrays as Function Parameters structure, union, Storage Classes, Scope and life time of variables, simple programs using functions.

**Unit-V**

Basics of Pointer: declaring pointers, accessing data though pointers, NULL pointer, array access using pointers, pass by reference effect File Operations: open, close, read, write, append Sequential access and random access to files: In built file handling functions (rewind(), fseek(), ftell(), feof(), fread(), fwrite()), simple programs covering pointers and files.

**References**

1. Schaum Series, Gottfried B.S., Tata McGraw Hill, Programming with C
2. E. Balagurusamy, Mcgraw Hill, Programming in ANSI C
3. Asok N Kamthane, Pearson, Programming in C
4. Anita Goel, Pearson, Computer Fundamentals
5. Anita Goel and Ajay Mittal, Pearson, Computer fundamentals and Programming in C
6. Brian W. Kernighan and Dennis M. Ritchie, Pearson, C Programming Language
7. Rajaraman V, PHI, Computer Basics and Programming in C
8. Yashavant P, Kanetkar, BPB Publications, Let us C

*Page 98* *Praveen* *nigam* *Shrestha* *Shrestha* *Shrestha*

**Course Outcomes**

- CO1. Analyze a computational problem and develop an algorithm/flowchart to find its solution.
- CO2. Develop readable\* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
- CO3. Write readable C programs with arrays, structure or union for storing the data to be processed
- CO4. Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
- CO5. Write readable C programs which use pointers for array processing and parameter passing

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	H	L	L	L	H	H	M	H	H
CO2	H	M	H	H	H	H	M	M	H	H
CO3	M	L		M	M	H	M	H	H	H
CO4	M	H	M	L	H	H	M	M	H	H
CO5	L		M	H	H	H	M	M	H	H

H = Highly Related; M = Medium L = Low

*Page 68* *Praveen* *nigam* *Dr. J. S. J.* *Seenu* *Dr. J. S. J.* *Dr. J. S. J.*

## LIST OF LAB EXPERIMENTS

1. Familiarization of Hardware Components of a Computer
2. Familiarization of Linux environment – How to do Programming in C with Linux
3. Familiarization of console I/O and operators in C
  - i) Display "Hello World"
  - ii) Read two numbers, add them and display their sum
  - iii) Read the radius of a circle, calculate its area and display it
  - iv) Evaluate the arithmetic expression  $((a - b / c * d + e) * (f + g))$  and display its solution.  
Read the values of the variables from the user through console.
4. Read 3 integer values and find the largest among them.
5. Read a Natural Number and check whether the number is prime or not
6. Read a Natural Number and check whether the number is Armstrong or not
7. Read n integers, store them in an array and find their sum and average
8. Read n integers, store them in an array and search for an element in the array using an algorithm for Linear Search
9. Read n integers, store them in an array and sort the elements in the array using Bubble Sort algorithm
10. Read a string (word), store it in an array and check whether it is a palindrome word or not.
11. Read two strings (each one ending with a \$ symbol), store them in arrays and concatenate them without using library functions.
12. Read a string (ending with a \$ symbol), store it in an array and count the number of vowels, consonants and spaces in it.
13. Read two input each representing the distances between two points in the Euclidean space, store these in structure variables and add the two distance values.
14. Using structure, read and print data of n employees (Name, Employee Id and Salary)
15. Declare a union containing 5 string variables (Name, House Name, City Name, State and Pincode) each with a length of C\_SIZE (user defined constant). Then, read and display the address of a person using a variable of the union.
16. Find the factorial of a given Natural Number n using recursive and non recursive functions.
17. Read a string (word), store it in an array and obtain its reverse by using a user defined function.
18. Write a menu driven program for performing matrix addition, multiplication and finding the transpose. Use functions to (i) read a matrix, (ii) find the sum of two matrices, (iii) find the product of two matrices, (i) find the transpose of a matrix and (v) display a matrix.
19. Do the following using pointers
  - i) add two numbers
  - ii) swap two numbers using a user defined function
20. Input and Print the elements of an array using pointers
21. Compute sum of the elements stored in an array using pointers and user defined function.
22. Create a file and perform the following
  - i) Write data to the file
  - ii) Read the data in a given file & display the file content on console
  - iii) Append new data and display on console

23. Open a text input file and count number of characters, words and lines in it, and store the results in an output file.

#### References

1. Schaum Series, Gottfried B.S., Tata McGraw Hill, Programming with C
2. E. Balagurusamy, McGrawHill, Programming in ANSI C
3. Asok N Kamthane, Pearson, Programming in C
4. Anita Goel and Ajay Mittal, Pearson, Computer fundamentals and Programming in C
5. Brian W. Kernighan and Dennis M. Ritchie, Pearson, C Programming Language
6. Rajaraman V, PHI, Computer Basics and Programming in C
7. Yashavant P, Kanetkar, BPB Publications, Let us C

Page 68      Review      nizam      J. J.      Saurav      Shrestha      J. J.      Karan



BMA050A	Discrete Mathematics	L-T-P:4-1-0
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### Course Objective:

- Learn about partially ordered sets, lattices and their types.
- Understand Boolean algebra and Boolean functions, logic gates, switching circuits and their applications.
- Solve real-life problems using finite-state and Turing machines.
- Assimilate various graph theoretic concepts and familiarize with their applications.

### Unit-I: Partially Ordered Sets

Definitions, examples and basic properties of partially ordered sets (poset), Order isomorphism, Hasse diagrams, Dual of a poset, Duality principle, Maximal and minimal elements, Least upper bound and greatest upper bound, Building new poset, Maps between posets.

### Unit-II: Lattices

Lattices as posets, Lattices as algebraic structures, Sublattices, Products and homomorphisms; Definitions, examples and properties of modular and distributive lattices; Complemented, relatively complemented and sectionally complemented lattices.

### Unit-III: Boolean Algebras and Switching Circuits

Boolean algebras, De Morgan's laws, Boolean homomorphism, Representation theorem; Boolean polynomials, Boolean polynomial functions, Disjunctive and conjunctive normal McCluskey method, Karnaugh-forms, Minimal forms of Boolean polynomials, Quine diagrams, Switching circuits and applications.

### Unit-IV: Finite-State and Turing Machines

Finite-state machines with outputs, and with no output; Deterministic and no deterministic finite-state automaton; Turing machines: Definition, examples, and computations.

### Unit-V: Graphs

Definition, examples and basic properties of graphs, Königsberg bridge problem; Subgraphs, Pseudographs, Complete graphs, Bipartite graphs, Isomorphism of graphs, Paths and circuits, Eulerian circuits, Hamiltonian cycles, Adjacency matrix, Weighted graph, Travelling salesman problem, Shortest path and Dijkstra's algorithm.

### References:

1. B. A. Davey & H. A. Priestley (2002). Introduction to Lattices and Order (2nd edition). Cambridge University Press.
2. Edgar G. Goodaire & Michael M. Parmenter (2018). Discrete Mathematics with Graph Theory (3rd edition). Pearson Education.
3. Rudolf Lidl & Günter Pilz (1998). Applied Abstract Algebra (2nd edition). Springer.
4. Kenneth H. Rosen (2012). Discrete Mathematics and its Applications: With Combinatorics and Graph Theory (7th edition). McGraw-Hill.
5. C. L. Liu (1985). Elements of Discrete Mathematics (2nd edition). McGraw-Hill10

### Course Outcomes:

This course will enable the students to:

- CO1. Students will understand basic properties of partially ordered sets (poset), Order isomorphism, Hasse diagrams.

*Fig 4 98* *Pram* *nigam* *J. S. J.* *Seenu* *Shristi* *Jaspreet*



- CO2. Students will understand the Lattices as posets and Complemented, relatively complemented and sectionally complemented lattices.
- CO3. Study of Boolean Algebras and Switching Circuits.
- CO4. Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems .
- CO5. Students will understand the language of graphs and trees.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	L	H	M		L	M		H	H
CO2	M	M	M	H	M	L	H	L		M
CO3	H	M	H	H	M	H	M	L	H	M
CO4	M	M	M	H	H	M		M	L	H
CO5	M	L	M		L	M	M		H	M

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *mjani* *J. J. J.* *Seena* *Shrestha* *J. J. J.*

BMA051A	Combinatorial Analysis	L-T-P:4-1-0
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**Course Objective:**

- To understand pigeonhole principle, elementary counting, binomial theorem, permutations and generating functions.
- To learn Eulerian walks, Isomorphism, Hamiltonian cycles, Trees and bipartite graphs.
- To understand chromatic polynomials, planar graphs and Ramsey theory.

**Unit-I:**

Pigeonhole Principle, Induction, Elementary Counting, Binomial Theorem, Compositions, Integer Partitions, Integer, Set Partitions.

**Unit-II:**

Permutations, Cycle Type, Stirling Numbers of the First Kind, The Sieve, Generating Functions, Catalan Numbers, Partitions, Exponential Generating Functions.

**Unit-III:**

Vertex Degree, Eulerian Walks, Isomorphism, Hamiltonian Cycles, Tournaments, Trees, Counting Trees, Minimum Weight Spanning Trees, Matrix-Tree Theorem.

**Unit-IV:**

Bipartite Graphs, Matchings in Bipartite Graphs, Midterm Latin Rectangles, Konig-Egervary Theorem, Matchings in Bipartite Graphs, Chromatic Polynomials.

**Unit-V:**

Planar Graphs, Polyhedra, Coloring Maps, Ramsey Theory, A Probabilistic Proof.

**References:**

1. Bona, Miklos. *A Walk Through Combinatorics: An Introduction to Enumeration and Graph Theory*. World Scientific Publishing Company, 2011. ISBN: 9789814335232
2. R.P. Grimaldi, B.V. Ramana, *Discrete and Combinatorial mathematics – An applied introduction*, Pearson Education (2007).
3. Richard A Brnaldi, *Introductory Combinatorics*, Pearson Education, Inc.(2004)
4. Miklos Bona, *Introduction to Enumerative Combinatorics*, Mc Graw Hill (2007)
5. J.H.Vanlint, R.M. Wilson, *A course in Combinatorics*, Cambridge University Press – (1992, 2001)
6. Stasys Jukna, *Extremal Combinatorics – With applications in computer science*, Springer-Verlag (2001)

**Course Outcomes:**

CO1:- Understand the Pigeonhole Principle, Binomial Theorem and Set Partitions.

CO2:- Understand the Permutations, Stirling Numbers of the First Kind, Generating Functions, Catalan Numbers.

CO3:- Understand the Eulerian Walks, Isomorphism, Hamiltonian Cycles, Trees.

CO4:- Understand the Bipartite Graphs, Chromatic Polynomials.

CO5:- Understand the Planar Graphs, Polyhedra, Coloring Maps, Ramsey Theory.

*Fig 4 98* *Pram* *nigam* *J. J. J.* *Seena* *Shrestha* *J. J. J.*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	L	H	M	H	L	H		M	H
CO2	M	L	H	H	M	M		L	M	M
CO3	M	L	M	H	M		M	M	L	M
CO4	M	L	L	H	H		M	L	M	H
CO5	H		L	H	H		M	L	M	H

H = Highly Related; M = Medium L = Low

Page 68 *Praveen* *nigam* *Dr. J. S. J.* *Seenu* *Dr. J. S. J.* *Dr. J. S. J.*

BMA052A	Finite element analysis of solid and fluids	L-T-P:4-1-0
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#### Course Objective:

- To understand basic Concepts of finite element analysis, virtual work, stiffness matrix of isoperimetric elements.
- To learn analysis of solids/structures and fluids.
- To learn non-linear finite element analysis of solids and structures, heat transfer analysis and solution of dynamic equilibrium equations.

#### Unit-I

Introduction, Basic Concepts of Finite Element Analysis, Introduction to Elasticity, Steps in Finite Element Analysis, Virtual Work and Variational Principle, Galerkin Method, Finite Element Method: Displacement Approach, Stiffness Matrix and Boundary Conditions.

#### Unit-II

Natural Coordinates, Triangular Elements, Rectangular Elements, Lagrange and Serendipity Elements, Solid Elements, Isoparametric Formulation, Stiffness Matrix of Isoparametric Elements, Numerical Integration: One Dimensional, Numerical Integration: Two and Three Dimensional

#### Unit-III

The finite element analysis process, Analysis of solids/structures and fluids, the principle of virtual work, The finite element formulation, Finite element solution process.

#### Unit-IV

Non-linear finite element analysis of solids and structures, Heat transfer analysis, Finite element analysis of heat transfer and incompressible fluid flow, Physical explanation of Gauss elimination.

#### Unit-V

Solution of dynamic equilibrium equations, Modeling for dynamic analysis and solution, Wave propagation response, Solution of the generalized eigen value problem.

#### Reference:

1. Bathe, K. J. *Finite Element Procedures*. 2nd ed. Klaus-Jürgen Bathe, 2014. ISBN: 9780979004957.
2. C. S. Krishnamoorthy, *Finite Element Analysis*, Tata McGraw-Hill.
3. David V. Hutton, *Fundamentals of Finite Element Analysis*, McGraw Hill.
4. D. Maity, *Computer Analysis of Framed Structures*, I.K. International Pvt. Ltd. New Delhi.
5. Erik G. Thompson, *Introduction to the Finite Element Method: Theory, Programming and Applications*, John Wiley.
6. H. C. Martin and G. F. Carey, *Introduction to Finite Element Analysis - Theory and Application*, New York, McGraw-Hill.
7. Irving H. Shames, Clive L. Dym, *Energy and Finite Element Methods in Structural Mechanics*, New Age International.
8. K. J. Bathe, *Finite Element Procedures*, Prentice-Hall of India, New Delhi, India.
9. M. Mukhopadhyay, *Matrix, Finite Element, Computer and Structural Analysis*, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.
10. O. C. Zienkiewicz and Y.K. Cheung, *The Finite Element Method in Structural and Solid Mechanics*, McGraw Hill.

*Fig 4.98* *Pranav* *nigam* *Sharma* *Shrestha* *Shrestha*

11. London P.E. Ceruzzi, A History of Modern Computing, The MIT Press, Cambridge, MA, 1998.
12. R. D. Cook, Concepts and Applications of Finite Element Analysis, Wiley.
13. S.S. Rao, Finite Element Analysis, Elsevier Butterworth-Heinemann.
14. W. Weaver Jr. and J. M. Gere, Matrix Analysis of Framed Structure, CBS Publishers & Distributors, New Delhi, India.

**Course Outcomes:**

- CO1:- Understand the basic concepts of Finite Element Analysis, Virtual Work and Variational Principle, Stiffness Matrix and boundary conditions.
- CO2:- Understand the natural coordinates, Triangular Elements, Rectangular Elements, Lagrange and Serendipity Elements, Solid Elements.
- CO3:- Understand the finite element analysis process, Analysis of solids/structures and fluids.
- CO4:- Understand the non-linear finite element analysis of solids and structures, Heat transfer analysis, Finite element analysis of heat transfer and incompressible fluid flow.
- CO5:- Understand the solution of dynamic equilibrium equations, modeling for dynamic analysis and solution, wave propagation response.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	L	H	H	M		L	L	M	H
CO2	H	L	M	H	M		L	L	M	H
CO3	H		H	M	H		L	L	M	M
CO4	H	L	M	M	H	L	M	L	M	H
CO5	M		L	H	H	L	M	L	H	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *mjani* *J. S. J.* *S. S. S.* *Shrestha* *J. S. J.*

<b>BMA053A</b>	<b>Mathematical Finance</b>	<b>L-T-P:4-1-0</b>
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#### **Course Objectives:**

- To develop skills to formulate mathematical problems based on the financial industry.
- To carry out relevant mathematical and financial analysis, develop and implement appropriate tools to present and interpret model results.
- To understand Stochastic Analysis techniques and methods in data analysis

#### **Unit-I: Basic Theory of Interest and Fixed-Income**

Securities Principal and interest: simple, compound and continuous; Present and future value of cash flow streams; Net present value, Internal rates of return and their comparison; Inflation, Annuities; Bonds, Bond prices and yields, Macaulay duration and modified duration.

#### **Unit-II: Term Structure of Interest Rates**

Bonds and Derivatives Spot rates, forward rates and explanations of term structure; Running present value, Floatingrate bonds, Immunization, Convexity; Putable and callable bonds; Exchange-traded markets and over-the-counter markets; Derivatives: Forward contracts, Future contracts, Options, Types of traders, Hedging, Speculation, Arbitrage.

#### **Unit-III: Mechanics of Options Markets**

No-arbitrage principle, Short selling, Forward price for an investment asset; Types of options: Call and put options, Option positions, Underlying assets, Factors affecting option prices, Upper and lower bounds for option prices, Put-call parity, Effect of dividends. Scholes Model

#### **Unit-IV: Stochastic Analysis of Stock Prices and Black-Scholes model**

Binomial option pricing model, Risk neutral valuation: European and American options on assets following binomial tree model; Lognormal property of stock prices, Distribution of rate of return, Expected return, Volatility, Estimating volatility from historical data, Extension of risk-neutral valuation to assets following geometric Brownian motion, Scholes formula for European options. –Black

#### **Unit-V: Hedging Parameters Trading Strategies and Swaps**

Hedging parameters: Delta, gamma, theta, rho and vega; Trading strategies involving options, Swaps, Mechanics of interest rate swaps, Comparative advantage argument, Valuation of interest rate swaps, Currency swaps, Valuation of currency swaps.

#### **References:**

1. John C. Hull & Sankarshan Basu (2018). Options, Futures and Other Derivatives (10th edition). Pearson Education.
2. David G. Luenberger (2013). Investment Science (2nd edition). Oxford University Press.
3. Sheldon M. Ross (2011). An Elementary Introduction to Mathematical Finance (3rd edition). Cambridge University Press.

#### **Course Outcomes:**

This course will enable the students to:

- CO1. Created interest yielding investments using the concepts of Net Present Value, and Internal Rate of Return.
- CO2. To understand Term Structure of Interest Rates and Types of traders, Hedging, speculation, Arbitrage.
- CO3. Study of Types of options: Call and put options, Option positions, Underlying assets,

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Factors affecting option prices, Upper and lower bounds for option prices.

CO4. Appreciate pricing and hedging of options, interest rate swaps and no-arbitrage pricing concepts. Learn stochastic analysis, Ito's formula, Ito integral and the Black-Scholes model.

CO5. Study and use Hedging parameters, trading strategies and currency swaps.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	L	M	H	H	L	M	M	L	H
CO2	M		L	M	M		M	L	M	H
CO3	M		L	M	H	L	M	L	M	M
CO4	H		L	M	H		M	L	M	H
CO5	M	L	M	M	L		M	L	H	M

H = Highly Related; M = Medium L = Low

Fig 4.98 *Praveen* *nijam* *Dr. J. S. S. S.* *Dr. J. S. S. S.* *Dr. J. S. S. S.*



BMA054A	Fuzzy and Computational Mathematics	L-T-P:4-1-0
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#### Course Objective:

1. Provide an emphasis on the differences and similarities between fuzzy sets and classical sets theories.
2. The main objective of this course is to establish thorough background knowledge on evolutionary algorithms in graduate students and enable them to pursue individual research in solving real world optimization problems.

#### Unit-I

Basic Definitions – Basic set theoretic operations for Fuzzy sets – Extensions: Types of Fuzzy sets – algebraic operations - Extension Principle: operation for type 2 fuzzy sets – algebraic operations with fuzzy numbers – special extended operations – Extended operations for LR-representation of fuzzy sets.

#### Unit-II

Fuzzy relations and fuzzy sets – Composition of Fuzzy relations – Min-max composition and its properties – Fuzzy graphs – Special fuzzy relation - Possibility Theory – Possibility of fuzzy events – Possibility Vs Probability.

#### Unit-III

An overview – Multivalued logic – Fuzzy propositions – Fuzzy quantifiers – Linguistic hedges – Inference from conditional fuzzy propositions – Approximate reasoning: An overview of fuzzy expert system – Fuzzy implications and their selection – Multi-conditional approximate reasoning – The role of fuzzy relation equation.

#### Unit-IV

An overview – Fuzzy rule base, Fuzzy inference engine, Fuzzification, De-fuzzification and the various De-fuzzification methods (the centre of area, the centre of maxima and the mean of maxima methods) – Fuzzy controllers: An example – Fuzzy systems and Neural Networks – Automata – Dynamical Systems.

#### Unit-V

Individual decision making – Multiperson decision making – Multicriteria decision making – Multi stage decision making – Fuzzy ranking methods – Fuzzy linear programming – Applications in Civil Engineering, Mechanical Engineering, Industrial Engineering and Medicine.

#### Reference:

1. Fuzzy set theory and its applications Fourth edition, H.J. Zimmermann. Springer, 2015.
2. Theory and Applications, George J. Klir and Bo Yuan, PHI, 2013. C
3. Dr. M. Ganesh, Introduction to Fuzzy Sets and Fuzzy Logic, Prentice Hall India Learning Private Limited (2006)
4. George. J. Klir and Tina A. Folger, "Fuzzy Sets Uncertainty and Information" Printice Hall of India Pvt. Ltd., New Delhi, 2006.
5. M. Amirthavalli, Fuzzy logic and Neural Networks, Scitech Publications Pvt. Ltd, Chennai and Hyderabad, 2007
6. 4.Timothy J. Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill INC, New York, 1996.

*Fig 4 98* *Pram* *nigam* *J. K. S.* *S. S. S.* *Shrestha* *J. K. S.*



**Course Outcomes:**

This course will enable the students to:

- CO1 Understand Fuzzy sets Fuzzy relations and Fuzzy Graphs.
- CO2 Understand Fuzzy Logic, Classical logic, Fuzzy Systems, and Decision making in Fuzzy environment
- CO3 Be able to distinguish between the crisp set and fuzzy set concepts through the learned differences between the crisp set characteristic function and the fuzzy set membership function.
- CO4 Be able to draw a parallelism between crisp set operations and fuzzy set operations through the use of characteristic and membership functions respectively.
- CO5 Become aware of the use of fuzzy inference systems in the design of intelligent or humanistic systems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H		M	M	H		M	L	M	H
CO2	M		M	M	H	L	H	L	H	H
CO3	M	L	M	H	H		M	M	M	H
CO4	L	L	M	M	H		H	L	M	M
CO5	M		L	M	M		M	H	M	M

H = Highly Related; M = Medium L = Low

*Fig 4 98* *Pramod* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

<b>BMA055A</b>	<b>Network Optimization</b>	<b>L-T-P:4-1-0</b>
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**Course Objective:**

- To understand about network models and shortest paths.
- To learn basic algorithms for the maximum flow problem and minimum cost flow.
- To learn applications of network flows, Lagrangian relaxation and multi-commodity flows.

**Unit-I**

Introduction to network models, Computational complexity and data structures, Graph search algorithms, Transformations and flow decomposition.

**Unit-II**

Shortest paths: label setting algorithms, The radix heap algorithm, label correcting algorithms, Algorithm analysis.

**Unit-III**

Basic algorithms for the maximum flow problem, combinatorial applications of maximum flows, Preflow push algorithms, Minimum cost flow: basic algorithms, Minimum cost flow: polynomial time algorithms.

**Unit-IV**

Applications of network flows; Linear programming review, The network simplex algorithm, NP-completeness.

**Unit-V**

Lagrangian relaxation 1, Lagrangian relaxation 2, Multicommodity flows 1, Multicommodity flows 2.

**References:**

1. Ahuja, Ravindra K., Thomas L. Magnanti, and James B. Orlin. *Network Flows: Theory, Algorithms, and Applications*. Upper Saddle River, NJ: Prentice Hall, 1993. ISBN: 9780136175490.
2. Dimitri P. Bertsekas. *Network Optimization: Continuous and Discrete Models*. Athena Scientific, first edition, 1998.
3. M. Pioro, D. Medhi. *Routing, Flow and Capacity Design in Communication and Computer Networks*, Elsevier, 2004.
4. <https://ocw.mit.edu/courses/sloan-school-of-management/15-082j-network-optimization-fall-2010/lecture-notes/>

**Course Outcomes:**

- CO1:- Understand the network models, graph search algorithms, transformations and flow decomposition.
- CO2:- Understand the Shortest paths and algorithm analysis.
- CO3:- Understand basic algorithms for the maximum flow problem, minimum cost flow: basic algorithms, and polynomial time algorithms.
- CO4:- Understand the applications of network flows, the network simplex algorithm.
- CO5:- Understand Lagrangian relaxation 1, Lagrangian relaxation 2, Multicommodity flows 1, Multi-commodity flows 2.

*Fig 4 98* *Praun* *nijam* *J. P. S.* *Savina* *Shrestha* *Dr. J. K. K. K.*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	H	M	H	L	M	H
CO2	M	L	M	M	L	L	M	L	M	M
CO3	L	M	M	M	M	M	L	L	M	H
CO4	M		L	M	H	M	M	L	M	H
CO5	M		L	M	H	L	M	L	M	H

H = Highly Related; M = Medium L = Low

Page 98 *Praveen* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

<b>BMA056A</b>	<b>Introduction to Simulation Modeling &amp; Analysis</b>	<b>L-T-P:4-1-0</b>
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**Course objectives:**

- To understand the types of models.
- To understand the general principles and Concepts in discrete - event simulation, event scheduling.
- To understand the Random Variate Generation.

**Unit – I**

Introduction to Simulation: Simulation, Advantages, Disadvantages, Areas of application, System environment, components of a system, Model of a system, types of models, steps in a simulation study. Simulation Examples: Simulation of Queuing systems, Simulation of Inventory System, Other simulation examples.

**Unit – II**

General Principles: Concepts in discrete - event simulation, event scheduling/ Time advance algorithm, simulation using event scheduling. Random Numbers: Properties, Generations methods, Tests for Random number- Frequency test, Runs test, Autocorrelation test.

**Unit – III**

Random Variate Generation: Inverse Transform Technique- Exponential, Uniform, Weibull, Triangular distributions, Direct transformation for Normal and log normal Distributions, convolution methods- Erlang distribution, Acceptance Rejection Technique Optimization Via Simulation: Meaning, difficulty, Robust Heuristics, Random Search.

**Unit – IV**

Introduction, Diophantine Equations, Divisibility, GCD, Euclidean Algorithm, Primes, Binomial Coefficients, Congruences, Fermat, Euler, Wilson, Linear Congruences, Linear Congruences, Chinese Remainder Theorem, Algorithms.

**Unit – V**

Output Analysis – Types of Simulations with Respect to Output Analysis, Stochastic Nature of output data, Measures of Performance and their estimation, Output analysis of terminating simulation, Output analysis of steady state simulations.

**Reference**

1. Jerry Banks, John S Carson, II, Berry L Nelson, David M Nicol, Discrete Event system Simulation, Pearson Education, Asia, 4th Edition, 2007, ISBN: 81-203-2832-9.
2. Geoffrey Gordon, System Simulation, Prentice Hall publication, 2nd Edition, 1978, ISBN: 81-203-0140-4.
3. Averill M Law, W David Kelton, Simulation Modelling & Analysis, McGraw Hill International Editions – Industrial Engineering series, 4th Edition, ISBN: 0-07-100803-9.
4. Narsingh Deo, Systems Simulation with Digital Computer, PHI Publication (EEE), 3rd Edition, 2004, ISBN: 0-87692-028-8.

**Course Outcomes:**

This course will enable the students to:

**CO1:** Understand the basics of simulation modeling and replicating the practical situations in organizations

**CO2:** Generate random numbers and random variates using different techniques.

*Fig 98* *Pram* *nigam* *JPS* *Saur* *Shrestha* *Jas*

**CO3:** Develop simulation model using heuristic methods.

**CO4:** Analysis of Simulation models using input analyzer, and output analyzer

**CO5:** Explain Verification and Validation of simulation model.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	L	M	M	H	L	M		M	H
CO2	M	L	M	H	H	M	M	M	M	M
CO3	M		M	M	M	M	M	M	M	H
CO4	M	L	H	M	M	M	M	M	M	H
CO5	M	L	M	M	M	M	M	H	M	H

H = Highly Related; M = Medium L = Low

*Fig 4.98* *Praveen* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

BMA057A	Introduction to Algorithms	L-T-P:4-1-0
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#### Course Objectives:

- To understand algorithmic thinking and models of computation.
- To learn hashing with chaining, table doubling, topological sorting and single-source shortest paths problem.
- To learn dynamic programming and computational complexity.

#### Unit I:

Algorithmic thinking, peak finding, models of computation, Python cost model, document distance, sorting and Trees, insertion sort, merge sort, heaps and heap sort, binary search trees, BST sort, AVL trees, AVL sort, counting sort, radix sort, lower bounds for sorting and searching.

#### Unit II:

Hashing with chaining, table doubling, Karp-Rabin, open addressing, cryptographic hashing, integer arithmetic, Karatsuba multiplication, square roots, Newton's method

#### Unit III:

Breadth-first search (BFS), depth-first search (DFS), topological sorting, single-source shortest paths problem, Dijkstra, Bellman-Ford, Speeding up Dijkstra

#### Unit IV:

Dynamic Programming: Memoization, subproblems, guessing, bottom-up; Fibonacci, shortest paths, Parent pointers; text justification, perfect-information blackjack, string subproblems, psuedopolynomial time; parenthesization, edit distance, knapsack, two kinds of guessing; piano/guitar fingering, Tetris training, Super Mario Bros.

#### Unit V:

Advanced topics: Computational complexity, Algorithms research topics.

#### References:

1. Cormen, Thomas, Charles Leiserson, Ronald Rivest, and Clifford Stein. *Introduction to Algorithms*. 3rd ed. MIT Press, 2009. ISBN: 9780262033848.
2. Miller, Bradley, and David Ranum. *Problem Solving with Algorithms and Data Structures Using Python*. 2nd ed. Franklin, Beedle & Associates, 2011. ISBN: 9781590282571.
3. Cormen, Leiserson, Rivest, and Stein, *Introduction to Algorithms, 3rd Edition* (CLRS).

#### Course Outcomes:

- CO1:- Understand algorithmic thinking and models of computation.  
CO2:- Understand hashing with chaining, table doubling and integer arithmetic.  
CO3:- Understand breadth-first search (BFS), depth-first search (DFS), topological sorting and single-source shortest paths problem.  
CO4:- Understand dynamic programming.  
CO5:- Understand the computational complexity.

*Fig 4 98* *Praun* *nijam* *JTS* *Seenu* *Shristi* *Dr. Karan*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	L	M	M	H	L	L		M	H
CO2	M	L	L	M	M	L	M		M	H
CO3	M	L	L	M	M	M	L		M	M
CO4	M		L	M	H	L	M	L	M	H
CO5	L	L	M	M	M		M	L	M	M

H = Highly Related; M = Medium L = Low

Page 98 *Praveen* *nigam* *Dr. J. S. S. S.* *Seenu* *Dr. J. S. S. S.* *Dr. J. S. S. S.*

BMA058A	Matrix methods in data analysis signal processing and Machine learning	L-T-P:4-1-0
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#### Course Objectives:

- To learn about multiplying and factoring matrices, eigen values, eigen vectors, four ways to solve least squares problems and randomized matrix multiplication.
- To learn about derivatives of inverse and singular values, saddle points, maxmin principle and minimizing a function step by step.
- To learn about gradient descent, linear programming and two-person games, stochastic gradient descent.
- To learn structure of neural nets for deep learning.

#### Unit-I:

The column space of  $A$  contains all vectors  $Ax$ , multiplying and factoring matrices, orthonormal columns in  $Q$  give  $QQ' = I$ , eigen values and Eigen vectors, positive definite and semi-definite matrices, singular value decomposition (SVD)

#### Unit-II:

Eckart-Young: the closest rank  $k$  matrix to  $A$  norms of vectors and matrices, four ways to solve least squares problems, survey of difficulties with  $Ax = b$ , minimizing  $\|x\|$  subject to  $Ax = b$ , computing eigen values and singular values, randomized matrix multiplication, low rank changes in  $A$  and its inverse.

#### Unit-III:

Matrices  $A(t)$  Depending on  $t$ , derivative  $= dA/dt$ , derivatives of inverse and singular values, rapidly decreasing singular values, counting parameters in SVD, LU, QR, Saddle Points, maxmin principle, definitions and Inequalities, minimizing a function step by step.

#### Unit-IV:

Gradient descent: downhill to a minimum, accelerating gradient descent (Use Momentum), linear programming and two-person games, stochastic gradient descent.

#### Unit-V:

Structure of neural nets for deep learning, back propagation: Find Partial Derivatives, completing a rank-one matrix, circulants, eigen vectors of circulant matrices: fourier matrix, image net is a convolutional neural network (CNN), the convolution rule, neural nets and the Learning Function.

#### Reference:

1. Strang, Gilbert. *Linear Algebra and Learning from Data*. Wellesley-Cambridge Press. 2019. ISBN: 9780692196380.
2. Gene H. Golub and Charles F. Van Loan, *Matrix Computations*, The Johns Hopkins University Press.
3. C.G. Cullen, *An Introduction to Numerical Linear Algebra*, PWS, Boston.
4. Christopher M. Bishop, *Pattern Recognition and Machine Learning*, 2006.
5. T. Hastie, R. Tibshirani, and J. Friedman, *The Elements of Statistical Learning: Data Mining, Inference, and Prediction*, 2001.

#### Course Outcomes:

CO1:- Understand the multiplying and factoring matrices, eigen values, eigen vectors.

CO2:- Understand four ways to solve least squares problems and randomized matrix multiplication.

*Fig 98* *Pram* *nigam* *JTS* *Saur* *Shrestha* *Joshi*



CO3:- Understand derivatives of inverse and singular values, saddle points, maxmin principle and minimizing a function step by step.

CO4:- Understand gradient descent, linear programming and two-person games, stochastic gradient descent.

CO5:- Understand learn structure of neural nets for deep learning.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M		M	H	H		M	L	H	M
CO2	M		M	M	M		M	L	M	M
CO3	M	L	M	M	M		M	L	M	H
CO4	M	L	M	M	H	L	M	L	M	H
CO5	L		M	M	M	L	M	L	M	M

H = Highly Related; M = Medium L = Low

*Page 98* *Praveen* *nijam* *Dr. J. S. S. S.* *Seenu* *Dr. S. S. S.* *Dr. S. S. S.*

**Course Objective:**

- Understand all of the concepts integer linear programming and bounded variable.
- Understand all of the concepts queuing and game theory.
- Apply your understanding of the concepts of sequencing theory.

**Unit I**

Revised Simplex Method, Bounded Variable linear programming problem. Introduction to linear integer programming, Branch and Bound Technique, Gomory's Cutting Plane Algorithm for pure and mixed linear integer programming problem.

**Unit II**

Queueing Systems: General concepts of a queueing system, measures of performance, arrival and service processes, single and multiple server models, channels in parallel and in series with limited and unlimited queues, Little's formula, Queues with finite waiting room, Queues with impatient customer (Balking and reneging), Markovian queues- M/M/1 with finite and infinite waiting space, M/M/C, Birth and death queueing systems.

**Unit III**

Concepts of Game problem. Two- person zero-sum game. Pure and Mixed strategies. Saddle point and its existence. Fundamental Theorem of Rectangular games. Concept of Dominance. Dominance and Graphical method of solving Rectangular games. Relationship between rectangular game and Linear Programming Problem. Solving rectangular game by Simplex method.

**Unit IV**

Project Scheduling: PERT and CPM with known activity times. Critical Path Analysis, Various types of floats. Probability considerations in PERT. Updating of PERT charts. Project crashing. Formulation of CPM as a linear programming problem. Resource leveling and resource scheduling.

**Unit V**

Sequencing problem: Introduction to Sequencing problem. Flow shop problem: Processing  $n$  jobs through 2, 3 and  $m$  machines. General  $n/m$  job-shop problem.

**References**

1. L. R. Ford, D. R. Fulkerson: Flows in Network, Princeton University Press, 1962.
2. M. S. Bazara, J. J. Jarvis, H. D. Sherali: Linear Programming and Network Flows, Wiley, 3rd Edition, 2004.
3. R. K. Ahuja, T. L. Magnanti, B. Orlin: Network Flows-Theory. Algorithm and Applications, Prentice Hall, NJ. 1993.
4. P. A. Jenson, W. J. Barnes: Network Flows Programming, John Wiley and Sons, 1980
5. S. E. Elmaghraby: Activity Networks, Project Planning, and Control, John Wiley and Sons, 1977.
6. J. D. Weist, F. K. Levy: A Management Guide to PERT/ CPM. 2nd Edition, PHI, 1967 (Reprint 2007).
7. Hamdy A. Taha: Operations Research-An Introduction, Prentice Hall, 9th Edition, 2010.
8. Wayne L. Winston and M. Venkataramanan: Introduction to Mathematical Programming: Applications and Algorithms, 4th edition, Duxbury Press, 2002.
9. A. Ravindran, D. T. Phillips and James J. Solberg: Operations Research- Principles and Practice, John Wiley & Sons, 2005.
10. G. Hadley: Nonlinear and Dynamic Programming, Addison-Wesley, 1964.

*Fig 98* *Pram* *nigam* *J. J. Jarvis* *Seenu* *Shrestha* *Dr. J. J. Jarvis*

**Course Outcomes:**

This course will enable the students to:

CO1:- To understand the Basic concepts of revised simplex method and integer programming.

CO2:-Understanding the basics concepts of queuing theory.

CO3:- Understanding the basics concepts of game theory.

CO4:-Understanding the project management technique.

CO5:-Understanding the concepts of sequencing.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	M	L	H	L	L	L	M	H
CO2	M	L	M	M	H	L	M		M	H
CO3	M	L	M	M	H	L	M		M	H
CO4	M	M	L	M	H	M	L	L	M	H
CO5	M	L	M	M	M	M	M	L	H	M

H = Highly Related; M = Medium L = Low

Page 98     

BMA060A	Applied Statistical Methods	L-T-P:4-1-0
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#### Course objectives:

- Understand how variance can be used to define a statistic that measures the linear relationship between variables
- Use technology for developing concepts and analyzing data.
- Introduction to index number and volume relatives, link and chain relative.

#### Unit-I

Introduction & definition of time series, its different components, illustrations, additive and multiplicative models, determinations of trend, free hand curve, semi average methods, moving averages, methods of least squares, analysis of seasonal ratio to trend, link relative methods.

#### Unit-II

Index number – its definition, application of index number, price relative and quantity or volume relatives, link and chain relative, problem involved in computation of index number, use of averages, simple aggregative and weighted average method. Laspeyre's, Paasche's and Fisher's index number, time and factor reversal tests of index numbers, consumer price index.

#### Unit- III

Sources of demographic data – census, register, ad-hoc survey, hospital records, demographic profiles of Indian Censuses. Measurement of mortality, crude death rates, age specific death rates, infant mortality rates, death rate by cause

#### Unit-IV

Measurement of fertility crude birth rate, general fertility rate, age-specific birth rate, total fertility rate, gross reproduction rate, net reproduction rate, standardized death rates, age pyramid of sex composition, other measures of fertility. Logistic curve fitting and its use in population projection. Complete life table, its main features and construction.

#### Unit-V

Demand and supply, law of demand and supply. Elasticity of demand: Price, Income and Cross elasticity. Engel's curve and Engel's law, Pareto's law of income.

#### Reference:

1. Montgomery D.C. (1985): Introduction to Statistical Quality Control (Wiley).
2. Draper & Smith: Applied Regression Analysis
3. Burr: Industrial Quality Control.
4. Wetherill and Brown: Statistical Quality Control
5. Croxton F.E. and Cowden D.J.: Applied General Statistics
6. Goon, Gupta and Dasgupta: Fundamentals of Statistics, Vol. I & II Siya Ram: Applied Statistics.

#### Course Outcomes:

This course will enable the students to:

**CO1:** Understand time series and analysis of seasonal ratio to trend, link relative methods.

**CO2:** Study and use Index number.

**CO3:** Learn demographic methods

**CO4:** Learn logistic curve fitting and its use in population projection and age specific birth rate.

**CO5:** Understand statistical quality control.

*Signature of Prof. Dr. J. K. Singh*      *Signature of Prof. Dr. J. K. Singh*      *Signature of Prof. Dr. J. K. Singh*      *Signature of Prof. Dr. J. K. Singh*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M		L	M	M	L	M		M	M
CO2	M	L	M	M	H	L	M		M	M
CO3	M	L	M	M	M	L	M	L	M	H
CO4	M	L	M	M	M	L	M	L	M	H
CO5	M	L	M	M	H		M	L	M	M

H = Highly Related; M = Medium L = Low

Page 68  
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BMA061A	Theory of Numbers	L-T-P:4-1-0
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#### Course Objectives:

- Identify and apply various properties of and relating to the integers including the Well-Ordering Principle, primes, unique factorization, The Euclidean algorithm.
- Understand the concept of congruence and use various results related to congruence's including the Chinese Remainder Theorem.
- To Understand Fermat's Theorem

#### UNIT I:

Divisibility theory in the integers: early number theory, the division algorithm, the greatest common divisor, the Euclidean Algorithm, Diophantine equation  $ax+by=c$ , Primes and their Distributions, The Fundamental theorem of Arithmetic, the Sieve of Eratosthenes, The Goldbach Conjecture, Primes and factorization.

#### UNIT II:

Theory of Congruences, Modular arithmetic, Carl Friedrich Gauss, Basic Properties of Congruences, Binary and Decimal Representations of Integers, Linear Congruences and the Chinese remainder theorem.

#### UNIT III:

Fermat's Theorem: Pierre de Fermat, Fermat's little Theorem and Pseudoprimes, Wilson's Theorem, The Fermat-Kraitchik Factorization Method, Quadratic law of reciprocity, application. Arithmetical functions. Mobius inversion formula.

#### UNIT IV:

Euler's Generalization of Fermat's Theorem, Leonhard Euler, Euler Phi function, Euler's Theorem, Some Properties of the Phi-function, The Diophantine equations  $x^2 + y^2 = z^2$ ,  $x^4 + y^4 = z^4$ . Farey sequences.

#### UNIT V:

Primitive roots and indices :Primitive roots of unity, the Order of an Integer Modulo  $n$ , Primitive Roots for Primes, Composite Numbers Having Primitive Roots, The Theory of Indices, Numbers of special forms (perfect numbers, mersenne primes and amicable numbers, Fermat numbers).

#### REFERENCE

1. David M. Burton, Elementary Number Theory, Wm. C. Brown Publishers, Dubuque, Iowa 1989.
2. K. Ireland, and M. Rosen, A Classical Introduction to Modern Number Theory, GTM Vol. 84, Springer-Verlag, 1972.
3. G.A. Jones, and J.M. Jones, Elementary Number Theory, Springer-Verlag, 1998.
4. W. Sierpinski, Elementary Theory of Numbers, North-Holland, Ireland, 1988.
5. Niven, S.H. Zuckerman, and L.H. Montgomery, An Introduction to the Theory of Numbers, John Wiley, 1991.
6. H.B. Mann, Addition Theorems, Krieger, 1976.
7. Melvyn B. Nathanson, Additive Number Theory: Inverse Problems and the Geometry of Sumsets, Springer-Verlag, 1996.

*Fig 4 98* *Pram* *nijam* *J. J. J.* *Seena* *Shristi* *Jaspreet*

**Course Outcomes:**

This course will enable the students to:

**CO1:** Understand Divisibility theory in the integers.

**CO2:** Study and use Congruences.

**CO3:** Learn Quadratic Residues, Quadratic Reciprocity.

**CO4:** Learn Phi function, Diophantine equations and Farey sequences.

**CO5:** Understand Primitive roots and indices.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	M		M	L	M	M
CO2	M		M	H	M		M	L	M	M
CO3	M		M	M	H		M	L	M	H
CO4	M	L	M	M	H		M	L	M	M
CO5	M		M	M	M		M		M	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *nijam* *J. S. S. S.* *S. S. S.* *Shrestha* *J. S. S. S.*



BMA062A	DATA SCIENCE USING R PROGRAMMING	L-T-P:4-0-0
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#### Course objectives:

- Learn Fundamentals of R.
- Covers how to use different function sin R, how to read data
- Into R, accessing packages, writing R functions, debugging, and organizing data using R functions.
- Cover the Basics of statistical data analysis with examples.
- The whole syllabus will give an idea to collect, compile and visualize data using statistical functions.

#### UNIT I:

**Introduction to R:** What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages in R: Installing a R Package, Few commands to get started: installed. Packages(), package Description(), help(), find. package(), library() - Input and Output – Entering Data from keyboard– Printing fewer digits or more digits–Special Values functions :NA, Inf and -inf.

#### UNIT II:

R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame – R - Variables: Variable assignment, Data types of Variable, Finding Variables (), Deleting Variables – R Operators: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators-R Decision Making: if statement, if – else statement, if– else if statement, switch statement – R Loops: repeat loop, while loop, for loop – Loop control statement: break statement, next statement.

#### UNIT III:

**R-Function** : function definition, Built in functions: mean(), paste(), sum(), min(), max(), seq(), user-defined function, calling a function, calling a function without an argument, calling a function with argument values - **R-Strings** – Manipulating Text in Data: substr(), strsplit(), paste(), grep(), to upper(), to lower() - **R Vectors** – Sequence vector, rep function, vector access, vector names, vector math, vector recycling, vector element sorting-**R List**-Creating a List, List Tags and Values, Add/Delete Element to or from a List, Size of List, Merging Lists, Converting List to Vector - **R Matrices** – Accessing Elements of a Matrix, Matrix Computations: Addition, subtraction, Multiplication and Division- **R Arrays**: Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements - **R Factors** –creating factors, generating factor levels gl().

#### UNIT IV:

**Data Frames** –Create Data Frame, Data Frame Access, Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Datafrom Data Frame, **Expand Data Frame**: Add Column, Add Row - Joining columns and rowsin a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast().

**Loading and handling Data in R:** Getting and Setting the Working Directory – getwd(), setwd(), dir() - **R-CSV Files**- Input as a CSV file, Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() - Writing into a CSV File – **R-Excel File**– Reading the Excel file.

*Page 98* *Praveen* *nijam* *JTS* *Saurav* *Shrestha* *Dr. J. K. K. K.*



## UNIT V:

**Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median:** Mean Applying Trim Option, Applying NA Option, Median- Mode- **Standard Deviation- Correlation-Spotting Problems in Data with Visualization:** visually Checking Distributions for a single Variable- **R –Pie Charts:** Pie Chart title and Colors- Slice Percentages and Chart Legend, 3D Pie Chart – **R Histograms** – Density Plot - **R – Bar Charts:** Bar Chart Labels, Title and Colors.

## REFERENCES

1. Sandip Rakshit, R Programming for Beginners, Mc Graw Hill Education (India), 2017, ISBN: 978-93-5260-455-5.
2. Seema Acharya, Data Analytics using R, Mc Graw Hill Education (India), 2018, ISBN:978-93-5260-524-8.
3. Tutorials Point(I) simply easy learning, Online Tutorial Library(2018), *R Programming*, Retrieved from [https://www.tutorialspoint.com/r/r\\_tutorial.pdf](https://www.tutorialspoint.com/r/r_tutorial.pdf).
4. Andrie de Vries, Joris Meys, R for Dummies A Wiley Brand, 2nd Edition, John Wiley and Sons, Inc, 2015, ISBN: 978-1-119-05580-8

### Course outcome:

CO1:-Understand the basics of Fundamental of R.

CO2:-Understands the loading, retrieval techniques of data.

CO3:-Understand how data is analyzed and visualized using statistic functions.

CO4:-Understand the basic of create data frame and expend data frame like Add Column, Add Row, Joining columns and rows.

CO5:- Understand and the basic concept of Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	M	M	L	M	M	M	L	M	H
CO2	M	M	L	M	H	M	L	L	M	H
CO3	M	M	L	M	H	M	L	L	M	H
CO4	M	H	L	M	M	M	L	L	M	M
CO5	M	L	M	M	M	L	M	L	M	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *Praam* *nigam* *JR* *Seema* *Shristi* *Jas* *Harsh*

BMA063A	DATA SCIENCE USING R PROGRAMMING LAB	L-T-P:0-0-1
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#### PART A

1. Write a program to check whether a year (integer) entered by the user is a leap year or not?
2. Write a program to find the sum of natural numbers without formula using the if-else statement and the while loop.
3. Write a program that prints the grades of the students according to the marks obtained. The grading of the marks should be as follows.

Marks	Grades
800-1000	A+
700 – 800	A
500 – 700	B+
400-500	B
150 – 400	C
Less than 150	D

4. Write an R program to make a simple calculator that can add, subtract, multiply and divide using switch cases and functions.
5. Write a set of instructions to create the following matrix using vectors and rbind () function. Rename the rows to Lang1, Lang2 & Lang3 respectively and use the function to access any one elements using row names.

MatrixOfTechnology	Rows	Columns			
		1	2	3	4
	1	C#	Java	Cobol	.Net
	2	JavaScript	NodeJs	R	Azure
	3	Power BI	ASP.Net	Unity	Block Chain

6. Write a program to perform searching within a list (1 to 50). If the number is found in the list, print that the search is successful otherwise print that the number is not in the list.
7. Create a list and data frame that stores the marks of any three subjects for 10 students. Find out the total marks, average, maximum marks and minimum marks of every subject.
8. Write the steps to import data from Excel to CSV files and apply data viewer functions likerm(), dim(), head(), tail(), sorting, filtering, searching to view few set of rows.

#### PART B

1. Write a program to create two 3X3 matrices A and B and perform the following operations
  - a) Transpose of the matrix
  - b) addition
  - c) subtraction
2. Write a program to create a list containing strings, numbers, vectors and logical values and do the following manipulations over the list.
  - a. Access the first element in the list

- b. Give the names to the elements in the list
  - c. Add element at some position in the list
  - d. Remove the element
  - e. Print the fourth element
  - f. Update the third element
3. Write a program to create a Data Frame with following details and do the following operations."

Item Code	Item Category	Item Price
1001	Electronics	700
1002	Desktop Supplies	300
1003	Office Supplies	350
1004	USB	400
1005	CD Drive	800

- a. Subset the Data frame and display the details of only those items whose price is greater than or equal to 350.
  - b. Subset the Data frame and display only the items where the category is either "Office Supplies" or "Desktop Supplies"
  - c. Create another Data Frame called "item-details" with three different fields item Code, Item Qty on Hand and Item Reorder Lvl and merge the two frames.
4. Let us use the built-in dataset air quality which has Daily air quality measurements in New York, May to September 1973. Create a histogram by using appropriate arguments for the following statements.
- a. Assigning names, using the air quality dataset.
  - b. Change colors of the Histogram
  - c. Remove Axis and Add labels to Histogram
  - d. Change Axis limit so far Histogram
  - e. Create a Histogram with density and Add Density curve to the histogram
5. Design a data frame in R for storing about 20 employee details. Create a CSV file named "input.csv" that defines all the required information about the employee such as id, name, salary, start date, dept. Import into R and do the following analysis.
- a. Find the total number rows & columns
  - b. Find the maximum salary
  - c. Retrieve the details of the employee with maximum salary
  - d. Retrieve all the employees working in the IT Department
  - e. Retrieve the employees in the IT Department whose salary is greater than 20000 and write these details into another file "output.csv".
6. Create a data set or table ["Smart Phone"] in an excel sheet that stores the mobile information [price, company name, model, Sale Percent] of five different companies. Store at least 20rows. Write the scripts and find out the output for the following information.
- a. Maximum price of the mobile of each company
  - b. Minimum price of mobile of each company
  - c. Average price of mobile of each company
  - d. Total Price of mobile of each company
7. The Tooth Growth data are from a study which examined the growth of teeth in guinea pigs (n=10) in response to three dose levels of Vitamin C (0.5, 1, and 2 mg), which was administered using two delivery methods (orange juice or ascorbic acid). Data from the Tooth Growth Study is available as an R dataset and information about this study can be found by using R help.

Page 98

Praveen

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Shruti

Dr. J. S. S.

- a. How many rows are there is Tooth Growth?
  - b. What is the mean and standard deviation of Tooth length
  - c. Which treatment is the best in terms of tooth growth? Derive the findings based on correlation between Dosage and Length for both supplements.
8. Using the built in dataset mtcars which is a popular dataset consisting of the design and fuel consumption patterns of 32 different automobiles. The data was extracted from the 1974 Motor Trend US magazine, and comprises fuel consumption and 10 aspects of automobile design and performance for 32 automobiles (1973-74 models).

**Format**

A data frame with 32 observations on 11 variables

[1] mpg Miles/(US)gallon, [2] cyl Number of cylinders

[3] disp Displacement (cu.in.), [4] hp Gross horsepower

[5] drat Rear axle ratio, [6] wt Weight (lb/1000)

[7] qsec 1/4 mile time, [8] vs V/S, [9] am Transmission (0=automatic, 1=manual), [10] gear Number of forward gears, [11] carb Number of carburetors

Answer the following using the functions from stats package.

- a. What is the total number of observations and variables in the dataset?
- b. Plot three distributions for each variable and determine whether continuous variables are normally distributed or not. If not, what is their skewness?
- c. What is the average difference of gross horse power (hp) between automobiles with 3 and 4 number of cylinders (cyl)? Also determine the difference in their standard deviations.
- d. Which pair of variables has the highest Pearson correlation?

Page 68

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BMA064A	Python Programming	L-T-P:4-0-0
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#### Course Objective:

- Understand all of the concepts relating Python programming.
- Understand all of the concepts data types and operator.
- Apply your understanding of the concepts of functions in Python.

#### Unit I

Conceptual introduction: topics in computer science, algorithms; modern computer systems: hardware architecture, data representation in computers, software and operating system; Installing Python; basic syntax, interactive shell, editing, saving, and running a script.

#### Unit II

The concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages; Conditions, boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation. Strings and text files; manipulating files and directories, os and sys modules.

#### Unit III

text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated). String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers

#### Unit IV

Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.

#### Unit V

Design with functions: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments. Recursive functions. Testing, Debugging, Exceptions, Assertions. Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects

#### References:

1. Guttag, John. Introduction to Computation and Programming Using Python: With Application to Understanding Data Second Edition. MIT Press, 2016. ISBN: 9780262529624.

#### Course Outcomes:

This course will enable the students to:

- CO1:- To understand the Basic requirement of Python  
CO2:-Understanding the basics concepts of data types.  
CO3:- Understanding the basics concepts of text files.

*Fig 4 98* *Pramod* *nijam* *Prasanth* *Shruti* *Dr. J. Karan*

CO4:-Understanding the operators, sorting and searching method .

CO5:- Understanding the concepts of Testing, Debugging.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	H	M	M	L	M	H
CO2	M	H	M	M	M	H	L	L	M	H
CO3	L	M	L	M	M	H	L	L	M	H
CO4	M	M	L	L	M	H	M	M	M	M
CO5	M	M	L	L		M	L	L	M	H

H = Highly Related; M = Medium L = Low

Page 98  
Praveen  
Nigam  
J. K. S. S.  
Saurav  
Anish  
Jaspreet



BMA065A	Python Programming Lab	L-T-P:0-0-1
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1. Installing Python environments
2. Using Python Interpreter to do basic operations like arithmetic computations.
3. Working with variables of different data types and using them in expressions.
4. Building stand alone Python scripts
5. Implementing logic requiring conditional expressions and looping
6. Working with strings using inbuilt functionalities of the data type
7. Working with Python inbuilt data types like Lists, Tuples and Dictionaries
8. Working with modularity: Implementing functions and designing logic in a modular fashion
9. Implement unit testing measures assertions and exception handling
10. Use Python to model object oriented programming principles using various use cases.

#### References:

1. Gutttag, John. Introduction to Computation and Programming Using Python: With Application to Understanding Data Second Edition. MIT Press, 2016. ISBN: 9780262529624.








BMA066A	Database Management Systems	L-T-P:4-0-0
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### Course Objectives

- To impart the fundamentals of Relational Database Management Systems.
- To emphasize the significance of Database Design and Normalization.
- To familiarize the concepts of Transaction Processing, Concurrency Control, Query Processing and Optimization.

### Unit – I

Introduction – Database- Database management system- Characteristics of the database approach- Role of Database administrators- Role of Database Designers- End Users Categories of data models- Schemas- Instances- - DBMS Architecture and Data Independence – The Three schema architecture- DBMS Languages and Interfaces Classifications of Database Management Systems.

### Unit – II

Data Modelling Using Entity-Relationship Model -Using High Level Conceptual Data Models for Database Design- Example Database applications. Entity types- Entity Sets Attributes and Keys. Relationships- Relationship types- Roles and Structural constraints. Weak Entity Types and Drawing E- R Diagrams

### Unit – III

Database Design-Functional dependencies and Normalization for Relational Databases - Normalization concepts- first- second- third normal forms.

### Unit – IV

SQL data definition and data types- specifying constraints in SQL- schema change statements- Basic queries- INSERT- DELETE and UPDATE statements in SQL- Views – Concept of a view in SQL.

### Unit - V

Transaction Processing Concepts and Concurrency Control Techniques -Transaction and System concepts – Desirable properties of Transactions – Schedules and Recoverability. Lock-Based Protocols – Locks- Granting of Locks- and Two phase locking protocol.

### References:

1. Elmasri & Navathe, Fundamentals of Database Systems, 5th Edition, Addison Wesley 2008.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6th Edition, McGraw Hill, 2011.
3. Patrick O'Neil, Elizabeth O'Neil, Database Principles Programming and Performance, 2nd Edition, Morgan Kaufmann Publishers India, 2001

*Fig 4 98* *P. Kumar* *mjani* *J. K. S.* *S. S. S.* *Shrestha* *J. K. S.*



**Course Outcomes:**

This course will enable the students to:

- CO1 Analyze Database design methodology. Acquire knowledge in fundamentals of Data Base Management System.
- CO2 Analyze the difference between traditional file system and DBMS.
- CO3 Handle with different Data Base languages. Draw various data models for Data Base and Write queries mathematically.
- CO4 Design data base and normalize data and Understand how query are being processed and executed.
- CO5 Deal with online transactions and control Concurrency. Understand types of Data Base failures and Recovery.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	H	M	L		M	H
CO2	M	M	L	M	M	H	L		M	H
CO3	L	M	L	M	H	M	L		M	M
CO4	L	M	L	L	M	H	M		M	H
CO5	M	M	L	M	M	H	L		M	M

H = Highly Related; M = Medium L = Low

*Fig 4.98* *Praveen* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

### Software Lab based on Database Management Systems

**Note:** My Access/My SQL may be used.

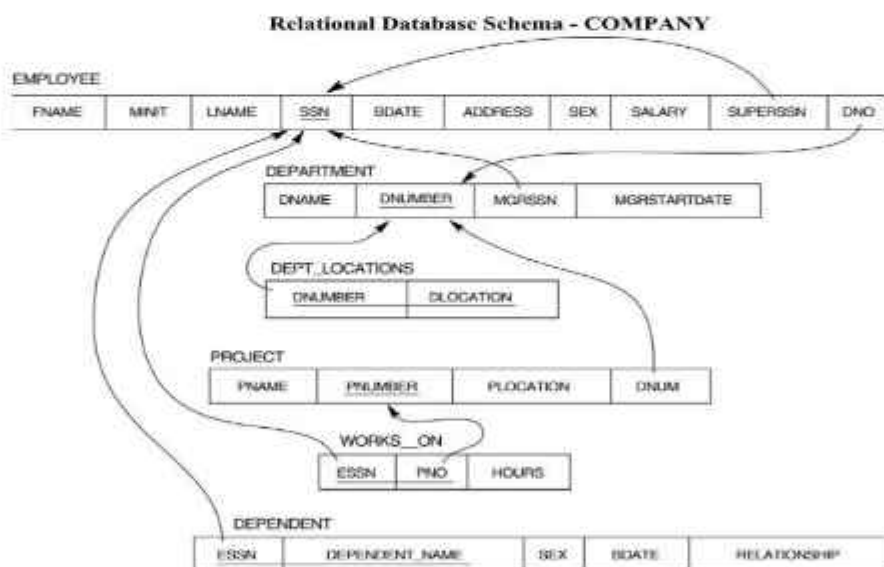
The following concepts must be introduced to the students:

DDL Commands

- Create table, alter table, drop table

DML Commands

- Select, update, delete, insert statements
- Condition specification using Boolean and comparison operators (and, or, not, =, <, >, <=, >=)
- Arithmetic operators and aggregate functions (Count, sum, avg, Min, Max)
- Multiple table queries (join on different and same tables)
- Nested select statements
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by.....having
- Arranging using order by



#### Questions to be performed on above schema

1. Create tables with relevant foreign key constraints
2. Populate the tables with data
3. Perform the following queries on the database :
  1. Display all the details of all employees working in the company.

Fig 4.98

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2. Display ssn, lname, fname, address of employees who work in department no 7.
3. Retrieve the birthdate and address of the employee whose name is 'Franklin T. Wong'
4. Retrieve the name and salary of every employee
5. Retrieve all distinct salary values
6. Retrieve all employee names whose address is in 'Bellaire'
7. Retrieve all employees who were born during the 1950s
8. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)
9. Retrieve the names of all employees who do not have supervisors
10. Retrieve SSN and department name for all employees
11. Retrieve the name and address of all employees who work for the 'Research' department
12. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
13. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
14. Retrieve all combinations of Employee Name and Department Name
15. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.
16. Increase the salary of all employees working on the 'ProductX' project by 15%.
17. Retrieve employee name and increased salary of these employees.
18. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
19. Select the names of employees whose salary does not match with salary of any employee in department 10.
20. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
21. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
22. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
23. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.

Page 68

Praveen

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Shristi

Dr. J. Narayan

24. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
25. For each department, retrieve the department number, the number of employees in The department, and their average salary. For each project, retrieve the project number, the project name, and the number of employees who work on that project.
26. Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively.
27. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.
28. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.
29. Delete all dependents of employee whose ssn is '123456789'.
30. Delete an employee from Employee table with ssn = '12345' (make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL.
31. Perform a query using alter command to drop/add field and a constraint in Employee table.

BMA068A	Regression Analysis	L-T-P:4-0-0
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### Course Objective:

- Understand all of the concepts related to Regression analysis.
- Understand all of the concepts linear and polynomial regression models.
- Apply your understanding of the concepts of ANOVA.

### Unit I

Simple Linear Regression: Linear Regression Model, Least square estimation of the parameters, Hypothesis Testing on the slope and intercept, Interval estimation in Simple linear Regression, Prediction of New Observations and Coefficient of Determination.

### Unit II

Multiple Linear Regression: Multiple Linear Regression Models, Estimation of the Model Parameters, Hypothesis testing in Multiple Linear Regression, Confidence Interval on the Regression and Prediction of New observations.

### Unit III

Generalized linear models - Logistic regression Models, Poisson regression - hypothesis testing on model parameter. Model Adequacy Checking: Introduction, Residual Analysis, Detection, treatment of Outliers and Lack of fit of the Regression Model.

### Unit IV

Polynomial regression models – polynomial models in one variable – Polynomial models in two or more variables – variable selection and model building – computational techniques for variable selection.

### Unit V

Introduction to analysis of variance- one way and two way ANOVA – Analysis of variance in Regression: Response surface designs – Introduction to response surface methodology, Method of steepest ascent, Analysis of second order response surface, experimental design for fitting response surfaces.

### Suggested Books

1. Douglas C. Montgomery and Elizabeth A. Peck and G. Geoffrey Vining, "Introduction to Linear Regression Analysis", 3rd Edition, John Wiley & Sons, Inc
2. Douglas C. Montgomery, "Design and analysis of Experiments", 8th edition, John Wiley & Sons, Inc
3. Ravichandran, J. "Probability and Statistics for engineers", First Reprint Edition, Wiley India, 2012.

*Fig 98* *Praveen* *nigam* *Shruti* *Shruti* *Shruti* *Shruti*

**Course Outcomes:**

This course will enable the students to:

CO1:- To understand the Basic concepts of Linear Regression.

CO2:- Understanding the basics concepts of Multiple Regression.

CO3:- Understanding the basics concepts of Generalized Linear Model.

CO4:- Understanding of Polynomial Regression Model.

CO5: Understanding the Concept of ANOVA and experimental design.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	L	M	M	H		M	L	M	H
CO2	M		M	M	M	L	M		M	H
CO3	M	M	L	M	H	M	L		M	H
CO4	M	L	M	L	H	M	L	L	M	H
CO5	M	L	M	M	M	L	L		M	M

H = Highly Related; M = Medium L = Low

*Page 98* *Praveen* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

BMA069A	Statistics Lab with R	L-T-P:0-0-1
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#### Getting Used to R:

1. Describing Data.
2. Viewing and Manipulating Data.
3. Plotting Data.
4. Reading in Your Own Data
5. Estimating a Linear Relationship.
6. Scrutinizing the Residuals
7. Simple Linear Regression.
8. Multiple Regression.
9. Tests for Linear Hypothesis.
10. Bias in regression estimates.
11. Lack of fit.
12. Orthogonal Polynomials.
13. Analysis of Variance of a one-way classified data.
14. Analysis of Variance of a two-way classified data with one observation per cell.

#### *Suggested Books*

1. Maria Dolores Ugarte , Ana F. Militino , Alan T. Arnholt "Probability and Statistics with R" 2nd Edition on, CRC Press, 2016.
2. P. Dalgaard. Introductory Statistics with R, 2nd Edition. (Springer 2008)
3. Michael Akritas, " Probability & Statistics with R for Engineers and Scientists", 2nd Edition on, CRC Press, 2016.









<b>BMA070A</b>	<b>Data Analysis using Spreadsheet</b>	<b>L-T-P:4-0-0</b>
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**Course objectives:**

- Introduction to the Data filtering capabilities of Excel, the construction of Pivot Tables to organize data and introduction to charts in Excel.
- Describe and explain various concepts of using spreadsheets and concepts of data analysis
- Use spreadsheets to perform data analysis

**Unit I**

**Introduction to Excel**

About Excel & Microsoft, Uses of Excel, Excel software, Spreadsheet window pane, Title Bar, Menu Bar, Standard Toolbar, Formatting Toolbar, the Ribbon, File Tab and Backstage View, Formula Bar, Workbook Window, Status Bar, Task Pane, Workbook & sheets

**Unit II**

**Columns & Rows**

Selecting Columns & Rows, Changing Column Width & Row Height, Autofitting Columns &

Rows, Hiding/Unhiding Columns & Rows, Inserting & Deleting Columns & Rows, Cell, Address of a cell, Components of a cell – Format, value, formula, Use of paste and paste special

**Functionality Using Ranges**

Using Ranges, Selecting Ranges, Entering Information Into a Range, Using AutoFill

**Unit III**

**Creating Formulas**

Using Formulas, Formula Functions – Sum, Average, if, Count, max, min, Proper, Upper, Lower, Using AutoSum,

**Advance Formulas:** Concatenate, Vlookup, Hlookup, Match, Countif, Text, Trim

**Unit IV**

**Spreadsheet Charts**

Creating Charts, Different types of chart, Formatting Chart Objects, Changing the Chart Type,

Showing and Hiding the Legend, Showing and Hiding the Data Table

**Data Analysis:**

Sorting, Filter, Text to Column, Data Validation

**PivotTables**

Creating PivotTables, Manipulating a PivotTable, Using the PivotTable Toolbar, Changing Data

Field, Properties, Displaying a PivotChart, Setting PivotTable Options, . Adding Subtotals to PivotTables

*Fig 4 98* *Pawan* *nigam* *JTS* *Saurav* *Shrestha* *Dr. J. K. Singh*



## Unit V

### Spreadsheet Tools

Moving between Spreadsheets, Selecting Multiple Spreadsheets, Inserting and Deleting Spreadsheets Renaming Spreadsheets, Splitting the Screen, Freezing Panes, Copying and Pasting

Data between Spreadsheets, Hiding , Protecting worksheets

### Making Macros

Recording Macros, Running Macros, Deleting Macros

#### Course outcomes:-

CO1:- Introduction to Excel formatting and tools.

CO2:- Introduction to operations on columns & rows.

CO3:- Introduction to functionality using ranges.

CO4:- Introduction to formula functions in excel.

CO5:- Introduction to Spreadsheet Tools.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	M	H	L	L	M	H
CO2	M		L	M	M	H	L		M	M
CO3	L	M	L	M	M	H	L		M	M
CO4	M	M	L	M	H	M	L		M	H
CO5	L	M	L	M	H	H	L		M	H

H = Highly Related; M = Medium L = Low

*Page 68* *Praveen* *nigam* *Dr. J. S. S.* *Seenu* *Dr. J. S. S.* *Dr. J. S. S.*

BMA071A	Data Analysis using Spreadsheet Lab	L-T-P:0-0-1
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#### Data Analysis using Spreadsheet Lab

1. Introduction to Excel formatting and tools
2. Operations on Columns & Rows
3. Functionality Using Ranges
4. Formula Functions in excel
5. Use of Advance Formulas
6. Spreadsheet Charts
7. Data Analysis using Sorting, Filter, Text to Column, Data Validation
8. Operation related to PivotTables
9. Spreadsheet Tools
10. Working with Macros









BMA072A	Integral Transforms and Fourier Analysis	L-T-P:4-1-0
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**Course Objective:**

- Students will learn theoretical concepts and uses of various Integral Transforms.
- Understand the importance of Laplace, Mellin and Fourier transform
- To solve several technical problems using Laplace Mellin and Fourier transform.

**Unit-I**

Laplace transform, Linearity, Existence theorem, Laplace transforms of derivatives and integrals, Shifting theorems, Change of scale property, Laplace transforms of periodic functions, Dirac's delta function.

**Unit-II**

Differentiation and integration of transforms, Convolution theorem, Integral equations, Inverse Laplace transform, Lerch's theorem, Linearity property of inverse Laplace transform, Translations theorems of inverse Laplace transform, Inverse transform of derivatives, Applications of Laplace transform in obtaining solutions of ordinary differential equations and integral equations.

**Unit-III**

Fourier and inverse Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier sine and cosine transforms, Linearity property, Change of scale property, Shifting property, Modulation theorem, Relation between Fourier and Laplace transforms.

**Unit-IV**

Solution of integral equation by Fourier sine and cosine transforms, Convolution theorem for Fourier transform, Parseval's identity for Fourier transform, Plancherel's theorem, Fourier transform of derivatives, Applications of infinite Fourier transforms to boundary value problems, Finite Fourier transform, Inversion formula for finite Fourier transforms.

**Unit-V**

Fourier cosine and sine series, Fourier series, Differentiation and integration of Fourier series, Absolute and uniform convergence of Fourier series, Bessel's inequality, The complex form of Fourier series.

**References:**

1. James Ward Brown & Ruel V. Churchill (2011). Fourier Series and Boundary Value Problems. McGraw-Hill Education.
2. Charles K. Chui (1992). An Introduction to Wavelets. Academic Press.
3. Erwin Kreyszig (2011). Advanced Engineering Mathematics (10th edition). Wiley.
4. Walter Rudin (2017). Fourier Analysis on Groups. Dover Publications.
5. A. Zygmund (2002). Trigonometric Series (3rd edition). Cambridge University Press.

**Course Outcomes:**

This course will enable the students to:

- CO1 Know about piecewise continuous functions, Dirac delta function, Laplace transforms and its properties.
- CO2 Solve ordinary differential equations using Laplace transforms.

*Fig 4 98* *Pram* *nigam* *J. S. J.* *S. S. S.* *Shrestha* *J. S. J.*

- CO3 Familiarise with Fourier transforms of functions belonging to  $L^2(\mathbb{R})$  class, relation between Laplace and Fourier transforms.
- CO4 Explain Parseval's identity, Plancherel's theorem and applications of Fourier transforms to boundary value problems.
- CO5 Learn Fourier series, Bessel's inequality, term by term differentiation and integration of Fourier series. Apply the concepts of the course in real life problems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	L	M	H	M		M		M	H
CO2	M	L	M	M	H		M		M	M
CO3	M		M	M	H	L	M	L	M	H
CO4	M		M	M	H		M	L	M	H
CO5	M		M	M	H		M		M	H

H = Highly Related; M = Medium L = Low

Page 68  
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BMA073A	Wavelets and Applications	L-T-P:4-1-0
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### Course Objectives

- To design wavelets and understanding different types of wavelet
- To analyze the conditions to be satisfied for scaling and wavelet function to be a wavelet
- To understand the analysis, design and applications of different types of signals

### Unit-I

Basic concepts of signals and systems, Frequency spectrum of signals; Classification of signals: Discrete time signals and continuous time signals, periodic and non-periodic signals; Classification of systems: Linear, nonlinear, time-variant, time-invariant, stable and unstable systems.

### Unit-II

Time-Frequency Analysis Orthogonal functions, Orthonormal functions, Function spaces, Orthogonal basis functions, Haar scaling function, Haar spaces: Haar space  $V_n$ , general Haar space  $V_n$ ; Haar wavelet, Haar wavelet spaces: Haar wavelet space  $W_n$ , general Haar wavelet space  $W_n$ ; Decomposition and reconstruction, Time-frequency analysis, Orthogonal and orthonormal bases.

### Unit-III

Discrete Fourier transform of a digital signal, Complex form of a Fourier series, Inverse discrete Fourier transform, Window Fourier transform, Short time Fourier transform, Admissibility condition for a wavelet, Classes of wavelets: Haar, Morlet, Mexican hat, Meyer and Daubechies wavelets; Wavelets with compact support.

### Unit-IV

Stationary and non-stationary signals, Haar transform, 1-level Haar transform, Multi-level Haar transform, Conservation and compaction of energy, multi resolution analysis, Decomposition and reconstruction of signals using discrete wavelet transform (DWT).

### Unit-V

Wavelet series expansion using Haar and other wavelets, Applications in signal compression, Analysis and classification of audio signals using DWT, Signal de-noising: Image and ECG signals.

### References:

1. Charles K. Chui (1992). An Introduction to Wavelets. Academic Press.
2. Ingrid Daubechies (1999). Ten Lectures on Wavelets. SIAM
3. Michael W. Frazier (1999). An Introduction to Wavelets Through Linear Algebra. Springer-Verlag.

*Fig 4-98* *P. Kumar* *m. j. j.* *S. S. S.* *Shrestha* *Dr. J. K. J.*

4. Stéphane Mallat (2008). A Wavelet Tour of Signal Processing (3rd edition). Academic Press. 5. M.J. Roberts (2004). Signals and Systems: Analysis Using Transform Methods and MATLAB. McGraw-Hill Education.

6. David K. Ruch & Patrick J. Van Fleet (2009), Wavelet Theory: An Elementary Approach with Applications. John Wiley & Sons.

7. James S. Walker (2008). A Primer on Wavelets and Their Scientific Applications (2nd edition). Chapman & Hall/CRC, Taylor & Francis.

#### Course Outcomes:

This course will enable the students to:

CO1 Know basic concepts of signals and systems.

CO2 Understand the concept of Haar spaces.

CO3 Learn Fourier transform and wavelet transform of digital signals.

CO4 Learn the concepts of Discrete Wavelet Transforms.

CO5 Apply wavelets in signal processing and image processing.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	L	H	H	L	L	H	H
CO2	M	L	L	M	M	H	L	M	H	H
CO3	M	M	M	M	H	H	L		M	H
CO4	M	L	L	M	M	H	M	L	M	H
CO5	M	L	L	M	H	H	L	L	M	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *nigam* *J. S. Walker* *Seena* *Shrestha* *J. S. Walker*

BMA074A	Mathematical Logic	L-T-P:4-1-0
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#### Course Objectives:

- To introduce important aspects of propositional logic, first order predicate logic, computability and its extensions
- To understand the familiarity with the basic concepts and methods of logic, set theory, and recursion.
- This course lays the foundation for more advanced studies in logic and mathematics.

#### Unit-I

First-order languages, Terms of language, Formulas of language, First order theory.

#### Unit-II

Languages Structures of first order languages, Truth in a structure, Model of a theory, Embeddings and isomorphism.

#### Unit-III

Syntax of propositional logic, Semantics of propositional logic, Compactness theorem for propositional logic, Proof in propositional logic, Meta theorem in propositional logic, Post tautology theorem.

#### Unit-IV

Proof in first-order logic, Meta theorems in first-order logic, Some meta theorem in arithmetic, Consistency and completeness.

#### Unit-V

Completeness theorem, Interpretation in a theory, Extension by definitions, Compactness theorem and applications, Complete theories, Applications in algebra.

#### References:

1. Richard E. Hodel (2013). An Introduction to Mathematical Logic. Dover Publications.
2. Yu I. Manin (2010). A Course in Mathematical Logic for Mathematicians (2nd edition). Springer.
3. Elliott Mendelson (2015). Introduction to Mathematical Logic (6th edition). Chapman & Hall/CRC.
4. Shashi Mohan Srivastava (2013). A Course on Mathematical Logic (2nd edition). Springer.

#### Course Outcomes:

This course will enable the students to:

- CO1 Learn the syntax of first-order logic
- CO2 Understand semantics of first-order languages.
- CO3 Understand the propositional logic and their properties.

*Fig 4 98* *Pram* *nijam* *JS* *Seena* *Shristi* *Dr. J. Karapinar*

CO4 Learn basic theorems like compactness theorem, meta theorem and post-tautology theorem.

CO5 Assimilate the concept of completeness interpretations and their applications with special emphasis on applications in algebra.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	M	L	M	H	M	L	M	H	H
CO2	M	M	L	M	M	L	M		M	M
CO3	M	M	L	L	H	M	L	L	H	H
CO4	M	L	M	M	M	M			H	H
CO5	M	L	L	M	M		M		M	M

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *nigam* *J. K. Singh* *S. Kumar* *Shrestha* *J. K. Singh*



BMA075A	Operating Systems	L-T-P:4-0-0
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### Course Objectives

- The objective of the course is to provide basic knowledge of computer operating system structures and functioning.
- The course familiarizes the student with basic knowledge of computer operating systems.

### Unit – I

Operating System Objectives and functions-The Evolution of Operating Systems-Serial Processing-Simple batch Systems-Multi Programmed batch Systems-Time Sharing Systems.

### Unit – II

Definition of Process-Process States-Process Control Block-Operations on Process-Process Communication-Communication in Client-server System- Basic concepts of threads - Concurrency-Principles of Concurrency-Mutual exclusion - Semaphores – Messages – Deadlock - Deadlock Prevention - Deadlock detection - deadlock avoidance

### Unit – III

Memory Management-Address binding-Logical Vs Physical address space-Dynamic Loading-Dynamic Linking and Shared Libraries-Overlays-Swapping-Contiguous Memory allocation- Paging-Segmentation-Virtual memory-Demand paging-Page replacement Thrashing.

### Unit – IV

CPU Scheduling - Scheduling Criteria-Scheduling algorithms – FCFS, SJF, Priority, RR, Multilevel, Feedback Queue - Process synchronization-The Critical Section Problem Synchronization Hardware-Classical Problems of synchronization, File and Database System-File System-Functions of organization-Allocation and Free space management.

### Unit – V

Modern Operating Systems-Architecture and Features, Case Studies-Linux –Windows network OS - Windows XP (Design principles and components only). Shell introduction and Shell Scripting

### REFERENCES:

1. Silberschatz, Galvin, Gagne "Operating System Concepts "Sixth Edition-John Willey & Sons INC
2. William Stallings "Operating Systems, Internals and Design Principles",Fifth EditionPHI Publications New Delhi
3. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ,2005

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**Course Outcomes:**

This course will enable the students to:

- CO1 Understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.
- CO2 Understand the difference between process & thread, issues of scheduling of user level processes / threads and their issues & use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems and implement them in multithreaded programs.
- CO3 Gain knowledge about the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system.
- CO4 Demonstrate the design and management concepts along with issues and challenges of main memory, virtual memory and file system.
- CO5 Understand the types of I/O management, disk scheduling, protection and security problems faced by operating systems and how to minimize these problems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	L	H	M	L		H	H
CO2	M	M	L	L	H	M	L		H	H
CO3	M	L	L	M	M	M	L		H	M
CO4	M	L	L	M	M	H	L	M	H	M
CO5	M	M	L	L	H	M	L	M	H	H

H = Highly Related; M = Medium L = Low

Page 98 *[Signature]* *[Signature]* *[Signature]* *[Signature]* *[Signature]*

BMA076A	Operating Systems Lab	L-T-P:0-0-1
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### Software Lab based on Operating Systems

Note: Following exercises can be performed using Linux or Unix

1. Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
2. Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date.
3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified months.
6. Write a shell script to modify "cal" command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message -  
"Entered login name is invalid".
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of "who" command along with  
the total number of users.
10. Write a shell script to display the multiplication table any number.
11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
12. Write a shell script to find the sum of digits of a given number.
13. Write a shell script to merge the contents of three files, sort the contents and then display  
them page by page.
14. Write a shell script to find the LCD (least common divisor) of two numbers.
15. Write a shell script to perform the tasks of basic calculator.
16. Write a shell script to find the power of a given number.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.
20. Program to show the pyramid of special character "\*".

Page 68

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BMA077A	Data Structures And Algorithms	L-T-P:4-0-0
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### Course Objectives

- To understand the various algorithm design and analysis techniques
- To learn linear data structures – lists, stacks, and queues
- To learn different sorting and searching algorithms
- To understand Tree and Graph data structures

### Unit – I

Introduction: Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm. Algorithm Design Techniques: Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms.

### Unit – II

Sorting Techniques: Elementary sorting techniques-Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques-Heap Sort, Quick Sort, Sorting in Linear Time-Bucket Sort, Radix Sort and Count Sort Searching Techniques: Linear and Binary search.

### Unit – III

Complexity Analysis: Medians & Order Statistics. Data Structures: Arrays Single and Multi-dimensional Arrays, Sparse Matrices, Stacks, Implementing stack using array and linked list, Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another, Queues Array and Linked representation of Queue, De-queue, Priority Queues.

### Unit – IV

Linked Lists Singly, Doubly and Circular Lists, representation of Stack and Queue as Linked Lists. Recursion. Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion.

### Unit – V

Introduction to Tree as a data structure; Binary Trees, Binary Search Tree, (Creation, and Traversals of Binary Search Trees)

### References:

1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein-Introduction to Algorithms, PHI, 3rd Edition 2009.
2. Sarabasse & A.V. Gelder Computer Algorithm –Introduction to Design and Analysis, Publisher-Pearson 3rd Edition 1999.
3. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning, 2012.
4. Sartaj Sahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
5. Aaron M. Tenenbaum, Moshe J. Augenstein, Yedidyah Langsam, "Data Structures Using C and C++", Second edition, PHI, 2009.
6. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson.
7. D.S Malik, Data Structure using C++, Second edition, Cengage Learning, 2010.

*Fig 4 98* *Pawan* *nigam* *JP* *Saurav* *Shrestha* *Dr. J. K. Singh*

**Course Outcomes:**

This course will enable the students to:

- CO1 Student will be able to choose appropriate data structure as applied to specified problem definition. Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- CO2 Students will be able to apply concepts learned in various domains like DBMS, compiler construction etc.
- CO3 Students will be able to use linear and non-linear data structures like stacks , queues , linked list
- CO4 Students will be able to represent Stack and Queue as Linked Lists.
- CO5 Students can analyze Tree as a data structure with their properties.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	L	M	M	H	M	L	M	M	H
CO2	L	M	L	M	H	H		M	M	H
CO3	M	L	L	M	M	H	L	M	M	M
CO4	M	L	L	M	H	H	L	M	M	H
CO5	M	L	L	M	H	H	L	M	M	H

H = Highly Related; M = Medium L = Low

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BMA078A	Data Structures And Algorithms Lab	L-T-P:0-0-1
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**Software Lab based on Analysis of Algorithms:**

1. Implement Insertion Sort (The program should report the number of comparisons)
2. Implement Merge Sort (The program should report the number of comparisons)
3. Implement Heap Sort (The program should report the number of comparisons)
4. Implement Randomized Quick sort (The program should report the number of comparisons)
5. Implement Radix Sort.
6. Implement Searching Techniques
7. Implementation of Recursive function.
8. Array and Linked list implementation of Stack and Queue.
9. Implementation of Single, Double and circular Linked List
10. Creation and traversal of Binary Search Tree.

Page 68  
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BMA079A	Internet Technologies	L-T-P:4-1-0
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### Course Objectives

- To build web applications using ASP and client side script technologies use with Microsoft's IIS.
- To build XML applications with DTD and style sheets that span multiple domains ranging from finance to vector graphics to genealogy for use with legacy browsers..

### Unit – I

World Wide Web – Web browsers – Markup Languages –Style Sheet technologies –client side, server side - HTML – Headings –Links -images- Lists- Tables- Forms- Frames

### Unit – II

Cascading style sheets-Inline styles-Embedded style sheets-Linking External style sheets Positioning elements- Dynamic HTML – Object model and collections, Event model, Filters and Transitions.

### Unit – III

JAVASCRIPT-Introduction – Simple program-Decision making - Equality and Relational operators – Control statements – Functions – Programmer defined functions, JavaScript global functions, Recursion – Arrays – References and Reference parameters, Passing arrays to functions, Multidimensional arrays – Objects – Object types.

### Unit – IV

XML-Introduction- Structuring data-XML namespaces-Document Type Definitions (DTDs) and Schema-W3C XML schema documents-XML vocabularies-Document Object Model (DOM), DOM methods- Simple API for XML (SAX)-Extensible Style sheet Language (XSL)-Simple Object Access Protocol (SOAP).

### Unit - V

PHP-Introduction-String processing and regular expressions-Viewing Client/Server environment variables-Form processing and Business logic-Verifying a username and password-connecting to a database

### References:

1. Deitel, Deitel and Neito, INTERNET and WORLD WIDE WEB – How to program, Pearson Education Asia, 5th Edition , 2011.
2. Achyut S Godbole and Atul Kahate, "Web Technologies", Second Edition, Tata McGraw Hill, 2012.
3. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013.
4. David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011

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**Course Outcomes:**

This course will enable the students to:

- CO1 Understand, analyze and apply the role of languages like HTML, DHTML, CSS, XML, Java script, VBScript, ASP, PHP and protocols in the workings of the web and web applications
- CO2 Analyze a web project and identify its elements and attributes in comparison to traditional projects.
- CO3 Understand, analyze and create web pages using HTML, DHTML and Cascading Styles sheets.
- CO4 Understand, analyze and build dynamic web pages using JavaScript and VBScript (client side programming).
- CO5 Understand, analyze and build interactive web applications.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	H	M	L	M	H	H
CO2	M	M	L	M	H	M	L	M	M	H
CO3	M	M	L	M	H	H	L	M	M	H
CO4	M	H	L	L	H	H	L	M	M	H
CO5	M	M	L	L	H	H		M	M	H

H = Highly Related; M = Medium L = Low

*Fig 4.98* *Praveen* *nigam* *J. K. S.* *Seena* *Shrestha* *Jaspreet*



BMA080A	Correlation & Regression	L-T-P:4-0-0
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### Course Objective:

- To understand the Basic requirement of Correlation & Regression.
- To describe methods of PLS.
- To develop an understanding of Attributes Techniques.

### Unit-I

**Principal of Least Square:** Fitting of Straight line, second degree parabola, Power curve and Exponential Curve.

**Correlation and Regression:** Correlation, Scatter Diagram, Karl Pearson's Coefficient of Correlation and its properties. Spearman's Rank Correlation Coefficient. Regression-Fitting of Regression Lines, Regression Coefficients with properties.

### Unit-II

Multiple and partial correlation, intra class correlation and correlation ratio. Problem of correlated errors: autocorrelation, Analysis of collinear data, detection and correction of multicollinearity.

### Unit-III

Linear regression analysis, regression coefficient and properties. Multiple and partial regression, examine the multiple regression equation, concept of weighted least square, regression equation on grouped data, various methods of selecting the best regression equation.

### Unit-IV:

Linear estimation, Gauss- Markoff's theorem. Estimable functions, error and estimate space, normal equation and least square estimators, estimation of error variance, estimation with correlated observations, properties of least square estimators, generalized inverse of matrix and solution of normal equations, variance and covariance of least square estimators.

### Unit-V:

**Theory of Attributes:** Classes and class frequencies, order of class frequencies, Ultimate class frequency, Consistency of data (up to order 3). Independence of attributes, contingency table, Association of attributes, Measures of association.

### References:

1. Arnold, B.C., Balakrishnan, N. & Nagaraja, H.N. (1992): A First Course in Order Statistics. John Wiley.
2. David, H.A. & Nagaraja, H.N. (2003): Order Statistics. 3rd Ed. John Wiley.
3. Goon, Gupta & Das Gupta. (1991): Outline of Statistical Theory. Vol. I, World Press.
4. Hogg, R.V. and Craig, A.T. (1971): Introduction to Mathematical Statistics, McMillan.
5. Johnson, S. and Kotz. (1972): Distribution in Statistics, Vol.I, II. And III, Houghton and Muffin.
6. Kendall, M.G. and Stuart. (1996): An Advanced Theory of Statistics, Vol. I, II. Charles Griffin.

*Fig 4 98* *Pram* *nigam* *JS* *Saur* *Shrest* *Dr. J. K. Singh*

7. Mood, A.M., Graybill, F.A. and Boes, D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill.
8. Mukhopadhyay, P. (1996): Mathematical Statistics, New Central Book Agency (P) Ltd.
9. Draper, N.R. & Smith, H. (1998): Applied Regression Analysis, 3rd Ed. John Wiley.
10. Ezekiel, M. (1963): Methods of Correlation and Regression Analysis, John Wiley.
11. Kutner, M.H., Nachtsheim, C.J. & Neter, J. (2004): Applied Linear Regression Models, 4th Ed. With Student, CD. McGraw Hill.
12. Rohatgi, V.K. (1984): An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.

#### Course Outcomes:

This course will enable the students to:

- CO1:- To understand the concept of correlation.
- CO2:- To Understand the concept of Multiple Correlation.
- CO-3 To understand the concept of estimation of Regression.
- CO-4 To understand the concept of Linear Model.
- CO5: To understand the concept of Attributes.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	M	M	H	M	M	H
CO2	H	H	L	L	M	L	H	M	M	H
CO3	M	M	M	L	L	L	H	H	H	M
CO4	L	M	M	L	L	L	H	H	M	M
CO5	M	M	M	L	L	L	H	H	H	M

H = Highly Related; M = Medium L = Low

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BMA081A	Statistics Lab -I	L-T-P:0-0-1
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#### List of programs

- Computations of Correlation for Linear Data
- Computations of Rank Correlation.
- Computations of Principal of Least Square for Straight line and Second-degree Curve.
- Fit a Regression Equation for Linear Data.
- Computations of Class frequency for Attributes and test the Independence of Attributes.

#### References:

1. Arnold, B.C., Balakrishnan, N. & Nagaraja, H.N. (1992): A First Course in Order Statistics. John Wiley.
2. David, H.A. & Nagaraja, H.N. (2003): Order Statistics. 3rd Ed. John Wiley.
3. Goon, Gupta & Das Gupta. (1991): Outline of Statistical Theory. Vol. I, World Press.
4. Hogg, R.V. and Craig, A.T. (1971): Introduction to Mathematical Statistics, McMillan.
5. Johnson, S. and Kotz. (1972): Distribution in Statistics, Vol.I, II. And III, Houghton and Muffin.
6. Rohatgi, V.K. (1984): An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.








BMA082A	Industrial Statistics & Sampling Distribution	L-T-P:4-0-0
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### Course Objectives:

- To understand the Basic requirement of statistics to society
- To describe methods of Testing.
- To understand the Basic requirement of SQC.

### Unit-I

#### Statistical Quality Control -I

Concept of SQC, process control. Causes of variation in quality, Shewhartz Control Charts technique of rational sub groups, control limits, Natural tolerance limits, Specification limits, summary of out of control criteria.

### Unit-II

#### Statistical Quality Control -II

Control Charts for Variables: Construction of Mean, Range and Standard Deviation Charts. Concept of defects and defectives. Control chart for attributes: Construction of np-chart, p-chart, and c-chart.

### Unit-III

#### Chi-square Distribution

Definition, Derivation, Moments, Moment Generating Function, Cumulant Generating Function. Limiting and Additive property of Chi-square variates. Distribution of ratio of chi-square variates

#### Applications of Chi-square

Chi-square test for testing normal population variance, Test for goodness of fit, Contingency table and Test for independence of attributes, Yates correction for 2x2 contingency table conditions of Chi-square.

### Unit-IV:

#### t-Distribution

Definition of Student's-t and Fisher's-t statistics and derivation of their distributions. Limiting property of t-distribution. Applications: Testing of single mean, Difference of two means, paired t-test and sample correlation coefficient.

### Unit-V:

#### F-Distribution

Definition of Snedecor's F-distribution and its derivation. Applications- Testing of equality of two variance. Fisher's transformation and its uses. Relationship between 't', 'F' and chi-square statistics.

### References:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, S Chand & Company, New Delhi
2. Grant, E.L. (1964): Statistical Quality Control, Mc Graw Hill.
3. Montgomery, D.C. (2001): Introduction to Statistical Quality Control, John Wiley and Sons, Third Edition.
4. Goon, A.M., Gupta, M.K. and Dasgupta, B. Das (1991): An Outline of Statistics, Volume II, The World Press Pvt Ltd, Calcutta
5. Mood Alexander M., Graybill Frankline and Boes Duane C.: Introduction to Theory of Statistics, Mc Graw Hill & Company, Third Edition

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6. Rohatgi, V.K.(1967): An Introduction to Probability Theory and Statistics, John Wiley And Sons.
7. Snedecor, G.W. and Cochran, W.G. (1967): Statistical Methods, Iowa State University Press.

**Course Outcomes:**

This course will enable the students to:

CO1:- Understanding the basics concepts SQC.

CO2:- Understanding the Concept of Control Charts.

CO3:- Understanding the applications of Chi-square -distribution.

CO4:- Understanding the various methods to T-distribution.

CO5:- Understanding the various methods to F-distribution

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	L	L	M	M	H	H
CO2	H	H	L	H	L	H	H	H	H	H
CO3	M	H	L	H	L	H	H	H	H	H
CO4	M	H	L	H	L	H	H	H	H	H

H = Highly Related; M = Medium L = Low

Fig 4.98     



BMA084A	Applied Statistics	L-T-P: 4-1-0
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### Course Objective:

- To understand the Basic requirement of statistics to society
- To describe methods of Demography
- To develop an understanding of index numbers

### Unit-I

#### Vital Statistics - I

Meaning, definition and utility. Sources of demographic data- census, registration. Indices of mortality. Measurement of mortality, crude death rate and standardization death rates. Indices of fertility, Measurement of fertility – crude birth rate, general fertility rate. Age- specific fertility rate, total fertility rate. Gross and Net Reproduction Rates.

### Unit-II

#### Vital Statistics - II

Stationary and stable population, concept and determination of the rate of increase in a stable population. Life table: Construction of life table from graduated rates of mortality and evaluation of probabilities of survival and death from a life table.

### Unit-III

#### Demand Analysis

Demand and supply, law of demand and supply. Elasticity of demand: Price, Income and Cross elasticity. Engel's curve and Engel's law, Pareto's law of income.

### Unit-IV:

#### Index Number – I

Meaning and uses of index numbers, problem in the construction of index numbers, price relatives, quantity and value relatives. Fixed base and chain base index numbers, use of averages. Weighted and unweighted index numbers- Laspeyers, Paasche's, Marshall-Edgeworth and Fisher's ideal index numbers, Dorbish, Kelly's fixed base index numbers.

### Unit-V:

#### Index Number – II

Test for index numbers. Base shifting, splicing and deflating. Consumer Price Index numbers, Construction of cost of living index and Whole-sale price index.

### References:

1. Gupta, S.C. and Kapoor, Fundamentals of Applied Statistics, S Chand & Company, New Delhi.
2. Srivastava O.S. (1983) : A Text Book of Demography, Vikas Publishing House, new Delhi.
3. Benjamin B. (1959): Health and Vital Statistics, Allen and Unwin.
4. Croxton, F.E., Cowden, D.J. and Klein, S. (1982): Applied General Statistics, 3rd Edn. Prentice Hall of India (P) Ltd.
5. Mukhopadhyay, P. (1994) :Applied Statistics, new Central Book Agency Pvt. Ltd., Calcutta.

*Fig 4 98* *P. Kumar* *mijani* *J. S. S. S.* *S. S. S.* *Shrestha* *J. S. S. S.*

6. Goon A.M., Gupta M.K. and Das Gupta B. (1986): Fundamentals of Statistics, Vol. II, World Press, Calcutta.

**Course Outcomes:**

This course will enable the students to:

CO1:- To understand the basic concept of Vital Statistics.

CO2:- To understand the concept of Life Table.

CO-3 : To understand the concept of Demand analysis.

CO-4 : To understand the basic concept of Index numbers.

CO5:- To understand the concept of Cost of living Index number.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	H	M	M	L	H	H	H	H	H
CO2	H	H	M	M	L	M	H	H	H	H
CO3	H	H	L	M	M	M	H	H	H	H
CO4	H	H	L	M	M	M	H	H	H	H
CO5	H	H	L	M	M	M	H	H	H	H

H = Highly Related; M = Medium L = Low

Page 68  
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BMA085A	Statistical Inference & Sampling	L-T-P :4-1-0
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#### Course Objective:

- To develop an understanding of estimation
- To develop an understanding of sampling Techniques.
- To develop an understanding of Testing.

#### Unit-I

**Basic Concepts:** Sampling distribution, Sampling Distribution of sum of Binomial, Poisson and mean of Normal Distribution. Standard Error: Meaning and role of Central Limit Theorem for identically independently distributed (i.i.d) random variables.

#### Unit-II

##### Statistical Hypothesis and test of significance I

Definition, Simple and Composite hypotheses. Null and Alternative Hypotheses, two Types of errors in sampling, critical region, level of significance critical and p-values, procedure and testing of hypothesis.

#### Unit-III

**Statistical Hypothesis II:** one tailed and two tailed test, Power and size of the test, and critical region Neyman Pearson Lemma and its application for finding BCR. **Estimation:** Parametric space, sample space, point estimation. Requirements of good estimator: Consistency, unbiasedness, efficiency, sufficiency.

**Minimum variance unbiased (MVU) estimators.** Cramer-Rao inequality. Minimum Variance Bound (MVB) estimator, Rao-Blackwell theorem, Lehmann-Scheffe theorem.

#### Unit-IV:

**Sample Surveys:** Concepts of Population and sample. Complete enumeration vs sampling. Need for sampling. Principal and organizational aspects in the conduct of a sample survey. Sampling and Non sampling errors.

#### Unit-V:

**Basic sampling methods:** Simple random sampling with or without replacement for the estimation of mean, total, proportion. Determination of sample size. Probability proportional to size sampling (with replacement).

**Stratified random sampling:** Different allocations. Proportion and Optimum allocation.

#### References:

1. Gupta, S.C. and Kapoor, V.K Fundamentals of Applied Statistics, S Chand & Company, New Delhi.
2. Chandra T.K. (1999): A First Course in Asymptotic Theory in Statistics, Narosa
3. Goon A.M., Gupta M.K. & Dasgupta B. (1994): An Outline of Statistical Theory (Vol-1 and 2), World Press
4. Hogg R.V. & Craig A.T. (1978): Introduction to Mathematical Statistics
5. Spiegel M.R., (1967): Theory and Problem of Statistics, Schaum's Publishing Series.

*Fig 4 98* *Prahar* *nigam* *JP* *Seena* *Shrestha* *Dr. J. K. Kapoor*

6. Raj, D. and Chandhoke, P. (1998): Sample Survey Theory. Narosa Publishing house.
7. Singh, D. and Chaudhary, F.S. (1995): Theory and Analysis of Sample Survey Designs. New Age International (P) Ltd.
8. Sukhatme, P.V., Sukhatme, B.V., Sukhatme, S. and Asok, C. (1984): Sampling Theory of Surveys with Applications. Iowa State University Press, Iowa, USA.
9. Cochran, W.G. (1977): Sampling Techniques. John Wiley and Sons, N.Y.
10. Murthy, M.N. (1967): Sampling Theory and Methods. Statistical Publishing Society, Kolkata.

#### Course Outcomes:

This course will enable the students to:

CO1:-To understand the Basic requirement of Hypothesis

CO2:- Understanding the applications of Estimation and various methods to MVUE

CO3:-To understand the Basic concepts of sample survey and Basic sampling method

CO4:- Understanding the basics concepts of Stratified random sampling.

CO5:- To understand the basic sampling method.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	L	L	M	M	H	H
CO2	H	H	L	H	L	H	H	H	H	H
CO3	M	H	L	H	L	H	H	H	H	H
CO4	M	H	L	H	L	H	H	H	H	H
CO5	M	M	L	M	L	L	M	M	H	H

H = Highly Related; M = Medium L = Low

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BMA086A	ANOVA & DOE	L-T-P :4-0-0
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#### Course Objective:

- To understand the Basic Concept of Time Series.
- To describe methods of ANOVA
- To develop an understanding of Design of Experiment.

#### Unit-I

**Analysis of variance:** One-way and two-way classified data for fixed effects models. Analysis of Covariance: One-way and two-way classified data with one concomitant variable.

#### Unit-II

**Experimental designs:** Role, historical perspective, terminology, experimental error, basic principles, uniformity trials, fertility contour maps, choice of size and shape of plots and blocks.

**Basic designs:** Completely Randomized Design (CRD).

#### Unit-III

**Randomized Block Design (RBD), Latin Square Design (LSD)** – layout, model and statistical analysis, relative efficiency, analysis with missing observations.

#### Unit-IV:

**Time Series:** Introduction, decomposition of a time series, different components with illustrations. Measurement of trend-Graphical Method, Method of Semi-averages, Method of fitting curves. Method of Moving Averages. Measurement of seasonal variation- Method of Simple Averages, Ratio to Trend Method, Ratio to Moving Average Method and Link Relative Method. Measurement of cyclical variation residual method.

#### Unit-V:

**Non Parametric Tests:** Definition merits and limitations, Sign test for univariate and bivariate distributions, Run test and Median test for small and large samples.

#### References:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, S Chand & Company, New Delhi
2. Chandra T.K. (1999): A First Course in Asymptotic Theory in Statistics, Narosa
3. Goon A.M., Gupta M.K. & Dasgupta B. (1994): An Outline of Statistical Theory (Vol-1 and 2), World Press
4. Hogg R.V. & Craig A.T. (1978): Introduction to Mathematical Statistics
5. Spiegel M.R., (1967): Theory and Problem of Statistics, Schaum's Publishing Series.
6. Guilford, J.P. and Fruchter B. (1980): Fundamental Statistics in Psychology and Education. McGraw Hill.
7. Cochran, W.G. and Cox, G.M. (1959): Experimental Design. Asis Publishing House.
8. Das, M.N. and Giri, N.C. (1986): Design and Analysis of Experiments. Wiley Eastern Ltd.
9. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2005): Fundamentals of Statistics. Vol. II, 8th Edn. World Press, Kolkata.
10. Kempthorne, O. (1965): The Design and Analysis of Experiments. John Wiley.
11. Montgomery, D. C. (2008): Design and Analysis of Experiments, John Wiley.

#### Course Outcomes:

This course will enable the students to:

CO-1 : Understanding the basic concept of ANOVA.

CO-2 : To understand the Basic concepts of Experimental design and CRD

CO3:- Understanding the basics concepts of RBD,LSD

*Fig 98* *Pram* *nigam* *J. S. S.* *S. S.* *Shrestha* *J. S. S.*

CO4: To understand the Basic concepts of Time Series.

CO5:- Understanding the basics concepts of Non Parametric Test.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	L	L	M	M	H	H
CO2	H	H	L	H	L	H	H	H	H	H
CO3	H	H	L	H	L	H	H	H	H	H
CO4	M	H	L	H	L	H	H	H	H	H
CO5	H	H	L	H	L	M	L	M	M	M

H = Highly Related; M = Medium L = Low

Page 98  
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BMA087A	Statistics Lab -III	L-T-P:0-0-1
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#### List of programs

- Computations with one way analysis
- Computations with Two way analysis
- Computations with CRD
- Computations with RBD
- Computations with LSD
- Methods to Solve Time Series Problems.
- Hypothesis for Non Parametric.

#### Text Books:

Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, S Chand & Company, New Delhi

#### Reference Books:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, S Chand & Company, New Delhi
2. Chandra T.K. (1999): A First Course in Asymptotic Theory in Statistics, Narosa
3. Goon A.M., Gupta M.K. & Dasgupta B. (1994): An Outline of Statistical Theory (Vol-1 and 2), World Press
4. Hogg R.V. & Craig A.T. (1978): Introduction to Mathematical Statistics
5. Spiegel M.R., (1967): Theory and Problem of Statistics, Schaum's Publishing Series.
6. Guilford, J.P. and Fruchter B. (1980): Fundamental Statistics in Psychology and Education. Mc Graw Hill.
7. Cochran, W.G. and Cox, G.M. (1959): Experimental Design. Asis Publishing House.
8. Das, M.N. and Giri, N.C. (1986): Design and Analysis of Experiments. Wiley Eastern Ltd.
9. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2005): Fundamentals of Statistics. Vol. II, 8th Edn. World Press, Kolkata.
10. Kempthorne, O. (1965): The Design and Analysis of Experiments. John Wiley.
11. Montgomery, D. C. (2008): Design and Analysis of Experiments, John Wiley.

Page 98  
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BMA088A	Stochastic Process & Queuing Theory	L-T-P: 4-1-0
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#### Course Objective:

- To understand the Basic concept of Stochastic Process.
- To describe methods of Markov Chain & Poisson Process.
- To develop an understanding of Queuing Theory.

#### Unit-I

Probability Distributions: Generating functions, Bivariate probability generating function. Stochastic Process: Introduction, Stationary Process.

#### Unit-II

Markov Chains: Definition of Markov Chain, transition probability matrix, order of Markov chain, Markov chain as graphs, higher transition probabilities.

#### Unit-III

Generalization of independent Bernoulli trials, classification of states and chains, stability of Markov system, graph theoretic approach.

#### Unit-IV:

Poisson Process: postulates of Poisson process, properties of Poisson process, inter-arrival time, pure birth process, Yule Furry process, birth and death process, pure death process.

#### Unit-V:

Queuing System: General concept, steady state distribution, queuing model, M/M/1 with finite and infinite system capacity, waiting time distribution (without proof). Gambler's Ruin Problem: Classical ruin problem, expected duration of the game.

#### References:

1. Medhi, J. (2009): Stochastic Processes, New Age International Publishers.
2. Basu, A.K. (2005): Introduction to Stochastic Processes, Narosa Publishing.
3. Bhat, B.R. (2000): Stochastic Models: Analysis and Applications, New Age International Publishers.
4. Taha, H. (1995): Operations Research: An Introduction, Prentice- Hall India.
5. Feller, William (1968): Introduction to probability Theory and Its Applications, Vol I, 3<sup>rd</sup> Edition, Wiley International.

#### Course Outcomes:

This course will enable the students to:

- CO1:- To understand the Basic of Stochastic Process.  
CO2:- Understanding the basics concepts of Markov Chain.  
CO3:- Understanding the applications of Stochastic Process.  
CO4:- Understanding the concept of Queuing Theory.  
CO5:-.. Understanding the various Models in Queuing Theory.

*Fig 4 98* *Pramit* *nijam* *Shrestha* *Shrestha* *Shrestha*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	L	L	M	M	H	H
CO2	H	H	L	H	L	H	H	H	H	H
CO3	H	H	L	H	L	H	H	H	H	H
CO4	M	H	L	H	L	H	H	H	H	H
CO5	H	H	L	H	L	M	L	M	M	M

H = Highly Related; M = Medium L = Low

Fig 4.98 *Praveen* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

BMA089A	Multivariate Analysis	L-T-P: 4-1-0
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#### Course Objective:

- To understand the Basic concept Bivariate Distributions.
- To describe methods Multivariate Normal Distribution.
- To develop an understanding of Sequential Analysis.

#### Unit-I

Bivariate Normal Distribution (BVN): p.d.f. of BVN, properties of BVN, marginal and conditional p.d.f. of BVN. Multivariate Data: Random Vector: Probability mass/density functions, Distribution function, Mean vector & Dispersion matrix, Marginal & Conditional distributions.

#### Unit-II

Multivariate Normal distribution and its properties. Sampling distribution for mean vector and variance- covariance matrix. Multiple and partial correlation coefficient and their properties. Introduction to Discriminant Analysis, Principal Components Analysis and Factor Analysis.

#### Unit-III

Sequential Analysis: Sequential probability ratio test (SPRT) for simple vs simple hypotheses. Fundamental relations among  $\alpha$ ,  $\beta$ , A and B, determination of A and B in practice.

#### Unit-IV:

Wald's fundamental identity and the derivation of operating characteristics (OC) and average sample number (ASN) functions, examples based on normal, Poisson, binomial and exponential distributions.

#### Unit-V:

Hotelling- $T^2$  and its properties and applications, Mahanalobis  $D^2$ . Wishart distributions and its properties. Asymptotic distribution of Z-tanh (r). Multivariate central limit theorem.

#### References:

1. Anderson, T.W. (2003): An Introduction to Multivariate Statistical Analysis, 3rdEdn., John Wiley
2. Muirhead, R.J. (1982): Aspects of Multivariate Statistical Theory, John Wiley.
3. Kshirsagar, A.M. (1972): Multivariate Analysis, 1stEdn. Marcel Dekker.
4. Johnson, R.A. and Wichern, D.W. (2007): Applied Multivariate Analysis, 6thEdn., Pearson & Prentice Hall
5. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2005): *An Outline Of statistical Theory, Volume II*, World Press.
6. Rao, C. R. (2000): Linear Statistical Inference, Wiley.
7. Mukhopadhyay, P.: Mathematical Statistics.

#### Course Outcomes:

This course will enable the students to:

1. CO1:- To understand the Basic concepts of Bivariate Normal Distribution.
2. CO2:- To Understanding the basics concept of Multinomial Normal Distribution.
3. CO3:- Understanding the basics concepts of Sequential Analysis
4. CO4:- Understanding the basics concept of Non-Parametric Methods.
5. CO5:- Understanding the basic concept of Hotelling- $T^2$  and its properties and applications.

*Fig 98* *Pram* *nijam* *JTS* *Saur* *Shrest* *Dr. J. K. Parashar*



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM  
OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	M	M	M	L	H	M	M	L
CO2	L	H	M	M	H	H	M	M	M	L
CO3	M	H	L	H	M	M	M	L	H	H
CO4	H	M	M	M	M	L	H	M	M	L

H = Highly Related; M = Medium; L = Low

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Page 68  
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**Department of Mathematics**  
**Course Structure and Syllabi**  
**B.Sc. Mathematics (Pass Course)**  
**Session 2022-25**



### **Program Outcome(PO's)**

Upon completion of B.Sc. (Pass Course) Mathematics programme, students will be able to acquire the following attributes.

#### **PO1: Disciplinary knowledge**

Capability of demonstrating comprehensive knowledge of mathematics and understanding of one or more disciplines which form a part of an undergraduate programme of study.

#### **PO2: Communications skills**

- (i) Ability to communicate various concepts of mathematics effectively using examples and their geometrical visualizations.
- (ii) Ability to use mathematics as a precise language of communication in other branches of human knowledge.
- (iii) Ability to communicate long standing unsolved problems in mathematics.
- (iv) Ability to show the importance of mathematics as precursor to various scientific developments since the beginning of the civilization.
- (v) Ability to explain the development of mathematics in the civilizational context and its role as queen of all sciences.

#### **PO3: Critical thinking and analytical reasoning**

- (i) Ability to employ critical thinking in understanding the concepts in every area of mathematics.
- (ii) Ability to analyze the results and apply them in various problems appearing in different branches of mathematics.

#### **PO4: Problem solving**

- (i) Capability to solve problems in computer graphics using concepts of linear algebra.
- (ii) Capability to solve various models using techniques of differential equations.
- (iii) Ability to solve linear system of equations, linear programming problems and network flow problems.
- (iv) Ability to provide new solutions using the domain knowledge of mathematics acquired during this programme.

#### **PO5: Research-related skills**

- (i) Capability for inquiring about appropriate questions relating to the concepts in various fields

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(ii) To know about the advances in various branches of mathematics.

**PO6: Information/digital literacy**

(i) Capability to use appropriate softwares to solve system of equations and differential equations.

(ii) Capability to understand and apply the programming concepts of C++ to mathematical investigations and problem solving.

**PO7:Self-directed learning**

Ability to work independently and do in-depth study of various notions of mathematics.

**PO8: Moral and ethical awareness/reasoning**

Ability to identify unethical behavior such as fabrication, falsification or misrepresentation of data and adopting objective, unbiased and truthful actions in all aspects.

**PO9: Lifelong learning**

Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning.

**PO10: Professional and Employability Skills**

(i) Completion of this programme will also enable the learners to join the teaching profession.

(ii) The programme will also help students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

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Semester-I

S.No.	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Calculus	BMA021C	4	1	-	4	1	-	5	Core
2	Subject B (Course 1)		4	-	2	4		1	5	Core
3	Subject C (Course 1)		4	-	2	4		1	5	Core
4	Web Development		2	-		2			2	Fundamental
5	Web Development Lab				2			1	1	Fundamental
6	Environment Studies		3		2*	3		1	4	Fundamental
7	Communication Skills		2	0	0	2	0	0	2	Foundation
8	Communication Skills Lab		0	0	2	0	0	1	1	Foundation
9	Culture Education I		2	-		2			2	Foundation
			21		12	21		6	27	

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Semester II

S. No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Group Theory	BMA043B	4	1	-	4	1	-	5	Core
2	Subject B (Course 2)		4	-	2	4		1	5	Core
3	Subject C (Course 2)		4	-	2	4		1	5	Core
4	Project Management Lab			-	2			1	1	Fundamental
5	Professional Skills		2	0	0	2	0	0	2	Foundation
6	Professional Skills Lab		0	0	2	0	0	1	1	Foundation
7	Culture Education-2		2	0	0	2	0	0	2	Foundation
			16		10	16		5	21	

*Prof. Dr. P. S. Rao*

*P. S. Rao*

*M. S. Rao*

*M. S. Rao*

*S. S. Rao*

*S. S. Rao*

*S. S. Rao*

Semester III

S. No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Numerical Analysis	BMA007D	4	1	-	4	1	-	5	Core
2	Subject B (Course3)		4	-	2	4		1	5	Core
3	Subject C (Course3)		4	-	2	4		1	5	Core
4	Advanced Spread Sheet Lab			-	2			1	1	Fundamental
5	Life Skills1(Personality Development)		1	0	2	1	0	1	2	Foundation
6	Value Education and Ethics-1		1	0	0	1	0	0	1	Foundation
7	Open Elective- I		3		0	3		0	3	Interdisciplinary
			17		10	17		5	22	

*Prof. Dr. P. S. Rao*

*Dr. N. S. Rao*

*Dr. S. S. Rao*

*Dr. P. S. Rao*



Semester IV

S.No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Ordinary Differential Equations	BMA092A	4	1	-	4	1	-	5	Core
2	Subject B (Course4)		4	-	2	4		1	5	Core
3	Subject C (Course 4)		4	-	2	4		1	5	Core
4	Python programming		2	-		2			2	Fundamental
5	Python programming Lab				2			1	1	Fundamental
6	Life Skills-2 (Aptitude)		1	0-	2	1	0	1	2	Foundation
7	Value Education and Ethics-2		1	0	0	1	0	0	1	Foundation
			16		10	16		5	21	

*Prof. Dr. Ramesh*

*nijam*

*Prakash*

*Dr. Rajendra*

Semester V

S.No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Mathematical Programming	BMA091A	4	1	-	4	1	-	5	Core
2	Subject B(Course5		4	-	2	4		1	5	Core
3	Subject C(Course5)		4	-	2	4		1	5	Core
4	Project				12			6	6	Discipline Specific
			12		18	12		9	21	

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*Shruti*

*Dr. J. K. Singh*

Semester VI

S. No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Real and Complex Analysis	BSM001A	4	1	-	4	1	-	5	Core
2	Subject B (Course 6)		4	-	2	4		1	5	Core
3	Subject C (Course 6)		4		2	4		1	5	Core
4	Open Elective- II		3			3			3	Interdisciplinary
5	Open Elective – III		3			3			3	Interdisciplinary
			18		6	18		2	21	

**Total Credits**

Credits	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total
	27	21	22	21	21	21	133








## Semester-I

BMA021C	Calculus	L-T-P:4-1-0
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### Course Objective:

- To increase the student's appreciation of the basic role played by mathematics in Basic Sciences.
- To find curvature, radius of curvature, Centre of curvature and Chord of curvature.
- Use Calculus to compute quantities like Points of inflexion, Asymptotes.
- To develop the concepts of Partial differentiation, Chain rule of partial differentiation.
- Total Differentiation and applications of it as maxima and minima of two variables.
- To trace curves in Cartesian, parametric and polar co-ordinates

### Unit-I

Real numbers, Sequences of real numbers, Convergence of sequences and series, Bounded and monotonic sequences; Definite integral as a limit of sum, Integration of irrational algebraic functions and transcendental functions, Reduction formulae, Definite integrals.

### Unit-II

Definition of limit of a real valued function, Limit at infinity and infinite limits;  $\delta$ - $\epsilon$  Continuity of a real valued function, Properties of continuous functions, Intermediate value theorem, Geometrical interpretation of continuity, Types of discontinuity; Uniform continuity.

### Unit-III

Differentiability of a real valued function, Geometrical interpretation of differentiability; Relation between differentiability and continuity, Differentiability and monotonicity, Chain rule of differentiation; Darboux's theorem, Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Geometrical interpretation of mean value theorems; Successive differentiation, Leibnitz's theorem.

### Unit-IV

Maclaurin's and Taylor's theorems for expansion of a function in an infinite series, Taylor's theorem in finite form with Lagrange, Cauchy and Roche-Schlomilch forms of remainder; Maxima and minima.

### Unit-V

Curvature, Asymptotes of general algebraic curves, Parallel asymptotes, Asymptotes parallel to axes; Symmetry, Concavity and convexity, Points of inflection, Tangents at origin, Multiple points, Position and nature of double points; Tracing of Cartesian, polar and parametric curves.

### References:

A series of handwritten signatures and initials, likely representing the authors or reviewers of the document.

1. Howard Anton, I. Bivens & Stephan Davis (2016). Calculus (10th edition), Wiley India.
2. Gabriel Klambauer (1986), Aspects of Calculus. Springer-Verlag.
3. Wieslaw Krawcewicz & Bindhyachal Rai (2003), Calculus with Maple Labs, Narosa.
4. Gorakh Prasad (2016), Differential Calculus (19th edition), Pothishala Pvt. Ltd.
5. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018), Thomas' Calculus (14th edition), Pearson Education.

**Course Learning Outcomes:** This course will enable the students to:

- CO1 Assimilate the notions of limit of a sequence and convergence of a series of real numbers.
- CO2 Calculate the limit and examine the continuity of a function at a point.
- CO3 Understand the consequences of various mean value theorems for differentiable functions.
- CO4 Understand the Maclaurin's and Taylor's theorems for expansion of a function in an infinite series.
- CO5 Understand the concepts of concavity and convexity, Points of inflexion, Asymptotes and tracing of curves in Cartesian, parametric and polar co-ordinates.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	H	H	M	L	H	M	M	M
CO2	H	M	H	H	L	L	M	M	M	M
CO3	H	M	M	M	L	L	H	H	M	L
CO4	H	H	M	M	L	L	M	H	M	M
CO5	H	M	M	M	L	M	L	M	L	H

H = Highly Related; M = Medium L = Low

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## Semester-II

<b>BMA043B</b>	<b>Group Theory</b>	<b>L-T-P:4-1-0</b>
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### **Course Objective:**

- Recall and use the definitions and properties of cosets and subgroups.
- Derive the existence of groups of a specified small order.
- Recall and apply Sylow's Theorems to determine the structure of certain groups of small order.

### **Unit-I**

Symmetries of a square, definition and examples of groups including dihedral, elementary properties of groups, Subgroups and examples of subgroups.

### **Unit-II**

Cyclic groups, Properties of cyclic groups, Lagrange's theorem, Euler phi function, Euler's theorem, Fermat's little theorem, cycle notation for permutations, properties of permutations, even and odd permutations, alternating groups, Cayley's theorem and its applications.

### **Unit-III**

Properties of cosets, normal subgroups, simple groups, factor groups, Cauchy's theorem for finite abelian groups; centralizer, normalizer, Center of a group, Product of two subgroups.

### **Unit-IV**

Group homomorphisms, Properties of homomorphisms, Group isomorphisms, properties of isomorphisms, First, second and third isomorphism theorems for groups.

### **Unit-V**

Introduction to Rings: examples and properties, Integral Domains, Division Rings, Fields and its Characteristics, Subrings, Ideals, Quotient Ring.

### **References:**

1. Michael Artin (2014). Algebra (2nd edition). Pearson.
2. John B. Fraleigh (2007). A First Course in Abstract Algebra (7th edition). Pearson.
3. Joseph A. Gallian (2017). Contemporary Abstract Algebra (9th edition). Cengage.
4. I. N. Herstein (2006). Topics in Algebra (2nd edition). Wiley India.
5. Nathan Jacobson (2009). Basic Algebra I (2nd edition). Dover Publications.
6. Ramji Lal (2017). Algebra 1: Groups, Rings, Fields and Arithmetic. Springer.
7. I.S. Luthar & I.B.S. Passi (2013). Algebra: Volume 1: Groups. Narosa.



**Course Learning Outcomes:**

The course will enable the students to:

- CO1 Link the fundamental concepts of groups and symmetries of geometrical objects.
- CO2 The student will be able to understand the theory of cyclic group and permutation group.
- CO3 Understand the concepts of Normal Subgroups.
- CO4 Learn the concept of Group homomorphisms and isomorphism.
- CO5 Learn about the concept of Ring, Integral Domain and Field.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	M	H	M	M	H	H	M	M
CO2	H	M	M	M	L	L	H	H	M	M
CO3	M	M	M	H	M	L	H	M	M	M
CO4	H	M	M	M	L	M	M	H	M	M
CO5	H	M	M	M	L	L	L	M	M	H

H = Highly Related; M = Medium L = Low

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### Semester-III

BMA007D	Numerical Analysis	L-T-P:4-1-0
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#### Course objective :

- Numerical methods, based upon sound computational mathematics, are the basic algorithms underpinning computer predictions in modern systems science.
- Such methods include techniques for simple optimisation, interpolation from the known to the unknown, linear algebra underlying systems of equations, Integrals, ordinary differential equations to simulate systems, and stochastic simulation under random influences.

#### Unit-I

Round-off error and computer arithmetic, Local and global truncation errors, Algorithms and convergence; Bisection method, False position method, Fixed point iteration method, Newton's method and secant method for solving equations.

#### Unit-II

Partial and scaled partial pivoting, Lower and upper triangular (LU) decomposition of a Jacobi, -matrix and its applications, Thomas method for tridiagonal systems; Gauss Seidel and successive over-relaxation (SOR) methods. -Gauss

#### Unit-III

Piecewise linear interpolation, Cubic spline Newton forward and backward difference- interpolation, Finite difference operators, Gregory interpolations.

#### Unit-IV

First order and higher order approximation for first derivative, Approximation for second derivative; Numerical integration: Trapezoidal rule, Simpson's rules and error analysis, Storer extrapolation methods, Richardson extrapolation. -Bulirsch

#### Unit-V

Kutta methods, Higher order one step method, Multi-step method-Euler's method, Runge Finite difference method, Shooting method, Real life examples: Google search engine, 1D and 2D simulations, Weather forecasting.

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**References:**

1. Brian Bradie (2006), A Friendly Introduction to Numerical Analysis. Pearson.
2. C. F. Gerald & P. O. Wheatley (2008). Applied Numerical Analysis (7th edition), Pearson Education, India.
3. F. B. Hildebrand (2013). Introduction to Numerical Analysis: (2nd edition). Dover Publications.
4. M. K. Jain, S. R. K. Iyengar & R. K. Jain (2012). Numerical Methods for Scientific and Engineering Computation (6th edition). New Age International Publishers.
5. Robert J. Schilling & Sandra L. Harris (1999). Applied Numerical Methods for Engineers Using MATLAB and C. Thomson-Brooks/Cole.

**Course Learning Outcomes:**

This course will enable the students to:

- CO1 Obtain numerical solutions of algebraic and transcendental equations.
  - CO2 Find numerical solutions of system of linear equations and check the accuracy of the solutions.
  - CO3 Learn about various interpolating and extrapolating methods.
  - CO4 Learn the concepts of Numerical Differentiation and Integration.
  - CO5 Solve initial and boundary value problems in differential equations using numerical methods.
- Apply various numerical methods in real life problems.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	L	H	L	M	H	H	M	M
CO2	H	L	L	H	L	L	H	H	M	M
CO3	H	M	M	M	L	L	H	M	H	M
CO4	H	M	L	M	L	M	M	H	M	M
CO5	H	H	M	M	L	L	L	M	L	H

H = Highly Related; M = Medium L = Low

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## Semester IV

BMA0992A	Ordinary Differential Equations	L-T-P:4-1-0
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### Course objectives:

- To understand the concepts relating to the order and linearity of ODEs and PDEs, analytic and computational solution methods for ODEs.
- To teach students the real-world applications of ODEs.
- To teach students the series solution of ordinary differential equations.

### Unit-I

Degree and order of a differential equation. Formation of differential equations, Equations of the first order and first degree-Equations variables separable, Homogeneous equations and equations reducible to homogeneous form. Linear equations and equations reducible to linear form. Exact differential equations and equations can be made exact.

### Unit-II

Linear differential equations of higher order with constant coefficients, Complimentary functions and Particular integrals.

### Unit-III

Linear differential equations of higher order with variable coefficients, Cauchy's Homogeneous linear differential equations, Exact differential equations, One part of CF is known, Normal form, Solution by transformation of the equation by changing the independent variable, Method of variation of parameters.

### Unit-IV

Orthogonal trajectories, First order but higher degree differential equations solvable for x, y and p, Clairaut's form, Simultaneous differential equations. Applications to differential equations.

### Unit-V

Series solution at ordinary and regular singular point: Power Series solution at ordinary points, Frobenius series solution at regular singular points.

### References:

1. M. D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co., 2003.
2. M. Ray, A Text Book on Differential Equations, Students and Friends Co., Agra, 1998.
3. E. A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.
4. R. S. Senger, Ordinary Differential Equations with Integration, Prayal Publ. 2000.

5. D. A. Murray, Introductory Course in Differential Equations, Orient Longman (India), 1967.

6. Frank Ayres, Theory and Problems of Differential Equations, TMH, 2002.

7. I. N. Snedon, Elements of Partial Differential Equations, TMH, 2001.

### Course Learning Outcomes:

The course will enable the students to:

- CO1 Understand the genesis and application of ordinary differential equations. Learn various techniques of getting exact solutions of solvable first order ordinary differential equations.
- CO2 Learn various techniques of getting exact solutions of solvable linear differential equations of higher order.
- CO3 Apply a range of techniques to solve second order ordinary differential equations with variable coefficient.
- CO4 Model physical phenomena using ordinary differential equations such as the electric circuit, simple harmonic motion etc.
- CO5 Power series method for higher order linear equations, especially in cases when there is no method available to solve such equations.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	H	H	L	M	H	H	M	M
CO2	H	M	M	M	M	L	H	H	M	M
CO3	H	L	H	M	L	L	H	M	H	M
CO4	H	M	M	M	L	M	M	H	M	M
CO5	H	H	M	M	L	L	L	M	M	H

H = Highly Related; M = Medium L = Low

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Semester V

BMA091A	Mathematical Programming	L-T-P:4-1-0
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**Course objectives:**

- To understand the basic concept of LPP.
- To understand Simplex and Revised Simplex algorithm.
- To understanding Duality theory, Dual simplex method.

**Unit-I**

Convexity and Basic Feasible Solutions Formulation, Canonical and standard forms, Graphical method; Convex and polyhedral sets, Hyperplanes, Extreme points; Basic solutions, Basic Feasible Solutions, Reduction of feasible solution to basic feasible solution, Correspondence between basic feasible solutions and extreme points, LPP Formulation.

**Unit-II**

Optimality criterion, Improving a basic feasible solution, Graphical method for LPP, Unboundedness, Unique and alternate optimal solutions; Simplex algorithm and its tableau format.

**Unit-III**

Artificial variables, Two-phase method, Big-M method. Formulation of the dual problem, Duality theorems, Complimentary slackness theorem, Economic interpretation of the dual, Dual-simplex method.

**Unit-IV**

Definition and formulation, Methods of finding initial basic feasible solutions: Northwest-corner rule, Least- cost method, Vogel approximation method; Algorithm for obtaining optimal solution. Assignment Problem: Mathematical formulation and Hungarian method.

**Unit-V**

Sequencing Problems: Introduction – Basic Assumptions – Sequencing n Jobs on 2 Machines – Sequencing n Jobs on 3 machines – Sequencing 2 Jobs on n Machines.

**References:**

1. Mokhtar S. Bazaraa, John J. Jarvis & Hanif D. Sherali (2010). Linear Programming and Network Flows (4th edition). John Wiley & Sons.
2. G. Hadley (2002). Linear Programming. Narosa Publishing House.
3. Frederick S. Hillier & Gerald J. Lieberman (2015). Introduction to Operations Research (10th edition). McGraw-Hill Education.
4. Hamdy A. Taha (2017). Operations Research: An Introduction (10th edition). Pearson.
5. Paul R. Thie & Gerard E. Keough (2014). An Introduction to Linear Programming and Game Theory (3rd edition). Wiley India Pvt. Ltd.



6. A. S. Gupta (2004). Calculus of Variations with Applications. PHI Learning

**Course Learning Outcomes:**

This course will enable the students to:

- CO1 Analyze and solve linear programming models of real life situations., and illustrate the concept of convex set and extreme points.
- CO2 Understand the theory of the simplex method. Provide graphical solutions of linear programming problems with two variables.
- CO3 Understand the concepts of artificial variable and duality.
- CO4 Learn about the applications to transportation, assignment problem.
- CO5 Understand problems related to machine sequencing.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	M	M	M	L	M	H	H	M	M
CO2	H	M	M	H	L	M	H	H	M	M
CO3	H	M	M	M	L	M	H	M	H	M
CO4	H	H	H	M	L	M	M	H	M	M
CO5	H	H	M	M	L	L	L	M	M	H

H = Highly Related; M = Medium L = Low

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## Semester VI

BSM001A	Real and Complex Analysis	L-T-P:4-1-0
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### OBJECTIVE:

- To understand the basic theory of sequence and series.
- To understand Riemann integrals and improper integrals.
- To develop an understanding of complex analysis.

### Unit I

Riemann Integral, Integrability of continuous and monotonic functions, Fundamental theorems of integral calculus, Mean Value theorems of integral calculus.

### Unit II

Improper integrals and their convergence. Comparison test, Abel's and Dirichlet's test, Integral as a function of a parameter and its applications.

### Unit III

Sequences, Theorems on limits of sequences, Monotone convergence theorem, Cauchy's convergence criterion. Infinite series, series of non-negative terms. Comparison test, Ratio test, Rabbe's, logarithmic, De Morgan and Bertrand's tests. Alternating series, Leibnitz's theorem.

### Unit IV

Complex Analysis: Analytic functions, Harmonic functions, Elementary functions. Mapping by elementary functions, Mobius transformations, Conformal mappings.

### Unit V

Complex integration, Singularity, poles and residue, contour integration.

### References

1. Shanti Narayan, A Course of Mathematical Analysis, S. Chand & Co. New Delhi.
2. T. M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3. S. Lang, Undergraduate Analysis, Springer-Verlag, New York, 1983.
4. P.K. Jain and S.K. Kaushik, An Introduction to Real Analysis, S. Chand & Co., New Delhi, 2000.
5. Shanti Narayan, Theory of Functions of a Complex Variable, S. Chand & Co. New Delhi.
6. R.V. Churchill & J.W. Brown, Complex Variables and Applications, 5th Edition, McGraw-Hill, New York, 1990.

### Course Outcomes:

CO1: Understanding the basic concepts of sequences.

CO2: Understanding the basics concepts of Infinite series.

CO3: Understanding the various fundamental aspects of Riemann Integrals.

CO4: Understanding the basics concepts of improper integrals and their convergence.

CO5: Developing the ability to understand the analytic functions, mapping by elementary functions and complex integration.

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	M			L	L	H	L
CO2	M	M	L	M				L	M	M
CO3	L	L	L	L			L	L	M	M
CO4	M	M	M	M			L	L	H	M
CO5	M	M	M	M				L	M	H

1. H = Highly Related; M = Medium L = Low










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## Statistics

### Objectives of the Course

This course is designed to provide the science student an intense foundational introduction to the fundamental concepts in Statistics. The course continues the introduction to the student started in Statistics to many branches of sciences and concentrates on pertinent and concrete examples and applications. After completing the course, the student should be able to work basic problem and word problems in Applied and Pure Statistics.

It is imperative to know the importance and scope of the discipline, to inculcate interest in statistics to impart knowledge of science as the basic objective of Education, to develop a scientific attitude to make students open minded, to develop an ability to work on their own and to make them fit for the society, to expose themselves to the diversity amongst life forms, to develop skill in practical analysis along with collection and interpretation of statistical materials and data, to develop an ability for the application of the acquired knowledge in the fields of statistics so as to make our country self-reliant and self-sufficient and to make them able to appreciate and apply ethical principles to statistical research and studies. The science/ mathematics/ engineering/ business student should have mastered and demonstrated the following quantitative skills after completing Statistics

Page 68  
Praveen  
Mujam  
J. K. S. J.  
Saurav  
Dhruv  
Jaspreet



SWAYAM is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy. Student can choose following subjects from “Swayam Portal” for fulfilment of their credits in the semester (depending upon the availability of the course on Swayam Portal).

Semester	Course Name
I	Descriptive Statistics with R software
II	Advanced Probability Theory
III	Regression Analysis
IV	Probabilistic Methods in PDE
V	Applied Multivariate Analysis
VI	Applied Multivariate Statistical Modelling

Page 68 *Praveen* *nigam* *Shiksha* *Seema* *Shiksha* *Shiksha*

### **Program Outcome(PO's)**

Upon completion of B.Sc. (Hons.) Mathematics programme, students will be able to acquire the following attributes.

#### **PO1: Disciplinary knowledge**

Capability of demonstrating comprehensive knowledge of mathematics and understanding of one or more disciplines which form a part of an undergraduate programme of study.

#### **PO2: Communications skills**

- (i) Ability to communicate various concepts of mathematics effectively using examples and their geometrical visualizations.
- (ii) Ability to use mathematics as a precise language of communication in other branches of human knowledge.
- (iii) Ability to communicate long standing unsolved problems in mathematics.
- (iv) Ability to show the importance of mathematics as precursor to various scientific developments since the beginning of the civilization.
- (v) Ability to explain the development of mathematics in the civilizational context and its role as queen of all sciences.

#### **PO3: Critical thinking and analytical reasoning**

- (i) Ability to employ critical thinking in understanding the concepts in every area of mathematics.
- (ii) Ability to analyze the results and apply them in various problems appearing in different branches of mathematics.

#### **PO4: Problem solving**

- (i) Capability to solve problems in computer graphics using concepts of linear algebra.
- (ii) Capability to solve various models using techniques of differential equations.
- (iii) Ability to solve linear system of equations, linear programming problems and network flow problems.
- (iv) Ability to provide new solutions using the domain knowledge of mathematics acquired during this programme.

#### **PO5: Research-related skills**

- (i) Capability for inquiring about appropriate questions relating to the concepts in various fields of mathematics.

*Fig 4 98* *Pramit* *nijam* *J. S. J.* *Saurav* *Shrestha* *Jaspreet*

- (ii) To know about the advances in various branches of mathematics.

**PO6: Information/digital literacy**

- (i) Capability to use appropriate softwares to solve system of equations and differential equations.
- (ii) Capability to understand and apply the programming concepts of C++ to mathematical investigations and problem solving.

**PO7: Self-directed learning**

Ability to work independently and do in-depth study of various notions of mathematics.

**PO8: Moral and ethical awareness/reasoning**

Ability to identify unethical behavior such as fabrication, falsification or misrepresentation of data and adopting objective, unbiased and truthful actions in all aspects.

**PO9: Lifelong learning**

Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning.

**PO10: Professional and Employability Skills**

- (i) Completion of this programme will also enable the learners to join the teaching profession.
- (ii) The programme will also help students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

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**Semester- 1**

<b>BSS001A</b>	<b>Basic Statistics</b>	<b>L-T-P:4-0-0</b>
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**OBJECTIVE:**

- To understand the Basic requirement of statistics to society
- To describe methods of Presentation of data
- To develop an understanding of Dispersion and Attributes.

<b>UNIT 1</b>	<p>Meaning of Statistics. Importance of Statistics. Scope of Statistics: In Industry, Biological Sciences, Medical Sciences, Economics, Social Sciences, Management Sciences, Agriculture, Insurance, Information technology, Education and Psychology. Limitations. Types of data : Collection of primary and secondary data.</p> <p><b>Organization of data :</b> Qualitative and Quantitative classification, discrete and continuous classification, Geographical and Chronological classification. Construction of frequency tables, frequency distribution for continuous and discrete data, cumulative frequency distributions (inclusive and exclusive methods). Graphical presentation of data: Histogram, Frequency Polygon, Frequency curve, Pie Chart and Ogives</p>
<b>UNIT 2</b>	<p><b>Measures of central tendency:</b> Statistical averages, characteristics of a good statistical average. Arithmetic Mean (A.M.), Mode and Median: Definition, effect of change of origin and scale. Formulae (for ungrouped and grouped data), merits and demerits. Empirical relation between mean, median and mode (without proof) merits and demerits.</p> <p><b>Measure of Dispersion-</b> Definition, different measures of Dispersion, simple properties, merits and demerits. Coefficient of variation.</p>
<b>UNIT 3</b>	<p><b>Skewness, Kurtosis and moments :</b> Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution. Bowley's coefficient of skewness: Bowley's coefficient of skewness, Karl Pearson's coefficient of skewness. Measures of skewness Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions. Measures of kurtosis based on moments (<math>\beta_2, \gamma_2</math>). Raw moments (<math>m'_r</math>) for ungrouped and grouped data. Central moments (<math>m_r</math>) for ungrouped and grouped data.</p>
<b>UNIT 4</b>	<p><b>Principal of Least Square:</b> Fitting of Straight line, second degree parabola, Power curve and Exponential Curve.</p> <p><b>Correlation and Regression:</b> Correlation, Scatter Diagram, Karl Pearson's Coefficient of Correlation and its properties. Spearman's Rank Correlation Coefficient. Regression-Fitting of Regression Lines, Regression Coefficients with properties.</p>
<b>UNIT 5</b>	<p><b>Theory of Attributes:</b> Classes and class frequencies, order of class frequencies, Ultimate class frequency, Consistency of data (up to order 3). Independence of attributes, contingency table, Association of attributes, Measures of association.</p>








**Text Books:**

S.P. Gupta : Statistical Methods, Sultan Chand & Sons. First edition.

**Reference Books:**

1. Goon A.M., Gupta M.K., Dasgupta B. Fundamentals of Statistics, Volume I, The World Press Private Limited, Calcutta. Fifth edition.
2. Shah R.J.: Descriptive Statistics, Seth Publications. Eighth edition.
3. Spiegel, M.R.: Theory and Problems of Statistics, Schaum's Publishing Series. Tata McGraw-Hill. First edition.
4. Welling, Khandeparkar, Pawar, Naralkar : Descriptive Statistics : Manan Prakashan
5. S.P. Gupta: Statistical Methods, Sultan Chand & Sons. First edition.
6. Prem . S. Mann (2007). Introductory Statistics (6th edition) John Wiley & Sons.
7. Allan Bluman (2009) Introductory Statistics. A step by step approach (7th edition). McGraw-Hill

**Course Outcomes**

CO1:-Understanding the basics about the data and frequency data.

CO2:-Understanding the basic concepts of measures of central tendency and measures of dispersion

CO3:-Understanding the various techniques to calculate skewness kurtosis and moments.

CO4:- Understanding the basic concepts about Linear Estimation.

CO5:- Understanding the basic concepts of Attributes.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	M	M	H	M	M	H
CO2	H	H	L	L	M	L	H	M	M	H
CO3	M	M	M	L	L	L	H	H	H	M
CO4	L	M	M	L	L	L	H	H	M	M
CO5	L	M	M	L	L	L	H	H	M	M

H = Highly Related; M = Medium L = Low

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BSS002A	Statistics Practical- I	L-T-P:0-0-1
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#### OBJECTIVE:

- To understand the Basic requirement of statistics to society
- To describe methods of Presentation of data
- To develop an understanding of Dispersion

#### List of programs

- Introduction to graphical presentation data
- Computations of Mean, Media and Mode.
- Computation of Geometric Mean and Harmonic Mean
- Computation of Mean Deviation.
- Computation of Quartile deviation.
- Computation of Variance.
- Computation of Coefficient of Variation.
- To check the symmetry of the distribution by coefficient of Skewness.
- To check the Shape of the distribution by coefficient of Kurtosis.
- Evaluate the Raw and Central Moments of the distribution.
- Solving system of moments and Attributes.
- Solve the problems of Linear Correlation and Regression.

#### Text Books:

Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, S Chand & Company, New Delhi

#### Reference Books:

1. Goon A.M., Gupta M.K., Dasgupta B. Fundamentals of Statistics, Volume I, The World Press Private Limited, Calcutta. Fifth edition.
2. Shah R.J.: Descriptive Statistics, Seth Publications. Eighth edition.
3. Spiegel, M.R.: Theory and Problems of Statistics, Schaum's Publishing Series. Tata McGraw-Hill. First edition.
4. Welling, Khandeparkar, Pawar, Naralkar : Descriptive Statistics : Manan Prakashan
5. S.P. Gupta : Statistical Methods, Sultan Chand & Sons. First edition.
6. Prem . S. Mann (2007). Introductory Statistics (6th edition) John Wiley & Sons.
7. Allan Bluman (2009) Introductory Statistics. A step by step approach (7th edition). McGraw-Hill
8. Meyer, P.: Introductory Probability and Statistical Applications. Addison Wesley
9. Stirzeker David (1994): Elementary Probability, Cambridge University Press.
10. Mukhopadhyay, P: Mathematical Statistics, New Central Book Agency.

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## Semester II

BSS003A	Probability & Random Variables	L-T-P:4-1-0
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### OBJECTIVE:

- To understand the Basic requirement of Correlation
  - To describe methods of Transformation.
- To develop an understanding of probability distribution

<b>UNIT 1</b>	<b>Probability:</b> Random experiment, trial, sample point and sample space, events, operations of events, concepts of equally likely, mutually exclusive and exhaustive events. <b>Definition of probability:</b> Classical, relative frequency and axiomatic approaches. Discrete probability space, properties of probability under set theoretic approach. Independence of events, Conditional probability, total and compound probability theorems, Baye's theorem and its applications.
<b>UNIT 2</b>	<b>Random variables</b> – discrete and continuous, probability mass function (pmf) and probability density function (pdf), Cumulative distribution function (cdf). Joint, Marginal and Conditional probability distributions. Independence of two variable, definition and application of Jacobian transformation for one and two variables
<b>UNIT 3</b>	<b>Mathematical Expectation:</b> Expectation of a random variable and its simple properties. Addition and Multiplication theorems of Expectations. Variance and covariance and their properties. Moment generating function, characteristic function, Cumulants, Cumulants generating functions and their properties. Chebyshev's Inequality. Law of Large numbers and Central limit Theoram.
<b>UNIT 4</b>	<b>Univariate Probability Distributions:</b> Uniform, Binomial, Poisson, Hypergeometric, Geometric and Negative Binomial with simple properties and applications. Fitting of Binomial and Poisson distribution. Normal and Poisson distributions as limiting case of binomial distribution
<b>UNIT 5</b>	<b>Continuous probability distributions:</b> Normal, Exponential, Rayleigh, Gamma, Beta distributions (First kind and Second kind), Distributions with simple properties and applications.

### Text Books:

Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, S Chand and Company, New Delhi

### Reference Books:

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (1991): Fundamentals of Statistics, Volume II, The World Press Pvt Ltd, Calcutta



2. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, S Chand and Company, New Delhi
3. Mood Alexander M., Graybill Frankline and Boes Duane C.: Introduction to Theory of Statistics, Mc Graw Hill & Company Third Edition .
4. Spiegel M.R., (1967): Theory and Problem of Statistics, Schaum's Publishing Series. 3.
5. Gupta, O.P.: Mathematical Statistics, Kedarnath Publication, Meerut
6. Goon, A.M., Gupta, M.K. and Dasgupta, B. (1991): An Outline of Statistics Volume II, The World Press Pvt Ltd. Calcutta

CO1:-Understanding the basics concepts of Probability.

CO3:-Understanding the basics concepts of transformation of random variables.

CO5:- Understanding the basics concepts of Continuous Distributions.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

H = Highly Related; M = Medium L = Low

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### Semester III

<b>BMA085A</b>	<b>Statistical Inference &amp; Sampling</b>	<b>L-T-P:4-1-0</b>
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#### OBJECTIVE:

- To develop an understanding of estimation
- To develop an understanding of sampling Techniques.
- To develop an understanding of Testing.

<b>UNIT 1</b>	<b>Basic Concepts:</b> Sampling distribution, Sampling Distribution of sum of Binomial, Poisson and mean of Normal Distribution. Standard Error. Meaning and role of Central Limit Theorem for identically independently distributed (i.i.d) random variables.
<b>UNIT 2</b>	<b>Statistical Hypothesis and test of significance I</b> Definition, Simple and Composite hypotheses. Null and Alternative Hypotheses, two Types of errors in sampling, critical region, level of significance critical and p-values, procedure and testing of hypothesis.
<b>UNIT 3</b>	<b>Statistical Hypothesis II:</b> one tailed and two tailed test, Power and size of the test, and critical region Neyman Pearson Lemma and its application for finding BCR. <b>Estimation:</b> Parametric space, sample space, point estimation. Requirements of good estimator: Consistency, unbiasedness, efficiency, sufficiency. <b>Minimum variance unbiased (MVU)</b> estimators. Cramer-Rao inequality. Minimum Variance Bound (MVB) estimator, Rao-Blackwell theorem, Lehmann-Scheffe theorem.
<b>UNIT 4</b>	<b>Sample Surveys:</b> Concepts of Population and sample. Complete enumeration vs sampling. Need for sampling. Principal and organizational aspects in the conduct of a sample survey. Sampling and Non sampling errors.
<b>UNIT 5</b>	<b>Basic sampling methods:</b> Simple random sampling with or without replacement for the estimation of mean, total, proportion. Determination of sample size. Probability proportional to size sampling (with replacement). <b>Stratified random sampling:</b> Different allocations. Proportion and Optimum allocation.

#### Text Books:

Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, S Chand & Company, New Delhi

#### Reference Books:

1. Gupta, S.C. and Kapoor, V.K Fundamentals of Applied Statistics, S Chand & Company, New Delhi.
2. Chandra T.K. (1999): A First Course in Asymptotic Theory in Statistics, Narosa

*Fig 98* *Pawan* *nigam* *J.P.S.* *Saurav* *Shrestha* *Dr. J. K. Kapoor*

3. Goon A.M., Gupta M.K. & Dasgupta B. (1994): An Outline of Statistical Theory (Vol-1 and 2), World Press
4. Hogg R.V. & Craig A.T. (1978): Introduction to Mathematical Statistics
5. Spiegel M.R., (1967): Theory and Problem of Statistics, Schaum's Publishing Series.
6. Raj, D. and Chandhoke, P. (1998): Sample Survey Theory. Narosa Publishing house.
6. Singh, D. and Chaudhary, F.S. (1995): Theory and Analysis of Sample Survey Designs. New Age International (P) Ltd.
7. Sukhatme, P.V., Sukhatme, B.V., Sukhatme, S. and Asok, C. (1984): Sampling Theory of Surveys with Applications. Iowa State University Press, Iowa, USA.
8. Cochran, W.G. (1977): Sampling Techniques. John Wiley and Sons, N.Y.
9. Murthy, M.N. (1967): Sampling Theory and Methods. Statistical Publishing Society, Kolkata.

### Course Outcomes

This course will enable the students to:

CO1:-To understand the Basic requirement of Hypothesis

CO2:- To understand the Basics of Inference.

CO3:- Understanding the applications of Estimation and various methods to MVUE

CO4:- To understand the Basic concepts of sample survey and Basic sampling method

CO5:- Understanding the basics concepts of Stratified random sampling.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	L	L	M	M	H	H
CO2	H	H	L	H	L	H	H	H	H	H
CO3	M	H	L	H	L	H	H	H	H	H
CO4	M	H	L	H	L	H	H	H	H	H
CO5	M	M	L	M	L	L	M	M	H	H

H = Highly Related; M = Medium L = Low

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# Semester IV

<b>BMA082A</b>	<b>Industrial Statistics &amp; Sampling Distributions</b>	<b>L-T-P:4-0-0</b>
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## OBJECTIVE:

- To understand the Basic requirement of statistics to society
- To describe methods of Testing.
- To understand the Basic requirement of SQC.

<b>UNIT 1</b>	<b>Statistical Quality Control -I</b> Concept of SQC, process control. Causes of variation in quality, Shewhartz Control Charts technique of rational sub groups, control limits, Natural tolerance limits, Specification limits, summary of out of control criteria.
<b>UNIT 2</b>	<b>Statistical Quality Control -II</b> Control Charts for Variables: Construction of Mean, Range and Standard Deviation Charts. Concept of defects and defectives. Control chart for attributes: Construction of np-chart, p-chart, and c-chart.
<b>UNIT 3</b>	<b>Chi-square Distribution</b> Definition, Derivation, Moments, Moment Generating Function, Cumulant Generating Function. Limiting and Additive property of Chi-square variates. Distribution of ratio of chi-square variates <b>Applications of Chi-square</b> Chi-square test for testing normal population variance, Test for goodness of fit, Contingency table and Test for independence of attributes, Yates correction for 2x2 contingency table conditions of Chi-square.
<b>UNIT 4</b>	<b>t-Distribution</b> Definition of Student's-t and Fisher's-t statistics and derivation of their distributions. Limiting property of t-distribution. Applications: Testing of single mean, Difference of two means, paired t-test and sample correlation coefficient.
<b>UNIT 5</b>	<b>F-Distribution</b> Definition of Snedecor's F-distribution and its derivation. Applications- Testing of equality of two variance. Fisher's transformation and its uses. Relationship between 't', 'F' and chi-square statistics.

## Text Books:

Gupta, S.C. and Kapoor, V.K Fundamentals of Applied Statistics, S Chand & Company, New Delhi.

## Reference Books:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, S Chand & Company, New Delhi
2. Grant, E.L. (1964): Statistical Quality Control, Mc Graw Hill.
3. Montgomery, D.C. (2001): Introduction to Statistical Quality Control, John Wiley and Sons, Third Edition.
4. Goon, A.M., Gupta, M.K. and Dasgupta, B. Das (1991): An Outline of

*Fig 4 98* *Poon* *nigam* *J.P.S.* *Savna* *Shrestha* *Dr. J. K. Kapur*

- Statistics, Volume II, The World Press Pvt Ltd, Calcutta
5. Mood Alexander M., Graybill Frankline and Boes Duane C.: Introduction to Theory of Statistics, Mc Graw Hill & Company, Third Edition
  6. Rohatgi, V.K.(1967): An Introduction to Probability Theory and Statistics, John Wiley And Sons.
  7. Snedecor, G.W. and Cochran, W.G. (1967): Statistical Methods, Iowa State University Press.

**Course Learning Outcomes:**

This course will enable the students to:

- CO1:- Understanding the basics concepts SQC.  
 CO2:- Understanding the Concept of Control Charts.  
 CO3: Understanding the applications of Chi-square -distribution.  
 CO4:- Understanding the various methods to T-distribution.  
 CO5:- Understanding the various methods to F-distribution

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	H	M	M	L	H	H	H	H	H
CO2	H	H	M	M	L	H	H	H	H	H
CO3	H	H	M	M	M	M	H	H	H	H
CO4	H	H	M	M	M	M	H	H	H	H
CO5	H	H	M	L	M	M	M	H	H	M

H = Highly Related; M = Medium L = Low

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BSS004A	Statistics Practical- II	L-T-P:0-0-1
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#### OBJECTIVE:

- To understand the Basic requirement of statistics to society
- To describe methods of Testing.
- To understand the Basic requirement of SQC.

#### List of programs

- Computation of Variable Control Charts.
- Computation for Mean and Range Control Charts.
- Computation for p, np and cControl Charts.
- To test the hypothesis for Testing Single Mean Problem by t test.
- To test the hypothesis for Testing Two Mean Problem by t test.
- To test the hypothesis for Testing Significance of Correlation Coefficient by t test.
- To test the hypothesis for testing Single Variance by Chi-Square test.
- To test the hypothesis for testing Goodness of fit by Chi-Square test.
- To test the hypothesis for testing Independence of Attributes. by Chi-Square.
- To test the hypothesis for testing Two Variance by F test.

#### Text Books:

Gupta, S.C. and Kapoor, V.K Fundamentals of Applied Statistics, S Chand & Company, New Delhi.

#### Reference Books:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, S Chand & Company, New Delhi
2. Grant, E.L. (1964): Statistical Quality Control, Mc Graw Hill.
3. Montgomery, D.C. (2001): Introduction to Statistical Quality Control, John Wiley and Sons, Third Edition.
4. Goon, A.M., Gupta, M.K. and Dasgupta, B. Das (1991): An Outline of Statistics, Volume II, The World Press Pvt Ltd, Calcutta
5. Mood Alexander M., Graybill Frankline and Boes Duane C.: Introduction to Theory of Statistics, Mc Graw Hill & Company, Third Edition
6. Rohatgi, V.K.(1967): An Introduction to Probability Theory and Statistics, John Wiley And Sons.
7. Snedecor, G.W. and Cochran, W.G. (1967): Statistical Methods, Iowa State University Press.

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**Semester V**

<b>BMA084A</b>	<b>Applied Statistics</b>	<b>L-T-P:4-1-0</b>
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**OBJECTIVE:**

- To understand the Basic requirement of statistics to society
- To describe methods of Demography
- To develop an understanding of index numbers

<b>UNIT 1</b>	<b>Vital Statistics – I</b> Meaning, definition and utility. Sources of demographic data- census, registration. Indices of mortality. Measurement of mortality, crude death rate and standardization death rates. Indices of fertility, Measurement of fertility – crude birth rate, general fertility rate. Age- specific fertility rate, total fertility rate. Gross and Net Reproduction Rates.
<b>UNIT 2</b>	<b>Vital Statistics – II</b> Stationary and stable population, concept and determination of the rate of increase in a stable population. Life table: Construction of life table from graduated rates of mortality and evaluation of probabilities of survival and death from a life table.
<b>UNIT 3</b>	<b>Demand Analysis</b> Demand and supply, law of demand and supply. Elasticity of demand: Price, Income and Cross elasticity. Engel's curve and Engel's law, Pareto's law of income.
<b>UNIT 4</b>	<b>Index Number – I</b> Meaning and uses of index numbers, problem in the construction of index numbers, price relatives, quantity and value relatives. Fixed base and chain base index numbers, use of averages. Weighted and unweighted index numbers- Laspeyers, Paasche's, Marshall-Edgeworth and Fisher's ideal index numbers, Dorbish , Kelly's fixed base index numbers.
<b>UNIT 5</b>	<b>Index Number – II</b> Test for index numbers. Base shifting, splicing and deflating. Consumer Price Index numbers, Construction of cost of living index and Whole-sale price index.

**Text Books:**

Gupta, S.C. and Kapoor, Fundamentals of Applied Statistics, S Chand & Company, New Delhi.

**Reference Books:**

1. Srivastava O.S. (1983) : A Text Book of Demography, Vikas Publishing House, new Delhi.
2. Benjamin B. (1959): Health and Vital Statistics, Allen and Unwin.
3. Croxton, F.E., Cowden, D.J. and Klein, S. (1982): Applied General Statistics, 3rd Edn. Prentice Hall of India (P) Ltd.





4. Mukhopadhyay, P. (1994) :Applied Statistics, new Central Book Agency Pvt. Ltd., Calcutta.
5. Goon A.M., Gupta M.K. and Das Gupta B. (1986): Fundamentals of Statistics, Vol. II, World Press, Calcutta.

### Course Outcomes

CO1:- To understand the basic concept of Vital Statistics.

CO2:- To understand the concept of Life Table.

CO-3 : To understand the concept of Demand analysis.

CO-4 : To understand the basic concept of Index numbers.

CO5:- To understand the concept of Cost of living Index number.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	H	M	M	L	H	H	H	H	H
CO2	H	H	M	M	L	H	H	H	H	H
CO3	H	H	M	M	L	M	H	H	H	H
CO4	H	H	L	M	M	M	H	H	H	H
CO5	H	H	L	M	M	M	H	H	H	H

H = Highly Related; M = Medium L = LOW

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## Semester VI

<b>BMA086A</b>	<b>ANOVA &amp; DOE</b>	<b>L-T-P:4-0-0</b>
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### OBJECTIVE:

- To understand the Basic Concept of Time Series.
- To describe methods of ANOVA
- To develop an understanding of Design of Experiment.

<b>UNIT 1</b>	<b>Analysis of variance:</b> One-way and two-way classified data for fixed effects models. <b>Analysis of Covariance:</b> One-way and two-way classified data with one concomitant variable.
<b>UNIT 2</b>	<b>Experimental designs:</b> Role, historical perspective, terminology, experimental error, basic principles, uniformity trials, fertility contour maps, choice of size and shape of plots and blocks. <b>Basic designs:</b> Completely Randomized Design (CRD).
<b>UNIT 3</b>	<b>Randomized Block Design (RBD), Latin Square Design (LSD)</b> – layout, model and statistical analysis, relative efficiency, analysis with missing observations.
<b>UNIT 4</b>	<b>Time Series:</b> Introduction, decomposition of a time series, different components with illustrations. Measurement of trend-Graphical Method, Method of Semi-averages, Method of fitting curves. Method of Moving Averages. Measurement of seasonal variation- Method of Simple Averages, Ratio to Trend Method, Ratio to Moving Average Method and Link Relative Method. Measurement of cyclical variation residual method.
<b>UNIT 5</b>	<b>Non Parametric Tests:</b> Definition merits and limitations, Sign test for univariate and bivariate distributions, Run test and Median test for small and large samples.

### Text Books:

Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, S Chand & Company, New Delhi

### Reference Books:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, S Chand & Company, New Delhi
2. Chandra T.K. (1999): A First Course in Asymptotic Theory in Statistics, Narosa
3. Goon A.M., Gupta M.K. & Dasgupta B. (1994): An Outline of Statistical Theory (Vol-1 and 2), World Press
4. Hogg R.V. & Craig A.T. (1978): Introduction to Mathematical Statistics
5. Spiegel M.R., (1967): Theory and Problem of Statistics, Schaum's Publishing Series.
6. Guilford, J.P. and Fruchter B.(1980): Fundamental Statistics in Psychology and Education. Mc Graw Hill.
7. Cochran, W.G. and Cox, G.M. (1959): Experimental Design. Asis Publishing House.
8. Das, M.N. and Giri, N.C. (1986): Design and Analysis of Experiments. Wiley Eastern Ltd.



9. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2005): Fundamentals of Statistics. Vol. II, 8th Edn. World Press, Kolkata.
10. Kempthorne, O. (1965): The Design and Analysis of Experiments. John Wiley.
11. Montgomery, D. C. (2008): Design and Analysis of Experiments, John Wiley.

### **Course Learning Outcomes:**

This course will enable the students to:

CO-1 : Understanding the basic concept of ANOVA.

CO-2 : To understand the Basic concepts of Experimental design and CRD

CO3:- Understanding the basics concepts of RBD,LSD

CO4: To understand the Basic concepts of Time Series.

CO5:- Understanding the basics concepts of Non Parametric Test.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M	L	L	M	M	H	H
CO2	H	H	L	H	L	H	H	H	H	H
CO3	H	H	L	H	L	H	H	H	H	H
CO4	M	H	L	H	L	H	H	H	H	H
CO5	H	H	L	H	L	M	L	M	M	M

H = Highly Related; M = Medium L = Low

*Fig 4 98* *Pramod* *nigam* *J. K. S.* *Saurav* *Shrestha* *Jaspreet*

BSS005A	Statistics Practical-III	L-T-P:0-0-1
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#### OBJECTIVE:

- To understand the Basic requirement of statistics to society
- To describe methods of ANOVA
- To develop an understanding of Factorial experiments and sampling Techniques.

#### List of programs

- Computations with one way analysis
- Computations with Two way analysis
- Computations with CRD
- Computations with RBD
- Computations with LSD
- Methods to Solve Time Series Problems for trend.
- Methods to Solve Moving average Time Series Problems.
- Methods to Solve Semi average Time Series Problems.
- Methods to Solve Time Series Problems for Cyclic Component.
- To test Hypothesis for Sign test by non-Parametric.
- To test Hypothesis for Run test by Non-Parametric.
- To test Hypothesis for U test by Non-Parametric.

#### Text Books:

Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, S Chand & Company, New Delhi

#### Reference Books:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, S Chand & Company, New Delhi
2. Chandra T.K. (1999): A First Course in Asymptotic Theory in Statistics, Narosa
3. Goon A.M., Gupta M.K. & Dasgupta B. (1994): An Outline of Statistical Theory (Vol-1 and 2), World Press
4. Hogg R.V. & Craig A.T. (1978): Introduction to Mathematical Statistics
5. Spiegel M.R., (1967): Theory and Problem of Statistics, Schaum's Publishing Series.
6. Guilford, J.P. and Fruchter B. (1980): Fundamental Statistics in Psychology and Education. Mc Graw Hill.
7. Cochran, W.G. and Cox, G.M. (1959): Experimental Design. Asis Publishing House.
8. Das, M.N. and Giri, N.C. (1986): Design and Analysis of Experiments. Wiley Eastern Ltd.
9. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2005): Fundamentals of Statistics. Vol. II, 8th Edn. World Press, Kolkata.
10. Kempthorne, O. (1965): The Design and Analysis of Experiments. John Wiley.
11. Montgomery, D. C. (2008): Design and Analysis of Experiments, John Wiley.

*Fig 4 98* *P. Kumar* *mishra* *J. K. Singh* *S. Kumar* *Shrestha* *Dr. J. K. Singh*



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**Department of Mathematics**  
**Course Structure and Syllabi**  
**M.Sc. Mathematics Course**  
**Session 2022-24**



Faculty of Science

M.Sc. In Mathematics

M.Sc. Mathematics Scheme 2022-24

Total credits for the batch 2022-24 is 98

Summary Sheet

Semester	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	Total
Credits	24	24	24	26	98

Type	Total Credit
Foundation	20
Core	36
Specialization (Including Elective Papers)	62
Interdisciplinary	20
General	0

*Page 98* *Praveen* *nijam* *Dr. J. S. S.* *Seenu* *Dr. S.* *Dr. S. S. S.*





## Semester I

	Subject	Paper Type	Subject Code	L	T	P	Credits (Total 24)
Theory	Algebra-1	F	MMA001A	3	1	0	4
	Advanced Analysis	F	MMA002B	3	1	0	4
	Topology	F	MMA003A	3	1	0	4
	Riemannian Geometry and Tensor Analysis	F	MMA004A	3	1	0	4
	Complex Analysis	F	MMA005B	3	1	0	4
Practical	Scilab I	S	MMA030A			4	2
	Numerical Analysis LAB I	S	MMA031A			4	2

*Page 68*

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## Semester II

	Subject	Paper Type	Subject Code	L	T	P	Credits (Total 24)
Theory	Algebra-II	C	MMA006A	3	1	0	4
	Functional Analysis-I	C	MMA007B	3	1	0	4
	Integral Transforms	ID	MMA019B	3	1	0	4
	Calculus of Variation and Special Function	C	MMA009A	3	1	0	4
	Theory of Optimization	C	MMA010B	3	1	0	4
	Seminar	S	MMA028A				2
Practical	Scilab II	S	MMA032A			4	2









### Semester III

	Subject	Paper Type	Subject Code	L	T	P	Credits (Total 24)
Theory	Differential Equations	S	MMA011B	3	1	0	4
	Functional Analysis-II	C	MMA012B	3	1	0	4
	Numerical Analysis	C	MMA013A	3	1	0	4
ELECTIVES (Any two of the following)							
Theory	Mathematical Modeling	ID	MMA014A	3	1	0	4
	Operations Research	C	MMA015B	3	1	0	4
	Discrete Mathematics	ID	MMA016A	3	1	0	4
	Fluid Dynamics	S	MMA017B	3	1	0	4
	Integral Equations	S	MMA018A	3	1	0	4
	Stochastic Processes & Queuing Theory	S	MMA036A	3	1	0	4
	Probability & Measure Theory	ID	MST002A	3	1	4	4
Practical	Latex LAB	S	MMA033A			4	2
	Numerical analysis LAB II	S	MMA034A			4	2









## Semester IV

	Subject	Paper Type	Subject Code	L	T	P	Credits (Total 28)
Theory	Analytic Dynamics	ID	MMA008C	3	1	0	4
<b>ELECTIVE (Any three of the following)*</b>							
Theory	Fractional Calculus	S	MMA020B	3	1	0	4
	Hydrodynamics	S	MMA021A	3	1	0	4
	Numerical Solution of Partial Differential Equations	S	MMA022A	3	1	0	4
	Number Theory and Cryptography	S	MMA023A	3	1	0	4
	Fuzzy Sets and Applications	S	MMA024A	3	1	0	4
	Advanced Graph Theory	S	MMA025A	3	1	0	4
	Sampling Distribution & Testing of Hypothesis	S	MMA026B	3	1	0	4
	Non-linear Dynamical Systems	S	MMA027A	3	1	0	4
	Major Project (Dissertation)	C	MMA029A				8
Practical	Latex beamer LAB	S	MMA035A			4	2

\*More Elective papers can be added subject to the availability of subject experts.

C-Core

F-Foundation

S-Specialization

ID- Interdisciplinary

G-General





SWAYAM is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy.

Student can choose following subjects from “Swayam Portal” for fulfillment of their credits in the semester (depending upon the availability of the course on Swayam Portal).

1. Operation Research
2. Functional Analysis

*Fig 4.68* *Praveen* *nigam* *Shruti* *Shruti* *Shruti* *Shruti* *Shruti*

**Note:**

1. The maximum number of students taking an elective shall be 35(preferably).
2. The electives will be offered to the students through counselling in the department based on the marks obtained in the first two semesters.

**Break-up of practical mark allotment (of 35 marks)**

Practical Record: 5 marks

Actual practicals: 20 marks

Question bank answers: 5 marks

(Spiral bound book with the answers in the candidates own handwriting) Viva: 5 marks

**Break-up of internal assessment marks for theory (of 20 marks)**

Attendance: 5 marks

Assignment: 15 marks

**Break-up of internal assessment marks for practical (of 15 marks)**

Preparatory practical exam or two internal tests: 15 marks

**Break-up of project work mark allotment (of 70 marks)**

Project Report : 10 marks

Actual project : 40 marks

Question bank answers : 10marks

(Hard bound book)

Viva : 10 marks

*Fig 4 98* *P. Kumar* *nijam* *J. S. S.* *S. S. S.* *Shrestha* *J. S. S.*

## Objectives

Our Master of Science program is a versatile degree that provides students with the optimal balance between a defined sequence of study and flexible course options.

Mathematics is one of the most enduring fields of study, and is essential in an expanding number of disciplines and professions. Our unique program will help you combine your knowledge of mathematics and solve problems in the physical and biological sciences, engineering, information technology, economics, and business. You will learn study essential topics in calculus, linear algebra and differential equations that can be applied directly to build applications in coding and cryptology, mathematical physics, mathematical biology, bioinformatics and finance.

The M.Sc. course in Mathematics aims at developing mathematical ability in students with acute and abstract reasoning. The course will enable students to cultivate a mathematician's habit of thought and reasoning and will enlighten students with mathematical ideas relevant for oneself and for the course itself.

*Page 98* *Praveen* *nijam* *J. J. S.* *Seenu* *Shristi* *Joshi* *Karapant*

## MISSION AND VISION OF THE NEW SYLLABUS IN MATHEMATICS

### Mission

- Improve retention of mathematical concepts in the student.
- To develop a spirit of inquiry in the student.
- To improve the perspective of students on mathematics as per modern requirement.
- To initiate students to enjoy mathematics, pose and solve meaningful problems, to use abstraction to perceive relationships and structure and to understand the basic structure of mathematics.
- To enable the teacher to demonstrate, explain and reinforce abstract mathematical ideas by using concrete objects, models, charts, graphs, pictures, posters with the help of software tools on a computer.
- To make the learning process student-friendly by having a shift in focus in mathematical teaching, especially in the mathematical learning environment.
- Exploit techno-savvy nature in the student to overcome math-phobia.
- To setup a mathematics laboratory in every college in order to help students in the exploration of mathematical concepts through activities and experimentation.
- To orient students towards relating Mathematics to applications.

### Vision

- To remedy Math phobia through authentic learning based on hands-on experience with computers.
- To foster experimental, problem-oriented and discovery learning of mathematics.
- To prove that the activity-center mathematics laboratory places the student in a problem solving situation and then through self-exploration and discovery habituates the student into providing a solution to the problem based on his or her experience, needs, and interests.
- To provide greater scope for individual participation in the process of learning and becoming autonomous learners.
- To provide scope for greater involvement of both the mind and the hand which facilitates cognition.
- To ultimately see that the learning of mathematics becomes more alive, vibrant, relevant and meaningful; a program that paves the way to seek and understand the world around them. A possible by-product of such an exercise is that math-phobia can be gradually reduced amongst students.
- To help the student build interest and confidence in learning the subject.

*Fig 4 98* *P. Kumar* *mishra* *J. K. Singh* *S. Kumar* *Sharma* *J. K. Singh*



### Program Educational Objectives (PEOs)

The M. Sc Mathematics curriculum is dedicated to prepare students for productive careers after 3-5 years of graduation.	
<b>PEO1:</b>	To train students to develop their positive attitude, skills in modern industry or teaching, and to become a multi facet personality shining in any chosen field.
<b>PEO2:</b>	To prepare them to pursue higher studies and conduct research.
<b>PEO3:</b>	Promote the culture of interdisciplinary research among all disciplines and applied mathematics.
<b>PEO4:</b>	Students will become effective collaborators and innovators, leading or participating in efforts to address social, technical and business challenges.

### Program Specific Outcome: M.Sc. Mathematics program:

PSO1: The Post graduates will become successful professionals by demonstrating logical and analytical thinking abilities (Professional Skills).

PSO2: The Post graduates will work and communicate effectively in inter-disciplinary environment, either independently or in a team, and demonstrate leadership qualities (Problem-Solving Skills).

PSO3: The Post graduates will engage in life-long learning and professional development through self-study, continuing education or professional and doctoral level studies (Successful Career and Entrepreneurship).

### Program Outcome(PO's)

Upon completion of the M.Sc. Mathematics program, students will be able to:

- PO1. Solve complex problems by critical understanding, analysis and synthesis.
- PO2. Demonstrate engagement with current research and developments in the subject.
- PO3. Evaluate hypotheses, theories, methods and evidence within their proper contexts.
- PO4. Select, interpret and critically evaluate information from a range of sources that include books, scientific reports, journals, case studies and the internet.
- PO5. Provide a systematic understanding of the concepts and theories of mathematics and their application in the real world to an advanced level, and enhance career prospects in a huge array offields.
- PO6. Demonstrate a range of appropriate general skills including ITcompetency.
- PO7. Critically interpret data, write reports and apply the basics of rules ofevidence.

*Fig 4 98* *Pram* *nijam* *J. S. S.* *S. S. S.* *Shrestha* *J. S. S.*

## SEMESTER- I

MMA001A	Algebra-1	3-1-0 [4]
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### OBJECTIVE:

- To understand the advanced group theory.
- To understand field extension for metric tensors, Sylow's theorems and Galois theory.
- To develop an understanding of advanced areas in algebra.

UNIT 1	Conjugate element, Normalizer, The class equation, Cauchy's theorem for finite abelian group, Sylow $p$ -subgroups.
UNIT 2	Direct product of groups. Structure theorem for finitely generated abelian groups.
UNIT 3	Normal and subnormal series. Composition series, Maximal subgroups, Jordan-Holder theorem. Solvable groups. Insolvability of $S_n$ for $n \geq 5$ .
UNIT 4	Extension fields. Finite, algebraic, and transcendental extensions, Splitting fields. Simple and normal extensions.
UNIT 5	Perfect fields, Primitive elements, Algebraically closed fields. Automorphisms of extensions. Galois extensions, Fundamental theorem of Galois theory, Galois group over the rationales.

### Suggested Readings

1. N. Herstein, Topics in Algebra, Wiley Eastern, 1975.
2. P. B. Bhattacharya, S. K. Jain and S. R. Nagpal, Basic Abstract Algebra (2nd Edition), Cambridge University Press, Indian Edition 1977.
3. Ramji Lal, Algebra, Vol.1, Shail Publications, Allahabad 2001.
4. Vivek Sahai and Vikas Bist, Algebra, Narosa Publishing House 1999.
5. D. S. Malik, J. N. Mordeson, and M. K. Sen, Fundamentals of Abstract Algebra, McGraw-Hill International Edition, 1997.

### Course Outcomes

- CO1:- Understanding the basic concept of Conjugate element, Normalizer, the class equation, Cauchy's theorem for finite abelian group, Sylow  $p$ -subgroups.
- CO2:- Understanding the Structure theorem for finitely generated abelian groups.
- CO3:- Understanding the basic concepts of normal, subnormal series and solvable groups.
- CO4:- Understanding the basic concept of extension of fields.
- CO5:- Developing the ability to understand Galois extensions, Fundamental theorem of Galois theory, Galois group over the rationales.

*Fig 4 98* *P. B. Bhattacharya* *mjani* *J. N. Mordeson* *Sen* *Shail* *J. N. Mordeson*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H		L					L	L	H
CO2	M		L		L			L	L	H
CO3	H	L	M	L	H			M	L	M
CO4	M	L	M	L	H	L	L	M	L	M
CO5	H	H	M	M	L	L	L	M	L	M

H = Highly Related; M = Medium; L = Low

Fig 4.98 *Praveen* *nijam* *Praveen* *Praveen* *Praveen*

MMA002B	Advanced Analysis	3-1-0 [4]
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**OBJECTIVE:**

- To introduce students to Basic concept of Real Analysis.
- To focus on basic mathematical concepts in measurable functions.
- To focus on theoretical and mathematical concepts in Lebesgue integral and summable functions.
- To develop an understanding of real analysis.

UNIT 1	Functions of several variables, Derivative of functions in an open subset of $\mathbb{R}^n$ into $\mathbb{R}^m$ as a linear transformation, Chain rule, Partial derivatives
UNIT 2	Algebra and algebras of sets, Algebras generated by a class of subsets, Borel sets, Lebesgue measure of sets of real numbers, Measurability and Measure of a set, Existence of Non-measurable sets.
UNIT 3	Measurable functions, Realization of non-negative measurable function as limit of an increasing sequence of simple functions, Structure of measurable functions, Convergence in measure, Egoroff's theorem.
UNIT 4	Weierstrass's theorem on the approximation of continuous function by polynomials, Lebesgue integral of bounded measurable functions, Lebesgue theorem on the passage to the limit under the integral sign for bounded measurable functions.
UNIT 5	Summable functions, Space of square summable functions, Fourier series and coefficients, Parseval's identity, Riesz-Fisher Theorem.

**Text Books:**

1. Walter Rudin, Principle of Mathematical Analysis (3rd edition) McGraw-Hill Kogakusha, International Student Edition, 1976.

**Reference Books:**

1. H. L., Royden, Real Analysis, 4th Edition, Macmillan, 1993.
2. E. Hewitt and K. Stromberg, Real and Abstract Analysis, Springer, 1969

**Course Outcomes:**

- CO1:- Understanding the basics concepts of Derivative of functions.  
CO2:- Understanding the basics concepts of Lebesgue measure.  
CO3:- Understanding the basics concepts of Measurable functions.  
CO4:- Understanding the fundamental concept of Lebesgue integral.  
CO5:- Developing the ability to understand summable functions.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	M	L	L	M	L		H	H	M
CO2	H	M		M	H			H	M	M
CO3	M	M	L	M	H		L	M	H	M
CO4	H	M	L	M	L			M	H	M
CO5	H	H	M	M	L	L		H	M	M

H = Highly Related; M = Medium L = Low

*Fig 498* *Pranav* *nigam* *JTS* *Saurav* *Shrestha* *Dr. J. K. Singh*

MMA003A	Topology	3-1-0 [4]
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#### OBJECTIVE:

- To explain how to distinguish spaces by means of simple topological invariants compactness, connectedness and the fundamental group.
- To explain how to construct spaces by gluing and to prove that in certain cases that the result is homeomorphic to a standard space.
- To construct simple examples of spaces with given properties e.g. compact but not connected or connected but not pathconnected.

<b>Unit 1</b>	Topological Space; Definition and examples of topological spaces. Closed sets. Closure. Dense sets. Neighborhood, interior, exterior, and boundary. Accumulation points and derived sets. Bases and sub-bases. Subspaces and relative topology.
<b>Unit 2</b>	Continuous functions and homeomorphism. First and second countable space. Lindelof spaces. Alternative methods of defining a topology in terms of Kuratowski closure operator and neighborhood systems.
<b>Unit 3</b>	Separable spaces. The separation axioms $T_0, T_1, T_2, T_3, T_4$ ; their characterizations and basic properties. Urysohn's lemma. Tietze extension theorem.
<b>Unit 4</b>	Compactness. Basic properties of compactness. Compactness and finite intersection property. Sequential, countable, and B-W compactness. Local compactness. One-point compactification. Connected spaces and their basic properties. Connectedness of the real line.
<b>Unit 5</b>	Components. Locally connected spaces. Tychonoff product topology in terms of standard sub-base and its characterizations. Product topology and separation axioms, connectedness, and compactness (incl. the Tychonoff's theorem), product spaces. Nets and filters, their convergence, and interrelation. Hausdorffness and compactness in terms of net/filter convergence.

#### Suggested Readings

1. J. L. Kelley, General Topology, Van Nostrand, 1955.
2. K. D. Joshi, Introduction to General Topology, Wiley Eastern, 1983.



3. James R. Munkres, Topology, 2nd Edition, Pearson International, 2000.
4. J. Dugundji, Topology, Prentice-Hall of India, 1966.
5. George F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill, 1963.
6. N. Bourbaki, General Topology, Part I, Addison-Wesley, 1966.
7. S. Willard, General Topology, Addison-Wesley, 1970.
8. S.W. Davis Topology, Tata McGraw Hill, 2006.

### Course Outcomes

CO1:- Understanding the Topological spaces and their properties.

CO2:- Understanding the basics concepts of First and second countable space over different spaces.

CO3:- Understanding the basics concepts of Separable spaces.

CO4:- Understanding the compact spaces and connected spaces and their basic properties

CO5:- Developing the ability to understand Nets and filters and their convergence

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	L		M			H		L	M	H
CO2		L		M	M			M	M	H
CO3		L	L	M	H			L	L	M
CO4		M	M	L	H	L			M	M
CO5	H	H	M	M	L		L	M	L	H

H = Highly Related; M = Medium; L = Low

*Fig 4 98* *P. Kumar* *mjani* *J. J. J.* *S. S. S.* *Shrestha* *J. J. J.*

MMA004A	Riemannian Geometry and Tensor Analysis	3-1-0 [4]
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#### OBJECTIVE:

- To understand the Transformation rules from Cartesian coordinates to curvilinear coordinates.
- To describe methods for metric tensors, Cristoffel symbols, curl, divergence, gradient of tensors calculations.
- To develop an understanding of Riemannian geometry.

UNIT 1	Geodesics, Differential equation of a geodesic, Single differential equation of a geodesic, Geodesic on a surface of revolution, Geodesic curvature and torsion, Gauss-Bonnet Theorem.
UNIT 2	Tensor Analysis– Coordinates, vectors, Tensors, Transformation of coordinates, Kronecker delta. Contra-variant and Covariant tensors, Symmetric tensors, Fundamental operations with tensors, Quotient law of tensors, Relative tensor.
UNIT 3	Riemannian space. Metric tensor, Indicator, Associate tensors, Length of a curve, Magnitude of a vector, unit vector, Null vector, Angle between two non-null vectors, Permutation symbols and Permutation tensors.
UNIT 4	Christoffel symbols and their properties, Covariant differentiation of tensors. Ricci's theorem, Intrinsic derivative, Geodesics, Differential equation of geodesic, Geodesic coordinates, Field of parallel vectors.
UNIT 5	Reimann-Christoffel tensor and its properties. Co-variant curvature tensor, Einstein space. Bianchi's identity. Einstein tensor, Flat space, Isotropic point, Schur's theorem.

#### Suggested Readings

1. R. S. Mishra, A Course in Tensors with Applications to Riemanian Geometry, Pothishala, Allahabad, 1965.
2. Y. Matsushima, Differentiable Manifolds, Marcel Dekker, 1972.
3. B. B. Sinha, An Introduction to Modern Differential Geometry, KalyaniPrakashan, New Delhi, 1982.
4. Y. Talpiert, Differential Geometry with applications to Mechanics and Physics, Marcel DekkarInc. 2001.
5. N.J. Hicks, Notes on Differential Geometry, D. Van Nostrand Inc., 1965.
6. Bansal, J.L. and Sharma, P.R., Differential Geometry: Jaipur Publishing House (2004).
7. Bansal, J.L., Tensor Analysis, Jaipur Publishing House, (2004).

#### Course Outcomes

- CO1:-Understanding the difference between Cartesian coordinates and curvilinear coordinates.
- CO2:-Understanding the basics concepts of Tensors and its components.
- CO3:- Understanding the basics concepts of Riemann space metric.
- CO4:-Understanding the various techniques to calculate Christoffel symbols, Covariant differentiation oftensors.
- CO5:-Developing the ability to understand Einstein space, Bianchi's identity.

*Fig 98* *Pawan* *mishra* *J.L.* *Sharma* *Sharma* *Jaipur*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L	H		M			L	M	H
CO2			L	M	H			M	M	H
CO3		L	L	M	H			L	L	M
CO4		M	M	L	H	L			M	M
CO5	H	H	M	M	L		L	M	L	H

H = Highly Related; M = Medium; L = Low

Fig 4.98 *Poonam* *nigam* *Shruti* *Shruti* *Shruti* *Shruti*



MMA005B	Complex Analysis	3-1-0 [4]
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### OBJECTIVE:

- To understand the concept of analytic functions, varieties of operations, analyses and problems that may arise within the context of a complex variable
- To study power series and the useful techniques for evaluating contour integrals based on the 'calculus of residues'
- To understand the complex mapping with their applications.

UNIT 1	<b>Analytic functions:</b> Introduction, Cauchy Riemann's equations, Complex Integration, Cauchy–Goursat Theorem, Proof of the Theorem, Simply Connected Domains, Multiply Connected Domains, Cauchy Integral Formula, An Extension of the Cauchy Integral Formula, Some Consequences of the Extension, Liouville's Theorem and the Fundamental Theorem of Algebra, Maximum Modulus Principle.
UNIT 2	<b>Series:</b> Convergence of Sequences, Convergence of Series, Taylor Series, Proof of Taylor's Theorem, Laurent Series, Proof of Laurent's Theorem, Absolute and Uniform Convergence of Power Series <b>Residues and Poles:</b> Isolated Singular Points, Residues, Cauchy's Residue Theorem, Residue at Infinity, The Three Types of Isolated Singular Points, Residues at Poles, Zeros of Analytic Functions, Zeros and Poles, Behavior of Functions Near Isolated Singular Points.
UNIT 3	<b>Application of Residues:</b> Evaluation of Improper Integrals, Improper Integrals from Fourier Analysis, Jordan's Lemma, Indented Paths, Definite Integrals Involving Sines and Cosines, Argument Principle, Rouché's Theorem.
UNIT 4	<b>Mapping by Elementary Functions:</b> Linear Transformations, Linear Fractional Transformations, Mappings of the Upper Half Plane, Riemann Surfaces <b>Conformal Mapping, Applications of Conformal Mapping:</b> Steady Temperatures, Steady Temperatures in a Half Plane, Temperatures in a Quadrant, Electrostatic Potential, Potential in a Cylindrical Space, The Bilinear or Fractional Transformation, The Schwarz–Christoffel Transformation.
UNIT 5	Analytic continuation, Schwarz's Reflection Principle, Infinite Products, Absolute, Conditional and Uniform Convergence of Infinite Products, Some Important Theorems on Infinite Products, Weierstrass' Theorem for Infinite Products, Some Special Infinite Products, Schwarz Lemma, open mapping theorem, univalent and multivalent functions.

### Suggested Readings

1. Brown and Churchill, Complex Variables and Applications, McGraw-Hill Education; 9 edition, 2013.
2. Schaum's Outline of Complex Variables, 2ed (Schaum's Outlines) 2nd Edition.
3. E. C. Titchmarsh, The Theory of Functions, Oxford University Press, 1990.
4. J. B. Conway, Functions of One Complex Variable, Narosa Publishing House, 1980.
5. E. T. Copson, Complex Variables, Oxford University Press, 1998.
6. L. V. Ahlfors, Complex Analysis, McGraw-Hill, 1977.
7. D. Sarason, Complex Function Theory, Hindustan Book Agency, Delhi, 1994.
8. I. Graham and G. Kohr, Geometric function theory in one and higher dimensions, Marcel Dekker, Inc., New York.

Page 68 *Praveen* *mishra* *Shrestha* *Shrestha*

### Course Outcomes:

Upon successful completion of this course, the student will be able to:

- CO1 Understand the significance of Cauchy-Riemann equations for analytic function. Differentiability for complex functions and be familiar with the Cauchy-Riemann equations. Will able to evaluate integrals along a path in the complex plane.
- CO2 Able to compute the Taylor and Laurent expansions of simple complex functions. Determine the nature of the singularities and calculating residues.
- CO3 Will able to solve improper integrals of various types.
- CO4 Understand the concept of complex mapping
- CO5 Able to identify analytic continuation with their related problems

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	H	M				M	H	M	L
CO2	H	M	L				M	M	H	M
CO3	H	L	L				M	H	L	L
CO4	H	M	L				M	M	M	L
CO5	H	M	M				L	M	H	L

H = Highly Related; M = Medium; L = Low

*Fig 4 98* *Poonam* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

MMA030A	Scilab I	0-0-4 [2]
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#### OBJECTIVE:

- This course can be used by students in Mathematics as an introduction to the fundamental ideas of SCILAB PACKAGE and as a foundation for the development of more advanced concepts in SCILAB.
- Study of this course promotes the development of basic programming skills in SCILAB and some basic introduction of MAXIMA software.

#### List of programs

1. Introduction to Scilab and commands connected with matrices.
2. Computations with matrices.
3. Solving system of equation and explain consistence.
4. Find the values of some standard trigonometric functions in radians as well as in degree.
5. Create polynomials of different degrees and hence find its real roots.
6. Find  $\sum_{n=1}^{500} n$  using looping structure.
7. Display Fibonacci series using Scilab program.
8. Display non-Fibonacci series using Scilab program.
9. Introduction to Maxima and matrices computations.
10. Commands for derivatives and  $n^{\text{th}}$  derivatives.
11. Scilab and Maxima commands for plotting functions.

#### TEXT BOOKS/OPEN SOURCE MATERIALS

1. <http://maxima.sourceforge.net/docs/intromax/intromax.pdf>
2. [www.scilab.org](http://www.scilab.org).
3. [Wxmaxima.sourceforge.net](http://Wxmaxima.sourceforge.net)

#### Course Outcomes (COs):

Upon successful completion of this subject students should be able to:

- CO1: Understand the main features and importance of the SCI LAB mathematical programming environment
- CO2: Apply working knowledge of SCI LAB package to simulate and solve matrices, system of equations, trigonometric functions, Fibonacci series and applications.
- CO3: Solve, simulate and analyze various matrices.
- CO4: Solve, simulate and analyze various system of equations.
- CO5: Solve, simulate and analyze trigonometric functions, Fibonacci series.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H							L	M	L
CO2		H						H	H	M
CO3					H	M		L	M	H
CO4		H					H	H	M	M
CO5								H	H	H

H = Highly Related; M = Medium; L = Low

*Fig 4 98* *Pranav* *nigam* *JTS* *Saurav* *Shrestha* *Dr. J. K. Singh*

MMA031A	Numerical Analysis I	0-0-4 [2]
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### OBJECTIVE:

- This course can be used by students in Mathematics as an introduction to the fundamental ideas of numerical analysis on SCILABPACKAGE.

### List of programs:

1. Introduction to Scilab – 2 weeks
2. Fixed Point iterative method
3. Newton-Raphson's method
4. Ramanujan's method
5. Gauss Elimination method
6. Gauss-Seidel iterative method
7. Thomas Algorithm
8. Lagrange Interpolation method
9. Cubic Spline Interpolation method
10. Rational function approximation of Pade Numerical integration over rectangular region
11. Gaussian Quadrature method
12. Gauss-Chebyshev method

### TEXT BOOKS/ OPEN SOURCE MATERIALS

1. M.K. Jain: Numerical solution of differential equations, Wiley Eastern (1979), Second Edition.
2. C.F. Gerald and P.O. Wheatley: Applied Numerical Methods, Low- priced edition, Pearson Education Asia (2002), Sixth Edition.
3. D.V. Griffiths and I.M. Smith, Numerical Methods for Engineers, Blackwell Scientific Publications (1991).
4. [www.scilab.org](http://www.scilab.org)

### REFERENCE BOOKS

1. S.C. Chapra, and P.C. Raymond: Numerical Methods for Engineers, Tata Mc Graw Hill, New Delhi(2000).
2. R.L. Burden, and J. Douglas Faires: Numerical Analysis, P.W.S. Kent Publishing Company, Boston (1989), Fourth edition.
3. S.S. Sastry: Introductory methods of Numerical analysis, Prentice- Hall of India, New Delhi(1998).
4. M.K. Jain, S.R.K. Iyengar and R.K. Jain: Numerical methods for scientific and Engineering computation, Wiley Eastern(1993).
5. G.D. Smith: Numerical Solutions of partial differential equations 2nd edition London, Oxford University Press(1978).
6. Parviz Moin: Fundamentals of Engineering Numerical analysis, Cambridge University Press(2006).
7. SCILAB- A Free software to MATLAB by Er. Hema Ramachandran and Dr. Achuthsankar
8. S. Nair., S. Chand and Company Ltd.(2008)








**Course Outcomes (COs):**

Upon successful completion of this subject students should be able to:

- CO1: Understand the main features and importance of the SCI LAB mathematical programming environment.
- CO2: Solution of equations: Newton-Raphson's method, Ramanujan's method, Gauss Elimination method, Gauss Elimination method and Gauss-Seidel iterative method(Using SCI LAB).
- CO3: Interpolation: Cubic spline interpolation (Using SCI LAB).
- CO4: Numerical integration: Rational function approximation of Pade Numerical integration over rectangular region (Using SCI LAB).
- CO5: Gaussian Quadrature method and Gauss-Chebyshev method (Using SCI LAB).

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H							H	M	H
CO2		H		M		M	H	L	L	M
CO3								L	M	L
CO4								M	M	M
CO5					H			L	L	L

H = Highly Related; M = Medium; L = Low

*Fig 4.98* *Praveen* *nigam* *J. K. S.* *Seena* *Shrestha* *Jaspreet*

## SEMESTER - II

MMA006A	Algebra-II	3-1-0 [4]
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### OBJECTIVE:

- To understand the advanced modulus theory.
- To understand advanced ring theory and Canonical forms.
- To develop an understanding of advanced areas in algebra.

<b>UNIT 1</b>	Modules, submodules, Quotient Modules, Isomorphism theorems.
<b>UNIT 2</b>	Cyclic modules, simple modules and semisimple modules and rings Schur's lemma. Free modules.
<b>UNIT 3</b>	Noetherian and Artinian modules and rings.
<b>UNIT 4</b>	Hilbert basis theorem. Solution of polynomial equations by radicals. Insolvability of the general equation of degree $\geq 5$ by radicals. Finite fields.
<b>UNIT 5</b>	Canonical forms: Similarity of linear transformations. Invariant subspaces. Reduction to triangular forms. Nilpotent transformations. Index of nilpotency. Invariants of a nilpotent transformation. The primary decomposition theorem. Jordan blocks and Jordan form.

### Suggested Readings

1. N. Herstein, Topics in Algebra, Wiley Eastern, 1975.
2. P. B. Bhattacharya, S. K. Jain and S. R. Nagpaul, Basic Abstract Algebra (2nd Edition), Cambridge University Press, 1997.
3. K. Hoffman and R. Kunze, Linear Algebra, 2nd Edition, Prentice Hall of India, 1971.
4. D. S. Malik, J. N. Mordeson, and M. K. Sen, Fundamentals of Abstract Algebra, McGraw- Hill International Edition, 1997.
5. Vivek Sahai and Vikas Bist, Algebra, Narosa Publishing House, 1999.
6. Ramji Lal, Fundamentals in Abstract Algebra, Chakra Prakashan, Allahabad, 1985.
7. J.S. Golan, Modules & the Structures of Rings, Marcel Dekker Inc.

### Course Outcomes

- CO1:- Understanding the basic concept of Modules, submodules, Quotient Modules, Isomorphism theorems.
- CO2:- Understanding the cyclic modules, simple modules and semisimple modules, rings, Schur's lemma and free modules.
- CO3:- Understanding the basics concepts of Noetherian, Artinian modules and rings.
- CO4:- Understanding the basic theory of Hilbert basis theorem and solution of polynomial equations.
- CO5:- Developing the ability to understand the Canonical form, Jordan blocks, Jordan form and transformations.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	L		M		L			M	L	M
CO2	L		M		L			M	L	M
CO3	L	M	M	L	H		L	M	L	H
CO4	L	L	M	L	H		L	H	L	M
CO5	L		L		L	L		L	L	L

H = Highly Related; M = Medium; L = Low





MMA007B	Functional Analysis- I	3-1-0 [4]
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**OBJECTIVE:**

- To introduce students to Basic concept of metric spaces.
- To develop an understanding of normed linear spaces and linear transformations.
- To develop an understanding few important applications of normed linear spaces analysis to other branches of both pure and applied mathematics.

UNIT 1	Metric Space, Subspace of a metric space, Product space, Continuous mappings, Sequence in a metric space, Convergence, Cauchy sequence. Complete metric space, Examples of Complete & Incomplete metric spaces.
UNIT 2	Banach contraction theorem and applications. Baire's category theorem, Ascoli-Arzelà theorem, compact sets, compact spaces and connected metric spaces. Separable metric space with examples.
UNIT 3	Normed linear spaces. Quotient space of normed linear spaces and its completeness. Banach spaces and examples. Bounded linear transformations. Normed linear space of bounded linear transformations
UNIT 4	Equivalent norms. Basic properties of finite dimensional normed linear spaces and compactness. Reisz Lemma. Multilinear mapping. Open mapping theorem. Closed graph theorem. Uniform boundness theorem.
UNIT 5	Continuous linear functionals. Hahn-Banach theorem and its consequences. Embedding and Reflexivity of normed spaces. Dual spaces with examples. Inner product spaces.

**Text Books:**

1. Erwin Kreyszig, Introductory Functional Analysis with Applications, John Wiley and Sons (Asia). Pvt. Ltd. 2006.
2. George Bachman and Lawrence Narici, Functional Analysis, Dover, 2000.

**Reference Books:**

1. John B. Conway. A course in Functional Analysis, second edition, Springer-Verlag. 2006.
2. Martin Schechter, Principles of Functional Analysis, second edition. AMS Bookstore, 2002.
3. V.S. Sunder. Functional Analysis: Spectral Theory, Birkhauser Texts, Basel. 1997.

**Course Outcomes:**

- CO1:- Understanding the basic concept of Metric Space, Subspace of a metric space, Convergence.  
CO2:- Understanding the compact sets, compact spaces and connected metric spaces  
CO3:- Understanding the Normed linear spaces  
CO4:- Understanding the Reisz Lemma. Multilinear mapping. Open mapping theorem. Closed graph theorem. Uniform boundness theorem.  
CO5:- Understanding the Continuous linear functionals. Hahn-Banach theorem and its consequences, Dual spaces with examples.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	M	L	L	M	L		H	H	M
CO2	H	M		M	H			H	M	M
CO3	M	M	L	M	H		L	M	H	M
CO4	H	M	L	M	L			M	H	M
CO5	H	H	M	M	L	L		H	M	M

H = Highly Related; M = Medium; L = Low

*Signature of Head of Institution*      *Signature of Principal*      *Signature of Professor*      *Signature of Assistant Professor*      *Signature of Lecturer*      *Signature of Teacher*

MMA019B	Integral Transforms	3-1-0 [4]
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#### OBJECTIVE:

- Students will learn theoretical concepts and uses of various Integral Transforms.
- Understand the importance of Laplace, Mellin and Fourier transform
- To solve several technical problems using Laplace Mellin and Fourier transform.

Unit 1	Laplace transform– Definition and its properties. Rules of manipulation. Laplace transform of derivatives and integrals.
Unit 2	Properties of inverse Laplace transform. Convolution theorem and applications of Laplace transform.
Unit 3	Fourier transform – Definition and properties of Fourier sine, cosine and complex transforms. Convolution theorem. Inversion theorems. Fourier transform of derivatives.
Unit 4	Mellin transform– Definition and elementary properties. Mellin transform of derivatives and integrals. Inversion theorem. Convolution theorem.
Unit 5	Complex inversion formula. Infinite Hankel transform– Definition and elementary properties. Hankel transform of derivatives. Inversion theorem. Parseval Theorem.

#### Suggested Readings

1. Lokenath Debnath, Dambaru Bhatta, INTEGRAL TRANSFORMS AND THEIR APPLICATIONS, 2E (English) 2 2nd Edition, Taylor & Francis India, 2006.
2. Mohammad Ahmad, A. N. Srivastava, Integral Transforms and Fourier Series, Narosa Book Distributors Pvt Ltd, 2012.
3. Pandey R K, INTEGRAL TRANSFORM AND ITS APPLICATION (English) 01 Edition, Anmol Publications, 2007.

#### Course Outcomes

Upon successful completion of this course, the student will be able to:

- CO1 Find Laplace transforms using table and properties. Will able to solve linear differential equations and systems of equations with input functions, such as: continuous, piecewise continuous, unit step, impulse and periodic.
- CO2 Students will solve inverse Laplace transforms using table and properties. Solve certain types integral, and integro-differential equations Solve certain classes of linear partial differential equations.
- CO3: Find Fourier transforms. Can able to solve certain types of PDE.
- CO4: Able to find Mellin transforms.
- CO5: Understand Hankel transform with it's definition and properties.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	H	M				M	H	M	L
CO2	H	M	L				M	M	H	M
CO3	H	L	L				M	H	L	L
CO4	H	M	L				M	M	M	L
CO5	H	M	M				L	M	H	L

H = Highly Related; M = Medium; L = Low

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MMA009A	Calculus of Variation and Special Function	3-1-0 [4]
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#### OBJECTIVE:

- To understand the basic variational problem and Euler's equation
- To determine types of DEs, which may be solved by application of special functions.
- To analyze properties of special functions by their integral representations and symmetries.
- To classify differential equations by their singularities

UNIT 1	Calculus of variation – Functionals, Variation of a functional and its properties, Variation problems with fixed boundaries, Euler's equation, Extremals, Functional dependent on several unknown functions and their first order derivatives. Functionals dependent on higher order derivatives, Functionals dependent on the function of more than one independent variable. Variational problems in parametric form.
UNIT 2	Gamma Function, Beta Function, Reimann-Zeta function, Gauss hypergeometric function and its properties, Series solution of Gauss hypergeometric equation. Integral representation, Linear and quadratic transformation formulas, Contiguous function relations, Differentiation formulae.
UNIT 3	Linear relation between the solutions of Gauss hypergeometric equation, Kummer's confluent hypergeometric function and its properties, Integral representation, Kummer's first transformation and
UNIT 4	Series solution of Legendre's equation, Legendre polynomials and functions $P_n(x)$ and $Q_n(x)$ . Properties of $P_n(x)$ and $Q_n(x)$ . Bessel functions $J_n(x)$ .
UNIT 5	Hermite polynomials $H_n(x)$ , Laguerre and Associated Laguerre polynomials.

#### Suggested Readings

1. A.S. Gupta, Calculus of Variation, Prentice Hall of India Pvt. Ltd, 2002.
2. I.M. Gelfand and S. V. Francis, Calculus of Variation, Prentice Hall, New Jersey.
3. E.D. Rainville, Special Functions, Macmillan & Co. New York (1960).
4. W.N. Labeledev, Special Functions and their Applications. Dover, (1972).

#### Course Outcomes

Upon successful completion of this course, the student will be able to:

- CO1 Students will be able to formulate variational problems and analyze them to deduce key properties of system behavior.
- CO2 Will able to identify Gauss hypergeometric function with it's solution and integral representation
- CO3 Derive the properties of Gauss hypergeometric function (such as recursion relations, derivative relationships, and orthogonality conditions) etc.
- CO4 Understand Bessel's and Legendre's equation with it's solution and various properties.
- CO5 Understand Hermite's polynomial and Laguerre's equation with it's solution and various properties

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	H	M				M	H	M	L
CO2	H	M	L				M	M	H	M
CO3	H	L	L				M	H	L	L
CO4	H	M	L				M	M	M	L
CO5	H	M	M				L	M	H	L

H = Highly Related; M = Medium; L = Low

*Signature of Head of Institution* *Signature of Internal Examiner* *Signature of External Examiner* *Signature of Head of Department*

MMA010B	Theory of Optimization	3-1-0 [4]
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#### OBJECTIVE:

This course is designed to introduce basic optimization techniques in order to get best results from a set of several possible solutions of different problems viz.

- Linear programming problems,
- Transportation problem,
- Assignment problem and unconstrained and
- Constrained problems etc.
- The major focus will be on formulation of real world phenomena from its physical considerations and implementation of optimization algorithms for solving these problems.

UNIT 1	Formulation of linear programming problem (LPP) -graphical method, Basic Feasible Solution, Extreme Points, Convex set, Convex linear combination, optimal solution of LPP using Simplex, BigM and two-phase methods, Exceptional cases in LPP i.e., Infeasible, unbounded, alternate and degenerate solutions.
UNIT 2	General Primal-Dual pair, Formulating a dual problem, Weak and strong duality theorems, Complementary slackness theorem, Dual simplex method, Economic interpretation of primal-Dual problems. Sensitivity analysis: change in right hand side of constraints, change in the objective function and coefficient matrix addition and deletion of constraint and variables.
UNIT 3	Initial basic Feasible solution of transportation problem, Balanced and unbalanced transportation problems, Optimal solutions of transportation problem using U-V /MODI methods
UNIT 4	Assignment problems; Mathematical formulation of assignment problem, typical assignment problem, the traveling salesman problem, Test for optimality, degeneracy, Integer Programming Problem: Introduction, Types of Integer Programming Problems, Gomory's All-IPP Method, All IPP Algorithm, Branch and Bound Technique
UNIT 5	Concept of convexity and concavity, Maxima and minima of convex functions, Single and multivariate unconstrained problems, constrained programming problems, Kuhn-Tucker conditions for constrained programming problems.

#### Suggested Readings

1. Edwin K. P. P. Chong, Stanislaw H. Zak, An Introduction to Optimization, Johan Welly.
2. M. C. Joshi & K.M. Moudgalya, Optimization Theory & Practice, Narosa Publ. New Delhi 2004.
3. S.S.Rao, Engg. Optimization: Theory & Practice, New Age Intl. Pub. New Delhi, 2003.
4. Laurence, Fausett, Fundamentals of Neural Networks, Pearson education Ltd,2005.
5. D.E. Goldberg, Genetic Algorithms in neural optimization and machine learning, Pearson Education Ltd.2004.
6. Sharma S. D., Operations Research: Theory, Methods & Applications, KEDAR NATH RAM NATH-MEERUT, 2011.
7. Kapoor V.K., Operations Research, Sultan Chand & Sons,2004.

Page 68  
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**Course Outcomes:**

At the end of the course, the students will be able to

- CO1 Apply the knowledge of basic optimization techniques in order to get best possible results from a set of several possible solution of different problems viz. linear programming problems, transportation problem, assignment problem and unconstrained and constrained problems etc.
- CO2 Formulate an optimization problem from its physical consideration.
- CO3 Select and implement an appropriate optimization technique keeping in mind its limitations in order to solve a particular optimization problem.
- CO4 Understand theoretical foundation and implementation of similar type optimization techniques available in the scientific literature.
- CO5 Continue to acquire knowledge and skills of optimization techniques that are appropriate to professional activities.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L	H		M			L	M	H
CO2			L	M	H			M	M	H
CO3		L	L	M	H			L	L	M
CO4		M	M	L	H	L			M	M
CO5	H	H	M	M	L		L	M	L	H

H = Highly Related; M = Medium; L = Low

Page 68  
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MMA032A	Scilab II	0-0-4 [2]
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### OBJECTIVE:

- This course can be used by students in Mathematics as an introduction to the fundamental ideas of advance numerical analysis on SCILAB PACKAGE and Plot graphs using SCILAB.

### List of Program:

1. Milne Predictor Corrector Method
2. Adam Moulton Predictor Corrector Method
3. Runge-Kutta-Fehlberg method
4. Finite difference method for BVP(ODE)
5. Finite difference method for Laplace/Poisson equations
6. Initial Boundary Value Problem using Explicit Finite Difference Method
7. Schmidt Method
8. Crank-Nicolson method
9. Crank Nicolson Scheme for Diffusion Equation
10. Shooting method for BVPs ODE.
11. Explicit Finite difference method for 1-d wave equation
12. Galerkin Finite Element Methods for ODE BVPs

### TEXT BOOKS

1. M.K. Jain: Numerical solution of differential equations, Wiley Eastern(1979), Second Edition.
2. C.F. Gerald and P.O. Wheatley: Applied Numerical Methods, Low- priced edition, Pearson Education Asia (2002), Sixth Edition.
3. D.V. Griffiths and I.M. Smith, Numerical Methods for Engineers, Blackwell Scientific publications(1991).

### REFERENCE BOOKS

1. S.C. Chapra, and P.C. Raymond: Numerical Methods for Engineers, Tata McGraw Hill, New Delhi(2000).
2. R.L. Burden, and J. Douglas Faires: Numerical Analysis, P.W.S. Kent Publishing Company, Boston (1989), Fourth edition.
3. S.S. Sastry: Introductory methods of Numerical analysis, Prentice- Hall of India, New Delhi(1998).
4. M.K. Jain, S.R.K. Iyengar and R.K. Jain: Numerical methods for scientific and Engineering computation, Wiley Eastern(1993)

### Course Outcomes (COs):

Upon successful completion of this subject students should be able to:

- CO1: Understand the main features and importance of the SCI LAB mathematical programming environment.
- CO2: Apply working knowledge of SCI LAB package to simulate and solve ordinary differential equations.
- CO3: Solution of ODE: Milne Predictor Corrector Method, Adam Moulton Predictor Corrector Method and Runge-Kutta-Fehlberg method (Using SCI Lab).
- CO4: Solution of ODE: Finite difference method for Laplace/Poisson equations, Initial Boundary Value Problem using Explicit Finite Difference Method (Using SCI Lab).
- CO5: Solution of 1-D wave equation and BVPs ODE: Shooting method, Explicit Finite difference method and Galerkin Finite Element Methods (Using SCI Lab).

*Fig 4 98* *Pram* *nijam* *J. S. S.* *S. S. S.* *Shrestha* *J. S. S.*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			M				H	L		H
CO2		H						H	M	L
CO3					H	M				M
CO4				M				M	H	
CO5				H					L	

H = Highly Related; M = Medium; L = Low

Page 68  
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### Semester –III

MMA011B	Differential Equations	3-1-0 [4]
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#### OBJECTIVE:

- To develop an understanding of Non-linear ordinary differential equations of particular forms.
- To develop an understanding the series solution, radius of convergence and method of differentiation.
- To develop an understanding of Partial differential equations of second order with variable co-efficient.
- To develop an understanding of linear homogeneous boundary value problems.
- To develop an understanding of Non-homogeneous boundary value problems.

UNIT 1	Non-linear ordinary differential equations of particular forms. Riccati's equation –General solution and the solution when one, two or three particular solutions are known. Total Differential equations. Forms and solutions, necessary and sufficient condition, Geometrical Meaning Equation containing three and four variables, total differential equations of second degree.
UNIT 2	Series Solution: Radius of convergence, method of differentiation, Cauchy-Euler equation, Solution near a regular singular point (Method of Forbenius) for different cases, Particular integral and the point at infinity.
UNIT 3	Partial differential equations of second order with variable coefficients- Monge's method. Classification of linear partial differential equation of second order, Canonical forms, Cauchy's problem of first order partial differential equation.
UNIT 4	Linear homogeneous boundary value problem, Eigen values and eigen functions, Sturm-Liouville boundary value problems, orthogonality of eigen functions, Lagrange's identity, properties of eigen functions, important theorems of Sturm Liouville system, Periodic functions.
UNIT 5	Non-homogeneous boundary value problems, Non-homogeneous Sturm-Liouville boundary value problems (method of eigen function expansion). Method of separation of variables, Laplace, wave and diffusion equations. Green's Functions: Non-homogeneous Sturm-Liouville boundary value problem (method of Green's function), Procedure of constructing the Green's function and solution of boundary value problem, properties of Green's function, Inhomogeneous boundary conditions, Dirac delta function, Bilinear formula for Green's function, Modified Green's function.

#### Reference Books:

1. J.L. Bansal and H.S. Dhama, Differential Equations Vol-II, JPH, 2004.
2. M.D. Rai singhania, Ordinary and Partial Differential Equations, S. Chand & Co., 2003.
3. L. C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Vol. 19, AMS, 1999.
4. I.N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1988.
5. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall of India, 1961.
6. Frank Ayres, Theory and Problems of Differential equations, TMH, 1990.
7. D.A. Murray, Introductory Course on Differential Equations, Orient Longman, 1902.
8. A.R.Forsyth, A Treatise on Differential Equations, Macmillan & Co. Ltd., London, 1956.

**Course Outcomes:** At the end of the course, the student should be able to:

- CO1:- Develop an understanding of Non-linear ordinary differential equations of particular forms.  
 CO2:- Develop an understanding the series solution, radius of convergence and method of differentiation.  
 CO3:- Develop an understanding of Partial differential equations of second order with variable co-efficient.  
 CO4:- Develop an understanding of linear homogeneous boundary value problems.  
 CO5:-Develop an understanding of Non-homogeneous boundary value problems.

*Signature of Professor* *Signature of Head of Institution* *Signature of Internal Examiner* *Signature of External Examiner*





MMA012B	Functional Analysis-II	3-1-0 [4]
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**OBJECTIVE:**

- To introduce students to Basic concept of Hilbert space and its properties.
- To develop an understanding of Orthonormal sets and Hilbert space.
- To develop an understanding few important applications of Differential calculus in Banach Space and Integral Calculus in Banach Space.

UNIT 1	Hilbert space and its properties. Cauchy-Schwartz inequality, Orthogonality and Functionals in Hilbert Spaces, Pythagorean theorem, Projection theorem, Separable Hilbert spaces and Examples.
UNIT 2	Orthonormal sets, Bessel's inequality, Existence of orthonormal bases by Gram-schmidt orthogonalization process. Complete orthonormal sets, Parseval's identity, Structure of a Hilbert space, Riesz representation theorem, Reflexivity of Hilbert spaces.
UNIT 3	Adjoint of an operator on a Hilbert space. Self-adjoint, Positive, Normal and Unitary operators and their properties. Projection on a Hilbert space. Invariance. Reducibility. Orthogonal projections. Eigen values and eigen vectors of an operator. Spectrum of an operator Spectral theorem.
UNIT 4	Differential calculus in Banach Space, Differentiability of Mappings between Banach Space, Derivatives of a Composite Map, Directional Derivative, Mean Value Theorem and its Applications, Partial Derivatives, Projection and Canonical Mappings, Derivative Matrix, Continuously differential Maps, Higher Derivatives, Taylor's Formula, Implicit and Inverse Function Theorems.
UNIT 5	Integral Calculus in Banach Space, Fundamental Theorem of Calculus, Mean Value Theorem, Ordinary Differential Equations in a Banach, k-Lipschitz Mapping, Existence and Uniqueness Theorems for Approximate Solutions.

**Text Books:**

1. Erwin Kreyszig, Introductory Functional Analysis with Applications, John Wiley and Sons (Asia). Pvt. Ltd., 2006.
2. George Bachman and Lawrence Narici, Functional Analysis, Dover, 2000.

**Reference Books:**

1. John B. Conway, A course in Functional Analysis, second edition, Springer-Verlag, 2006.
2. Martin Schechter, Principles of Functional Analysis, second edition, AMS Bookstore, 2002.
3. V.S. Sunder, Functional Analysis. Spectral Theory, Birkhauser Texts, Basel, 1997.

**Course Outcomes:**

- CO1:- Understanding the basic concept of Hilbert space and its properties, Cauchy-Schwartz inequality.
- CO2:- Understanding the Orthonormal sets and its applications.
- CO3:- Understanding the Adjoint of an operator on a Hilbert space, Eigen values and eigen vectors of an operator, Spectrum of an operator Spectral theorem.
- CO4:- Understanding the Differential calculus in Banach Space, Differentiability of Mappings between Banach Space.
- CO5:- Understanding the Integral Calculus in Banach Space, Fundamental Theorem of Calculus, Mean Value Theorem, Ordinary Differential Equations in a Banach, k-Lipschitz Mapping, Existence and Uniqueness theorems for approximate solutions.










**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	L	L	H		M			L	M	H
CO2	L		L	M	L			M	M	M
CO3		L	M	M	M			L	L	M
CO4		M	M	L	H	L			M	H
CO5	H	H	M	M	M		L	M	L	H

H = Highly Related; M = Medium L = Low

Fig 4.98 *Praveen* *nijam* *Dr. J. S. S. S.* *Dr. J. S. S. S.* *Dr. J. S. S. S.* *Dr. J. S. S. S.*

MMA013A	Numerical Analysis	3-1-0 [4]
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#### OBJECTIVE:

- This course helps students to have an in-depth knowledge of various advanced methods in numerical analysis.
- This includes solution of algebraic and transcendental equations, finite element method and ordinary and partial differential equations.

<b>Unit 1</b>	Numerical solutions of integral equations using Newton- Cotes, Lagrange's linear interpolation and Chebyshev polynomial.
<b>Unit 2</b>	Matrix Computations: System of linear equations, Conditioning of Matrices, Matrix inversion method, Matrix factorization, Tridiagonal systems.
<b>Unit 3</b>	Numerical solutions of system of simultaneous first order differential equations and second order initial value problems (IVP) by Euler and Runge-Kutta (IV order) explicit methods.
<b>Unit 4</b>	Numerical solutions of second order boundary value problems (BVP) of first, second and third types by shooting method and finite difference methods.
<b>Unit 5</b>	Finite Element method: Introduction, Methods of approximation: Rayleigh-Ritz Method, Galerkin Method and its application for solution of ordinary BVP.

#### Suggested Readings

1. M. K. Jain, S. R. K. Iyenger and R. K. Jain, Numerical Methods for Scientific and Engineering Computations, New Age Publications, 2003.
2. M. K. Jain, Numerical Solution of Differential Equations, 2nd edition, Wiley-Eastern.
3. S. S. Sastry, Introductory Methods of Numerical Analysis, 2008.
4. S. Gupta, Text Book on Calculus of Variation, Prentice-Hall of India, 2002.

#### Course Outcomes

- CO1:- Understanding the difference between Cartesian coordinates and curvilinear coordinates.
- CO2:- Understanding the basics concepts of Tensors and its components.
- CO3:- Understanding the basics concepts of Riemann space metric.
- CO4:- Understanding the various techniques to calculate Christoffel symbols, covariant differentiation of tensors.
- CO5:- Developing the ability to understand Einstein space, Bianchi's identity.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L	H		M			L	M	H
CO2			L	M	H			M	M	H
CO3		L	L	M	H			L	L	M
CO4		M	M	L	H	L			M	M
CO5	H	H	M	M	L		L	M	L	H

H = Highly Related; M = Medium; L = Low

*Fig 4 98* *Pram* *nigam* *JTS* *Saur* *Shrestha* *Dr. J. K. Jaiswal*

**ELECTIVE (Any two of the following)**

MMA014A	Mathematical Modeling	3-1-0 [4]
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**OBJECTIVE:**

- To develop an understanding of Mathematical Modeling.
- To develop an understanding of linear growth and decay models, nonlinear growth and decay models, Compartment models.
- To develop an understanding of Basic theory of linear difference equations with constant coefficients.
- To develop an understanding through linear programming, linear programming models in forest management, Transportation and assignment models.

<b>Unit 1</b>	Simple situations requiring mathematical modeling, techniques of mathematical modeling, Classifications, Characteristics and limitations of mathematical models, Some simple illustrations.
<b>Unit 2</b>	Mathematical modeling through differential equations, linear growth and decay models, Nonlinear growth and decay models, Compartment models, Mathematical modeling in dynamics through ordinary differential equations of first order.
<b>Unit 3</b>	Mathematical models through difference equations, some simple models, Basic theory of linear difference equations with constant coefficients, Mathematical modeling through difference equations in economic and finance, Mathematical modeling through difference equations in population dynamic and genetics.
<b>Unit 4</b>	Situations that can be modeled through graphs. Mathematical models in terms of Directed graphs, Mathematical models in terms of signed graphs, Mathematical models in terms of weighted digraphs.
<b>Unit 5</b>	Mathematical modeling through linear programming, Linear programming models in forest management. Transportation and assignment models.

**Suggested Readings**

1. J. N. Kapur, Mathematical Modeling, Wiley Eastern, 2002
2. D. N. Burghes, Mathematical Modeling in the Social Management and Life Science, Ellie Herwood and John Wiley, 2000.
3. Edward A. Bender, An Introduction to Mathematical Modeling, Dover publication, 2000.
4. J. N. Kapur, Mathematical Modelling (English) 1st Edition, New Age International Publishers Ltd.-New Delhi, 1998.

**Course Outcomes**

- CO1:- Understanding the Simple situations requiring mathematical modeling, techniques of mathematical modeling, Classifications, Characteristics and limitations of mathematical models.
- CO2:- Understanding the Mathematical modeling through differential equations, linear growth and decay models, Non-linear growth and decay models, Compartment models, Mathematical modeling in dynamics through ordinary differential equations of first order.
- CO3:- Understanding the Mathematical models through difference equations, some simple models, Basic theory of linear difference equations with constant coefficients, Mathematical modeling through difference equations in economic and finance, Mathematical modeling through difference equations in population dynamic and genetics.
- CO4:- Understanding the Situations that can be modeled through graphs. Mathematical models in terms of Directed graphs, Mathematical models in terms of signed graphs, Mathematical models in terms of weighted digraphs.
- CO5:- Understanding the Mathematical modeling through linear programming, Linear programming models in forest management. Transportation and assignment models.

*Fig 498* *P. Kumar* *m. j. j.* *S. S. S.* *Shrestha* *Dr. J. K. J.*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H		L					L	L	H
CO2	M		L		L			L	L	H
CO3	L	H	M	L	H	H	H	M	L	H
CO4	M	H	M	H	H	L	L	H	L	M
CO5	H	H	M	H	M	L	H	M	L	M

H = Highly Related; M = Medium; L = Low

Fig 4.98 Program Outcome Mapping

Signature: [Signature] Date: [Signature]

Signature: [Signature] Date: [Signature]

MMA015B	Operations Research	3-1-0 [4]
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#### OBJECTIVE:

- To understand the queueing theory.
- To describe methods for solving multi-objective programming methods.
- To develop an understanding of linear fractional and goal programming.
- To develop an understanding of Game theory.
- To understand the solving Methods for Network problems and project management.

Unit 1	Introduction to Queues and Queueing Theory, Characteristics of queueing systems, Birth-Death Process, Basic Queueing Theory (M/M/-/- Type Queues.
Unit 2	Basic Concept of Multi Objective and Multi Level Optimization. Integer Programming Mixed Integer Programming.
Unit 3	Linear Fractional Programming. Goal Programming. Sensitivity Analysis.
Unit 4	Game Theory: Introduction, Competitive Situations, Characteristics of Competitive Games, Maximin – Minimax Principle, Dominance.
Unit 5	Network Problems: Dijkstra's Algorithm, maximum flow problem and minimum spanning tree. Network Scheduling by PERT/CPM.

#### Suggested Readings

1. F. S. Hiller and G. J. Lieberman, Introduction to Operations Research (6th Edition), McGraw-Hill International Edition, 1995.
2. G. Hadley, Nonlinear and Dynamic Programming, Addison Wesley, 1998.
3. H. A. Taha, Operations Research – An Introduction, Macmillan, 2002
4. Kanti Swarup, P. K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons, New Delhi, 2004.
5. S. S. Rao, Optimization Theory and Applications, Wiley Eastern, 1998
6. N. S. Kambo, Mathematical Programming Techniques, Affiliated East-West Press Pvt. Ltd., New Delhi, 2004.

#### Course Outcomes

CO1:- Understanding the basics concepts of queueing theory.

CO1:- Understanding the multi-objective programming methods.

CO3:- Understanding the basics concepts of linear fractional and goal programming.

CO4:- Understanding the various techniques to game theory.

CO5:- Developing the ability to understand network problems and project management.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L	H		M			L	M	H
CO2			L	M	H			M	M	H
CO3		L	L	M	H			L	L	M
CO4		M	M	L	H	L			M	M
CO5	H	H	M	M	L		L	M	L	H

H = Highly Related; M = Medium; L = Low

*Fig 4 98* *Praveen* *nigam* *JTS* *Saurav* *Shrestha* *Dr. J. K. Singh*

MMA016A	Discrete Mathematics	3-1-0 [4]
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#### OBJECTIVE:

- Students will learn core ideas in graph theory, advance graph theory and trees.
- Understand the importance of the discrete mathematical topics for applied science.
- To construct mathematical models for several technical problems using theory of Computation.

<b>Unit 1</b>	Graph Theory: Definition of a graph, applications, Incidence and degree, Matrix representations of graph. Isolated and pendant vertices, Null graph, Isomorphism, Subgraphs, Walks, Paths and circuits, connected graphs, disconnected graphs, and components.
<b>Unit 2</b>	Graph Theory: Bipartite graphs. Planar graphs and their properties. Euler and Hamiltonian graph. Euler's formula for connected planar graphs. Dijkstra's algorithm Warshal's algorithm.
<b>Unit 3</b>	Trees: Trees and its properties, minimally connected graph, Pendant vertices in a tree, distance and centers in a tree, rooted and binary tree. Levels in binary tree, height of a tree, Spanning trees, rank and nullity. Minimal spanning trees, Kruskal's Algorithms, Directed trees, Search trees, Traversals
<b>Unit 4</b>	Theory of Computation: Finite automata, Deterministic and non-deterministic finite automata, Moore and Mealy machines. Regular expressions. Grammars and Languages, Derivations, Language generated by a grammar. Regular Language and regular grammar. Regular and Context free grammar, Context sensitive grammars and Languages. Pumping Lemma, Kleene's theorem.
<b>Unit 5</b>	as language acceptors. Universal Turing machines. Turing machine halting problem. Turing Machines: Basic definitions. Turing machines

#### Suggested Readings

1. F. Harary, Graph Theory, Narosa, 2002.
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall of India, 2003
3. W. T. Tutte, Graph Theory, Cambridge University Press, 2001
4. J. E. Hopcroft, R. Motwani, and J. D. Ullman, Introduction to Automata, Languages, and Computation (2nd edition), Pearson Edition, 2001.
5. P. Linz, An Introduction to Formal Languages and Automata, 3rd Edition, 1998.

#### Course Outcomes:

Upon successful completion of this course, the student will be able to:

- CO1 Students will understand the language of graphs and trees.
- CO2 Students will understand the use of graphs as models.
- CO3 Students will understand various types of trees and methods for traversing trees.
- CO4 Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems
- CO5 Communicate both technical and non-technical information in a range of forms (written, oral, electronic, graphic). Make effective use of appropriate technology. Reflect on your own learning and that of peers.

*Fig 4 98* *Pramod* *nijam* *J. S. J.* *Savara* *Shristi* *Jaspreet*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	H	M				M	H	M	L
CO2	H	M	L				M	M	H	M
CO3	H	L	L				M	H	L	L
CO4	H	M	L				M	M	M	L
CO5	H	M	M				L	M	H	L

H = Highly Related; M = Medium; L = Low

Fig 4.98 *Praveen* *nigam* *Dr. J. S. S. S.* *Dr. S. S. S.* *Dr. S. S. S.*



IMA017B	Fluid Dynamics	3-1-0 [4]
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#### OBJECTIVE:

- To teach students fundamental of fluid dynamics.
- To teach student's flow between parallel flat plates and flow between cylinders.
- To teach students Navier-Stokes equations of motion and its applications.
- To teach students Momentum integral theorems with applications.
- To teach students viscosity and non-dimensional parameters.

Unit 1	The concept of a fluid. Forces act on a fluid. Lagrangian and Eulerian equation of motion. Boundary surface. Stream lines. Path lines and streak lines. Velocity potential. Irrotational and rotational motions. Vortex lines.
Unit 2	Flow between parallel flat plates: Couette and plane Poiseuille flows. Flow through a pipe: Hagen Poiseuille flow, flow between two co-axially cylinders and two concentric rotating cylinders.
Unit 3	Navier-Stokes equation of motion. Complex velocity potential. Sources, sinks, doublets and their images. Conformal mapping, Milne-Thomson circle theorem. Theorem of Blasius
Unit 4	Boundary layer displacement and momentum thicknesses. Momentum integral theorems with applications. Effect of pressure gradient on the boundary layer development. Separation of boundary layer flow.
Unit 5	Viscosity. Analysis of stress and rate of strain. Stoke's law of friction. Thermal conductivity and generalized law of heat conduction. Non dimensional parameters and their physical importance.

#### Suggested Readings

1. F. Charlton, A Text Book of Fluid Dynamics, CBC, 1985.
2. S. W. Yuan, Foundations of Fluid Mechanics, Prentice-Hall, 1976.
3. Bansal, J.L., Viscous Fluid Dynamics, Oxford & IBH Publishing Co Pvt Ltd, 1997.
4. Klaus Gersten H Jr Oertel H Schlichting Hermann Schlichting Hermann Schlichting K Gersten, Boundary-Layer Theory 0008 Edition (English), Springer, 2000.

**Course Outcomes:** On completion of the course the student shall be able to:

1. Understand the fundamentals of Lagrangian and Eulerian equation of motion
2. Understand the niceties of different types of flows.
3. Understand the basics of Navier-Stokes equation of motion.
4. Understand the importance of Momentum integral theorems.
5. Understand can convert a dimensional equation to non- dimensional equation.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		M	H		M			M	M	H
CO2			M	M	H			M	M	H
CO3		M	M	M	H			M	L	M
CO4		M	M	M	H	M			M	M
CO5	H	H	M	M	M		M	M	M	H

H = Highly Related; M = Medium; L = Low

*Fig 98* *Pram* *nigam* *JPS* *Saur* *Shrestha* *Dr. J. K. Singh*



MMA018A	Integral Equations	3-1-0 [4]
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#### OBJECTIVE:

- To understand the modeling of problems as integral equations.
- To understand existence of the solutions of integral equations.
- To develop an understanding of advanced areas in integral equations.

Unit 1	Classification of integral equations of Volterra and Fredholm types. Conversion of initial and boundary value problem into integral equation. Conversion of integral equations into differential equations
Unit 2	Volterra and Fredholm integral Fredholm integral equations: Degenerate kernels, Method of successive approximation.
Unit 3	Resolvent kernels and Neumann series method for solution of integral equations
Unit 4	Integral equation with symmetric kernels. Use of Laplace and Fourier Transform to solve integral equations.
Unit 5	Definition of a boundary value problem for an ordinary differential equation of the second order and its reduction to a Fredholm integral equation of the second kind; Dirac Delta Function; Green Function for ordinary differential initial and boundary value problem.

#### Suggested Readings

1. Abdul J. Jerry, Introduction to Integral Equations with applications, Marcel Dekkar Inc. NY, 1990.
2. L.G. Chambers, Integral Equations: A short Course, Int. Text Book Company Ltd. 1976.
3. R. P. Kanwal, Linear Integral Equations, Springer Science & Business Media, 07-Nov-2012 Harry Hochsdedt, Integral Equations, John Wiley and Sons, 1973.

#### Course Outcomes

- CO1:- Understanding the basic concept of integral equations.  
CO2:- Understanding the theory of Volterra integral equations and their numerical solutions.  
CO3:- Understanding the basics concepts of Greens function for Fredholm Integral equations.  
CO4:- Understanding the basic theory of Fredholm integral equations and their solutions.  
CO5:- Developing the ability to understand the existence of the solutions of integral equations.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	L				L	L	M	L	L	M
CO2	M	L	L		L		L	M	L	M
CO3	H	L	L	L	H		L	M	L	M
CO4	H	L	M	L	H		L	M	L	H
CO5	M	H	H	L	L			H	L	H

H = Highly Related; M = Medium; L = Low

*Fig 4 98* *P. Kumar* *mijani* *J. J. J.* *S. S.* *Shrestha* *J. J. J.*

MMA036A	Stochastic Processes & Queuing Theory	3-1-0 [4]
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#### OBJECTIVE:

- To develop the Basic concepts of discrete and continuous random variables and probability distributions.
- Understanding the Joint distributions, Conditional distribution and law of large numbers.
- To develop the basics of Stochastic Process with Markov chain and Markov Process.
- Making students familiar with Queuing Theory and it's different models.

Unit 1	<b>Random Variables:</b> Introduction, Distribution and density functions, Discrete and continuous random variables, Bernoulli, Binominal, Poisson, (Gaussian), Exponential, Rayleigh, Uniform distributions. Functions of one random variable: distribution, mean, variance, moments and characteristics functions.
Unit 2	<b>Multiple Random Variables:</b> Distributions, Two functions of two random variables, Joint moments, Joint characteristics functions, Conditional distributions, conditional expected values, statistical independence. Multiple random variables: multiple functions of multiple random variables, jointly Gaussian random variables, sums of random variable, Multivariate normal distribution, Distribution of quadratic forms. Transforms and generating functions, laws of large numbers, Central limit theorem.
Unit 3	<b>Stochastic Processes:</b> Definitions, Random process concept, Introduction to Stochastic Processes (SPs): Definition and examples of SPs, classification of random processes according to state space and parameter space, types of SPs, elementary problems. Stationary Processes: Weakly stationary and strongly stationary processes, moving average and auto regressive processes. Power spectrum of stochastic processes, Gaussian and White processes, Properties of power spectral density.
Unit 4	Discrete-time Markov Chains (DTMCs): Definition and examples of MCs, transition probability matrix, Chapman-Kolmogorov equations; calculation of n-step transition probabilities, limiting probabilities, classification of states, ergodicity, transient Markov Chain, Markov Analysis.
Unit 5	<b>Queuing Theory:</b> Pure birth, pure death and birth-death processes. Mathematical models for M/M/1, M/M/N, M/M/S and M/M/S/N queues. Discrete Parameter Markov chains: M/G/1 Queuing model, Discrete parameter birth-death process.

#### Recommended Books:

1. Devor –Probability and statistics for engineering and sciences, Cengage learning 2011
2. Mendenhall – Introduction to probability and statistics, Cengage learning 2012
3. Probability Theory and Stochastic Processes for Engineers, Bhat, Pearson 2011
4. Probability and Random Processes with Application to Signal Processing, 3/e, Stark, Pearson 2002
5. Stochastic Processes, J. Medhi 3rd Edition, New Age International 2009.
6. Stochastic Process, S. M. Ross, 2<sup>nd</sup> Wiley, 1996.
7. Random Processes: Filtering, Estimation and Detection, Ludeman, Wiley 2002
8. An Introduction to Probability Theory & Its App., Feller, Wiley 1969
8. R. Nelson, Probability, Stochastic Processes, and Queueing Theory: The Mathematics of Computer Performance Modelling, Springer-Verlag, 1995.
9. E. Gelenbe, and G. Pujolle, Introduction to Queueing Networks, 2nd Edition, John Wiley, 1998.
10. R.B. Cooper, Introduction to Queueing Theory, 2nd Edition, North-Holland, 1981.
11. Probability, Statistics And Random Processes, Veerarajan.



### Course Outcomes

Upon successful completion of this course, the student will be able to:

- CO1 Understand the Basic concept of a random variable and probability distributions.
- CO2 Understanding the basics concepts of Joint distributions, Conditional distribution and law of large numbers.
- CO3 Understand the Properties of random processes and Stochastic Process.
- CO4 Understand the concept of Markov Chain and Transition Probabilities.
- CO5 Understand the concept of Queuing Theory.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	M	M	L	L	M	L	L	H	M	L
CO2	M	M	L	L	M	L	L	H	M	M
CO3	H	H	M	M	H	L	M	H	H	M
CO4	H	H	H	M	H	M	M	H	H	H
CO5	H	H	H	H	H	M	M	H	H	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *nigam* *J. S. S. S.* *S. S. S.* *Shrestha* *J. S. S. S.*

MST002A	Probability & Measure Theory	3-1-0 [4]
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**Objectives:**

1. To Explain the foundation of probability theory, random variable.
2. To Explain probability distribution, mathematical expectation, etc. which forms the basis of basic statistics.
3. To exposed about the law of large numbers

UNIT 1	General probability space, various definition of probability, combinations of events, additive and multiplicative law of probability, conditional probability, Bayes' theorem and its application.
UNIT 2	Random variables: discrete and continuous random variables, p.m.f., p.d.f. and c.d.f., illustrations and properties of random variables, univariate transformations with illustrations. Two dimensional random variables: discrete and continuous type, joint, marginal and conditional p.m.f, p.d.f., and c.d.f., independence of variables, bivariate transformations with illustrations.
UNIT 3	Mathematical Expectation and Generating Functions: Expectation of single and bivariate random variables and its properties. Moments and Cumulants, moment generating function, cumulant generating function and characteristic function. Uniqueness and inversion theorems (without proof) along with applications. Conditional expectations.
UNIT 4	Classes of sets, fields, $\sigma$ -fields, minimal $\sigma$ -field, Borel $\sigma$ -field in $\mathbb{R}^K$ , sequence of sets, limsup and liminf of a sequence of sets. Measure, Probability measure, properties of a measure, Caratheodory extension theorem (statement only), Lebesgue and Lebesgue-Stieltjes measures on $\mathbb{R}^K$
UNIT 5	Limit laws: convergence in probability, almost sure convergence, convergence in mean square and convergence in distribution and their inter relations, Chebyshev's inequality, W.L.L.N., S.L.L.N. and their applications, De-Moivre Laplace theorem, Central Limit Theorem (C.L.T.) for i.i.d. variates, applications of C.L.T. and Liapunov Theorem (without proof)

**Suggested Readings:**

1. Kingman, J.F. & Taylor, S.J. (1996): *Introduction to Measure and Probability*, Cambridge Univ. Press.
2. Loeve (1996): *Probability Theory*, Affiliated East-West Press Pvt. Ltd. New Delhi.
3. Bhatt, B.R. (2000): *Probability*, New Age International India.
4. Feller, W. (1971): *Introduction to Probability Theory and its Applications*, Vol. I and II. Wiley, Eastern-Ltd.
5. Rohatgi, V.K (1984): *An Introduction to Probability Theory and Mathematical Statistics*, Wiley Eastern.
6. Billingsley, P. (1986): *Probability and Measure*, John Wiley Publications.
7. Dudley, R.M. (1989): *Real Analysis and Probability*, Worlds Worth & Books.
8. Tucket H.G. (1967): *A Graduate Course in Probability*, Academic Press.
9. Basu, A.K. (1999): *Measure Theory and Probability*, PHI.

Page 98     

**Course Outcomes**

CO1:-Understanding the concept of Probability.

CO2:-Understanding the concept of Mathematical Expectations and MGF.

CO3:-Understanding the concept of Random Variable.

CO4:-Understanding the concept of Sigma Field.

CO5:-Understanding the basic concept of Law of Convergence in Probability.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H	L			H		M	H		M
CO2	H	L			H		M	H		M
CO3	H	L			H		M	H		M
CO4	H	L			H		M	H		M
CO5	H	L			H		M	H		M

H = Highly Related; M = Medium L = Low



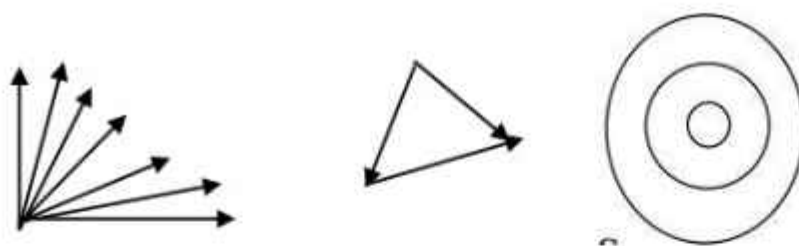









7. Draw a figure using Latexcommands.



### TEXT BOOKS / OPEN SOURCE MATERIALS

1. Bruce E Shapiro : Introducing Latex, California State University, Northridge, 2009.
2. Tobias Oetiker, Hubert Partl, Irene Hyna and Elisabeth Schlegl : The Not So Short Introduction to Latex, Version 4.20,2006.

### Course Outcomes (COs):

**Upon successful completion of this subject students should be able to:**

- CO1: Understand the main features and importance of the LaTeXuser interface of LaTeX, Understand how LaTeX differs from a word processor, format text in various ways and learn how to use LaTeX to format mathematical equations.
- CO2: Typing of text in LaTeX
- CO3: Typing of text including roman letters, alphabets, special symbols and mathematical symbols in LaTeX.
- CO4: Display of equations in LaTeX.
- CO5: Creating a table and drawing a figure in LaTeX.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	M	H						H		H
CO2			M					M	M	
CO3				M						
CO4						H		L		M
CO5							M		M	L

H = Highly Related; M = Medium; L = Low

*Fig 4 98* *Pramod* *nijam* *Prasanna* *Prasanna* *Prasanna* *Prasanna*

MMA034A	Numerical Analysis LAB II	0-0-4 [2]
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#### OBJECTIVE:

- This course can be used by students in Mathematics as an introduction to the fundamental ideas of advance numerical analysis on SCILAB PACKAGE and Plot graphs using SCILAB.

#### List of Program:

1. Plots 2-D
2. plots 3-D
3. Euler's Method
4. Modified Euler's Method
5. Runge-Kutta 2<sup>nd</sup> Order method
6. Runge-Kutta 4<sup>th</sup> Order method
7. Adam's Predictor-corrector method
8. Trapezoidal rule
9. Simpson's 1/3 rule
10. Simpson's 3/8 rule
11. Double integration using Trapezium rule
12. Double integration using Simpson's rule
13. L-U factorization method

#### TEXT BOOKS

1. M.K. Jain: Numerical solution of differential equations, Wiley Eastern (1979), Second Edition.
2. C.F. Gerald and P.O. Wheatley: Applied Numerical Methods, Low- priced edition, Pearson Education Asia (2002), Sixth Edition.
3. D.V. Griffiths and I.M. Smith, Numerical Methods for Engineers, Blackwell Scientific publications (1991).

#### REFERENCE BOOKS

2. S.C. Chapra, and P.C. Raymond: Numerical Methods for Engineers, Tata McGraw Hill, New Delhi (2000).
3. R.L. Burden, and J. Douglas Faires: Numerical Analysis, P.W.S. Kent Publishing Company, Boston (1989), Fourth edition.
4. S.S. Sastry : Introductory methods of Numerical analysis, Prentice- Hall of India, New Delhi (1998).
5. M.K. Jain, S.R.K. Iyengar and R.K. Jain: Numerical methods for scientific and Engineering computation, Wiley Eastern (1993)

#### Course Outcomes (COs):

Upon successful completion of this subject students should be able to:

- CO1: This course can be used by students in Mathematics as an introduction to the fundamental ideas of advance numerical analysis on SCILAB PACKAGE and Plot graphs using SCILAB.
- CO2: Plots 2-D and 3-D graphs (Using SCI LAB).
- CO3: Solution of ODE: Euler's Method, Modified Euler's Method, Runge-Kutta 2<sup>nd</sup> Order method, Runge-Kutta 4<sup>th</sup> Order method and Adam's Predictor-corrector method (Using SCI LAB).
- CO4: Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Double integration using Trapezium rule and Double integration using Simpson's rule (Using SCI LAB).
- CO5: L-U factorization method (Using SCI LAB).

*Fig 4 98* *Pram* *nijam* *JTS* *Saur* *Shrest* *Jas*



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H							M	M	L
CO2		M								M
CO3			H	M	M	H		L	H	
CO4										
CO5								M		M

H = Highly Related; M = Medium; L = Low

Fig 4.98 *Praveen* *nigam* *Dr. J. S. S. S.* *Dr. J. S. S. S.* *Dr. J. S. S. S.*

## SEMESTER – IV

MMA008C	Analytic Dynamics	3-1-0 [4]
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### OBJECTIVE:

- The mathematical framework plays a role in the formulation of modern quantum and relativity theories.
- Topics studied the kinematics of dynamics of systems of particles.
- Topics studied Lagrangian and Hamiltonian dynamics and rigid body dynamics.
- The emphasis is both on the formal development of the theory and also use of theory in solving actual physical problems.

<b>Unit 1</b>	D'Alembert's principle, General equations of motion of a rigid body, Motion of centre of inertia and motion relative to centre of inertia, Motion about a fixed axis: Finite forces moment of effective forces about a fixed axis of rotation, Angular momentum, Kinetic energy of a rotating body about a fixed line, Equation of motion of the body about the axis of rotation, Principle of conservation of energy.
<b>Unit 2</b>	Motion of a rigid body in two dimensions: Equations of motion in two dimensions, Kinetic energy of a rigid body, Moment of momentum, Rolling and sliding friction, Rolling of a sphere on a rough inclined plane, Sliding of a rod, Sliding and rolling of a sphere on an inclined plane, Sliding and rolling of a sphere on a fixed sphere, Equations of motion of a rigid body under impulsive forces, Impact of a rotating elastic sphere on a fixed horizontal rough plane, Change in kinetic energy due to the action of impulse.
<b>Unit 3</b>	Motion in three dimensions with reference to Euler's dynamical and geometrical equations, Motion under no forces, Motion under impulsive forces, Conservation of momentum (linear and angular) and energy for finite as well as impulsive forces.
<b>Unit 4</b>	Lagrange's equations for holonomous dynamical system, Energy equation for conservative field, Small oscillations, Motion under impulsive forces, Motion of a top.
<b>Unit 5</b>	Hamilton's equations of motion, Hamilton's principle and principle of least action.

### Suggested Readings:

1. N. C. Rana and P.S. Joag, Classical Mechanics, Tata McGraw-Hill, 1991.
2. J. L. Synge and B. A. Griffith, Principles of Mechanics, McGraw-Hill, 1991.
3. L. N. Hand and J. D. Finch, Analytical Mechanics, Cambridge University Press, 1998.
4. Naveen Kumar Generalized Motion of Rigid Body, Narosa, 2004.
5. S.L. Loney - An Elementary Treatise on the Dynamics of a Particle and of Rigid Bodies, Kalyani Publishers, New Delhi, 2004.
6. Bansal, J.L., Dynamics of a Rigid Body, Jaipur Publishing Co., 2004
7. M.D. Raishinghamia, Dynamics, S.Chand & Co. New Delhi, 2016.
8. M.Ray and H.S. Sharma, Text Book on Dynamics of Rigid Body, Student's friend & Company, 1960.

### Course Outcomes:

- CO1:- Understanding the Fundamental laws of mechanics.  
 CO2:- Understanding the basics concepts of D'Alembert's principle.  
 CO3:- Understanding the basics concepts of Euler's dynamical equation of motion.  
 CO4:- Understanding the Lagrange's equation of motion.  
 CO5:- Developing the ability to understand Hamilton's principle and principle of least action.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L	M		L			L	M	L
CO2			L	M	H			H	H	H
CO3		L	M	H	L			L	L	M
CO4		M	M	L	H	L			M	M
CO5	M	H	H	M	L		L	M	L	H

H = Highly Related; M = Medium; L = Low



**ELECTIVE (Any Three of the following )**

<b>MMA020B</b>	<b>Fractional Calculus</b>	<b>3-1-0 [4]</b>
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**OBJECTIVE:**

- To introduce students to Basic concept of fractional calculus.
- To develop an understanding of fractional derivatives and integral.
- To develop an understanding few important application fractional derivative to other branches of both pure and applied mathematics.

<b>UNIT 1</b>	Special functions of fractional calculus: Gamma function, Beta functions, Mittag-Leffler function, Wright function.
<b>UNIT 2</b>	Fractional derivatives and integrals: Grunwald-Letnikov fractional derivatives, Riemann-Liouville fractional derivatives, geometric and physical interpretation of fractional integration and differentiation, sequential fractional derivatives, properties of fractional derivatives.
<b>UNIT 3</b>	Laplace, Fourier and Mellin transforms of fractional derivatives. Linear fractional differential equations: Equation of a general form, existence and uniqueness theorem as a method of solution, dependence of a solution on initial conditions.
<b>UNIT 4</b>	Laplace transform method, standard fractional differential equations, sequential fractional differential equations, fractional Green's function.
<b>UNIT 5</b>	Some methods for solving fractional order equations: Mellin transform, power series, Bebenko's symbolic calculus method, orthogonal polynomials, numerical evaluation of fractional derivatives, approximation of fractional derivatives.

**Texts/References:**

1. Basic Theory of Fractional Differential Equations, Y. Zhou, World Scientific, 2014.
2. Fractional Differential Equations, I. Podlubny, Academic Press, 1998.
3. The Fractional Calculus: Theory and Applications of Differentiation and Integration to Arbitrary Order, K.B. Oldham and J. Spanier, Dover Publications, 2006.
4. An Introduction to the Fractional Calculus and Fractional Differential Equations, K.S. Miller and B. Ross, Wiley-Interscience, 1993.

**Course Outcomes:**

- CO1:- Understanding the basic concept of fractional calculus.
- CO2:- Understanding the fractional derivatives and integrals Grunwald-Letnikov fractional derivatives, Riemann-Liouville fractional derivatives.
- CO3:- Understanding the Laplace, Fourier and Mellin transforms of fractional derivatives. Linear fractional differential equations.
- CO4:- Understanding the Laplace transform method, standard fractional differential equations, Green's function.
- CO5:- Understanding the Mellin transform, power series, Bebenko's symbolic calculus method, orthogonal polynomials, numerical evaluation of fractional derivatives.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>							<b>Program Specific Outcome</b>		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L	H		M			L	M	H
CO2			L	M	H			M	M	H
CO3		L	L	M	H			L	L	M
CO4		M	M	L	H	L			M	M
CO5	H	H	M	M	L		L	M	L	H

H = Highly Related; M = Medium; L = Low

*Fig 98* *Pranav* *nigam* *JTS* *Saurav* *Shrestha* *Dr. J. K. Singh*



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L	M		L			L	M	M
CO2			L	M	H			H	H	H
CO3		M	M	H	L			L	L	L
CO4	M	L	H	L	H	M			M	M
CO5	L	H	M	M	M		L	M	L	H

H = Highly Related; M = Medium; L = Low








MMA022A	Numerical Solution of Partial Differential Equations	3-1-0 [4]
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**Objectives:** This course has the following objectives:

- To teach students the Numerical solutions of parabolic PDE in one space: two and three levels explicit and implicit difference schemes.
- To expose students to the Numerical solution of parabolic PDE of second order in two space dimension: implicit methods.
- To expose student's basics of Nonlinear initial BVP. Difference schemes for parabolic PDE in spherical and cylindrical coordinate systems in one dimension. Numerical solution of hyperbolic PDE in one and two space dimension.
- To teach students „Difference schemes for first order equations. Numerical solutions of elliptic equations, approximations of Laplace and biharmonic operators.
- To teach students Finite element method: Linear, triangular elements and rectangular elements.

<b>Unit 1</b>	Numerical solutions of parabolic PDE in one space: two and three levels explicit and implicit difference schemes. Convergence and stability analysis.
<b>Unit 2</b>	Numerical solution of parabolic PDE of second order in two space dimension: implicit methods, alternating direction implicit (ADI) methods.
<b>Unit 3</b>	Nonlinear initial BVP. Difference schemes for parabolic PDE in spherical and cylindrical coordinate systems in one dimension. Numerical solution of hyperbolic PDE in one and two space dimension: explicit and implicit schemes. ADI methods.
<b>Unit 4</b>	Difference schemes for first order equations. Numerical solutions of elliptic equations, approximations of Laplace and biharmonic operators. Solutions of Dirichlet, Neuman and mixed type problems.
<b>Unit 5</b>	Finite element method: Linear, triangular elements and rectangular elements.

#### Suggested Readings

1. M. K. Jain, S. R. K. Iyenger and R. K. Jain, Computational Methods for Partial Differential Equations, Wiley Eastern, 1994.
2. M. K. Jain, Numerical Solution of Differential Equations, 2nd edition, Wiley Eastern.
3. S. S. Sastry, Introductory Methods of Numerical Analysis, Prentice-Hall of India, 2002.
4. D. V. Griffiths and I. M. Smith, Numerical Methods of Engineers, Oxford University Press, 1993.
5. C. F. General and P. O. Wheatley Applied Numerical Analysis, Addison- Wesley, 1998.

**Course Outcomes:** On completion of the course the student shall be able to:

1. Understand the fundamentals of the Numerical solutions of parabolic PDE in one space: two and three levels explicit and implicit difference schemes.
2. Understand the niceties of Numerical solution of parabolic PDE of second order in two space dimension: implicit methods.
3. Understand the basics of Nonlinear initial BVP. Difference schemes for parabolic PDE in spherical and cylindrical coordinate systems in one dimension. Numerical solution of hyperbolic PDE in one and two space dimension.
4. Understand the importance of Difference schemes for first order equations. Numerical solutions of elliptic equations, approximations of Laplace and biharmonic operators.
5. Understand and get ready to apply Finite element method: Linear, triangular elements and rectangular elements.

*Fig 98* *P. Kumar* *m. jain* *J. S. Sastry* *Dr. P. O. Wheatley* *Dr. C. F. General*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		M	H		M			M	M	H
CO2			M	M	H			M	M	H
CO3		M	M	M	H			M	L	M
CO4		M	M	M	H	M			M	M
CO5	H	H	M	M	M		M	M	M	H

H = Highly Related; M = Medium; L = Low

Fig 4.98 *Poonam* *nigam* *JTS* *Seema* *Arish* *Joshi* *Kapoor*



MMA023A	Number Theory and Cryptography	3-1-0 [4]
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#### OBJECTIVE:

- This course is concerned with the basics of analytical number theory.
- Topics such as divisibility, congruence's, quadratic residues and functions of number theory are covered in this course.
- One of the applications of the said concepts are also included. Cryptography is the science of encrypting and decrypting any information.
- This is one of the finest applications of Number Theory. As a piece of information is expressed through symbols, representing it in a way that only the intended party would know it is the best part of encryption and decryption.
- As the world is flooded with information, generation, transfer and acquisition of it is very important. Students with basic background in Number Theory can take up this course.

Unit 1	Number Theory: Introduction, Time estimates for doing arithmetic, Divisibility and Euclidean algorithm, Congruencies, Some applications to factoring.
Unit 2	Finite Fields and quadratic residues: Finite Fields, Quadratic Residues and Reciprocity.
Unit 3	Cryptography: Some simple crypto Systems, Enciphering matrices, Public Key: The Idea of Public key Cryptography.
Unit 4	RSA, Discrete log, Knapsack, Zero-knowledge protocols and Oblivious Transfer.
Unit 5	Pseudo Primes, Rho Method, Fermat factorization and Factor bases.

#### Suggested Readings

1. Neal Koblitz, A Course in Number Theory and cryptography: A Graduate Text, Springer (Second Ed).
2. David M. Burton, Elementary Number Theory, Wm. C. Brown Publishers, Dubuque, Iowa 1989.
3. K. Ireland, and M. Rosen, A Classical Introduction to Modern Number Theory, GTM Vol. 84, Springer-Verlag, 1972.
4. G.A. Jones, and J.M. Jones, Elementary Number Theory, Springer-Verlag, 1998.
5. W. Sierpinski, Elementary Theory of Numbers, North-Holland, Ireland, 1988.

#### Course Outcomes (CO's)

- CO1: Solve problems in elementary number theory and apply elementary number theory to cryptography.
- CO2: Be able to compute a group of units directly. Compute Euler's function  $\phi$ , be able to use a formula for  $\phi$  to study relations between numbers  $n$  and  $\phi(n)$ .
- CO3: Be able to understand the operations with congruences, linear and non-linear congruence equations (with relatively small moduli)
- CO4: Student's will understand and be able to use the founding theorems: Lagrange theorem, Fermat's little theorem, Wilson's theorem, concept of a pseudo prime.
- CO5: Understand the basics of RSA security and be able to break the simplest instances.

*Fig 4 98* *P. Kumar* *mjani* *J. J. J.* *S. S.* *Shrestha* *J. J. J.*



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H		M			L	M	H
CO2		L	L	M	H			M	M	H
CO3		L	L	M	H			L	L	M
CO4	H	M	M	L	H	L			M	M
CO5	M	H	M	M	L		L	M	L	H

H = Highly Related; M = Medium; L = Low

Page 68 *Praveen* *nigam* *Dr. J. S. S.* *Seenu* *Dr. S.* *Dr. S. K. S.*

MMA024A	Fuzzy Sets and Applications	3-1-0 [4]
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**Objective:**

- To develop an understanding of Fuzzy Sets and Applications.
- To develop an understanding of Operations on fuzzy sets, Convex fuzzy sets.
- To develop an understanding of Basic theory of Fuzzy Maths.

<b>Unit 1</b>	Basic Concepts of Fuzzy Sets and Fuzzy Logic: Motivation. Fuzzy sets and their representations. Membership functions and their designing.
<b>Unit 2</b>	Types of Fuzzy sets. Operations on fuzzy sets. Convex fuzzy sets. Alpha-level cuts. Geometric interpretation of fuzzy sets. Linguistic variables. Possibility measure and distribution.
<b>Unit 3</b>	Fuzzy rules. Fuzzy Relations and Fuzzy Arithmetic: Composition of fuzzy relations. Fuzzy numbers. Arithmetic operations on fuzzy numbers. Fuzzy reasoning.
<b>Unit 4</b>	Fuzzy mapping rules and fuzzy implication rules. Fuzzy rule-based models for function approximation. Types of fuzzy rule-based models (the Mamdani, TSK, and standard additive models). Fuzzy Implications and Approximate Reasoning. Fuzzy Logic and Probability Theory: Possibility versus probability. Probability of a fuzzy event. Baye's theorem for fuzzy events. Probabilistic interpretation of fuzzy sets. Fuzzy measure.
<b>Unit 5</b>	Decision making in Fuzzy environment: Fuzzy Decisions, Fuzzy Linear programming, Fuzzy Multi criteria analysis, Multi objective decision making. Fuzzy databases and queries: Introduction, Fuzzy relational databases, Fuzzy queries in crisp databases.

**Suggested readings**

1. J. Yen and R. Langari: Fuzzy Logic: Intelligence, Control, and Information, Pearson Education, 2003.
2. G. J. Klir and B. Yuan: Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice-Hall of India, 1997.
3. H.J. Zimmermann, Fuzzy Set theory and its Applications, Kluwer Academic Publ, 2001.

**Course Outcomes**

CO1: -Understanding the Basic Concepts of Fuzzy Sets and Fuzzy Logic: Motivation. Fuzzy sets and their representations. Membership functions and their designing.

CO2: -Understanding the Types of Fuzzy sets. Operations on fuzzy sets. Convex fuzzy sets. Alpha-level cuts. Geometric interpretation of fuzzy sets. Linguistic variables. Possibility measure and distribution.

CO3: - Understanding the Fuzzy rules. Fuzzy Relations and Fuzzy Arithmetic: Composition of fuzzy relations. Fuzzy numbers. Arithmetic operations on fuzzy numbers. Fuzzy reasoning.

CO4: -Understanding the Fuzzy mapping rules and fuzzy implication rules. Fuzzy rule-based models for function approximation. Types of fuzzy rule-based models (the Mamdani, TSK, and standard additive models). Fuzzy Implications and Approximate Reasoning. Fuzzy Logic and Probability Theory : Possibility versus probability. Probability of a fuzzy event. Baye's theorem for fuzzy events. Probabilistic interpretation of fuzzy sets. Fuzzy measure.

*Fig 4 98* *Pram* *nigam* *JTS* *Saur* *Shrestha* *Dr. J. K. Jaiswal*

CO5: - Understanding the Decision making in Fuzzy environment: Fuzzy Decisions, Fuzzy Linear programming, Fuzzy Multi criteria analysis, Multi objective decision making, Fuzzy databases and queries: Introduction, Fuzzy relational databases, Fuzzy queries in crisp databases.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H		L					L	L	H
CO2	M		L		L			L	L	H
CO3	H	L	M	L	H	H	H	M	L	M
CO4	H	M	H	H	M	H	L	M	L	H
CO5	H	M	H	M	H	L	H	M	L	M

H = Highly Related; M = Medium; L = Low.

Fig 4.98 *Praveen* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

MMA025A	Advanced Graph Theory	3-1-0 [4]
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#### OBJECTIVE:

- To develop an understanding of basic concepts of Graph Theory.
- To develop an understanding of Advanced Graph Theory.

<b>Unit 1</b>	Trees: Spanning trees and enumeration. Matching: Matching and Maximum Matching, Hall's Matching condition, Minimax Theorems.
<b>Unit 2</b>	Independent Sets and Covers. Dominating Sets. Connectivity: Connectivities of graphs, Cut-sets, Edge Connectivity and Vertex Connectivity.
<b>Unit 3</b>	Menger's Theorem. Network Flow problem, maximum network flows, flow augmenting paths.
<b>Unit 4</b>	Ford-Fulkerson Theorem. Coloring of graphs: Chromatic number and chromatic polynomial of graphs, Brook's Theorem.
<b>Unit 5</b>	Four Color Theorem. Planarity: Planar Graphs, Testing of Planarity, Kuratowski Theorem for Planar graphs, Random Graphs.

#### Suggested Readings

1. D.B.West, Graph Theory, Pearson Publ.2002.
2. F.Harary, Graph Theory. Narosa Publ. ND,2000.
3. R. Diestel, Graph Theory, Springer,2000.

#### Course Outcomes

CO1:-Understanding the trees: Spanning trees and enumeration. Matching: Matching and Maximum Matching, Hall's Matching condition, Minimax Theorems.

CO2:-Understanding the Independent Sets and Covers. Dominating sets. Connectivity: Connectivities of graphs, Cut-sets, Edge connectivity and Vertex Connectivity.

CO3:- Understanding the Menger's Theorem. Network Flow problem, maximum network flows, flow augmenting paths.

CO4:-Understanding the Ford-Fulkerson Theorem. Coloring of graphs: Chromatic number and chromatic polynomial of graphs, Brook's Theorem.

CO5:- Understanding the Four Color Theorem. Planarity: Planar Graphs, Testing of Planarity, Kuratowski Theorem for Planar graphs, Random Graphs.

*Fig 4 98* *Pearson* *mjani* *Springer* *Diestel* *Harary*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H		H					L	H	H
CO2	M		H		H			L	L	H
CO3	H	L	M	L	M	H	H	M	H	M
CO4	M	M	H	H	H	L	L	M	H	H
CO5	H	H	M	H	M	L	H	M	L	M

H = Highly Related; M = Medium; L = Low

Fig 4.98 *Praveen* *nijam* *Dr. J. S. S. S.* *Dr. J. S. S. S.* *Dr. J. S. S. S.*

MMA026B	Sampling Distribution & Testing of Hypothesis	3-1-0 [4]
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#### OBJECTIVE:

- To describe methods of Sampling distribution
- To develop an understanding of Chi-square, t and F-Distribution in statistics
- To describe methods of Experimental design
- To develop and understand non parametric test

<b>Unit 1</b>	<b>Basic Concepts:</b> Theory of sampling, population and estimation Statistical inference, testing of hypothesis. <b>Statistical Hypothesis and test of significance I</b> Definition, Simple and Composite hypotheses. Null and Alternative Hypotheses, two Types of errors in sampling, critical region, level of significance critical and p-values, procedure and testing of hypothesis.
<b>Unit 2</b>	<b>Sampling Distribution:</b> Chi Square ( $X^2$ ) Distribution and Its Properties, Chi - Square Test, Application of Chi -Square Distribution: Chi-Square Test for Population Variance, Chi-square Test of Goodness of Fit, Independence of Attributes, T- Distribution & Its Properties, And Applications: Testing of single mean, Difference of two means, paired t-test and sample correlation coefficient. <b>F-Distribution:</b> Definition of Snedecor's F-distribution. Application- Testing of equality of two variance.
<b>Unit 3</b>	<b>Analysis of variance:</b> One-way and two-way classified data for fixed effects models.
<b>Unit 4</b>	<b>Experimental designs:</b> Role, historical perspective, terminology, experimental error, basic principles, uniformity trials, fertility contour maps, choice of size and shape of plots and blocks. <b>Basic designs:</b> Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD) – layout, model and statistical analysis, relative efficiency, analysis with missing observations.
<b>Unit 5</b>	<b>Non Parametric Tests:</b> Definition merits and limitations, Sign test for univariate and bivariate distributions, Run test and Median test for small and large samples.

#### Text Books:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, S Chand & Company, New Delhi

#### Reference Books:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, S Chand & Company, New Delhi
2. Mood Alexander M., GraybillFrankline and Boes Duane C.: Introduction to Theory of Statistics, Mc Graw Hill & Company Third Edition
3. Gupta, O.P.: Mathematical Statistics, Kedarnath Publication, Meerut
4. Croxton, F.E., Cowden, D.J. and Klein, S. (1982): Applied General Statistics, 3rd Edn. Prentice Hall of India (P) Ltd.
5. Serfling R.J. (1980): Approximation Theory of Mathematical Statistics, John Wiley
6. Cochran, W.G. and Cox, G.M. (1959): Experimental Design. Asis Publishing House.
7. Das, M.N. and Giri, N.C. (1986): Design and Analysis of Experiments. Wiley Eastern Ltd.
8. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2005): Fundamentals of Statistics. Vol. II, 8th Edn World Press, Kolkata.
9. Kempthorne, O. (1965): The Design and Analysis of Experiments. John Wiley.
10. Montgomery, D. C. (2008): Design and Analysis of Experiments, John Wiley.



**Course Outcomes**

CO1:- To understand the Basic requirement of Hypothesis

CO2:- To test hypothesis and methodology such as sampling, goodness-of-fit testing, Independence of attributes and mean is testing.

CO3:- To understand about the Analysis of Variance techniques.

CO4:- To understand the Basic concepts of Experimental design and CRD and Understanding the basics concepts of RBD and LSD.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	M	M	L	M	L	L	M	M	H	H
CO2	H	H	L	H	L	H	H	H	H	H
CO3	H	H	L	H	L	H	H	H	H	H
CO4	M	H	L	H	L	H	H	H	H	H
CO5	H	H	L	H	L	M	L	M	M	M

H = Highly Related; M = Medium; L = Low

Page 98     

MMA027A	Linear Dynamical Systems	3-1-0 [4]
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#### OBJECTIVE:

- The classification of fixed points of autonomous systems, attractors and repellers, natural boundaries, case study: population growth.
- Topics studied the autonomous second order systems, constant coefficient equations, phase curves and fixed points, classification of fixed points of linear systems, analyzing non-linear systems.
- Topics studied Discrete Systems – examples of discrete systems, some terminology, linear discrete systems.
- The emphasis is both on the Bifurcations in one-dimensional flows – introduction, saddle-node bifurcation, trans critical bifurcation.
- Topics studied Bifurcation in two-dimensional flows – saddle-node, trans critical, and Pitchfork bifurcations, Hopf bifurcation.

Unit 1	First order continuous autonomous systems – some terminology, classification of fixed points of autonomous systems, attractors and repellers, natural boundaries, case study: population growth.
Unit 2	Second order continuous autonomous systems – autonomous second order systems, constant coefficient equations, phase curves and fixed points, classification of fixed points of linear systems, analyzing non-linear systems, case studies: lead absorption in the body, interacting species.
Unit 3	Discrete Systems – examples of discrete systems, some terminology, linear discrete systems, non-linear discrete systems, quadratic maps.
Unit 4	Bifurcations in one-dimensional flows – introduction, saddle-node bifurcation, trans critical bifurcation, Pitchfork bifurcation.
Unit 5	Bifurcation in two-dimensional flows – saddle-node, trans critical, and Pitchfork bifurcations, Hopf bifurcation.

#### Suggested Readings

1. Introduction to Applied Non-Linear Dynamical systems and Chaos (Vol-2) – S. Wiggins, TAM, Springer-Verlag, New York, 1990.
2. Differential Equations, Dynamical Systems and an Introduction to Chaos – M.W. Hirsch, S. Smale, and R.L. Devaney, Elsevier (2004).
3. Introduction to Non-Linear Systems – J. Berry and Arnold, Great Britain 1996.
4. Non Linear Dynamics and Chaos – S. H. Strogatz, Addison- Wesley Publishing Company, USA, 1994.

#### Course Outcomes:

- CO1:- Understanding the classification of fixed points of autonomous systems.
- CO2:- Understanding the basics concepts of autonomous second order systems, constant coefficient equations, phase curves and fixed points.
- CO3:- Understanding the basics concepts of some terminology, linear discrete systems, non-linear discrete systems.
- CO4:- Understanding the Bifurcations in one-dimensional flows.
- CO5:- Developing the ability to understand Bifurcation in two-dimensional flows.

Fig 4 98 P. 98 m. j. 98 98 98 98 98 98



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

<i>Course Outcome</i>	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		L	M		L			L	M	L
CO2			L	M	H			H	H	H
CO3		M	M	H	L			L	L	M
CO4		L	M	L	M	L			M	H
CO5	H	M	H	M	H		L	M	L	M

H = Highly Related; M = Medium; L = Low

Fig 4.98 *Poonam* *nigam* *J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

MMA035A	LATEX BEAMER LAB	0-0-4 [2]
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#### OBJECTIVE:

1. Understand, how to deals with tables, graphs in latex. Know beamer in latex, typographical settings in latex for scientific article.
2. Create a frame environment with title "Latex Beamer presentation" and include author name, Institute, current date and footnote.
3. Make a frame title as "What is Beamer?" and include the definition of Beamer in different blocks.
4. Display the following texts 10 times "This is an example for Latex Beamer". For each display change the font size (decreasing order), font style, text color and otherproperties.
5. Make a frame title as "Equations". In different blocks type theequations

$$y = ax^2 + bx + c, \text{ call it as (1) and } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}, \dots\dots\dots (2).$$

Then cross refer eqn. (2) at some other point

6. Create a file and Import the file into latex beamer. Make frame title as " Importing files". Use doc, jpg, pdf and other file formats inthese.
7. Make a frame title as "Tables" and create atable.

Hydrogen Line	Spectral order		
	First	Second	Third
Red	657	656.7	656.3
Blue	487.3	486.7	486.1
Violet	433.5	434.3	0*

8. Create a frame environment. Try to use different back ground pictures.
9. Insert few pictures in single page (frame) and give the frame title as "Graph".
10. Create references using bibliography environment. Name the frame as "References". Use California or Harvard bibliographic system.
11. Make a frame title as "Table of Contents" and list out the following one by one using pause command  
(1) Introduction (2) Equations (3) Importing files  
  
(4) Tables (5) Graph and (6) References.
12. Make a beamer presentation. Use a suitable title for thepresentation.

#### TEXT BOOKS / OPEN SOURCE MATERIALS

1. Charles T .Batts: A Beamer Tutorial in Beamer.  
(<http://www.ctan.org/tex-archive/macros/latex/contrib/beamer/doc/>)
2. <http://latex-beamer.sourceforge.net>.

*Fig 4 98 Beamer nizam JTSI Seema Shristi Jyoti Karapant*

**Course Outcomes (COs):**

Upon successful completion of this subject students should be able to:

CO1: Understand the how to deals with tables, graphs in latex. Know beamer in latex, typographical settings in latex for scientific article.

CO2: Apply working knowledge of SCI LAB package to simulate and solve matrices, system of equations, trigonometric functions, Fibonacci series and applications.

CO3: Solve, simulate and analyze various matrices.

CO4: Solve, simulate and analyze various system of equations.

CO5: Solve, simulate and analyze trigonometric functions, Fibonacci series.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	M							M	M	L
CO2		H								M
CO3					H	M		L	H	
CO4				H						
CO5				H				M		M

H = Highly Related; M = Medium; L = Low

Fig 4.98 *Praveen* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

Open elective from Department of Mathematics						
S.No	Paper Name	Code	L	T	P	Stream
1	Fundamentals of Probability and Statistics	DMA019A	3	0	0	Open to All Schools
2	Professional Skills(Mathematical Aptitude)	DMA018A	3	0	0	
3	Basic Mathematics	DMA003A	3	0	0	
4	Quantitative Mathematics	DMA004A	3	0	0	
5	Commercial Mathematics	DMA005A	3	0	0	
6	Optimization Techniques	DMA006A	3	0	0	Open to all Engineering Streams
7	Transform Calculus and its applications	DMA007A	3	0	0	
8	Fuzzy Mathematics	DMA008A	3	0	0	
9	Probability Theory for Engineers	DMA009A	3	0	0	









DMA019A	Fundamentals of Probability and Statistics	L-T-P:3-0-0
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**Course objective:-**

- To define the Sample spaces and events
- To calculate probabilities using Conditional probability, Rule of total probability and Bayes' theorem.
- To explain the concept of a random variable and the probability distributions.

**Unit I**

Sample spaces and events; probability axioms and properties; counting techniques; conditional probability and Bayes' rule; independence.

**Unit II**

Defining random variables (Discrete and continuous); probability distributions; expected values of random variables and of functions of random variables

**Unit III**

Commonly used discrete and continuous distributions (Uniform, Binomial, Normal, Poisson and Exponential random variables) and their properties.

**Unit IV**

Principal of Least Square, Fitting of Straight line, second degree parabola, Power curve and Exponential Curve.

**Unit V**

Correlation, Scatter Diagram, Karl Pearson's Coefficient of Correlation and its properties. Spearman's Rank Correlation Coefficient. Regression- Fitting of Regression Lines, Regression Coefficients with properties.

**References:**

1. Goon Gupta and Das Gupta: Fundamentals of Statistics, Vol. 1, The World Press Pvt. Ltd., Kolkata.
2. Gupta and Kapoor : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
3. Gupta and Kapoor : Fundamentals of Applied Statistics, Sultan Chand and Sons, New Delhi.
4. Sheldon Ross, An Elementary Introduction to Mathematical Finance, 2nd Ed., Cambridge University Press, USA, 2003.

*Fig 4 98* *Pram* *nigam* *JS* *Saur* *Shrest* *Dr. J. K. Kapur*

**Course outcome:**

**CO1:-** To express the concepts of factorial and the basic principal of counting.

**CO2:-** To explain the concept of a random event.

**CO3:-** To Solve the problems about Uniform, Binomial, Normal, Poisson and Exponential random variables

**CO4:-** To define Fitting of Straight line, second degree parabola, Power curve and Exponential Curve.

**CO5:-** To understand the Correlation, Scatter diagram, Regression Lines, Regression Coefficients with properties.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	H	H	H	L		L	M	H	H
CO2	H	M	L	M	L		L	M	H	H
CO3	H	M	H	H	M		H	M	M	H
CO4	H	H	H	H		M	H	H	H	H
CO5	H	M	H	H	M	M	H	H	H	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *Praveen* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*

<b>DMA018A</b>	<b>Professional Skills (Mathematical Aptitude)</b>	<b>L-T-P:3-0-0</b>
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**Course objective:-**

- To define Decimal Fractions and problems on numbers
- To calculate simple interest
- To understand Surds and Indices

**Unit-I**

Number System, H.C.F. and L.C.M. of Numbers, Decimal Fractions.

**Unit-II**

Simplification, Square Roots and Cube Roots, Average, Problems on Numbers.

**Unit-III**

Problems on Ages, Surds and Indices, Logarithms, Percentage.

**Unit-IV**

Profit and Loss, Time and Work, Time and Distance, Ratio and Proportion, Partnership.

**Unit-V**

Simple Interest, Compound Interest.

**Course outcome:-**

**CO1:-** To understand H.C.F. and L.C.M. of Numbers.

**CO2:-** To solve the square roots and cube roots.

**CO3:-** To understand Problems on Ages.

**CO4:-** To calculate Time and Distance, Ratio and Proportion.

**CO5:-** To understand Simple Interest, Compound Interest.

**References:**

1. Quantitative Aptitude, R.S. Agrawal
2. The Pearson Guide To Quantitative Aptitude For Competitive Examination, Dinesh Khattar
3. Teach Yourself Quantitative Aptitude, Arun Sharma

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	L	H	M				L	M	M
CO2	M	M	M	H				L	M	M
CO3	M	M	M	H				L	L	M
CO4	M	L	H	M				L	L	M
CO5	M	L	M	H				L	M	M

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *nigam* *J. K. Singh* *S. Kumar* *Shrestha* *Dr. J. K. Singh*



DMA003A	Basic Mathematics	L-T-P:3-0-0
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**Course objective:-**

- To explain and apply basic mathematics.
- To solve system of linear equation by use of matrix.
- To describe and concept of Arithmetic Progression, Geometric Progression, Harmonic Progression .Derivation of the nth term and sum of the first n terms.

**Unit I**

Exponents; Polynomials; Linear Equations – slopes, intercepts & slope-intercept form.

**Unit II**

Solving the Equations- Linear and Quadratic; Solving the system of Equations -Elimination and Substitution methods (Up to 3variables).

**Unit III**

Types of Matrices, Operations on Matrices; Matrix expression of a system of linear equations; Adjoint and Inverse of Matrix; Solving linear equations with an inverse matrix.

**Unit IV**

Calculation of determinants (up to third-order determinants); Minors and cofactors; Properties of determinants; Solving linear equations by determinants-Cramer's rule.

**Unit V**

Motivation for studying Arithmetic Progression, Geometric Progression, Harmonic Progression .Derivation of the nth term and sum of the first n terms .

**References**

1. Mathematics: A Complete Introduction: The Easy Way to Learn Maths (Teach Yourself),Hugh Neill

**Course outcomes:-**

**CO1:-** To solve the linear equation.

**CO2:-** To solve the system of equation by Elimination and Substitution methods.

**CO3:-** To define types of matrices and solving linear of equation.

**CO4:-** To calculate of determinates.

**CO5:-** Motivation for studying Arithmetic Progression.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M			L	L	H	M
CO2	L	L	L	M				L	M	M
CO3	L	H	L	M			L	L	M	L
CO4	M	M	M	M			L	L	H	L
CO5	M	M	M	M				L	M	M

H = Highly Related; M = Medium; L = Low

*Fig 4 98* *Pram* *nigam* *JTS* *Seena* *Shrestha* *Dr. J. K. Jaiswal*



DMA004A	Quantitative Mathematics	L-T-P:3-0-0
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**Course objectives:-**

- To introduction OR; Scope, Techniques, Characteristics and Limitations of Operation Research
- To understand of general structure
- To be able to perform statistical analysis.

**Unit-I**

Introduction to OR; Scope, Techniques, Characteristics and Limitations of Operation Research; Methodology and Models in OR (only theory). Application of LPP in Management, Advantages of LPP (only theory) Formulation of LPP, Solution of LPP by Graphical method: Infeasible and Unbounded Solution, Formulation of Dual of a LPP.

**Unit-II**

General Structure; Various methods for finding initial solution: Maximization and Minimization problems North West Corner Method, Least Cost Method, Vogel's Approximation Method; Finding Optimal Solution: Modified Distribution method; Variations: Unbalanced Transportation Problem, Theoretical concept of Degeneracy only; Assignment problems; General Structure; Finding Optimal Solution; Maximization problem, Restrictions on Assignments, Alternate Optimal solutions.

**Unit-III**

Terminology; Networking Concepts; Rules for drawing network diagram; CPM Computations: CPM Terminology, Finding critical path - Different Floats; PERT Computations: Computation of earliest and latest allowable times, Probability of meeting the scheduled dates; difference between PERT and CPM.

**Unit-IV**

Terminology; Two person zero sum game; Solution to games: Saddle point, dominance rule, Value of the game, mixed strategy, Graphical method of solving a game – (2 x n) and (m x 2) games.

**Unit-V**

**Introduction to Statistics:** Basic concepts, Statistics in business.

**Descriptive Statistics:** Measure of Central Tendency Mean, Median, Mode, Percentiles, Quartiles.

**Descriptive Statistics:** Measures of Variation Range, Inter-quartile range, Mean Absolute Deviation, Variance and Standard deviation

**References:**

1. Gupta and Kapoor : Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
2. Gupta and Kapoor : Fundamentals of Applied Statistics, Sultan Chand and Sons, New Delhi.
3. Hamdy A. Taha: Operations Research-An Introduction, Prentice Hall, 9th Edition, 2010.
4. Wayne L. Winston and M. Venkataramanan: Introduction to Mathematical Programming: Applications and Algorithms, 4th edition, Duxbury Press, 2002.
5. KantiSwaroop, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons, New Delhi, 1998.

*Fig 4 98* *Pram* *nigam* *J.P.S.* *Saur* *Shrestha* *Dr. J. K. Kapoor*

**Course outcomes:-**

**CO1:-** To define the basic application of management.

**CO2:-** To define the West Corner Method, Least Cost Method, Vogel's Approximation Method.

**CO3:-** To understand the networking concepts.

**CO4:-** To understand the graphical method solving a game.

**CO5:-** To define : Basic concepts, Statistics in business.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	H	M	H	L		L	L	M	H
CO2	H	M	H	H	L		M	L	L	M
CO3	H	H	M	H	L		L	L	L	H
CO4	H	M	H	H	L		M	M	L	M
CO5	H	H	M	H	M		M	H	M	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *nigam* *J. K. S.* *S. S. S.* *Shrestha* *J. K. S.*

<b>DMA005A</b>	<b>Commercial Mathematics</b>	<b>L-T-P:3-0-0</b>
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Course objectives:-

- To understand the basic concepts of Mathematics.
- To understand of Computations involving percentage.
- To concept of banking.

#### Unit I

Ratio and Proportion. Review of ratio and proportion. Application of direct and inverse proportion (variation).

#### Unit II

Percentage and its Applications Concept of percentage. Conversion of percents to a decimal ( fraction ) and vice - versa. Computations involving percentage. Applications of percentage to (i) profit and loss (ii) simple interest (iii) discount (rebate) (iv) sales tax (v) commission in transaction (vi) instalment buying

**Unit III:** Compound Interest Compound interest and its application to rate of growth and depreciation. (conversion periods not more than 4 )

#### Unit IV

Concept of Banking. Types of accounts: (a) Saving (b) Fixed/term deposit Calculation of interest in saving account and on fixed deposit with not more than 4 conversion periods.

#### Unit V

Basic principles: Comparison, arbitrage and risk aversion, Interest (simple and compound, discrete and continuous), time value of money, inflation, net present value, internal rate of return (calculation by bisection and Newton-Raphson methods)

#### References

1. Sheldon Ross, An Elementary Introduction to Mathematical Finance, 2nd Ed., Cambridge University Press, USA, 2003.

#### Course outcomes:-

**CO1:-** To understand the application of direct and indirect of variation.

**CO2:-** To solve the simple interest simple discount etc.

**CO3:-** To define the compound interest and its application.

**CO4:-** To understand the concept of banking and types of account.

**CO5:-** To calculate the internal rate of return by bisection method and Newton-Rapshon method.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M			M	H	M	M
CO2	M	M	L	M			L	M	H	M
CO3	M	L	L	M			M	M	M	M
CO4	M	M	M	L			M	H	H	H
CO5	M	M	M	M			M	M	H	H

H = Highly Related; M = Medium L = Low

*Fig 4 98* *Pram* *nigam* *JPS* *Saur* *Shrestha* *Dr. J. K. Singh*

DMA006A	Optimization Techniques	L-T-P:3-0-0
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**Course objectives:-**

- To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems.
- An ability to apply knowledge of mathematics and science.

**Unit I**

Introduction, History of Optimization, Optimization Problem, Classification, Formulation, Convex sets; Introduction, Structure and Formulation of Linear Programming Problem. Examples of LP Model Formulation (Production, Marketing, Finance etc.). Graphical Solution methods of LP Problem.

**Unit II**

Standard Form of an LP Problem. Simplex Algorithm. Duality in Linear Programming.

**Unit III**

Mathematical Model. Methods for finding initial solution. Test for optimality.

**Unit IV**

Basic concepts of Game Theory. Classification and Description of Games. Pay-off matrix, saddle point solutions, Mixed strategy, Dominated Strategies

**Unit V**

Basic concepts of integer and mixed integer programming, Gomory's and branch and bound method for solving integer and mixed integer programming.

**References**

1. KantiSwaroop, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons, New Delhi, 1998.
2. Hamdy A. Taha, Operations Research, Prentice-Hall of India, 1997.
3. Sharma S. D., Operations Research: Theory, Methods & Applications, KEDAR NATH RAM NATH-MEERUT, 2011.
4. Sharma J.K., Operations Research: Theory and Applications, Macmillan India Ltd., 2007

**Course outcomes:-**

CO1:- Understanding the Concept of optimization and classification of optimization problems.

CO2:- Formulation simplex methods variable with upper bounds.

CO3:- To understand the mathematical model.

CO4:- To understand the basic concept of game theory.

CO5:- To understand the basic concepts of integer and mixed integer programming.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	M			L		H	L
CO2	H	H	M	M	L	L	M	M	L	M
CO3	M	M	L	M	M		M	M	M	H
CO4	M	M	M	M		L	M	M	M	M
CO5	H	H	L	M	L	L	L	M	L	M

H = Highly Related; M = Medium L = Low

*Fig 4 98* *P. Kumar* *nigam* *J. K. Sharma* *Sharma* *Sharma* *Sharma*



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	M	L	M			L	L	H	M
CO2	M	L	L	M				L	M	M
CO3	L	H	L	M			L	L	M	L
CO4	M	M	M	M			L	L	H	L
CO5	M	M	M	M				L	M	M

H = Highly Related; M = Medium L = Low

Page 68 *Praveen* *nigam* *J. K. S.* *Seenu* *Arish* *Joshi* *K. K. K.*

DMA008A	Fuzzy Mathematics	L-T-P:3-0-0
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**Course objectives:**

- This course introduces students to the basic concepts of modeling in systems using fuzzy sets.
- The concepts of fuzzy sets are introduced and their role in applications of semantic interpreters, control systems and reasoning systems.

**Unit- I**

Basic concepts of fuzzy set, t-norm, t-conorms, membership function,  $\alpha$ -cut, Algebra of fuzzy sets, distance between fuzzy sets, fuzzy relation.

**Unit- II**

Fuzzy numbers, Arithmetic operations of fuzzy numbers, Extension principle, Interval arithmetic, Defuzzification

**Unit- III**

Fuzzy valued functions, fuzzy equations, fuzzy inequalities, system of fuzzy linear equations, maximum and minimum of fuzzy functions.

**Unit- IV**

Classical Logic – Multi-valued Logics – Fuzzy Propositions – Fuzzy Quantifiers – Linguistic hedges – Inference from conditional Fuzzy proposition.

**Unit- V**

Fuzzy sets in Decision making, Optimization in Fuzzy environment, Fuzzy set application in image processing.

**References**

1. George J.Klir and Bu Yuan, Fuzzy sets and Fuzzy logic Theory and applications, Prentice Hall of India, New Delhi.
2. Didier Buboiss and Henri Prade, Fuzzy sets and systems, Academic Press.
3. James J Buckley, Esfandiar Eslami, An Introduction to Fuzzy logic and Fuzzy sets (Springer).
4. H.J.Zimmerman, Fuzzy set theory and application (Allied Publication in Association with KLUWER)

**Course Outcomes:**

By the end of the course, student will be able to:

CO1 :-To define the basic concept of fuzzy set

CO2:- Understand basic knowledge of the fuzzy sets, operations and their properties.

CO3:- Understand the fundamental concepts of Fuzzy functions and Fuzzy logic

CO4:- To understand the Classical Logic – Multi-valued Logics etc.

CO5:- Apply the concepts of Fuzzy sets in image processing, Pattern reorganization and Decision making.

*Fig 4 98* *P. Kumar* *mjani* *J. K. S.* *S. S. S.* *Shrestha* *J. K. S.*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	M	L	M			L	L	H	L
CO2	L	L	L	M				L	M	M
CO3	L	H	L	M			L	L	M	M
CO4	M	M	M	M	L		L	L	H	L
CO5	M	M	M	M	L	L		L	M	M

H = Highly Related; M = Medium L = Low

Fig 4.98 *Praveen* *nigam* *Dr. J. K. Singh* *Seema* *Dr. J. K. Singh* *Dr. J. K. Singh*



DMA009A	Probability Theory for Engineers	L-T-P:3-0-0
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**Course objective:**

- To apply the rules of probability (addition, conditional, multiplication) and terms of probability (mutually exclusive, independent and dependent).
- To use probability distribution for discrete random variables to make prediction about the probability of certain events.
- Focus on correlation and regression techniques, the two powerful tools in statistics.

**Unit-I**

Basic notions of probability, Conditional probability and independence, Baye's theorem. Random variables - Discrete and continuous, Cumulative distribution function, Probability mass/density functions; Mathematical expectation, Moments.

**Unit-II**

Discrete distributions: Uniform, Binomial, Negative binomial, Poisson distribution. Continuous distributions: Gamma, Exponential, Normal approximation to the binomial distribution.

**Unit-III**

Joint cumulative distribution function and its properties, Joint probability density function, Marginal distributions, Expectation of function of two random variables, Joint moment generating function, Conditional distributions and expectations.

**Unit-IV**

**Principal of Least Square:** Fitting of Straight line, second degree parabola, Power curve and Exponential Curve.

**Correlation and Regression:** Correlation, Scatter Diagram, Karl Pearson's Coefficient of Correlation and its properties, Spearman's Rank Correlation Coefficient. Regression- Fitting of Regression Lines, Regression Coefficients with properties.

**Unit-V**

**Statistical Hypothesis and test of significance**

Definition, Simple and Composite hypotheses. Null and Alternative Hypotheses, two Types of errors in sampling, critical region, level of significance critical and p-values, procedure and testing of hypothesis

**References:**

1. Robert V. Hogg, Joseph W. McKean & Allen T. Craig (2013). Introduction to Mathematical Statistics (7th edition), Pearson Education.
2. Irwin Miller & Marylees Miller (2014). John E. Freund's Mathematical Statistics with Applications (8th edition). Pearson. Dorling Kindersley Pvt. Ltd. India.
3. Jim Pitman (1993). Probability, Springer-Verlag.
4. Sheldon M. Ross (2014). Introduction to Probability Models (11th edition). Elsevier.
5. A. M. Yaglom and I. M. Yaglom (1983). Probability and Information. D. Reidel Publishing Company. Distributed by Hindustan Publishing Corporation (India) Delhi.

*Fig 4 98* *Pg 100* *mjani* *10/10/17* *Seena* *10/10/17* *10/10/17*

**Course Outcomes:**

This course will enable the students to:

CO1 Understanding basic concepts about probability and Random variable.

CO2 Learn about the discrete and continuous probability distributions.

CO3 Understand distributions in the study of the joint behaviour of two random variables.

CO4 Establish a formulation helping to predict one variable in terms of the other that is, correlation and linear regression. Also understand about fitting of curves.

CO5:- To understand Statistical Hypothesis and test of significance.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	M			L	L	H	L
CO2	M	M	L	M	L			L	M	M
CO3	L	L	L	L			L	L	M	M
CO4	M	M	M	M	L		L	L	H	M
CO5	M	M	M	M	L	L		L	M	H

1. H = Highly Related; M = Medium L = Low

Page 68  
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**JECRC<sup>TM</sup>**  
**UNIVERSITY**  
BUILD YOUR WORLD

**School of Science**  
**Course Structure and Syllabus**  
**B. Sc. Microbiology**  
**Academic Programme**  
**2022-2025**

Dr. P. S. Singh

Rashmi

**Programme Outcome:** After completion of degree course the student will be acquainted with sufficient knowledge in Microbiology. The degree program combines the teaching of core principles with hands-on laboratory experience, preparing students for exciting careers in industry and academia.

The course also provides a wide range of opportunities in *industries, pharmaceutical companies, Health care services* and *teaching* after graduating the course.

**The student outcomes are:**

1. To familiarize students with fundamental concept of basic techniques and their applications in applied sciences.
2. It is expected that the knowledge gained through this course will make student competent to meet the challenges of academic and professional courses.
3. To train the student in various aspects related to applied microbiology and medical microbiology.
4. An ability to apply profound understanding of basic to applied microbiology.
4. An ability to design and perform experiments, as well as to analyze and interpret data.
5. An ability to communicate effectively with reference to speaking, reading, writing and listening clearly in person through electronic media in English and Hindi and able to get acquainted with the people, ideas books media and technology.
6. A recognition of the need for, and an ability to engage in life-long learning.
7. A knowledge of contemporary and burning issues.

#### **B.Sc. Microbiology Program Educational Objective (PEO's):**

A Graduate of the Microbiology should:

##### **PEO-I**

Students will develop themselves as effective professionals by the knowledge gained with attention to team work, effective communication, critical thinking and problem solving skills.

##### **PEO-II**

Students will develop professional skills that prepare them for self employment as well as to qualify competitive examination and life-long learning in advanced areas of Microbiology and applied fields.

##### **PEO-III**

Students will demonstrate their ability to adapt to a rapidly changing environment by having learned and applied new skills and new technologies.

##### **PEO-IV**

Students will be provided with an educational foundation that prepares them for excellence, leadership roles along diverse career paths with encouragement to professional ethics and active participation needed for a successful career.



### Program Outcome

A candidate who is conferred an UG (Hons) degree i.e. B.Sc. (Hons) degree in microbiology needs to have acquired/developed following competencies during the programme of the study:

- PO1. Acquired knowledge and understanding of the microbiology concepts as applicable to diverse areas such as medical, industrial, environment, genetics, agriculture, food and others
- PO2. Demonstrate key practical skills/competencies in working with microbes for study and use in the laboratory as well as outside, including the use of good microbiological practices.
- PO3. Competent enough to use microbiology knowledge and skills to analyze problems involving microbes, articulate these with peers/ team members/ other stake holders, and undertake remedial measures/ studies etc.
- PO4. Developed a broader perspective of the discipline of Microbiology to enable him/her to identify challenging societal problems and plan his professional career to develop innovative solutions for such problems.
- PO5. Acknowledges health safety environment (HSE) and ethical issues in handling chemicals and biological materials; understands the environmental impacts associated with the activity; performs risk assessments and is familiar with safety instructions in his/her subject area.
- PO6. Can communicate scientific results to the general public and experts by writing well structured reports and— contributions for scientific publications and by oral presentations
- PO7. To demonstrate knowledge to understand the culture, essential facts, concepts, principles and theories relating to the subject areas identified and to recognize, analyze problems and plan strategies for their solution.



**JECRC UNIVERSITY**  
**FACULTY OF SCIENCE**  
**SESSION 2022-2025**

**Details of Scheme for B Sc.(Hons.) with various Courses & their credits with contact Hours**  
**\*\*Note: In 6th Semester Students have a Choice either he can go for offered Courses or he may avail Internship in some reputed Institute / Industry or In House Dissertation**

**\*Field/ Project Work and Report**

**Semester I**

S.N o.	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
1	Physicochemical Techniques (BMI001C)	4	-	2	4		1	5	Core
2	Microbial Diversity (BMI003C)	4	-	2	4		1	5	Core
3	Cell and Molecular Biology (BMI070A)	4	-	2	4		1	5	Core
4	Web Development (DCA001A)	2	0	0	2	0	0	2	Fundamental
5	Web Development Lab	0	0	2	0	0	1	1	Fundamental
6	Communication Skills (DEN001A)	2	0	2	2	0	1	3	Foundation
7	Culture Education -1 (DIN001A)	2	0	0	2	0	0	2	Foundation
8.	Environment Studies (DCH001A)	3		2*	3	0	1	4	Fundamental

		21		12	21		6	27	
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### Semester II

Subject Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
9	Bacteriology and Systematics (BMI072A)	4	-	2	4		1	5	Core
10	Biochemistry (BMI005C)	4	-	2	4		1	5	Core
11	Mycology and Phycology (BMI074A)	4	-	2	4		1	5	Core
12	Project Management Lab (DCA003A)	0	0	2	0	0	1	1	Fundamental
13	Professional Skills (DEN002A)	2	0	2	2	0	1	3	Foundation
14	Culture Education-2 (DIN002A)	2	0	0	2	0	0	2	Foundation
15	DSE-1	4	-	2	4		1	5	DSE-1
		20		12	20		6	26	

### Semester III

S.No	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits	Total Credits	Paper Category
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					L	T	P		
16	Virology (BMI017C)	4	-	2	4		1	5	Core
17	Microbial Physiology (BMI029C)	4	-	2	4		1	5	Core
18	DSE-2	4	-	2	4		1	5	DSE-2
19	Advanced Spread Sheet Lab (DCA004A)		-	2			1	1	Fundament al
20	Life Skills1(Personal ity Development) (DEN003A)	1	0	2	1	0	1	2	Foundation
21	Value Education& Ethics -I (DIN003A)	1	0	0	1	0	0	1	Foundation
22	Open Elective-I	3	0	0	3	0	0	3	Interdiscipl inary
23	Research Methodology (BMI135A)	3	1	0	3	1	0	4	Interdiscipl inary
		20		10	20		5	26	

#### Semester IV

S. No	Subject	Lectu re (Hr.)	Tutorial s (Hr.)	Practica l (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		

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24	Microbial Genetics (BM1022C)	4	-	2	4		1	5	Core
25	Biostatistics (BM1024B)	4	-	2	4		1	5	Core
26	Agriculture and Veterinary Microbiology (BM1078A)	4	-	2	4		1	5	Core
27	<del>Python Programming</del>	<del>2</del>	<del>0</del>	<del>0</del>	<del>2</del>	<del>0</del>	<del>0</del>	<del>2</del>	<del>Fundamental</del>
28	<del>Python Programming Lab</del> <i>Python Blogging Logging (DCA 012A)</i>	<del>0</del>	0	2	0	0	1	1	Fundamental
29	Life Skills-2 (Aptitude) <i>DM 4011E</i>	1	0-	2	1	0	1	2	Foundation
30	Value Education & Ethics-2 <i>(DIN 004A)</i>	1	0	0	1	0	0	1	Foundation
31	Open Elective-II	3	0	0	3	0	0	3	Interdisciplinary
		19	1	10	19	1	5	24	

#### Semester V

S. No	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
32	Genetic Engineering (BM1076A)	4	-	2	4		1	5	Core
33	DSE-3	4	-	2	4		1	5	DSE-3

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34	DSE-4	4		2	4		1	5	DSE-4
35	Open Elective III	3	-	-	3			3	Interdisciplinary
36	Project (BMI047A)			12			6	6	Discipline Specific
		15		18	15		9	24	

**Semester VI: \*\*Note:In 6th Semester Student have a Choice either he can go for offered Courses or he may avail Internship in some reputed Institute / Industry or In House Dissertation**

S.No	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
37	DSE-5	4	-	2	4		1	5	DSE-5
38	DSE-6	4	-	2	4		1	5	DSE-6
39	DSE-7	4	-	2	4		1	5	DSE-7
40	DSE-8	4	-	2	4	0	1	5	Interdisciplinary
41	Seminar (BMI139A)	1		0	1		0	1	Interdisciplinary
		17		8	17		4	21	

### Total Credits

Credits	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total
	27	26	26	24	24	21	148

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**B. Sc. Microbiology Department Course**

<b>Semester –I</b>				
<b>Course</b>	<b>Title</b>	<b>L</b>	<b>P</b>	<b>C</b>
BMI001C	Physicochemical Techniques	4		4
BMI002C	Physicochemical Techniques Lab		1	1
BMI 003C	Microbial Diversity	4		4
BMI 004C	Microbial Diversity Lab		1	1
BMI070A	Cell and Molecular Biology	4		4
BMI071A	Cell and Molecular Biology Lab		1	1
<b>Semester –II</b>				
BMI072A	Bacteriology and Systematics	4		4
BMI073A	Bacteriology and Systematics Lab		1	1
BMI005C	Biochemistry	4		4
BMI006C	Biochemistry Lab		1	1
BMI074A	Mycology and Phycology	4		4
BMI075A	Mycology and Phycology Lab		1	1
	Discipline Specific Elective –I	4		4
	Discipline Specific Elective -I Lab		1	1
<b>Semester –III</b>				
BMI017C	Virology	4		4
BMI018C	Virology		1	1
BMI029C	Microbial Physiology	4		4
BMI030C	Microbial Physiology Lab		1	1
	Discipline Specific Elective –II	4		4
	Discipline Specific Elective -II Lab		1	1
BMI138A	Research Methodology	4		4

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Semester -IV				
BMI022C	Microbial Genetics	4		4
BMI023C	Microbial Genetics Lab		1	1
BMI024B	Biostatistics	4		4
BMI025B	Biostatistics Lab		1	1
BMI078A	Agriculture and Veterinary Microbiology	4		4
BMI079A	Agriculture and Veterinary Microbiology Lab		1	1
Semester -V				
BMI076A	Genetic Engineering	4		4
BMI077A	Genetic Engineering Lab		1	1
	Discipline Specific Elective - III	4		4
	Discipline Specific Elective - III Lab		1	1
BMI047A	Project			6
	Discipline Specific Elective - IV	4		4
	Discipline Specific Elective - IV Lab		1	1
Semester -VI				
	Discipline Specific Elective - V	4		4
	Discipline Specific Elective - V Lab		1	1
	Discipline Specific Elective - VI	4		4
	Discipline Specific Elective - VI Lab		1	1
	Discipline Specific Elective- VII	4		4
	Discipline Specific Elective- VII Lab		1	1

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	Discipline Specific Elective-VIII	4		4
	Discipline Specific Elective-VIII Lab		1	1
BMI139A	Seminar	1		1

#### Discipline Specific Elective Papers

Tracks	Course Code	Title	L	P	C
Food Microbiology	BMI082A	Fundamentals of Food Microbiology I	4		4
	BMI083A	Fundamentals of Food Microbiology Lab I		1	1
	BMI084A	Food Chemistry	4		4
	BMI085A	Food Chemistry Lab		1	1
	BMI086A	Food Packaging Technology	4		4
	BMI087A	Food Packaging Technology Lab		1	1
	BMI088A	Food Quality and Foodborne Diseases	4		4
	BMI089A	Food Quality and Foodborne Diseases Lab		1	1
	BMI090A	Dairy Microbiology	4		4
	BMI091A	Dairy Microbiology Lab		1	1
	BMI092A	Food Law and Standards	4		4
	BMI093A	Food Law and Standards Lab		1	1
	BMI094A	Microbial toxins and food protection	4		4
	BMI095A	Microbial toxins and food protection Lab		1	1
Medical Microbiology	BMI096A	Introduction of Medical Microbiology	4		4
	BMI097A	Introduction of Medical Microbiology Lab		1	1
	BMI010B	Immunology II	4		4
	BMI011B	Immunology Lab II		1	1
	BMI098A	General Pathology	4		4
	BMI099A	General Pathology Lab		1	1

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	BMI100A	Clinical Biochemistry	4		4
	BMI101A	Clinical Biochemistry Lab		1	1
	BMI102A	Automation in Medical Microbiology	4		4
	BMI103A	Automation in Medical Microbiology Lab		1	1
	BMI104A	Human Anatomy and Physiology	4		4
	BMI105A	Human Anatomy and Physiology Lab		1	1
	BMI106A	Parasitology			
	BMI107A	Parasitology Lab			
Industrial Microbiology	BMI108A	Basic Industrial Microbiology	4		4
	BMI109A	Basic Industrial Microbiology Lab		1	1
	BMI110A	Fermentation Technology	4		4
	BMI111A	Fermentation Technology Lab		1	1
	BMI112A	Microbial Productions of Metabolites	4		4
	BMI113A	Microbial Productions of Metabolites Lab		1	1
	BMI114A	Quality Assurance and Quality Control of Microbial Products	4		4
	BMI115A	Quality Assurance and Quality Control of Microbial Products Lab		1	1
	BMI116A	Industrial Management, Government Laws and Regulations	4		4
	BMI117A	Industrial Management, Government Laws and Regulations Lab		1	1
	BMI118A	Biomining and Microbial Metabolites	4		4
	BMI119A	Biomining and Microbial Metabolites Lab		1	1
	BMI120A	Microbial Products for Human Consumption	4		4
	BMI121A	Microbial Products for Human Consumption Lab		1	1
Environment Microbiology	BMI122A	Environment and Microorganism	4		4
	BMI123A	Environment and Microorganism Lab		1	1






BMI124A	Eco Restoration and Development	4		4
BMI125A	Eco Restoration and Development Lab		1	1
BMI126A	Environmental Monitoring	4		4
BMI127A	Environmental Monitoring Lab		1	1
BMI048A	Waste Management	4		4
BMI049A	Waste Management Lab		1	1
BMI128A	Environmental Legislation and Policy	4		4
BMI129A	Environmental Legislation and Policy Lab		1	1
BMI130A	Microbial Ecology	4		4
BMI131A	Microbial Ecology Lab		1	1
BMI132A	Agro-Environment Microbiology	4		4
BMI133A	Agro-Environment Microbiology Lab		1	1

#### Open electives offer by Department

#### Open Elective-I Human Microbial Disease Management (BMI134A)

#### Open Elective-II Microbial Products (BMI135A)

#### Open Elective-III Biosafety and IPR (BMI136A)

#### Virtual Labs

S.No	Course Name	Sources	Link
1	Biochemistry Virtual Lab I	AMRITA VISHWA VIDYAPEETHAM	<a href="http://biotech01.vlabs.ac.in/">http://biotech01.vlabs.ac.in/</a>
2	Biochemistry Virtual Lab II	AMRITA VISHWA VIDYAPEETHAM	<a href="https://vlab.amrita.edu/?sub=3&amp;brch=64">https://vlab.amrita.edu/?sub=3&amp;brch=64</a>
3	Immunology Virtual Lab I	AMRITA VISHWA VIDYAPEETHAM	<a href="https://vlab.amrita.edu/?sub=3&amp;brch=69">https://vlab.amrita.edu/?sub=3&amp;brch=69</a>
4	Immunology Virtual Lab II	AMRITA VISHWA VIDYAPEETHAM	<a href="https://vlab.amrita.edu/?sub=3&amp;brch=70">https://vlab.amrita.edu/?sub=3&amp;brch=70</a>

5	Microbiology Virtual Lab I	AMRITA VISHWA VIDYAPEETHAM	<a href="https://mvi-au.vlabs.ac.in/">https://mvi-au.vlabs.ac.in/</a>
6	Microbiology Virtual Lab II	AMRITA VISHWA VIDYAPEETHAM	<a href="https://vlab.amrita.edu/?sub=3&amp;brch=76">https://vlab.amrita.edu/?sub=3&amp;brch=76</a>
7	Molecular Biology Virtual Lab I	AMRITA VISHWA VIDYAPEETHAM	<a href="http://mbvi-au.vlabs.ac.in/">http://mbvi-au.vlabs.ac.in/</a>
8	Molecular Biology Virtual Lab II	AMRITA VISHWA VIDYAPEETHAM	<a href="https://mbvii-au.vlabs.ac.in/">https://mbvii-au.vlabs.ac.in/</a>
9	Cell Biology Virtual Lab I	AMRITA VISHWA VIDYAPEETHAM	<a href="http://cbi-au.vlabs.ac.in/">http://cbi-au.vlabs.ac.in/</a>
10	Cell Biology Virtual Lab II	AMRITA VISHWA VIDYAPEETHAM	<a href="http://cbii-au.vlabs.ac.in/">http://cbii-au.vlabs.ac.in/</a>
11	Bioinformatics Virtual Lab II	AMRITA VISHWA VIDYAPEETHAM	<a href="https://vlab.amrita.edu/index.php?sub=3&amp;brch=274">https://vlab.amrita.edu/index.php?sub=3&amp;brch=274</a>
12	Ecology Virtual Lab	AMRITA VISHWA VIDYAPEETHAM	<a href="https://vlab.amrita.edu/index.php?sub=3&amp;brch=272">https://vlab.amrita.edu/index.php?sub=3&amp;brch=272</a>
13	Bioreactor Modeling and Simulation Lab	IIT Delhi	<a href="http://38.100.110.143/model/index.html">http://38.100.110.143/model/index.html</a>
14	Biological image analysis virtual Lab I	AMRITA VISHWA VIDYAPEETHAM	<a href="https://vlab.amrita.edu/?sub=3&amp;brch=278">https://vlab.amrita.edu/?sub=3&amp;brch=278</a>

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI001C	Physicochemical Techniques	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

CO1-Understand the general principle, working and applications of laboratory instruments.

CO2-Understand the basic principle, working and applications of centrifugation and electrophoresis technique.

CO3-Understand the basic of autoradiography, biological hazards of radiation and safety measures in handling radioisotopes

CO4- Understand the Microbial techniques used in microbial lab and cultivation of microbes in lab.

CO5-Understand the culture techniques and general staining techniques used for bacteria, fungi and algae.

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### Unit-I

General lab Instruments: principle, working and applications of pH meter, Autoclave, laminar air flow, calorimeter, spectrophotometer, centrifuge, water bath, vortex mixer, oven, incubator and colony counter. Microscopy: light microscopy, phase contrast, Fluorescence microscopy and electron microscopy.

### Unit -II

Centrifugation: types, working, principle and applications; Electrophoresis: types, working, principle and applications.

### Unit – III

Radioisotopic Techniques: Types of radioisotopes used in Biochemistry, units of radioactivity measurements, isotopes commonly used in biochemical studies –  $^{32}\text{P}$ ,  $^{35}\text{S}$ ,  $^{14}\text{C}$  and  $^3\text{H}$ ).

### Unit IV

Chromatography: types, working, principle and applications; Spectroscopic Techniques: Beer-Lambert law, light absorption and its transmittance, application of visible and UV spectroscopic techniques

### Unit V

Autoradiography. Biological hazards of radiation and safety measures in handling radioisotopes. Biological applications of radioisotopes.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	3	2	1	1	1
CO2	2	3	3	3	3	3	3
CO3	1	1	2	3	2	2	0
CO4	3	2	3	1	1	0	0
CO5	3	3	2	0	3	0	1

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Khandelwal P.P., Textbook of optics and atomic physics, 2015, Himalaya Publishing House
2. Patel S.B., Nuclear physics an introduction, 2<sup>nd</sup> edition, 2011, New Age International
3. Pattabhi and Gautha, Biophysics, 2<sup>nd</sup> edition, 2009, Narosa Publishing House
4. Nakara and Choudhary, Instrumentation measurements and analysis, 3<sup>rd</sup> Edition, 2010, Tata Mc Graw Hill
5. Khandpur R.S., Handbook of analytical instruments, 3<sup>rd</sup> Edition, 2015, Tata Mc Graw Hill

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6. Beiser A, Perspectives of modern physics, 1969, Mc Graw Hill
7. White H.E., Introduction to atomic spectra, 2005, Mc Graw Hill
8. Lodish, Berk, Matsudara, Kaiser, Krieger, Zipursky, Darnell, Molecular cell biology, 8<sup>th</sup> edition 2016, W.H. Freeman and Co.

#### Physicochemical Techniques Lab (BMI002C)

- 1) Demonstration of laboratory rules, basic requirements in a microbiological laboratory and safety measures.
- 2) Demonstration of the components, use and care of bright field microscope.
- 3) Determination of size of a given microorganism using micrometry.
- 4) Demonstration of the pH meter and determination of pH of a given sample.
- 5) Demonstration of centrifuge for the given sample.
- 6) Demonstration of electrophoresis/ PAGE.
- 7) Separation of chlorophyll a and b using paper chromatography.
- 8) Separation of amino acids using TLC.
- 9) Verification of Beer – Lamberts' Law.
- 10) Preparation of standard curve of proteins by spectroscopy.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI003C	Microbial Diversity	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1- Understand the history of microbiology and classification of microorganism.  
 CO2- Analyze the structural organization of bacterial system.  
 CO3- Understand the cellular structure, biosynthesis and function of bacterial system.  
 CO4- Evaluate the structures of algae, fungi and protozoan.  
 CO5- Apply the sterilization, isolation and staining techniques to the microbial culture.

#### Unit-I

History of Microbiology – Overview, Biogenesis and abiogenesis, golden age of microbiology and development in the field of medical microbiology, immunology, environmental microbiology, contributions of Robert Hooke, Antonie von Leeuwenhoek, Redi, Spallanzani, Needham, Pasteur, Tyndal, Joseph Lister, Robert Koch (Germ Theory), Edward Jenner and Alexander Flemming, Martinus Beijerinck, Scope of Microbiology, aim and principles of classification, systematics and taxonomy, conventional, molecular and recent approaches to polyphasic bacterial taxonomy.

#### Unit -II

Whittaker's five kingdom classification, Carl Woese three domain classification, Bacterial

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morphology and subcellular structures; Slime layer, Capsule, Cell wall, cell membrane, Ribosome, inclusion bodies - inorganic, organic; Exospores & Cysts: types & structure. Plasmids and episomes.

### Unit -III

Bacterial Chromosome (Fundamental differences with eukaryotic chromosome). Bacterial cell wall biosynthesis and structure. Differences between eubacteria and archaebacteria.

### Unit -IV

Brief description of salient features, classification of Algae, Fungi and Protozoa: General characteristics, vegetative and reproductive structure of Protozoa: *Giardia*, *Entamoeba* and *Plasmodium*, *Trichomonas*, *monocystes*

### Unit -V

Methods of studying microorganism; Staining techniques: simple staining, Gram staining, negative staining and acid-fast staining. Sterilization techniques (physical & chemical sterilization). Culture media & conditions for microbial growth. Pure culture isolation: Streaking, serial dilution and plating methods; cultivation, maintenance and preservation of pure cultures.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	0	3	1	3	0
CO2	2	3	1	0	0	1	2
CO3	2	2	1	0	0	1	1
CO4	3	1	3	1	1	2	2
CO5	3	3	2	2	2	2	2

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR, General Microbiology, 5<sup>th</sup> edition, 2005, McMillan.
2. Atlas, Principles of Microbiology, 2<sup>nd</sup> ed., 1997, McGraw-Hill
3. Alexopoulos CJ, Mims CW, and Blackwell M, Introductory Mycology. 4<sup>th</sup> edition, 1996, John and Sons, Inc.
4. Cappucino J and Sherman N., Microbiology: A Laboratory Manual. 9<sup>th</sup> edition, 2010, Pearson Education limited.
5. Kumar HD., Introductory Phycology, 2<sup>nd</sup> edition, 1990, Affiliated East Western Press.
6. Madigan MT, Martinko JM and Parker J., Brock Biology of Microorganisms. 12<sup>th</sup> edition, 2009, Pearson/Benjamin Cummings.
7. Pelczar MJ, Chan ECS and Krieg NR., Microbiology. 5<sup>th</sup> edition, 1993, McGraw Hill Book Company.
8. Tortora GJ, Funke BR, and Case CL., Microbiology: An Introduction, 9<sup>th</sup> edition, 2008,

Pearson Education.

**Microbial Diversity Lab (BMI004C)**

- 1) Preparation of bacterial smear.
- 2) Simple staining of bacteria and fungi.
- 3) Identification of common morphological forms of bacteria.
- 4) Identification of Cyanobacteria (blue-green algae).
- 5) Identification of some common fungi (*Aspergillus*, *Penicillium*, *Mucor* and *Rhizopus*).
- 6) Identification of common algae.
- 7) Demonstration and explanation of different types of viruses.
- 8) Gram staining.
- 9) Microscopic examination of free-living protozoa of a pond.
- 10) Hanging drop technique demonstrating motility of Bacteria.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI070A	Cell and Molecular Biology	4	1	4	2	5

**Course outcome (CO)**

On completion of the course, students are able to:

CO1- Understand the cell structural organization and function of cell organelles.

CO2- Understand the structure of DNA and its component.

CO3- Understand the cell cycle and its regulation along with extracellular control of cell growth and apoptosis.

CO4- Understand the transcription in prokaryotes and its regulation.

CO5- Understand the concept of split genes, concept of introns and exons and processing of rRNA.

**Unit I**

Concepts of cell- Prokaryotic & Eukaryotic cells. Cell organization of Prokaryotic cells with special reference to Bacteria. Eukaryotic cells - cell wall & plasma membrane; structure & function of cell organelles and inclusions. Episome, Mesosome, Flagella and Fimbriae.

**Unit II**

Experimental evidences for nucleic acid as genetic material. Structure of DNA; Models of DNA replication. Enzymes, proteins and other factors involved in DNA replication. Mechanism of DNA replication in prokaryotes & eukaryotes Super helicity in DNA, linking number, topological properties.



### Unit III

Cell cycle: Eukaryotic Cell Cycle, Regulation of Cell cycle progression, Events of Mitotic Phase, Meiosis and Fertilization. Cell cycle and Programmed cell death- Control system, intracellular control of cell cycle events, Apoptosis, extracellular control of cell growth and apoptosis.

### Unit IV

Transcription: Definition, difference from replication, promoter - concept and strength of promoter RNA Polymerase and the transcription unit. Transcription in Eukaryotes: RNA polymerases, general Transcription factors. Translational machinery, Charging of tRNA, aminoacyl tRNA synthetases, Mechanisms of initiation, elongation and termination of polypeptides in both prokaryotes and eukaryotes, Fidelity of translation, Inhibitors of protein synthesis in prokaryotes and eukaryote

### Unit V

Split genes, concept of introns and exons, RNA splicing, spliceosome machinery, concept of alternative splicing, Polyadenylation and capping, Processing of rRNA, RNA interference: si RNA, miRNA and its significance.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	0	1	0	0	1
CO2	1	2	0	1	0	0	1
CO3	3	3	1	0	1	2	0
CO4	2	2	2	0	0	2	1
CO5	2	3	2	0	0	2	1

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Karp, G., Cell and Molecular Biology: Concepts and Experiments, 6<sup>th</sup> Edition, 2010, John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. Cell and Molecular Biology, 8<sup>th</sup> Edition, 2006, Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman R.E., The Cell: A Molecular Approach, 5<sup>th</sup> Edition, 2009, ASM Press & Sunderland, Washington, D.C.
4. Becker W.M., Kleinsmith L.J., Hardin. J. and Bertoni G. P., The World of the Cell, 7<sup>th</sup> Edition, 2009, Pearson Benjamin Cummings Publishing

#### Cell and Molecular Biology (BMI071A)

- 1) To analyze prepared slides of mitosis.

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- 2) To perform and identify different stages of mitosis in onion root tip.
- 3) To analyze prepared slides of meiosis.
- 4) To perform and identify different stages of meiosis in onion flower bud.
- 5) To prepare the slide of giant chromosome.
- 6) Isolation of genomic and plasmid DNA from *E.coli*
- 7) Estimations of DNA using diphenylamine reagent, and UV spectrophotometer (A260 measurement)
- 8) Estimations of RNA using orcinol reagent, and UV spectrophotometer (A260 measurement)
- 9) Resolution and visualization of DNA by Agarose Gel Electrophoresis.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI072A	Bacteriology and Systematics	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1- Understand the classification of bacterial bergey's manual and functioning of microbial structure.
- CO2- Analyze the various shapes, habitat and function of Gram negative.
- CO3- Analyze the archeabacteria structure, habitat and its type.
- CO4- Analyze the various shapes, habitat and usefulness of Gram positive.
- CO5- Analyze the bacterial growth, control and preservation.

#### Unit I

Bacteria: Internal structure, Bacterial shapes and arrangement, cell membrane, cell wall of bacteria, inclusion bodies, flagella, capsule, slime, fimbriae and pilli. Bacterial endospores – structure, formation and germination. Effect of antibiotics on the cell wall and formation of spheroplasts, protoplasts and L-forms. A brief outline of salient features of major bacterial groups according to Bergey's manual of systematic Bacteriology Volume I and II.

#### Unit II

Gram negative Eubacteria: The Spirochetes, Aerobic/microaerophilic, motile, helical/vibroid, Gram negative Bacteria, Non motile, Gram negative curved bacteria. Aerobic, anaerobic and facultative anaerobic bacteria.

#### Unit III

Sulphur reducing bacteria. Anaerobic Gram negative Cocci. *Neisseria*, *Rickettsia*, *Chlamydia*, Anaerobic Gram negative rods: *Rhizobium*, *Agrobacterium*, *Salmonella*, Archaeobacteria: Introduction to Nanoarchaeota (*Nanoarchaeum*), Crenarchaeota (*Sulfolobus*, *Thermoproteus*) and Euryarchaeota [Methanogens (*Methanobacterium*, *Methanocaldococcus*), thermophiles

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 - Top left: A large signature, possibly "Rashmi".  
 - Middle left: A signature, possibly "Rashmi".  
 - Bottom left: A signature, possibly "Rashmi".  
 - Bottom center: A signature, possibly "Rashmi".  
 - Bottom right: A signature, possibly "Rashmi".



(*Thermococcus*, *Pyrococcus*, *Thermoplasma*), and Halophiles (*Halobacterium*, *Halococcus*).

#### Unit IV

Gram positive Eubacteria: Gram positive Cocci; Streptococcus, staphylococcus, Gram Positive rod; Bacillus, Clostridium, endospore forming Gram positive bacteria, Non-spore forming Gram positive Rods of regular shape, Nonspore forming Gram positive Rods of irregular shape; *Corynebacterium*

#### Unit V

Cultivation of Bacteria: growth of bacteria, growth curve, environmental factors affecting growth, quorum sensing. Nutritional requirements in bacteria and nutritional categories. Culture media: components of media, natural and synthetic media, chemically defined media, complex media, selective, differential, enriched and enrichment media. Physical methods of microbial control: heat, low temperature, high pressure, filtration, desiccation, osmotic pressure, radiation. Chemical methods of microbial control: disinfectants, types and mode of action. Asexual methods of reproduction. Preservation techniques of microbial culture.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	3	0	0	1
CO2	3	3	2	2	2	0	1
CO3	3	3	1	3	2	1	0
CO4	3	2	2	3	2	1	0
CO5	3	2	1	1	0	0	1

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Schlegel H S, General Microbiology, 7th edition, 1995, Cambridge University Press
2. Pelczar M J, Chan E C S, Kreig N R, Microbiology, 5th edition, 2006, Tata Mc Graw Publication
3. Cappuccino J G and Sherman N, Microbiology-a Laboratory Manual, 6th edition, 2006, Addison Wesley, Pearson Education, Inc.
4. Tortora G J, Funke B R, Case C L, Microbiology-an introduction, 9th edition, 2008, Pearson Education, Inc.,
5. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR, General Microbiology. 5<sup>th</sup> edition, 2005, McMillan
6. Atlas, Principles of Microbiology, 2<sup>nd</sup> ed., 1997, McGraw-Hill

#### Bacteriology and Systematics Lab (BMI073A)

- 1) Negative staining for capsule

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- 2) Flagella staining
- 3) Endospore staining
- 4) Acid fast staining
- 5) Explanation of Culture media and their types.
- 6) Demonstration of sterilization by moist heat using autoclave.
- 7) Preparation of culture media – liquid and solid media.
- 8) Demonstration of selective and differential media.
- 9) Demonstration of culture inoculation techniques – spread plate, streak plate and pour plate methods
- 10) Demonstrations of pure culture techniques – streak plate, pour plate and serial dilution method.
- 11) Demonstration of cultivation of Anaerobic bacteria.
- 12) Antibiotic sensitivity testing by disc diffusion method.
- 13) Bacterial growth curve formation by turbidity measurement method.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI005C	Biochemistry	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

CO-1 Understand molecular interactions, basic chemical reactions and pH, characterize and understand the roles of biomolecules.

CO-2 Understand and apply the structure, properties and biological importance of carbohydrates and nucleic acids.

CO-3 Understand and apply the classification, chemical properties and biological importance of lipids.

CO-4 Analyze the classification, characteristics and structures of proteins and enzymes, inhibition & kinetics

CO-5 Understand the definition, classification, deficiency of vitamin and inborn error of metabolism

#### Unit I

Introduction to biochemistry, scope and importance Molecular interactions, Types of bonds, colligative properties of water, The concept of pH, dissociation and ionization of acids and bases. Henderson-hasselbalch equation, Classification and biological importance of biomolecules.

#### Unit II

Classification and biological importance of Carbohydrates, Monosaccharides; Disaccharides Oligosaccharides, Polysaccharides (Homo & Heteropolysaccharides). Nucleic acids, Biosynthesis of nucleotides. Base composition. A+T and G+C rich genomes.

#### Unit III

Classification and biological importance of lipids; Chemical properties and characterization of triglycerides, fats & fatty acids, Waxes, phospholipids and glycolipids.

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#### Unit IV

Classification, structure, properties and biological importance of Amino acids and Proteins; biologically active peptides, structure of proteins-primary, secondary, tertiary and quaternary, Ramachandran plot. Nomenclature and classification of enzymes & enzyme units, Enzymes: as biocatalyst, classification, specificity, active site, enzyme kinetics (Michaelis and Menten equation) isozymes, coenzymes, factors affecting enzyme activity, enzyme inhibition.

#### Unit V

Definition and classification of vitamins, vitamin deficiency diseases, biochemistry, occurrence & functions of water soluble and fat soluble vitamins, Vitamins as coenzyme.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	2	0	2	3	2
CO2	1	3	3	1	3	2	1
CO3	2	3	2	1	3	1	2
CO4	2	3	2	1	2	1	2
CO5	2	2	1	0	1	2	2

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Conn EE and Stumpf PK, Outlines of Biochemistry, 1976, John Wiley & Sons.
2. Nelson & Cox, Lehninger Principle of Biochemistry, 6<sup>th</sup> edition, 2013, W. H. Freeman Co.
3. Voet & Voet, Principles of Biochemistry, 4<sup>th</sup> edition, 2012, John Wiley & Sons.
4. Rastogi V.B. and Aneja K. R., Zubay's Principles of Biochemistry, revised edition, 2016, Medtec
5. Deb A.C., Fundamental of Biochemistry, 4<sup>th</sup> edition, 1990, new central book agency, Calcutta
6. Berg, Tymoczko and Stryer, Biochemistry, 7<sup>th</sup> edition, 2011, W.H. Freeman & Co Ltd
7. Satyanarayana U and Chakrapani U, Biochemistry, 5<sup>th</sup> edition, 2017, Elsevier.
8. Srivastava H.S., Element of Biochemistry, 2017, Rastogi Publications Meerut.
9. Jain J.L., Fundamentals of Biochemistry, 2017, S.Chand publishers New Delhi.

#### Biochemistry Lab (BMI006C)

- 1) Qualitative test (Molisch's test) for presence of the carbohydrates in a given sample.
- 2) Iodine test for presence of Starch in a given sample.
- 3) Benedict's test for presence of reducing sugars in a given sample.
- 4) Fehling's test for presence of reducing sugars in a given sample.
- 5) Ninhydrin test for the presence of amino acids in a given sample.
- 6) Xanthoproteic test for the presence of aromatic amino acids in a given sample.
- 7) Biuret test for the presence of peptides or proteins in a given sample.
- 8) Solubility test for lipids.

- 9) Qualitative test for the presence of fatty acids by titrimetric method.
- 10) Determination of acid value of fats and oil.
- 11) Determination of iodine number of a fat sample.
- 12) Measurement of Riboflavin (Vitamin B2) in a given sample.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI074A	Mycology & Phycology	4	1	4	2	5

**Course outcome (CO)** On completion of the course, students are able to:

- CO1- Understanding the diversity of the fungi
- CO2- Understanding the various fungus genera and its role in the environment.
- CO3- Analyze the application of the fungus products
- CO4- Understanding the various genera of algae.
- CO5- Analyze the various algae structure and its application.

#### Unit I

Characteristics, classification and cellular & thallus organization of fungi. General features, structure, nutrition, reproduction of different fungi group - Phycomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes. Heterothallism and Parasexuality. Sex hormones in fungi, physiological specialization, phylogeny of fungi.

#### Unit II

General features, taxonomic status and evolutionary significance economic importance of important fungal genera - *Mucor*, *Saccharomyces*, *Neurospora*, *Agaricus*, *Fusarium*, *Alternaria*, *Curvularia* and *Cladosporium*. General account and importance of lichen. Important plant diseases caused by fungi- symptoms, disease cycles and control (Late & Early blight, Black rust, Smut, Wilt and Red rot).

#### Unit III

Role of fungi in biotechnology, Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Myco -proteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides). Mushroom and its cultivation.

#### Unit IV

General characteristics and evolution of algae. Occurrence, thallus organization, algae cell ultra-structure, pigments, flagella, eye- spot food reserves and vegetative, asexual and sexual reproduction. Classification of algae.

#### Unit V

General features, structure and reproduction and economic importance of *Chlamydomonas*.

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*Chlorella*, *Diatoms*, *Microcystis*, *Oscillatoria*, *Spirulina*, *Anabaena*, *Nostoc*, *Rivularia* and *Scytonema*. Mass cultivation of algae as a source of protein.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	2	1	0	0
CO2	2	3	0	2	2	1	1
CO3	3	3	2	2	2	1	2
CO4	2	2	0	2	1	0	0
CO5	3	2	1	2	2	0	2

3 = Highly Related; 2 = Medium; 1 = Low

**Suggested Readings:**

1. Alexopoulos, C.J., Mims, C.W. and Blackwell, M, Introductory Mycology. John Wiley, New York.
2. Mehrotra, R.S. and K.R. Aneja An Introduction to Mycology. New Age International Press, New Delhi.
3. Webster, J. Introduction to fungi. Cambridge University Press. Cambridge, U.K. (1985).
4. Bessey E.A. Morphology and Taxonomy of fungi. Vikas Publishing House Pvt. Ltd., New Delhi.
5. Jhon Webster and R W S Weber. Introduction to Fungi. Cambridge University Press 2007.
6. A. V. S. S. Sambamurty. A Textbook of Algae. I.K. International Publishing House Pvt. Limited, 2010
7. H.D. Kumar and H.N. Singh. A Textbook on Algae (Macmillan international college edition)

**Mycology & Phycology Lab (BMI075A)**

1. Preparation of Potato Dextrose Medium.
2. Isolation and identification of pathogenic and non-pathogenic fungi.
3. Isolation and identification of fungal plant pathogen from leaves, stems and other aerial parts of the plants.
4. Study of the symptoms and life cycle of important plant disease caused by fungi of classes – Myxomycetes, Oomycetes, Phycomycetes, Zygomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes
5. Study of the vegetative and reproductive structures of following genera through temporary and permanent slides: *Mucor*, *Saccharomyces*, *Penicillium*, *Agaricus* and *Alternaria*
6. Purification and preservation of pure cultures of common algae and fungi.
7. Identification of edible and poisonous mushrooms.
8. Isolation and identification of blue-green algae from pond water.
9. Isolation and identification of algae from soil.
10. Determination of algal growth by counting, Estimation of polysaccharides of *Nostoc*, *Volvox*.
11. Demonstration of photosynthesis by algae.

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Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI017C	Virology	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO 1 Understand the history, classification, morphology of virus.
- CO2 Understand the Bacteriophage and plant viruses.
- CO 3 Understand the animal viruses, plant virus transmission and cultivation of viruses.
- CO 4 Understand the Oncogenic and new emerging viruses in society.
- CO 5 Applying the Preventive and control of viral diseases.

#### Unit I

Brief history on discovery of virus. Nomenclature and classification (LHT and as per VII report of the international committee on taxonomy of viruses) Distinctive properties of virus. Morphology and ultrastructure (capsid, envelop and viral genome, their types and structure).

#### Unit II

Virus related agents (viroids, Prions) Bacteriophage, (structural organization life cycle.) Plant Virus: Classification and nomenclature, lytic and lysogenic cycle of reproduction, general symptom and effect of virus on plant (paddy, tomato and sugarcane).

#### Unit III

Animal viruses: Classification and nomenclature. Epidemiology, replication, pathogenicity prevention and treatment of RNA virus; Picorna virus, Rhabdovirus, HIV virus, Influenza Virus and DNA virus; Pox virus, Herpes virus, Hepatitis virus. Transmission of plant virus. Virus of cyanobacteria and fungi. Cultivation of virus on embryonated eggs, experimental animals and cell cultures

#### Unit IV

Oncogenic and emerging viruses: Introduction to oncogenic viruses. Types of oncogenic DNA and RNA viruses: Concepts of oncogenes and proto-oncogenes. Emerging viruses, their management and control strategies: H1N1, Chikungunya, Dengue, Ebola, Zika and Nipah virus, Covid 19.

#### Unit V

Prevention and control of viral diseases: Antiviral compounds and their mode of action: AZT, aciclovir, ganciclovir. Interferons and their mode of action. General principles of viral vaccines: live attenuated vaccines, inactivated viral vaccine, subunit vaccine, recombinant viral vaccine.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course	Program Outcome
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Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	0	0	2	3	1	1
CO2	2	3	1	2	2	3	1
CO3	3	3	2	1	2	2	1
CO4	3	2	2	2	3	2	1
CO5	2	0	1	3	3	1	1

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:-

1. Dimmock NJ, and Primrose SB., Introduction to Modern Virology. 4<sup>th</sup> edition 1994, Blackwell Science Ltd.
2. Dimmock, NJ, Easton, AI., Leppard, KN, Introduction to Modern Virology. 6<sup>th</sup> edition, 2007, Blackwell Publishing Ltd.
3. Carter J and Saunders V, Virology: Principles and Applications, 2007, John Wiley and Sons.
4. Flint SJ, Enquist, LW, Krug, RM, Racaniello, VR, Skalka, AM Principles of Virology, Molecular biology, Pathogenesis and Control. 2<sup>nd</sup> edition, 2004, ASM press Washington DC.
5. Levy JA, Conrat HF, Owens RA., Virology. 3<sup>rd</sup> edition, 2000, Prentice Hall publication.
6. Wagner EK, Hewlett MJ., Basic Virology, 2<sup>nd</sup> edition, 2004, Blackwell Publishing.
7. Mathews., Plant Virology, 2004, Hull R. Academic Press, New York.
8. Nayudu MV., Plant Viruses, 2008, Tata McGraw Hill, India.
9. Bos L., Plant viruses-A text book of plant virology by 1999. Backhuys Publishers.
10. Versteeg J., A Color Atlas of Virology, 1985, Wolfe Medical Publication.

#### Virology Lab (BMI018C)

1. Demonstration of the diseases of plants caused by viruses viz. Tobacco Mosaic Disease and Cucumber Mosaic disease.
2. Demonstration of the human diseases caused by viruses viz. AIDS, Mumps, Small pox and Chicken pox etc.
3. Demonstration of different types of plant viruses.
4. Demonstration of different types of animal viruses.
5. Cultivation of animal viruses in embryonated eggs.
6. Demonstration of Plaque test for the bacteriophages.
7. Case study of Pandemic COVID-19, MERS-CoV, Ebola virus disease, Zika virus disease, H1N1 Swine Flu disease, AIDS

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI029C	Microbial Physiology	4	1	4	2	5

#### Course outcome (CO)

*Rashmi* *Arul* *R* *MSD*

On completion of the course, students are able to:

- CO1-Understand the nutrition type and transport of nutrients in microorganism.
- CO2-Understand the different physiological pathways and cycles in microbes.
- CO3-Analyze the chemolithotrophy and photosynthesis in bacteria.
- CO4-Analyze the assimilation and disassimilation of nitrogen bacteria in environment.
- CO5-Apply the environmental trends on bacterial growth.

#### Unit I

Microbial growth in response to nutrition and energy – Autotroph/Phototroph, heterotrophy, Chemolithoautotroph, Chemolithoheterotroph, Chemoheterotroph, Chemolithotroph, photolithoautotroph, Photoorganoheterotroph. Passive and facilitated diffusion. Primary and secondary active transport, concept of uniport, symport and antiport Group translocation Iron uptake

#### Unit II

Concept of aerobic respiration, anaerobic respiration and fermentation Sugar degradation pathways i.e. EMP, ED, Pentose phosphate pathway TCA cycle. Electron transport chain: components of respiratory chain, comparison of mitochondrial and bacterial ETC, electron transport phosphorylation, uncouplers and inhibitors. Fermentation - Alcohol fermentation and Pasteur effect; Lactate fermentation (homofermentative and heterofermentative pathways), concept of linear and branched fermentation pathways.

#### Unit III

Introduction to aerobic and anaerobic chemolithotrophy with an example each. Hydrogen oxidation (definition and reaction) and methanogenesis (definition and reaction). Introduction to phototrophic metabolism - groups of phototrophic microorganisms, anoxygenic vs. oxygenic photosynthesis with reference to photosynthesis in green bacteria, purple bacteria and Cyanobacteria.

#### Unit IV

Anaerobic respiration with special reference to dissimilatory nitrate reduction (Denitrification; nitrate/nitrite and nitrate/ammonia respiration; fermentative nitrate reduction). Introduction to biological nitrogen fixation Ammonia assimilation. Assimilatory nitrate reduction, dissimilatory nitrate reduction, denitrification.

#### Unit V

Definitions of growth, measurement of microbial growth, Batch culture, Continuous culture, generation time and specific growth rate, synchronous growth, diauxic growth curve. Microbial growth in response to environment - Temperature (psychrophiles, mesophiles, thermophiles, extremophiles, thermotolerants, psychrotrophs), pH (acidophiles, alkaliphiles), solute and water activity (halophiles, xerophiles, osmophilic), Oxygen (aerobic, anaerobic, microaerophilic, facultative aerobe, facultative anaerobe), barophilic.



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	1	3	2	0
CO2	3	3	0	0	2	2	1
CO3	2	1	0	1	3	3	0
CO4	2	2	1	0	3	2	0
CO5	2	1	0	1	2	2	1

3 = Highly Related; 2 = Medium; 1 = Low

**Suggested Reading:**

1. Devlin R. M. and Witham F. H., Plant Physiology. 4<sup>th</sup> edition, 1987, Belmont; Calif.; Wadsworth
2. Gottschalk G., Bacterial Metabolism, 2<sup>nd</sup> edition, 1986, Springer
3. Madigan M. T., Martinko J. M. and Parker J., Brock Biology of Microorganisms. 11<sup>th</sup> edition, 2005, Pearson/ Benjamin Cummings.
4. Moat A. G., Foster J. W., Spector M. P., Microbial Physiology. 4<sup>th</sup> edition, 2002, John Wiley & Sons.
5. Reddy S. R. and Reddy S. M., Microbial Physiology, 2008, Scientific Publishers India.
6. Stanier R. Y., Ingraham J. L., Wheelis M. L. and Painter P. R., General Microbiology, 5<sup>th</sup> edition, 2005, McMillan
7. Willey J. M., Sherwood L. M., Woolverton C. J., Prescott, Harley and Klein's Microbiology, 9<sup>th</sup> edition, 2014, McGraw Hill Publishers.

**Microbial Physiology Lab (BMI030C)**

- 1) Demonstration of effect of temperature on bacterial growth.
- 2) Demonstration of effect of pH on bacterial growth.
- 3) Demonstration of effect of salt/sugar concentration on bacterial growth.
- 4) Demonstration of metals on bacterial growth.
- 5) Amylase production test.
- 6) Effect of nitrogen sources on growth of *E. coli*.
- 7) Demonstration of alcoholic fermentation.
- 8) Measurement of bacterial growth by turbidity measurements.
- 9) Preparation of growth curve for bacterial growth in a batch culture and calculate the mean generation time (doubling time).
- 10) Demonstration of the thermal death time and decimal reduction time of *E. coli*.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
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BMI138A	Research Methodology	4	0	4	0	4
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### Course outcome (CO)

On completion of the course, students are able to:

- CO1-Understand the problem, significance and approaches of research
- CO2- Understand the concept of review paper writing and gap in research
- CO3- Understand the IPR in research publication
- CO4- Understand the writing methods of research articles
- CO5- Analyse the interpretation of results data with statistical tools.

### UNIT I

Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Defining and formulating the research problem, selecting the problem, necessity of defining the problem

### UNIT II

Importance of literature review in defining a problem, literature review-primary and secondary sources, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

### UNIT III

Ethics-ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, copy right, royalty, scholarly publishing-citation and acknowledgement, plagiarism, reproducibility and accountability.

### UNIT IV

Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

### UNIT V

Meaning of interpretation, technique of interpretation, precaution in interpretation, tools used in interpretation of data. Software used to analyze data (SPSS, GraphPad Prism).

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	3	2	1	2
CO2	3	3	2	2	3	3	2
CO3	3	2	2	3	3	3	3
CO4	1	3	3	2	3	3	2
CO5	3	2	2	3	2	2	3

3 = Highly Related; 2 = Medium; 1 = Low

**Suggested Readings:**

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes.
4. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
5. Wadehra, B.L. 2000. Law relating to patents, trade marks, copyright designs and geographical indications. Universal Law Publishing.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI022C	Microbial Genetics	4	1	4	2	5

**Course outcome (CO)**

On completion of the course, students are able to:

CO1-Understand the organization of prokaryotic Genomes.

CO2-Undersatnd the process and mechanism of genetic exchange.

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- CO3-Understand the molecular mechanism of gene regulation in prokaryotes.  
 CO4-Understand the different cycles of bacteriophages.  
 CO5-Understand the different aspects of bacteriophage genetics.

### Unit I

Prokaryotic Genomes - Physical organization of bacterial genomes (Structure of the bacterial nucleoid, Replication and partitioning of the bacterial genome and Genome of Archaea). Mutations and mutagenesis: Definition and types of Mutations, Physical and chemical mutagens.

### Unit II

Mechanism of genetic exchange : Plasmid, Types of plasmids (F Plasmid : a Conjugate plasmid, Mobilization of Non-conjugative plasmid, R plasmid, Col plasmid Copy number and incompatibility), Episomes. Transposable elements (Insertion sequence and transposons, Integrins and Antibiotic-Resistance cassettes, Multiple Antibiotic Resistant bacteria, Mu-virus);

### Unit III

Molecular Mechanism of gene regulation in prokaryotes - Transcriptional regulation in prokaryotes (inducible and repressible system, positive regulation and negative regulation); Operon concept - lac, trp, Ara operons. Bacterial Genetics (Mutant phenotype, DNA mediated Transformation; Conjugation (Cointegrate Formation and Hfr Cells, Time-of-Entry Mapping, F' Plasmid); Transduction (Generalized transduction, Specialized Transduction)- gene mapping.

### Unit IV

Bacteriophages: Stages in the Lytic Life Cycle of a typical phage, Properties of a phage infected bacterial culture, Specificity in phage infection, E. coli Phage T4, E.coli Phage T7, E.coli phage lambda, Immunity to infection, Prophage integration, Induction of prophage, Induction & Prophage excision, Repressor, Structure of the operator and binding of the repressor and the Cro product, Decision between the lytic and lysogenic Cycles, Transducing phages, E.coli phage phiX174, The lysogenic Cycle.

### Unit V

Bacteriophage Genetics - Benzer's fine structure of gene in bacteriophage T4 : Plaque Formation and Phage Mutants, Genetic recombination in the lytic cycle, (concept of recon, muton, cistron).

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	2	1	2	3
CO2	3	2	1	2	1	2	1
CO3	2	2	1	2	0	1	1
CO4	1	3	1	0	1	2	0



CO5	1	1	3	2	1	0	1
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3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Gardner, E.J., Simmons, M.J., Snustad, D.P., 8<sup>th</sup> edition, 2008, Principles of Genetics, Wiley India
2. Karp G, Cell and Molecular Biology, 4th edition, 2005, John Wiley and Sons
3. Elliott W H and Elliot D C, Biochemistry and Molecular Biology, 3<sup>rd</sup> edition, 2005, Oxford University Press
4. Malacinski G.M. and Freifelder D., Essentials of Molecular Biology, 3<sup>rd</sup> edition, 1998, Jones and Bartlett Publishers
5. Scheeler P. and Bianchi D.E., Cell and Molecular Biology, 3<sup>rd</sup> edition, 1987, John Wiley and Sons
6. Maloy S.R., Cronnan J.E., Freifelder D., Microbial Genetics, 2<sup>nd</sup> edition, 1994, Jones and Bartlett Publishers

#### Microbial Genetics Lab (BMI023C)

- 1) Isolation of antibiotic resistant bacteria population by gradient plate method.
- 2) Isolation of antibiotic resistant mutants by Replica plating technique.
- 3) Demonstration of genetic recombination in bacteria by conjugation.
- 4) UV-induced auxotrophic mutants production and isolation of the mutants by replica plating.
- 5) Demonstration of genetic recombination in bacteria by transduction.
- 6) Demonstration of genetic recombination in bacteria by transformation.
- 7) Demonstration of carcinogens/mutagens by the Ames test.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI024B	Biostatistics	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1-Evaluate the frequency distribution by data and graphical methods.  
 CO2- Evaluate the measure of central tendency.  
 CO3- Evaluate the dispersion from the data.  
 CO4- Evaluate the statistical inference tools.  
 CO5- Evaluate the correlation and regression analysis.

#### Unit I

Introduction, Definition, Functions, scope and application of biostatistics. Understanding the concepts of descriptive and inferential statistics. Frequency distribution, Collection of data : Primary and secondary data, tabulation of data, discrete and continuous series. Graphical presented : Types of diagrams, Graphs of frequency distribution- Bar diagrams, Histogram, frequency Polygon, smooth frequency curve, Ogives.

### Unit II

Measures of Central Value, Introduction, Definition and Limitation of Average; Mathematical Average—Mean; Arithmetic, Geometric, Harmonic and Positional Average- Mode, Median.

### Unit III

Measures of Dispersion, Introduction, Definition, various measures of variation; Range, Quartile deviation, Mean Deviation, Standard Deviation, Variance.

### Unit IV

Statistical Inference, Testing of Hypothesis ; Procedure, test of significance of mean; Standard error of mean and standard deviation ; student's 't' test , chi-square test.

### Unit V

Correlation, Introduction, definition, kinds- negative, positive and zero correlation, coefficient of correlation, methods of studying correlation-scatter diagram, Graphical method, Karl pearson's coefficient of correlation. Regression Analysis, Introduction, definition, regression equation, regression lines and regression coefficients.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	2	2	1	2	2
CO2	1	2	3	1	0	3	1
CO3	1	3	2	1	0	2	1
CO4	1	2	3	2	0	3	1
CO5	1	3	3	2	1	3	2

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Edmondson and Druce D., Advanced Biology Statistics, 1996, Oxford University Press;.
2. Danial W., Biostatistics: A foundation for Analysis in Health Sciences, 2004, John Wiley and Sons Inc.
3. Gupta S.C. and Kapoor V.K., Fundamental of mathematical Statistics, 2017, sultan chand & sons
4. Sundar Rao P.S.S. and Richard J., Introduction to biostatistics and research methodology, 5<sup>th</sup> edition, 2012, PHI Learning Pvt. Ltd.
5. Banarjee P.K. , Introduction to biostatistics, 3<sup>rd</sup> edition, 2006, S. Chand Publication, India
6. Rastogi V.B. Biostatistics, 3<sup>rd</sup> revised edition, 2015, Rastogi publication

#### Biostatistics Lab (BMI025B)

- 1) Construction of frequency tables.
- 2) Exercises on data interpretation using histograms, polygons and pie- charts.
- 3) Exercises on Airthematic mean, geometric mean and harmonic mean
- 4) Exercises on median.
- 5) Exercises on mode.



- 6) Exercises on the testing of hypothesis using student t test.
- 7) Exercises on the testing of hypothesis using Chi-square test.
- 8) Exercises on computing correlation coefficient.
- 9) Exercises on computing regression coefficient.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI078A	Agriculture and Veterinary Microbiology	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

CO1-Understanding of the multifarious roles of microorganisms in soil, in association with plants and thus in the field of agriculture.

CO2-Understand the Importance of agriculture in national economy and cultivation of various crops.

CO3-Understand the role of Major pests and diseases of rice, wheat, cotton, chickpea, sugarcane and their management

CO4-Understand the animal diseases with respect to etiology, symptoms, mode of transmission, prophylaxis and control.

CO5-Understand the importance of Elementary Livestock Handling.

#### Unit-I

History of Agricultural Microbiology; Microbes and their importance in maintenance of soil, Biogeochemical cycles, role of microbes in maintaining the fertility of soil. Bio fertilizers – Bacterial, - Azotobacter and vermiform compost. Soil microorganism –association with vascular plants- phyllosphere, Rhizobium, Rhizoplane associative nitrogen fixation. Biofertilizers- Cyanobacterial and Azolla.

#### Unit -II

Importance of agriculture in national economy; basic principles of crop production; cultivation of rice, wheat, chickpea, pigeon-pea, sugarcane, groundnut, tomato, and mango. Major soils of India; role of NPK and their deficiency symptoms. Elementary knowledge of growth, development, photosynthesis, respiration and transpiration; Elements of economic botany

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### Unit – III

Major pests and diseases of rice, wheat, cotton, chickpea, sugarcane and their management. Organic farming; bio-fertilizers; bio-pesticides. Recombinant DNA technology; transgenic crops. Important rural development programmes in India; organizational set up of agricultural research, education and extension in India. Elements of statistics.

### Unit IV

Study of following animal diseases with respect to etiology, symptoms, mode of transmission, prophylaxis and control: FMD, swine flu, bird flu, Rabies, bovine tuberculosis, Marek's, ranikhet, brucellosis, distemper

### Unit V

Elementary Livestock Handling: An overview of animal behaviour, Common tools used for animal control; Restraint and handling of animals, Nutrition Principles of animals nutrition; Nutritional importance of carbohydrates, lipids, proteins, vitamins, minerals and water; Feeds and fodders; Scientific feeding of livestock.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	3	1	1
CO2	2	1	2	1	2	2	1
CO3	3	1	1	2	3	3	2
CO4	2	3	2	2	2	1	3
CO5	2	1	3	1	1	1	1

### Suggested Readings:

1. Stanbury, PF., Principles of Fermentation Technology. Whittaker, A and Hall, S.J 2<sup>nd</sup> Edition. Pergamon Press (1995).
2. Banwart, GJ. Basic Food Microbiology. CBS Publishers and Distributors, Delhi. (1989).
3. Hobbs BC and Roberts D. Food poisoning and Food Hygiene. Edward Arnold (A division of Hodder and Stoughton) London.
4. Joshi. Biotechnology: Food Fermentation Microbiology, Biochemistry and Technology. Volume 2.



5. Arora MP. 1995. Animal Behaviour. WB London. Bouenger EG. 1994.
6. Animal Behaviour. WB London. Fraser AF & Broom DM. 1997.
7. Farm Animal Behaviour and Welfare. CABI. Fraser AF & Broom DM. 1999.

#### **Agriculture and Veterinary Microbiology Lab (BMI079A)**

- 1) MBRT of milk samples and their standard plate count.
- 2) Alkaline phosphatase test to check the efficiency of pasteurization of milk.
- 3) Various livestock farming units and their economic analysis.
- 4) Evaluation of different farming systems and their economic importance.
- 5) Analysis of breeding, feeding, housing - Disease control management.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI076A	Genetic Engineering	4	1	4	2	5

On completion of the course, students are able to:

CO1- Understand the various tools and methods used in genetic engineering.

CO2- Understand that how genetic tools useful in cloning and genetic transformation.

CO3- Understand the cloning vectors uses, its formation and various types of vectors used in genetic engineering.

CO4- Understand the DNA amplification technique through PCR and DNA sequencing technique.

CO5- Apply the knowledge of genetic engineering in Gene delivery and production of transgenic progeny's.

#### **Unit I**

Introduction to genetic engineering: Milestones in genetic engineering and biotechnology

Restriction modification systems: Mode of action, applications of Type II restriction enzymes in genetic engineering. DNA modifying enzymes and their applications: DNA polymerases.

Terminal deoxynucleotidyl transferase, kinases and phosphatases, and DNA ligases

#### **Unit II**

Cloning: Use of linkers and adaptors: Transformation of DNA: Chemical method, Electroporation. Methods of DNA, RNA and Protein analysis: Agarose gel electrophoresis, Southern - and Northern - blotting techniques, dot blot, DNA microarray analysis, SDS-PAGE, and Western blotting

#### **Unit III**

Cloning Vectors: Definition and Properties Plasmid vectors: pBR and pUC series Bacteriophage lambda and M13 based vectors Cosmids, BACs, YACs Expression vectors: E.coli lac and T7 promoter-based vectors, yeast YIp, YEp and YCp vectors, Baculovirus based vectors,

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mammalian SV40-based expression vectors

#### Unit IV

DNA Amplification and DNA sequencing: PCR: Basics of PCR, RT-PCR, Real-Time PCR  
Genomic and cDNA libraries: Preparation and uses, Genome sequencing Sanger's method of  
DNA Sequencing: traditional and automated sequencing

#### Unit V

Application of Genetic Engineering: Gene delivery: Microinjection, electroporation, biolistic  
method (gene gun), liposome and viral mediated delivery, *Agrobacterium* - mediated delivery.  
Products of recombinant DNA technology: Products of human therapeutic interest - insulin,  
hGH, antisense molecules. Bt transgenic - cotton, brinjal, flavosavo tomato, Gene therapy,  
recombinant vaccine, protein engineering.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	2	1	1
CO2	2	2	2	2	1	2	2
CO3	2	3	3	1	2	2	1
CO4	3	3	2	1	3	1	1
CO5	2	2	3	2	3	1	1

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Reading:

1. Benjamin Lewin, Gene VII, Oxford University Press, (2000).
2. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter, Molecular biology of the Cell, 4th Edition. Garland publishing Inc. (2002).
3. Darnell, Lodish and Baltimore, Molecular Cell Biology, Scientific American Publishing Inc. (2000).
4. Watson J.D, Baker T.A, Bell S.P, Gann A, Levine M, Losick R, Molecular Biology of Gene, 5th Edition. The Benjamin/Cummings Pub. Co. Inc. (2003).
5. David Frifielder, Stanely R. Maloy, Molecular biology and Microbial genetics. 2nd Edition, Jones and Barlett Publishers. (1994)
6. Brown T.A., Gene Cloning and DNA analysis. 2nd Edition, ASM press. (2004).
7. Sandy Primrose. Principles of Gene Manipulation and Genomics. 7th Ed., Blackwell Publishers. (2006).
8. Glick BR and Pasternak JJ, Molecular Biotechnology, 2nd Ed. ASM press. (2003).
9. Uldis N. Streips, Ronald E. Yasbin. Modern Microbial Genetics. 2nd Edition Wiley-Liss, Inc. (2002).
10. Desmond S. T. Nicholl. An Introduction to Genetic Engineering. Cambridge University Press; (2008)

#### Genetic Engineering Lab (BMI077A)

- 1) Isolation of Plasmid DNA from *E.coli*.



- 2) Digestion of DNA using restriction enzymes and analysis by agarose gel electrophoresis
- 3) Ligation of DNA fragments
- 4) Interpretation of sequencing gel electropherograms
- 5) Designing of primers for DNA amplification
- 6) Amplification of DNA by PCR
- 7) Demonstration of Southern blotting

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI047A	Project Work on Microbiology of Societal Importance	-	-	-	-	6

Course learning outcomes: By the conclusion of this course, the students:

**Outcome 1.** Have developed a very good understanding of areas where microbiology has social importance.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOME:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	3	3	3

### Discipline Specific Electives

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI 082A	Fundamentals of Food Microbiology	4	1	4	2	5

**Course outcome (CO)**

On completion of the course, students are able to:

CO1- Understand the food microorganism and its classification and importance.

CO2- Apply the principle of food preservation and removal of microorganism.

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CO3- Understand and analyze about microorganism responsible for food contamination and spoilage.

CO4- Analyze the food infection and intoxication.

CO5- Understand and apply the health standard, fermentation of food and, disposal and treatment process.

#### Unit I

Microorganisms important in food microbiology; Molds, yeasts and bacteria - General Characteristics - Classification and importance, Nutritional requirements of bacteria and fungi.

#### Unit II

Principles of food preservation - Asepsis - Removal of micro organisms, anaerobic conditions - High temperature - Low temperature - Drying - Food additives

#### Unit III

Contamination and spoilage - Cereals, sugar products, vegetables and fruits, meat and meat products, milk and milk products - Fish and sea food - Poultry, Spoilage of canned foods. Spoilage and defects of fermented dairy products - oriental fermented foods

#### Unit IV

Food borne infections and intoxications - bacterial, non -bacterial - Food borne disease outbreaks, Laboratory testing, preventing measures, Food sanitation, plant sanitation

#### Unit V

Employees' health standards, waste treatment and disposal, quality control, Food fermentations : Bread cheese, vinegar, fermented vegetables, fermented dairy products

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	2	3	0	0
CO2	0	0	1	1	0	1	3
CO3	3	0	0	3	0	0	2
CO4	0	0	0	0	0	3	1
CO5	2	0	0	0	0	1	0

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Adams MR and Moss MO, Food Microbiology, Revised edition, 2008, New Age International (P) Limited Publishers, New Delhi, India.
2. Banwart JM, Basic Food Microbiology. 2<sup>nd</sup> edition, 2004, CBS Publishers and Distributors, Delhi, India.
3. Davidson PM and Brannen AL, Antimicrobials in Foods. 1993, Marcel Dekker, New York.
4. Dillion VM and Board RG, Natural Antimicrobial Systems and Food Preservation, 1996, CAB International, Wallingford, Oxon.

5. Frazier WC and Westhoff DC, Food Microbiology. 3rd edition, 1992, Tata McGraw-Hill Publishing Company Ltd, New Delhi, India.
6. Gould GW. New Methods of Food Preservation, 1995, Blackie Academic and Professional, London.
7. Jay JM, Loessner MJ and Golden DA, Modern Food Microbiology. 7<sup>th</sup> edition, 2005, CBS Publishers and Distributors, Delhi, India.
8. Lund BM, Baird Parker AC, and Gould GW, The Microbiological Safety and Quality of Foods. Vol.1-2, 2000, ASPEN Publication, Gaithersburg, MD.
9. Tortora GJ, Funke BR, and Case CL, Microbiology: An Introduction. 9<sup>th</sup> edition, 2008, Pearson Education.

#### **Fundamentals of Food Microbiology Lab (BMI083A)**

- 1) Determination of quality of milk sample by methylene blue reductase test.
- 2) Detection of number of bacteria in milk by standard plate count (SPC).
- 3) Alkaline phosphate test to check the efficiency of pasteurization of milk.
- 4) Production of yogurt/curd.
- 5) Isolation of spoilage microorganisms from spoiled milk.
- 6) Isolation of spoilage microorganisms from spoiled fruits and vegetables.
- 7) Isolation of spoilage microorganisms from spoiled bread.
- 8) Production of bread.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI084A	Food Chemistry	4	1	4	2	5

#### **Course outcome (CO)**

On completion of the course, students are able to:

- CO1 Understand the properties and reactions of carbohydrates, lipids and proteins during storage and processing of foods and the effect of these on the quality and property of foods.
- CO2 Analyze the main factors influencing the colour and flavour of food.
- CO3 Understand the composition of foods and the effect of these factors on foods.
- CO4 Evaluate large scale and profit motivated production of microorganisms or their products for direct use or as inputs in the manufacture of other products.
- CO5 Understand the process of browning reactions in food.

#### **Unit I**

Introduction to Chemistry of Foods : Carbohydrates Composition and factors affecting composition of foods - Moisture in foods and determination of moisture - Carbohydrates - Chemistry of cellulose, starches, other polysaccharides - starch enzymes, Gel formation and

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starch degradation - Pectic substances, their occurrence structure, properties and use in foods - Plant acids, acidity, taste

## Unit II

Classification of proteins, physical and chemical properties of proteins, functional properties of proteins in foods, hydrolysis of proteins - Major food - Proteins and their sources, Changes in proteins during processing - Determination of Proteins

## Unit III

Physical and chemical properties of fats, rancidity and flavour reversion, processing of oil bearing materials, refining of oils and fats, fat hydrolysis and inter-esterification, hydrogenation, shortenings and spreads - Emulsions, Definition, surface activity, surface film theory of emulsions, properties and types of emulsions, emulsifying agents, their chemistry during processing - Essential oils, Chemistry of occurrence, Extraction - Terpene oils and their use in foods.

## Unit IV

Cereals: Cereal varieties and their suitability for processing - Structure of wheat, rice - Chemical compositions and nutritional values of prominent cereals; Distribution of vitamins, proteins, minerals, carbohydrates and fats in different grains Pulses: Nutritional value of prominent pulses (Moong, Redgram, lentil, black gram and soyabeans) Oilseeds: Chemical composition and nutritional value of prominent oilseeds (Sunflower mustard, cotton seed, ground nut, cashewnut and coconut) - Distribution of vitamins, proteins, minerals, carbohydrates and fats in different oilseeds

## Unit V

Browning Reactions in Foods, Nonenzymatic Browning, Pigment Formation, Melanoidin - Maillard Polymers, Caramelization, Ascorbic Acid Oxidation, Antioxidant Activity of Nonenzymatic Browning Products, Inhibition of nonenzymatic browning.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	1	1	2	1
CO2	2	2	1	0	0	1	2
CO3	3	1	2	1	1	1	2
CO4	2	2	1	0	1	1	3
CO5	3	3	2	1	0	2	1

3 = Highly Related; 2 = Medium; 1 = Low

### Suggested Readings:

1. Food Science and experimental foods, Swaminathan, N. (1987) Ganesh Publications, Madras.
2. Food chemistry, Meyer L.M.(1969) Van Nustrand Reinhold co., New York.
3. Foundations of Food Preparation, Peckham, C.G. (1979),The Macmillan co., London.
4. Food Theory and Applications, Paul P.C. and Palmer H.H. (1972), John wiley and Sons, New York.
5. The experimental study of foods, Griswald R.M. (1962), Houghton, Muffin Co., New York.
6. Introductory foods, Bennion M. and Hughes, D. (1975), Macmillan publishing Co., New York.
7. Food facts and principles, SakuntalaManay and shadaksaraswamy, M (1987) Allied Publishers, New Delhi.

#### **Food Chemistry Lab (BMI085A)**

1. Systematic identification of biomolecules – Qualitative tests for amino acids and protein - Biuret test, Millon's test, Nitroprusside test, Ninhydrin test, Sakaguchi test.
2. Qualitative test for carbohydrates - Molisch's test, Bial's test, Benedicts test, Barfoeds test, Fehlings test, Seliwanof's test, Mucic acid test, Iodine test.
3. Qualitative test for Lipids - acrolein test, test for saturation, test for unsaturation, saponification test
4. Qualitative test for NPN substances - Urease test, Phosphotungstic acid test, Jaffes test, Uric acid test.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI086A	Food Packaging Technology	4	1	4	2	5

#### **Course outcome (CO)**

On completion of the course, students are able to:

CO1 Understand the fundamentals of packaging technology.

CO2 Understand the safety evaluation of materials used for packing.

CO3 Apply and examine the knowledge of properties for selection of packaging materials for foods & food product.

CO4 Analyze the different techniques of food packaging.

CO5 Understand the packaging equipments and machinery.

#### **Unit I**

Introduction of Food packaging - Need of food packaging - Role of packaging in extending shelf life of foods - Designing of package materials - Testing of package materials - Testing of

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package performance - Principles in the development of safe and protective packing - Safety assessment of food packaging materials

### Unit II

Food packaging systems, product characteristics and package requirements - Introduction of food packaging system - Different forms of packaging - Rigid, semi-rigid, flexible forms of packaging - Different packaging system for-Dehydrated foods, Frozen foods, Dairy products, Fresh fruits, Vegetables, Meat, Poultry, Sea foods

### Unit III

Types of packaging materials their characteristics and uses - Use of paper as a packaging material-Pulping - Fibrillation, Beating, Types of papers ,Testing methods - Use of glass as a packaging material-Composition, Properties, Types, Methods of bottle making - Use of metals as a packaging material - Tinsplate containers, Tinning process, Components of tinsplate, Tin free steel (TFS), Types of cans, Aluminium containers, Lacquers - Use of plastics as a packaging material-Types of plastics, Plastic films, laminated plastic materials, Co-extrusion

### Unit IV

Package accessories and advances in Packaging technology-Introduction - Active packaging - Modified atmosphere packaging-Controlled atmosphere packaging - Aseptic packaging - Packages for microwave ovens - Biodegradable plastics - Edible gums - Coatings

### Unit V

Packaging equipment and machinery- Vacuum packaging machine - CA & MA packaging machine - Gas packaging machine - Seal and shrink packaging machine - Form & fill sealing machine - Aseptic packaging systems - Retort pouches - Bottling machines - Carton making machines - Package printing machines

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	1	2	1	2
CO2	1	1	1	2	1	2	1
CO3	2	2	3	1	2	1	2
CO4	1	1	1	2	1	1	2
CO5	2	2	3	1	1	1	1

3 = Highly Related; 2 = Medium; 1 = Low

### Suggested Readings:

1. Srilakshmi,B.,2005, Food Science., New Age International (P) Limited., New Delhi.
2. Subalakshmi, G and Udipi, S.A, 2001, Food processing and preservation. New Age International Publishers, New Delhi.
3. Potter, N. N, Hotchkiss, J. H, 2000 Food Science. CBS Publishers, New Delhi.

4. Manay, N.S, Shadaksharaswamy, M.,2004, Foods- Facts and Principles, New Age International Publishers, New Delhi
5. Miquel Angelo P R C, Ricardo Nuno C P, Oscar Leandro D S R, Jose Antonio C T, Antonio Augusto V , 2016, Edible Food Packaging: Materials and Processing Technologies, CRC Press. Taylor & Francis ,Boca Raton , FL
6. Luciano P, Sara L,2016, Food Packaging Materials, Springer cham Heidelberg, New York
7. Robertson, G.L. 2006 Food Packaging: Principles and Practice (2nd ed.), Taylor & Francis
8. NIIR. (2003). Food Packaging Technology Handbook, National Institute of Industrial Research Board, Asia Pacific Business Press Inc.

#### **Food Packaging Technology Lab (BMI087A)**

- 1) To measure the thickness of a paper and paper boards used in packaging
- 2) To measure water absorption capacity of packaging paper
- 3) To measure the bursting strength of a packaging paper
- 4) To determine the static and dynamic tensile strength of a packaging paper
- 5) Determination of water vapour permeability (WVTR) of packaging material.
- 6) To find the amount of coating in a tin plate
- 7) Determination of a gas transmission rate of packaging material

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI088A	Food Quality and Foodborne Diseases	4	1	4	2	5

#### **Course outcome (CO)**

On completion of the course, students are able to:

- CO1- Evaluate the different sensory methods used for the quality determination of various foods.  
 CO2- Perform various tests to detect the presence of adulterants in foods.  
 CO3- Understand the various food laws and standards.  
 CO4- Understand the various lab practices in food quality  
 CO5- Understand the importance of Quality Control and Quality Assurance.

#### **Unit I**

Bacterial : Food Poisoning by *Staphylococcus*, *Clostridium perfringens*, *Clostridium botulinum*, *Salmonella*, *Brucella*, *E. coli*, *Shigella*, *Bacillus cereus*, *Yersinia enterocolitica*, *Vibrio cholerae*, *Listeria monocytogenes* - Fungi – Mycotoxins – Aflatoxin, ochratoxin, trichothecenes, Roquefortine. – Protozoas : *Entamoeba histolytica*, *Giardia*; Seafood Toxicants: Shellfish

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poisoning – ciguatera poisoning – scombroid fish poisoning - viral gastroenteritis, infectious hepatitis, poliomyelitis, Viral Diarrhoea – Rotavirus – Norwalk virus Control of food borne diseases

### Unit II

Sensory evaluation - definition and importance of sensory evaluation in relation to consumer acceptability and economic aspects-factors affecting food acceptance-terminology related to sensory evaluation - scoring procedures: types of tests -panel selection-screening and training of judges-requirement of sensory evaluation-sampling procedures-factors affecting sensory measurements. Chemical methods used in quality evaluation-Moisture, PR, HM, TVBN, Peroxide value, Acidity/ acid value detection of adulterants, Microbiological evaluation

### Unit III

Food laws and standards - Food regulations, grades and standards - Food safety objectives - National food legislation/ authorities and their role - product certifications: ISI mark of BIS, AGMARK, FPO, MFPO, international organization and agreements-food and agricultural organization (FAO), Concept of Codex Alimentarius/HACCP /USDA/ISO 9000 series /ISO22000 / Government regulatory practices and policies/FDA perspectives / PFA act and rules – Food Packaging and labelling

### Unit IV

Introduction, principles of sanitation, sanitation chemicals, disinfectants, sanitation methodology, sanitation procedures, CIP and COP- evaluating the effectiveness of sanitation programmes - Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP) in pharmaceutical industry - Regulatory aspects of quality control - ISO, WHO and US certification

### Unit V

Importance and functions of quality control - Methods for quality assessment - Sterilization control and sterility testing (heat sterilization, D value, z value, survival curve, Radiation, gaseous and filter sterilization) - Sampling and specification of raw materials and finished products - Statistical quality control – A comparison of Quality Control and Quality Assurance - Use of microbiology methods in a Quality-Control system - Use of microbiology methods in a Quality Assurance system

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	1	2	1	2
CO2	1	1	1	2	1	2	1
CO3	2	2	3	1	2	1	2
CO4	1	1	1	2	1	1	2



CO5	2	2	3	1	1	1	1
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3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Read G. and Nogodwanithana (1991), Yeast Technology, 2<sup>nd</sup> Edition, AVI Book, Van Nostrand, Reinhold, New York.
2. Lee B.H. (1996), Fundamental of Food Biotechnology, VCH Publishers.
3. Goldberg I. and Williams R. (1991), Biotechnology and Food Ingredients, Van Nostrand., Reinhold, New York.
4. Joshi V.K. and Pandey A. (1999), Biotechnology: Food Fermentation Vol. 1 & 2, Education Publisher and Distributer, New Delhi.
5. Marwaha S.S. and Arora, J.K. (2000), Food Processing: Biotechnological applications, Asia tech Publishers Inc., New Delhi.
6. Frazier W. C. and Westhoff D.C. (1995). Food Microbiology. Fourth Edition. Tata McGraw Hill Publishing Company Limited, New Delhi
7. Adams M.R. and M.O. MOSS (2005). Food Microbiology. 1st edition. Reprinted, Published by New Age International (P) Limited. Publishers - New Delhi

#### Food Quality and Foodborne Diseases Lab (BMI089A)

- 1) To find out the ash in the given food sample
- 2) To find out the amount of crude protein in a given food sample
- 3) To find out the amount of crude fiber in a given food sample
- 4) Sensory Evaluation of a food product by Preference Test-Hedonic Rating Scale
- 5) Sensory Evaluation of a food product by Descriptive Rating Test- Star Diagrams
- 6) To examine total plate count of given food sample.
- 7) To identify the gut micro biota in given food sample through specific medium

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI090A	Dairy Microbiology	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1-Understand the pathogenic microorganisms transmitted through raw milk.  
CO2-Understand the preservation technique of milk

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CO3-Analyze the composition of starter cultures and their use in dairy products

CO4-Analyze the various type of disease transmitted by raw milk.

CO5-Analyze the culture dependent and culture independent techniques for quantification of microorganisms from dairy products.

#### Unit I

Composition of milk of different animals – classes of milk - Microorganisms of concern in milk - Factors influencing microbial growth in milk - antibacterial properties of milk - Scope of dairy microbiology

#### Unit II

Preservation techniques in milk and milk based products – Asepsis, removal of microorganisms, anaerobic conditions, high and low temperatures, drying, irradiation, Chemical and bio preservatives and food additives

#### Unit III

Products from milk: market milk – condensed and dry milk products – frozen desserts Fermented Dairy Products: Starter cultures: their isolation, production, maintenance, biochemical characters - Products: Cream Cheese, yogurt, butter and Indigenous dairy products of India – probiotic dairy products

#### Unit IV

Human pathogens transmitted through raw milk and other dairy products: *Bacillus cereus*, *Campylobacter jejuni*, *Escherichia coli* O157:H7, *Listeria monocytogenes*, *Salmonella spp.*, *Yersinia enterocolitica*. Diseases transmitted through milk: brucellosis, tuberculosis, Q fever

#### Unit V

Quality analysis of milk: platform tests in milk - SPC, MBRT, alkaline phosphatase test, Resazurin test, clot on boiling test, titratable acidity, butter fat content test - FSSAI standards of milk - PMO – MMPO

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	3	3	1	2
CO2	3	2	2	1	1	2	1
CO3	2	1	3	3	2	1	2
CO4	3	2	3	2	1	2	2
CO5	2	2	1	2	2	1	1

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Frazier W. C. and Westhoff D.C. (1995). Food Microbiology. Fourth Edition. Tata McGraw Hill Publishing Company Limited, New Delhi
2. Adams M.R. and M.O. MOSS (2005). Food Microbiology. 1st edition. Reprinted, Published by New Age International (P) Limited, Publishers - New Delhi
3. Robinson R.K. (2002) Dairy Microbiology: Milk and Milk Products, 3rd Edn. Wiley Publishers.
4. Banwart JM. (1987). Basic Food Microbiology. 1st edition. CBS Publishers and Distributors, Delhi, India
5. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd
6. Betty C. Hobbs, Food Microbiology, Arnold-Heinemann Publishing Private Ltd
7. Hammer B. W. and Babal, Dairy Bacteriology, Prentice Hall Incorporated
8. Jay J.M., Modern Food Microbiology, CBS Publishers and Distributors, New Delhi. India

#### **Dairy Microbiology Lab (BMI091A)**

- 1) Sensory evaluation of milk
- 2) Chemical evaluation- Moisture, PR, HM, TVBN, Peroxide value, Acidity/ acid value
- 3) Detection of adulterants.
- 4) Enumeration of coliforms in milk.
- 5) Quantitative analysis of milk by SPC.
- 6) Enumeration of MPN in milk.
- 7) Enumeration of TPC in milk.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI092A	Food Law and Standards	4	1	4	2	5

#### **Course outcome (CO)**

On completion of the course, students are able to:

- CO1 Understand the information relating to food laws and regulations.
- CO2 Understand the law making process as it applies to food and food technology.
- CO3 Understanding and interpreting information on food labels.
- CO4 Analyze the major food law legislation and its importance to current regulations.
- CO5 Analyze the the role of regulatory agencies in enforcing current food laws.

#### **Unit I**

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Introduction to food laws, prevention of food adulteration Act (PFA-1954). The preamble of act, definition, primary food, kinds of adulteration in the act, adulterated food, article held as court, misbranded food, functional responsibilities of various authority, central food laboratories, role of inspectors

### Unit II

Food safety and quality requirements. Voluntary requirement, legal requirement, mandatory provision prescribed under PFA Act 1954 and rule 1955. Enforcement of prevention of food adulteration act (PFA-1954) by state government, ministries, departments responsible for ensuring food safety and quality in India

### Unit III

Food safety and standards act 2006 (FSSA 2006) rules and regulations 2011, existing food law in India, salient features of FSSA 2016, important provision of FSSA, essential commodities act.

### Unit IV

Codex alimentarius commission(CAC) , Statutes of Codex alimentarius commission, need for harmonizing national standards with codex. WTO implication, SPS agreement, TBT agreement, relation between the codex and WTO.

### Unit V

Customs act and import control regulation, and other law related to food products, legal Metrology, provisions of weight and measures act 1976, the insecticides act 1968, Consumer Protection Act 1986, Customs Act 1962.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	3	3	1	2
CO2	3	2	2	1	1	2	1
CO3	3	1	3	3	2	1	2
CO4	3	1	3	2	1	2	2
CO5	2	2	1	2	2	1	1

3 = Highly Related; 2 = Medium; 1 = Low

### Food law and Standards Lab(BMI093A)

1. Case study of any food industry (food processing and packaging where laws applied)

### Suggested Readings:

1. Kiron Prabhakar(2016) A Practical Guide to Food Laws and Regulations.Bloomsbury india
2. Rajan Nijhawan (2016) Food Safety and Standards Act, 2006, Rules & Regulations-- II.BCO 22<sup>nd</sup> edition.
3. Virag gupta (2019) The food safety and standard act,2006 along with rules and regulations as amended upto 15 APRIL, 2019; 12<sup>th</sup> edition commercial law publishers, (India) Pvt. Ltd.
4. Adams M.R. and M.O. MOSS (2005). Food Microbiology. 1st edition. Reprinted, Published by New Age International (P) Limited. Publishers - New Delhi
5. Srilakshmi,B.,2005, Food Science., New Age International (P) Limited., New Delhi.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI094A	Microbial Toxins and Food Protection	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1 Understand the microbial toxins and contamination in food  
 CO2 Understand the food toxicity by various microbes and chemical sources.  
 CO3 Understand the general principle of food protection.  
 CO4. Understand the foods protection by physical methods.  
 CO5 Analyze the food additives role in various food

#### Unit I

Microbial toxins (endotoxin and exotoxin) and toxoids, source and chemistry of microbial toxins in contamination of food grains and food products.

#### Unit II

Food toxicology: classification, dose, determination toxins in food, naturally occurring toxins from animals, bacterial and fungal and sea food sources. Food additives as toxicants: artificial colors, preservatives, sweeteners; toxicants formed during food processing such as nitrosamines, maillard reaction products acrylamide, benzene, heterocyclic amines and aromatic hydrocarbons

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and irradiation, risk of genetically modified food, food supplements, persistent organic pollutants.

### Unit III

General principles of food protection: methods of food protection, asepsis, maintenance of anaerobic conditions, protection by use of high temperature : Thermal death time, heat resistance of microorganisms, determination of thermal death process, protection by use of low temperatures: Growth of microorganisms at low temperatures, effect of subfreezing and freezing temperatures on microorganisms.

### Unit IV

Protection by drying: methods of drying, factors in the control of drying, microbiology of dried foods, food protection with modified temperature: definition, primary effect of CO<sub>2</sub> on microorganism, the safety of Map foods, spoilage of Map and vacuum packaged meats.

### Unit V

Protection by food additives: the ideal antimicrobial protection, food additives, added preservatives, developed preservatives, protection by Radiation: Ultra Violet radiation, ionizing radiations, Gamma rays and Cathode rays, Microwave processing.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	2	1	2	0
CO2	2	2	0	1	2	1	1
CO3	3	1	2	1	1	2	1
CO4	2	2	1	0	0	1	2
CO5	3	3	2	1	0	2	1

3 = Highly Related; 2 = Medium; 1 = Low

### Suggested Readings:

1. Introductory foods, Bennion M. and Hughes, D. (1975), Macmillan publishing Co., New York.



2. Food facts and principles, Sakuntala Manay and Shadaksaraswamy, M (1987) Allied Publishers, New Delhi.
3. Microbial Biotechnology by Glazer AN & Nikaido H., 2nd Ed., Cambridge University Press, 2007
4. Molecular Biotechnology by Glick BR, Pasternak JJ & Patten CL, Ed. IV, ASM Press, 2010
5. Biotechnology: A text Book of Industrial Microbiology by Crueger W, Crueger A, 2nd Ed., Sinauer associates, Inc. 1990.

#### Microbial Toxins and Food Protection Lab (BMI095A)

- 1) Detection of microbes from spoiled meat, egg and fish.
- 2) Isolation and identification of *Salmonella*, *E. coli*, *Listeria*, *Proteus*, *Shigella* and *Vibrio* spp.
- 3) Isolation and identification of *Staphylococcus aureus* using Baird parker agar.
- 4) To determine the LD<sub>50</sub> value of common microbial toxin i.e. aflatoxin, enterotoxin.
- 5) To study the antibiotic sensitivity pattern and MIC for different food pathogen.
- 6) To isolate and determine the food spoilage psychrotrophs from frozen food.
- 7) Biochemical characterization of purified bacterial strains for identification.
- 8) Microbial analysis from the chemically preserve food material.
- 9) Detection of microbial toxin from infected food/spoiled food.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI 096A	Introduction of Medical Microbiology	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

CO1-Remember the history and classification of pathogenic and medicinally important microorganisms.

CO2-Understand general characteristic, epidemiology, pathogenicity, diagnosis, prevention and control of Tuberculosis, Typhoid, Tetanus and Leprosy.

CO3- Understand the diseases such as flu, Mumps, Measles, Polio and Hepatitis B, Malaria and Leishmaniasis

CO4- Understand the sexually transmitted diseases (STD) and remember the generation of antibiotics and their mode of action on microorganism.

CO5- Understand the Transmission of pathogens including air borne, contact transmission and vector based transmission.

### Unit I

Discovery and History of pathogenic microorganism. Contribution made by eminent scientist's related to medical microbiology. Classification of medicinally important microorganism. Normal microflora of the human body: Importance of normal microflora, normal microflora of skin, throat, gastrointestinal tract, urogenital tract.

### Unit II

Characteristic of infectious disease. Disease cycle (source of disease, reservoir, carriers). Bacterial diseases, epidemiology, pathogenicity, laboratory, diagnosis, prevention and control of Tuberculosis, Typhoid, Tetanus and Leprosy.

### Unit III

General account of viral diseases; Pneumonia, flu, Mumps, Measles, Polio, Hepatitis B, Disease caused by Protozoan; malaria and leishmaniasis, amoebiasis.

### Unit IV

Brief account of STD diseases. Antibiotic Ist, IInd, IIIrd and advanced antibiotics. Mode of action of antibiotic on microorganism (in brief).

### Unit V

General account of fungal diseases mycoses, subcutaneous. Transmission of pathogens (Air borne, contact transmission and vector transmission). control measures.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	3	3	2	2
CO2	2	1	3	1	1	2	1
CO3	3	2	2	3	2	1	2
CO4	3	1	3	2	1	2	2
CO5	2	2	2	2	2	1	3

3= Highly Related; 2= Medium; 1 = Low

#### Suggested Readings:

1. Ananthanarayan R and Paniker CKJ, Textbook of Microbiology. 7<sup>th</sup> edition, 2005, University Press Publication.
2. Brooks GF, Carroll KC, Butel JS and Morse SA. Jawetz, Melnick and Adelberg's, Medical Microbiology, 24<sup>th</sup> edition, 2007, McGraw Hill Publication.



3. Goering R, Dockrell H, Zuckerman M and Wakelin D., Mims' Medical Microbiology. 4<sup>th</sup> edition, 2007, Elsevier.
4. Joklik WK, Willett HP and ZinsserADB, Microbiology, 19<sup>th</sup> edition, 1995. Appleton-Century-Crofts publication.
5. Willey JM, Sherwood LM, and Woolverton CJ., Prescott, Harley and Klein's Microbiology, 7<sup>th</sup> edition, 2008, McGraw Hill Higher Education.

#### **Introduction to Medical Microbiology Lab (BMI097A)**

- 1) Direct examination of infected tissues (skin) for dermatophytes.
- 2) Isolation of microorganisms from wound infection.
- 3) Isolation of microorganisms from teeth crevices.
- 4) Examination of microorganisms of sputum.
- 5) Isolation of enteric pathogens (*Salmonella* and *Shigella*).
- 6) Estimation of urine bacteria by pour plate method.
- 7) Determination of antibiotic susceptibility of a given microorganism against various antibiotics.
- 8) Demonstration of various routes for drug delivery to humans.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI 010B	Immunology	4	1	4	2	5

#### **Course outcome (CO)**

On completion of the course, students are able to:

CO1- Understand the immune system and lymphoid organs.

CO2- Understand and apply to evaluate the structure, classes, interaction and function antigen and antibodies.

CO3- Understand the complementary pathway and structure, function of MHC.

CO4- Understand the auto-immune diseases.

CO5- Understand about types of vaccines, immunodeficiency and autoimmunity.

#### **Unit I**

Overview of immune system; innate immunity and adaptive immunity. Cells and Organs of immune system: lymphocytes, mononuclear phagocytes, granulocytic cells, primary and secondary lymphoid organs, mixed leucocytes culture (MLC)

#### **Unit II**

Antigens: Properties of antigens, Adjuvants, Haptens. Antibodies: Basic structure, classes and function, Polyclonal sera, Monoclonal antibodies, Antigen- Antibody interaction: precipitation reaction, agglutination reaction, neutralization reaction, lytic reaction and phagocytic reaction.

#### **Unit III**

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Complement pathway (Classical and Alternative pathway), Major histocompatibility complex: class I & class II MHC antigens, antigen processing Structure and functions, organ transplant, transplantation immunology

#### Unit IV

Auto-immune diseases – autoimmunity & auto-immune diseases, factors contributing development of auto-immune diseases, mechanism of development, breakdown of self-tolerance, rejection of transplants, molecular mimicry, diagnosis & treatment of auto-immune diseases, replacement therapy, suppression of auto-immune processes, nature of auto-antigens, immunodeficiency, AIDS.

#### Unit V

Immune System in Health and Disease: Brief introduction to Vaccines, Immunodeficiency and autoimmune disorders, Vaccines & Vaccination – adjuvants, cytokines, DNA vaccines, recombinant vaccines, bacterial vaccines, viral vaccines, vaccines to other infectious agents, tumor vaccines, principles of vaccination, passive & active immunization.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	1	0	1	1
CO2	2	2	1	1	0	1	2
CO3	2	2	2	1	0	1	1
CO4	3	3	3	2	3	2	0
CO5	3	2	3	3	2	2	0

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Abbas AK, Lichtman AH, Pillai S., Cellular and Molecular Immunology, 6<sup>th</sup> edition, 2007, Saunders Publication, Philadelphia.
2. Delves P, Martin S, Burton D, Roitt IM., Roitt's Essential Immunology, 11<sup>th</sup> edition, 2006, Wiley-Blackwell Scientific Publication, Oxford.
3. Goldsby RA, Kindt TJ, Osborne BA., Kuby's Immunology, 6<sup>th</sup> edition, 2007, W.H. Freeman and Company, New York.
4. Murphy K, Travers P, Walport M., Janeway's Immunobiology, 7<sup>th</sup> edition, 2008, Garland Science Publishers, New York.
5. Peakman M, and Vergani D, Basic and Clinical Immunology, 2<sup>nd</sup> edition, 2009, Churchill Livingstone Publishers, Edinberg.
6. Richard C and Geiffrey S., Immunology. 6<sup>th</sup> edition, 2009, Wiley Blackwell Publication.

#### Immunology Lab (BMI011B)

- 1) Demonstration of the bacterial flora of the skin.
- 2) Demonstration of dermatophytes.
- 3) Isolation of microbial flora of mouth (from saliva).

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- 4) Isolation of microbes from upper respiratory tract (from throat).
- 5) Isolation of enteric pathogens (Coli form bacteria).
- 6) Determination of human blood group.
- 7) Determination of blood group along with Rh factor.
- 8) Demonstration of the Widal test.
- 9) Determination of RBCs in a given blood sample.
- 10) Estimation of WBCs count in a given sample.
- 11) Determination of differential leucocytes count (DLC) in given blood sample.
- 12) Determination of hemoglobin content in a given sample.
- 13) Determination of haematocrit (PCV) level of provided blood sample.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI098A	General Pathology	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1 Understand the general cell injury and adaptations.
- CO2 Understand the physiology of inflammation.
- CO3 Understand the Haemodynamic Disorders.
- CO4 Understand the collection of specimen.
- CO5 Understand the handling of the samples.

#### Unit I

Cell Injury and Cellular Adaptations. a) Normal Cell b) Cell Injury- types of cell injury, etiology of cell injury, morphology of cell injury, cellular swelling (in brief). c) Cell death: types- autolysis, necrosis, apoptosis & gangrene. d) Cellular adaptations- atrophy, hypertrophy, hyperplasia & dysplasia.

#### Unit II

Inflammation a) Acute inflammation - vascular event, cellular event, inflammatory cells. b) Chronic Inflammation - general features, granulomatous inflammation, tuberculoma.

#### Unit III

Haemodynamic Disorders : Oedema, hyperemia, congestion, haemorrhage, circulatory disturbances, thrombosis, ischaemia & infarction. Neoplasia: Definition, how does it differ from hyperplasia, difference between benign tumor and malignant tumor. Healing Definition, different phases of healing, factors influencing wound healing.

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#### Unit IV

Collection and Transportation of Specimen General Principles, Containers, Rejection, Samples- Urine, Faeces, Sputum, Pus, Body fluids, Swab, Blood.

#### Unit V

Care and Handling of Laboratory Animals Fluid, Diet, Cleanliness, Cages, ventilation, Temperature, Humidity, handling of Animals, Prevention of disease. Disposal of Laboratory/Hospital Waste Non-infectious waste, Infected sharp waste disposal, infected non-sharp waste disposal.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	1	0	1	1
CO2	2	2	1	1	0	1	2
CO3	2	2	2	1	0	1	1
CO4	3	3	3	2	3	2	0
CO5	3	2	3	3	2	2	0

3= Highly Related; 2= Medium; 1 = Low

#### Suggested Readings:

1. Murray PR, Baron EJ, Pfaller MA, Tenover PC and Tenover RH (Eds): Manual of Clinical Microbiology 6 th Ed. American Society for Microbiology, Washington, DC 2005.
2. Woods GL, Washington JA: The Clinician and the Microbiology Laboratory, Mandell
3. Ananthanarayan & Paniker's Textbook of Microbiology, 8th Ed., Orient Longman, India; 2009.
4. Bailey and Scott's Diagnostic Microbiology 9th Ed. C V Mosby, St. Louis, 2003.
5. Brooks, Geo F Jawetz Medical Microbiology 22nd Ed. Mc Graw Hill 2001.

#### General Pathology Lab (BMI099A)

- 1) Components and setting of the Compound microscope.
- 2) Focusing of object.
- 3) Use of low & high power objectives of microscope.
- 4) Use of oil immersion lens.
- 5) Care and Maintenance of the microscope.
- 6) Different types microscopy - • Dark field microscopy • Fluorescence Microscopy
- 7) Electronic Microscopy in brief.
- 8) Preparation of swabs/sterile tubes & bottles.
- 9) Preparation of smear.
- 10) Staining.: Gram & Ziehl -Neelsen staining.

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- 11) Identification of Culture Media.
- 12) Identification of common microbes.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI100A	Clinical Biochemistry	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1 Analyze the spectroscopic techniques.
- CO2 Understand the physiology of water and mineral metabolism
- CO3 Understand the Renal Function Tests, electrophoresis, PCR, autoanalysers.
- CO4 Analyze the cardiac profiling.
- CO5 Analyze the biochemistry profiling of the macromolecules in the cell.

#### Unit I

Photometry Definition, laws of photometry, absorbance, transmittance, absorption maxima instruments, parts of photometer, types of photometry-colorimetry, spectrophotometry, flame photometry, fluorometry, choice of appropriate filter, measurements of solution, calculation of formula, applications.

#### Unit II

Water & Mineral Metabolism Distribution of fluids in the body, ECF & ICF, water metabolism, dehydration, mineral metabolism, macronutrients (principal mineral elements) & trace elements. Liver Functions & their Assessment. Carbohydrate metabolism, Protein metabolism, Lipid metabolism, Measurements of serum enzyme levels 4-Bile pigment metabolism, Jaundice, its types and their biochemical findings.

#### Unit III

Renal Function Tests- Various Tests, GFR & Clearance, Immunodiffusion Techniques, Radioimmunoassay & ELISA Principles & Applications. Electrophoresis - Principle, Types & Applications. Polymerase Chain Reaction - Principle & Applications, Autoanalysers - Principle & Applications

#### Unit IV

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Vitamins, Fat & water soluble vitamins, sources, requirement, deficiency disorders & biochemical functions. Cardiac Profile - In brief Hypertension, Angina, Myocardial Infarction, Pattern of Cardiac Enzymes in heart diseases

### Unit V

Different methods of Glucose Estimation Principle advantage and disadvantage of different methods. Different methods of Cholesterol Estimation Principle, advantage and disadvantage of different methods.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	1	1	1	0	3
CO2	2	3	1	1	2	1	2
CO3	1	2	2	2	3	2	1
CO4	2	2	1	1	2	0	1
CO5	1	3	2	2	3	2	3

3= Highly Related; 2= Medium; 1 = Low

#### Suggested Readings:

1. Murray PR, Baron EJ, Pfaller MA, Tenover PC and Tenover RH (Eds): Manual of Clinical Microbiology 6 th Ed. American Society for Microbiology, Washington, DC 2005.
2. Woods GL, Washington JA: The Clinician and the Microbiology Laboratory, Mandell
3. GL, Bennett JE, Dolin R (Eds): Principles and Practice of Infectious Disease 4th Ed. Churchill Livingstone, New York, 2002.
4. E. Joan Stokes, M.W.D. Wren, G.L.Ridgway, Clinical Microbiology 7th Ed. Hodder Arnold Publishers 7 th Edition.
5. Ananthanarayan & Paniker's Textbook of Microbiology, 8th Ed., Orient Longman, India; 2009.
6. Bailey and Scott's Diagnostic Microbiology 9th Ed. C V Mosby, St. Louis, 2003.
7. Brooks, Geo F Jawetz Medical Microbiology 22nd Ed. Mc Graw Hill 2001.
8. Collier, Leslie Topley and Wilson's Microbiology and microbial infections Vol 7; 9th Ed.

#### Clinical Biochemistry lab (BMI101A)

- 1) Blood urea estimation
- 2) Serum creatinine estimation
- 3) Serum uric acid estimation
- 4) Serum total protein estimation
- 5) Serum albumin estimation
- 6) Serum globulin estimation

- 7) Serum glucose estimation
- 8) Total cholesterol estimation
- 9) HDL cholesterol (direct) estimation.
- 10) LDL cholesterol (direct) estimation
- 11) Triglyceride estimation
- 12) Serum Bilirubin total estimation
- 13) Serum Bilirubin direct estimation
- 14) Serum amylase estimation
- 15) Serum GOT (AST) estimation
- 16) Serum GPT (ALT) estimation
- 17) Alkaline phosphatase estimation
- 18) Acid phosphatase estimation
- 19) Serum sodium estimation
- 20) Serum potassium estimation
- 21) Serum chloride estimation

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI102A	Automation in Medical Microbiology	4	1	4	2	5

**Course outcome (CO) :**On completion of the course, students are able to:

- CO1 Understand the precipitation assay  
 CO2 Understand the physiology of inflammation.  
 CO3 Understand the Haemodynamic Disorders.  
 CO4 Understand the collection of specimen.  
 CO5 Understand the handling of the samples.

#### Unit I

Automation - Introduction, meaning, advantages, history. Precipitation assays: Double diffusion method (Ouchterlony techniques), Counter immunoelectrophoresis, Radial immunodiffusion, Quantitative immunoelectrophoresis, Immunonephelometry, Immunoelectrophoresis, Immunofixation (immunoblotting), Western blot

#### Unit II

Assay based on agglutination: Bacterial agglutination, Hemagglutination, Agglutination of inert particles coated with antigen or antibody.

#### Unit III

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Tests based on complement fixation. Test based on immunofluorescence, Immunofluorescence tests in microbiology, Quantitative immunofluorescence assay, Immunofluorescence tests for the detection of auto-antibodies, Immunofluorescence tests to detect tissue fixed antigen-antibody complex

#### Unit IV

Flow cytometry-surface staining, cytoplasmic staining, DNA-analysis, sorting, Radio immunoassay, Enzyme immunoassay; Cell culture- primary, secondary and those using established cell lines.

#### Unit V

Latest trends in Automation, Biochips, Lab on a chip (LoC), Nanosensors- advantages and disadvantages, PCR and its clinical applications.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	2	3	3	1
CO2	1	3	3	3	2	1	2
CO3	2	2	2	2	3	0	1
CO4	3	2	3	0	2	1	2
CO5	1	3	2	2	3	3	1

3= Highly Related; 2= Medium; 1 = Low

#### Suggested Readings:

1. Abbas AK, Lichtman AH, Pillai S., Cellular and Molecular Immunology, 6<sup>th</sup> edition, 2007, Saunders Publication, Philadelphia.
2. Delves P, Martin S, Burton D, Roitt IM., Roitt's Essential Immunology, 11<sup>th</sup> edition, 2006, Wiley-Blackwell Scientific Publication, Oxford.
3. Goldsby RA, Kindt TJ, Osborne BA., Kuby's Immunology, 6<sup>th</sup> edition, 2007, W.H. Freeman and Company, New York.
4. Murphy K, Travers P, Walport M., Janeway's Immunobiology, 7<sup>th</sup> edition, 2008, Garland Science Publishers, New York.
5. Nakara and Choudhary, Instrumentation measurements and analysis, 3<sup>rd</sup> Edition, 2010, Tata Mc Graw Hill
6. Lodish, Berk, Matsudara, Kaiser, Krieger, Zipursky, Darnell, Molecular cell biology, 8<sup>th</sup> edition 2016, W.H. Freeman and Co.

#### Automation in Medical Microbiology Lab (BMI103A)

- 1) Various experiments using ELISA.
- 2) Demonstration of PCR.
- 3) Demonstration of Semi-Autoanalyzer or fully automated analyzer.

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- 4) Dot ELISA.
- 5) Genotyping of candidate genes for diseases by RFLP.
- 6) Encapsulation of mammalian cells.
- 7) Isolation of cells from Chick embryo.
- 8) Establishment and maintenance of primary cell cultures.
- 9) Subculture of monolayer cells.
- 10) Subculture of suspension cells.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI104A	Human Anatomy and Physiology	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1 Understand the general anatomy of the various system of human.  
 CO2 Understand the physiology of cardiovascular and gastrointestinal system.  
 CO3 Understand the physiology of Endocrinology and urinary system.  
 CO4 Understand the physiology of nervous system of human.  
 CO5 Understand the physiology of skin, ear and nose.

#### Unit I

General Anatomy a) Cell - structure & function b) Tissue - Epithelium - Connective - Sclerous - Muscular - Nervous c) Lymphatic System 2. Systemic Basic Features of : a) Cardiovascular system b) Respiratory system c) Digestive system d) Excretory system e) Genital (Male & Female) system f) Nervous system.

#### Unit II

Cell: Structure & function. 2. Blood a) Blood cells b) Haemoglobin c) Blood groups d) Coagulation Factors e) Anaemia & Immunoglobulins 3. Cardiovascular system Heart rate, cardiac cycle, cardiac output, blood pressure, hypertension, radial pulse 4. Respiratory System a) Ventilation b) Functions c) Lungs Volumes and capacities 5. Gastrointestinal System Process of digestion in various parts.

#### Unit III

Endocrinology a) List of Endocrine Glands b) Hormones: Their secretion and functions, Excretion system a) Structure of nephron b) Urine formation, Excretion system a) Structure of nephron b) Urine formation

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#### Unit IV

Central Nervous System a) Parts b) Sliding Filament Theory c) Neuro Muscular Junction d) Wallerian Degeneration e) Motor Nervous system - Upper motor neuron system - Lower motor neuron system f) Sensory nervous system g) Sympathetic Nervous system h) Parasympathetic nervous system

#### Unit V

Skin - Function & Structure Muscular System, Classification of muscles & their functions, Special Senses - Eye & ear

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	0	1	1	2
CO2	2	2	1	1	0	2	1
CO3	3	3	2	1	1	1	2
CO4	2	2	1	0	0	1	3
CO5	2	3	2	0	0	2	1

3= Highly Related; 2= Medium; 1 = Low

#### Suggested Readings:

1. Guyton. A. Text Book of Medical Physiology, Elsevier Publication
2. Ganong, W.F. Reviews of Medical Physiology Lange Publication
3. Khurana I, Text Book of Physiology
4. Berne V Principal of Physiology Elsevier Mosby Publication
5. Clinical Anatomy for Medical Students, by: Richard S. Snell
6. General Anatomy, by: Vishram Singh
7. General Anatomy, by: B.D. Chaurasia
8. Embryology for Medical Students, by: Inderbir Singh
9. Text Book of Histology, by: Inderbir Singh

#### Human Anatomy and Physiology Labs (BMI105A)

Demonstration on the following:

- 1) Superior extremity: General features & identification of clavicle, scapula, humerus, radius, ulna, identification of the skeleton of hand.
- 2) Thorax: General features for thoracic vertebrae – typical and atypical, ribs-typical and atypical, sternum.
- 3) Inferior Extremity: General features of hip bone, femur, patella, tibia, fibula, identification of the skeleton foot.
- 4) Abdomen and Pelvis: General features of eleventh and twelfth ribs, lumbar vertebrae – typical and atypical, sacrum, coccyx, pelvis – male and female.

- 5) Brain: General feature of basis crania interna., skull cap.
- 6) Head and Neck: General features of skull, identification of individual skull bones, hyoid bone, ear ossicles, general features of cervical vertebrae typical and a typical.
- 7) Recording the arterial pulse.
- 8) Recording of Electrocardiogram.
- 9) Recording of human blood pressure.
- 10) To study the effect of change of posture on blood pressure.
- 11) To study the effect of moderate exercise on blood pressure.
- 12) Examination of Nervous system.
- 13) Examination of motor system.
- 14) To map peripheral field of vision with perimeter.
- 15) To find out acuity of vision.
- 16) To test colour vision.
- 17) To demonstrate light reflexes and accommodation reflex.
- 18) To assess the hearing of individual.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI106A	Parasitology	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1 Understand the term parastism and parasites groups.
- CO2 Understand the protozoan parasite infection in human.
- CO3 Understand the malaria parasite infection
- CO4. Understand the nematodes infection and diagnosis
- CO5 Analyze the tissue invade nematodes infection and diagnosis

#### Unit I

Definition - parastism, HOST, Vectors etc. Classification of Parasites; Phylum Protozoa- general Pathogenic and non pathogenic protozoa, Nematelminths/Round words (Nematoda), Platyhelminths - class-Cestoda, class-Trematoda; Protozoa: Intestinal Amoebae; *Entamoeba histolytica*: Life cycle, Morphology, Disease & Lab Diagnosis.

#### Unit II

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Flagellates of intestine/genitalia: *Giardia lamblia* : Life cycle, Morphology, Disease & Lab Diagnosis. *Trichomonas vaginalis* : Life cycle, Morphology, Disease & Lab Diagnosis; *E. coli* : Life cycle, Morphology, Disease & Lab Diagnosis

### Unit III

Malarial Parasite: *Plasmodium vivax*: Life cycle, Morphology, disease & lab diagnosis; Differences between *P. vivax*, *P. malaria*, *P. falciparum* & *P. ovale*.

### Unit IV

Nematodes: Intestinal Nematodes : *Ascaris* : Life cycle, Morphology, disease & lab diagnosis ; Brief discussion about *Enterobius vermicularis* (Thread worm ) and *Ancylostoma duodenale* (Hook worm)

### Unit V

Tissue Nematodes: *W. Bancrofti*- Life cycle, Morphology, Disease & Lab Diagnosis Phylum Platyhelminths a. Cestodes - *T. solium*, *T. saginata* & *E. granulosus*. b. Trematodes - *S. haematobium* & *F. hepatica*.

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	1	2	2	2	0
CO2	2	1	1	1	2	0	1
CO3	2	1	2	1	1	2	1
CO4	2	2	1	0	0	1	1
CO5	1	2	3	1	2	1	1

### Suggested Readings:

1. Medical Mycology. Kwon-Chung K.J and Bennett JE. 1992. Lea and Febiger, Philadelphia, USA.
2. Bailey and Scott's Diagnostic Microbiology- 11th edition: Eds: Forbes BA, Sahm DF, Weissfeld AS. 2002, Mosby, St. Louis, USA.
3. Medical Microbiology, 3rd edition. Eds: MIMS and others. 2004 Mosby, Spain.
4. Topley & Wilson's Microbiology and Microbial infections. 10th edition. Volumes 1- 6: 2008 Arnold, London.
5. Medical Parasitology. Rajesh Karyakarte & Ajit Damle, Books & Allied (P) Ltd., 2003.
6. Medical Immunology, 9th edition Eds: Stites DP, Terr AI and Parslow TG.1997, Appleton & Lange, Stamford, USA

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### Parasitology Lab (BMI107A)

- 1) Stool examination.
- 2) Identification of different ova & cysts in stool samples.
- 3) Examination of blood films including Leishmans stain for malarial parasites.
- 4) Lab diagnosis of parasitic infections.
- 5) Examination of Bone marrow smears for LD bodies
- 6) Examination of Hydatid fluid for scolices, hydatid hooklets.
- 7) Examination of CSF for *Acanthamoeba*
- 8) Examination of Liver abscess fluid for *Entamoeba*.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI108A	Basic Industrial Microbiology	4	1	4	2	5

### Course outcome (CO)

On completion of the course, students are able to:

CO1- Understand the introduction to industrial microbiology and fermentation processes.

CO2- Understand the types of bioreactors and measurement of fermentation parameters.

CO3- Understand and apply industrially microbial strains and fermentation media.

CO4- Understand and apply the down-stream processing.

CO5- Understand and apply industrially relevant products derived from Microbes.

### Unit I

Brief history and developments in industrial microbiology, Types of fermentation processes: Solid-state and liquid-state (stationary and submerged) fermentations, Batch, fed-batch and continuous fermentations.

### Unit II

Components of a typical bioreactor. Types of bioreactors: Laboratory, pilot-scale and production fermenters, continuously stirred tank reactor, air-lift fermenter. Measurement and control of fermentation parameters: pH, temperature, dissolved oxygen, foaming and aeration.

### Unit III

Industrially important microbes and their isolation, preservation and maintenance methods. Crude and synthetic media: Molasses, corn-steep liquor, sulphite waste liquor, whey, yeast extract, soybean meal, peptone and tryptone.

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#### Unit IV

Cell disruption by physical, chemical and biological methods. Membrane filtration, ultrafiltration, centrifugation, solvent-solvent extraction, precipitation, lyophilization and spray drying. Production of fermented beverages, alcohol, wine, beer, ethanol.

#### Unit V

Microorganisms, fermentation and recovery strategies: citric acid, glutamic acid, Vitamins - riboflavin, cyanocobalamin. Antibiotics: Penicillin, streptomycin. Enzymes: amylase, protease, lipase. Vaccines - genetic recombinant vaccines. Enzyme immobilization (cross linking, entrapment, adsorption and covalent bonding) and its applications.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	3	2	2
CO2	2	1	2	1	1	2	1
CO3	3	2	1	2	3	3	2
CO4	2	3	2	3	2	2	3
CO5	2	1	3	1	1	1	1

3= Highly Related; 2 = Medium; 1 – Low

#### Suggested Readings:

1. Okafor N. and Okeke B.C., Modern Industrial Microbiology and Biotechnology, 2nd edition. CRC press, UK. 2017.
2. Crueger W., Crueger A. and Aneja K.R., Biotechnology: A Textbook of Industrial Microbiology by. 3rd edition. Medtech Publisher, India. 2017.
3. Clark W., Biotechnology: Industrial Microbiology. CBS Publishers, India. 2016.
4. Peppler H.J. and Perlman D., Microbial technology. Vol I- Microbial processes and Vol II - Fermentation technology, 2nd edition. Academic Press, USA. 2009.
5. Stanbury P.F., Whitaker A. and Hall S.J., Principles of Fermentation Technology 2nd edition. Elsevier Science Ltd, Netherlands. 2006.
6. Waites M.J., Morgan N.L, Rockey J.S. and Higon G., Industrial Microbiology: An Introduction by Wiley -Blackwell. 2001.
7. Patel A.H., Industrial Microbiology, 1st edition. Macmillan India Limited. 1996.
8. Glazer A.N. and Nikaido H., Microbial Biotechnology: Fundamentals of Applied Microbiology, 1st edition. W.H. Freeman and Company, UK. 1995.
9. Casida L.E., Industrial Microbiology by. 1st edition. Wiley Eastern Limited, USA. 1991.

#### Basic Industrial Microbiology Lab (BMI109A)

- 1) Screening for amylase producing microorganisms.

- 2) Screening for organic acid producing microorganisms.
- 3) Microbial production and estimation of enzymes: Protease/Lipase
- 4) Microbial Production and estimation of Ethanol.
- 5) Production and Estimation of Citric acid.
- 6) Estimation of streptomycin.
- 7) A visit to any educational institute/industry to see different parts of an industrial fermenter and downstream processing techniques.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI110A	Fermentation Technology	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1- Understand the basic of fermentation technology and apply this knowledge to isolate the industrial important microorganism.
- CO2- Understand the significance of industrial Microorganisms and various media sterilization technique used in fermentation.
- CO3- Understand the basic of fermentor system and types of cell reactors.
- CO4- Understand the basic of fermentor design and its various types.
- CO5- Understand the scale up study, product recovery and down-stream processing, product development.

#### UNIT-I

History and Scope of fermentation technology. Industrial Microorganisms: Desirable characteristics and selection of industrial Microorganism, Isolation of suitable industrial microorganisms from natural habitat, Culture Collection Centres, Strain improvement and maintenance.

#### UNIT-II

Biology of industrial Microorganisms: Cell growth, Microbial growth kinetics, factors affecting growth, Basic nutrition, Primary metabolism, Secondary Metabolism, Regulation of Metabolism. Fermentation Media: Media composition, Media sterilization, Contamination, Inoculum media, Media economics, Screening for fermentation media

#### UNIT-III

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Fermentation system: Batch and continuous fermentation system, immobilized cell reactor system, solid state fermentation reactors.

#### UNIT-IV

Fermentor design: Basic design of Fermentor, Construction of bioreactors,, Requirements of aseptic operation, Aeration and mixing, Type of Fermentors stirrer tank bubble column and airlift, Instrumentation and control.

#### UNIT-V

Scale up study: Product recovery, scale up of fermentation, Down-stream processing, Product development, Regulation and safety

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	1	2	1	1
CO2	2	2	2	1	1	2	2
CO3	3	3	3	2	2	1	1
CO4	3	2	3	1	1	2	1
CO5	2	2	2	1	1	2	2

3= Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

1. Aneja.K.R et al.: A Text book of Basic and Applied Microbiology, New Age International Publishers, New Delhi.
2. Aneja.K.R and Mehrotra R.S.: Fungal Diversity & Biotechnology, New Age International Publishers, New Delhi.
3. Waites M.J. et al.: Industrial Microbiology, Blackwell Science Ltd.
4. Casida L.E.: Industrial Microbiology, New Age International Publishers, New Delhi.
5. Prescott and Dunn's.: Industrial Microbiology, AVI Publishing Co. USA.
6. Glazer A.N and Nikaido, H.: Microbial Biotechnology, W.N. Freeman and Co

#### Fermentation Technology Lab (BMI111A)

- 1) Determination of oil and grease from industrial waste.
- 2) Estimation of TS, TSS and TDS from sewage and industrial effluent.
- 3) Estimation of TVS from sewage and industrial effluent
- 4) Bacteriological analysis of potable water MPN
- 5) Estimation of chlorine dose of potable water

- 6) Production of penicillin in the laboratory.
- 7) Primary screening of amylase producing bacteria from soil.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI112A	Microbial Production of Metabolites	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO1- Understand the basic of nucleic acid production on large scale.  
 CO2- Understand the microbial production of necessary vitamins through fermentations technique.  
 CO3- Understand the microbial production of antibiotics, organism used production process and recovery of bacitracin.  
 CO4- Understand the taxonomical classification of bacterial biofertilizers and their physiology.  
 CO5- Understand the production of biofertilizers along with culture production, storage, and transportation technique.

#### UNIT – I

Microbial production of nucleosides and nucleotides: i) Introduction ii) Classification of methods for production of 5' IMP and 5'GMP iii) Production of 5'IMP and 5'GMP by fermentation.

#### UNIT – II

Microbial production of Vitamins: 1) Vitamin B12 - Organisms used, production method-process, recovery and assay. 2) Vitamin C - Organisms used, production method, process, recovery and assay.

#### UNIT – III

Microbial Production of Antibiotics: Organism used, production process and recovery of Bacitracin & Chloramphenicol, Production of Bioinsecticides: Introduction, Candidate Microorganisms, Production, Safety, Effectiveness, Advantages and Disadvantages

#### UNIT – IV

Bacterial Biofertilizers: Taxonomy, physiology and mass cultivation of *Rhizobium*, *Frankia*, *Azospirillum*, *Azotobacter* and *Cyanobacteria*

#### UNIT – V

Production of Biofertilizers: Isolation and identification of different nitrogen fixing microbes, assessment of nitrogen fixing ability of different strains under controlled and field conditions. Direct and indirect methods, culture production, storage, culture, carrier.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course	Program Outcome
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Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	2	2	2	0
CO2	3	2	2	1	1	1	2
CO3	2	1	1	2	2	2	1
CO4	3	2	3	1	1	1	1
CO5	2	2	1	2	2	2	0

3= Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings:

- Alexander, M. Introduction to Soil Microbiology; Wiley, New York.
- Sperut and Spemt: Nitrogen Fixation
- Aneja et al.: A Text book of Basic and Applied Microbiology, New Age International Publishers, New Delhi.

#### Microbial Production of Metabolites Lab (BMI113A)

- 1) Production of wine from grapes in the laboratory.
- 2) Demonstration of mushroom production (White button mushroom).
- 3) Isolation of Azotobacter from soil.
- 4) Isolation of Rhizobium from legume root nodules.
- 5) Preparation of biofertilizer from Azotobacter and Rhizobium in the laboratory.
- 6) Culturing and identification of yeast (*Saccharomyces cerevisiae*) in the lab.
- 7) Demonstration of amylolytic activity by a mold/bacterium.
- 8) Demonstration of proteolytic activity by a mold/bacterium.
- 9)

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI114A	Quality Assurance and Quality Control of Microbial Products	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

CO1- Understand the basic industrial Rules and standards as per IP, BP, USP, PFA and remember the laws of Indian pharmacopoeia.

CO2- Understand the detection technique of compounds and apply the knowledge to detect the compounds using indian pharmacopoeia.

CO3- Understand and apply the knowledge of quality control tests of pharmaceutical products.

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CO4- Understand and remember the international standards as per WHO, ISI, Biosafety and Validation.

CO5- Understand the biosafety in laboratories and pharmaceutical industries, environmental monitoring and bioburden tests.

#### UNIT – I

Industrial Rules and standards as per IP, BP, USP, PFA, Indian Pharmacopoeia: i) Introduction ii) Concept of pharmacopoeia iii) Concept of regulatory authorities iv) Types of pharmaceutical products iv) Microbiological Q.C

#### UNIT – II

Detection of Compounds using Indian Pharmacopoeia: A. Detection of Ascorbic acid tablets B. Detection of Vit. B12 C. Detection of Antibiotics - penicillin and streptomycin

#### UNIT – III

Quality Control Tests of Pharmaceutical Products i) Sterility test ii) Pyrogen test iii) Toxicity test iv) Carcinogenicity test iv) Mutagenicity test v) Allergy test

#### UNIT – IV

International Standards as per WHO, ISI, Biosafety and Validation A) Introduction of WHO, ISI standards. B) Concept of validation.-validation of moist heat sterilization in pharmaceuticals

#### UNIT – V

Biosafety in Laboratories and Pharmaceutical Industries, Environmental Monitoring and Bioburden Tests

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	3	2	3	1	1
CO2	2	2	2	1	1	2	2
CO3	1	3	3	2	3	1	1
CO4	3	1	1	1	1	1	2
CO5	2	2	3	2	3	2	1

3= Highly Related; 2 = Medium; 1 = Low

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### Suggested Readings:

1. Aneja.K.R et al.: A Text book of Basic and Applied Microbiology, New Age International Publishers, New Delhi.
2. Aneja.K.R and Mehrotra R.S.: Fungal Diversity & Biotechnology, New Age International Publishers, New Delhi.
3. Waite M.J. et al.: Industrial Microbiology, Blackwell Science Ltd.
4. Casida L.E.: Industrial Microbiology, New Age International Publishers, New Delhi.

### Quality Assurance and Quality Control of Microbial Products Lab (BMII15A)

- 1) Determination of pH
- 2) Determination of Acidity
- 3) Determination of alkalinity
- 4) Determination of moisture content
- 5) Determination of Chlorine dosage
- 6) Examine the Microbial limit test of tablet/capsule
- 7) Determination of sterility test of pharmaceutical products.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMII16A	Industrial Management, Government Laws and Regulations	4	1	4	2	5

### Course outcome (CO)

- On completion of the course, students are able to:
- CO1- Understand the basic principles of management, management meaning and concept of entrepreneurship
  - CO2- Understand the concepts of management and process of organization.
  - CO3- Understand the national and international scenario of patent, biopatent, copyright, trade secret, trademark and geographical Indications.
  - CO4- Understand the laws related to industrial regulation, industrial development and industrial regulation act.
  - CO5- Understand the basic laws related to industrial regulation taxation: Basic concept of taxation.

### UNIT - I

Entrepreneurship - Principles of management, management meaning and importance, Concept of Entrepreneurship



## UNIT – II

Concepts of Management: i. Planning meaning and importance ii. Organizing - Meaning and process of organization iii. Communication – Meaning and process control techniques. iv. Personal Management – Man power planning v. Purchase and store management – Concept of quotation, tenders, comparative statement, inspection and quality control, store management. vi. Concept of marketing – Basic Concepts, Costing, Pricing vii. Financial management – Fund raising, costing and pricing

## UNIT – III

IPR, National and International Scenario:-Patent, Biopatent, Copyright, Trade secret, Trademark, Geographical Indications, Designs, its basic concepts and laws relating to its infringement -IPR and WIPO, TRIPS

## UNIT – IV

Laws related to industrial regulation: Industrial development and regulation act- Object - Licensing of industries -Circumstances when license not required

## UNIT – V

Laws related to industrial regulation taxation: Basic concept of taxation - -Principle of taxation - Direct and indirect tax -Excise, sales MVAI

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	1	2	1	2	2
CO2	1	2	3	1	1	2	2
CO3	2	3	3	2	2	1	3
CO4	1	1	2	2	1	2	2
CO5	2	2	2	3	2	2	3

3= Highly Related; 2 = Medium; 1 = Low

### Industrial management, Government Laws and Regulations Lab (BMI117A)

1. Case study of any local industry (Management, Process and laws applied)

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI118A	Biomining and Microbial Metabolites	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO 1 Understand the basic concepts of Microbial extraction of metals from minerals and aqueous effluents.
- CO 2 Understand the Concept of enzymology, classification, and largescale isolation methods using fermentation technology and their application.
- CO 3 Understand the Concept of biosurfactants, types and their applications.
- CO 4 Understand the Enzymes – production and applications of other enzymes.
- CO 5 Understand the biosurfactants, definition, classification, types and their application in environment.

#### Unit I

Microorganisms in mineral recovery, indirect leaching and direct leaching, microorganisms involved in oxidation of minerals, recovery of copper by dump leaching, uranium leaching, gold mining, microorganisms in the removal of heavy metals from aqueous effluents

#### Unit II

Broad classification of Enzymes, Production of microbial enzymes (Strain selection and development, fermentation process and composition of the medium), large scale applications of microbial enzymes-Enzymes for starch processing, use of genetically modified Bacillus strain for production of amylases.

#### Unit III

Enzymes for textile designing (Subtilisins, genetic engineering of subtilisins), Enzymes for Cheese making (Chymosin-action, properties and recombinant chymosin. Lipases-properties and applications (interesterification of fats and oils).

#### Unit IV

Enzymes – production and applications of other enzymes such as invertase, pectinase, cellulase, glucose oxidase, catalase, lactase, polymerase, glucose isomerase etc.

#### Unit V

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Biosurfactants, definition, classification, types and their application in environment, petroleum recovery and other fields Microbial pigments-source, production and application, Biotransformation of steroids and antibiotics.

#### Biomining and Microbial Metabolites Lab (BMII19A)

- 1) Isolation and Identification of Reserve food material (Glycogen / polyphosphates, PHB) of *B. megaterium* and *Azotobacter* sp.
- 2) Quantitative estimation of amino acids by Rosen's method.
- 3) Quantitative estimation of sugars by Summner's method.
- 4) Demonstration of endogenous metabolism in *B megaterium* or *E. coli* and their survival under starvation conditions
- 5) Quantitative estimation of proteins by Folin-Lowry / Biuret method.
- 6) Production of fungal alpha amylase using solid-state fermentation/ production of protease by bacterial species and confirmation by determining the achromic point.
- 7) Purification of fungal alpha-amylase or bacterial protease by fractionation.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	1	2	1	2	2
CO2	1	2	3	1	1	2	2
CO3	2	3	3	2	2	1	3
CO4	1	1	2	2	1	2	2
CO5	2	2	2	3	2	2	3

#### Suggested Readings:

1. Microbial Biotechnology by Glazer AN & Nikaido H., 2nd Ed., Cambridge University Press, 2007
2. Molecular Biotechnology by Glick BR, Pasternak JJ & Patten CL, Ed. IV, ASM Press, 2010
3. Biotechnology: A text Book of Industrial Microbiology by Crueger W, Crueger A, 2nd Ed., Sinauer associates, Inc.1990.
4. Encyclopedia of Environmental Microbiology, 6 Vol. Set. Willey Publication.
5. Microbial Ecology by Alexander. Willey Publication

Course code	Course Title	L	P	Contact	Contact	Total
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				Hr	Hr	Credit
BMI120A	Microbial Products for Human Consumption	4	1	4	2	5

### Course outcome (CO)

On completion of the course, students are able to:

- CO 1 Understand the basic Antibiotics types, range and production of different types of antibiotics.
- CO 2 Understanding of immune system and development and production of various kinds of vaccines, vitamins and proteins.
- CO 3 Understand the Use of microbes in various fermented food products for human consumption.
- CO 4 Understand the use of microbes in the production of alcoholic bevarages.
- CO 5 Understand the production of Whiskeys – types and wine

### Unit I

Antibiotic fermentations – production of  $\beta$  lactams (penicillins), semi-synthetic penicillins and cephalosporins, amino-glycosides (streptomycin), macrolids (Erythromycin), quinines.

### Unit II

Production of proteins in bacteria and Yeast (Chymosin production) Recombinant and synthetic vaccines (problems with traditional vaccines, impact of Biotechnology on vaccine development-Subunit vaccine for Hepatitis B, potential problem of subunit vaccines). Vitamins (B12, riboflavin A)

### Unit III

Microbes in food industry, fermented foods (breads, sauerkraut, pickles, soysauce, tofu, tempeh, natto and poi) Dairy products from microbes (cheese, curd, yoghurt), microbes as food - single cell protein, mushrooms, probiotics.

### Unit IV

Alcoholic beverages – brief history of development of industrial process, production of beer (brewing) – media (raw materials used), process, maturation, carbonation. Types of beer (lager, pilsner, bock, ale, stout, porter).

### Unit V

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Whiskeys – types and production, Production of wine –media and raw material used, different types (sparkling wine, burned wine, cider, wine vinegar), vinegar.

### Microbial Products for Human Consumption Lab (BM1121A)

- 1) Demonstration of antibiotic fermentation through batch fermentation.
- 2) Demonstration of process of penicillin production through fermentation.
- 3) Isolation and identification of chymosin producing bacteria.
- 4) Demonstration of the role of recombinant and synthetic vaccines developed for human's.
- 5) To produce fermented food sauerkraut.
- 6) Study of single cell protein and its production process.
- 7) Production of wine from grapes.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	2	1	2	3	1
CO2	2	2	2	0	3	1	1
CO3	3	3	2	1	1	2	2
CO4	2	1	2	2	2	2	3
CO5	2	1	3	1	1	1	1

### Suggested Readings:

1. Palmer T. (2001) Enzymes Biochemistry, Biotechnology and Clinical Chemistry, 5th Edition, Howood Publishing Chishester, England.
2. Marangoni A.G. (2003), Enzyme Kinetics-A Modern Approach.
3. Price N.C. and Stevens L. (1999), Fundamentals of Enzymology 3rd Edition Oxford University Press, New York.
4. Dixon M. and Webb E.C. (1979), Enzyme, 3rd Edition, Academic Press, New York.
5. Uhlig H (1998), Industrial Enzymes and Their Applications, Jone Wiley, New York.

	Course Title	L	P	Contact	Contact	Total
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Course code				Hr	Hr	Credit
BMI122A	Environment and Microorganisms	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

CO1- Understand the scope and importance of environmental microbiology.

CO2- Understand and apply the aeromicrobiology.

CO3- Understand the biogeochemical cycles and microbial transport.

CO4- Understand and apply the microbial interactions.

CO5- Understand and apply solid waste management.

#### Unit I

Introduction to environmental microbiology, scope and importance. Microorganisms in environment: viruses, bacteria, algae, fungi and protozoa. Terrestrial environment: soil and soil subsurface environment, microorganisms in surface soil, shallow and deep subsurface environment.

#### Unit II

Aeromicrobiology : atmosphere, aeromicrobiological pathway, microbial survival in air, extramural and intramural aeromicrobiology. Aquatic and extreme environments: microbes present in aquatic environment, environment determinants that govern extreme environments.

#### Unit III

Microbial transport: factors affecting microbial transport, factors affecting transport of DNA. Biogeochemical cycling: carbon cycle: Microbial degradation of cellulose, nitrogen cycle: Nitrogen fixation, ammonification, nitrification, denitrification and nitrate, sulfur cycle: Microbes involved in sulphur cycle; Phosphorus cycle.

#### Unit IV

Microbial interactions: Microbe-microbe interactions: mutualism, synergism, commensalism, competition, amensalism, parasitism, predation. Microbe-plant interactions: microbes associated with roots and aerial plant surfaces, *Rhizobium* symbiosis, *Anabaena-Azolla* symbiosis, mycorrhizal associations, actinorhizal associations.

#### Unit -V

Solid waste management: Sources and types of solid waste, methods of solid waste disposal: incineration, sanitary landfill, composting.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	3	1	1
CO2	2	1	2	1	2	2	1
CO3	3	1	1	2	3	3	2

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 - Bottom center: *Handwritten initials*  
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CO4	2	3	2	2	2	1	3
CO5	2	1	3	1	1	1	1

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested readings:

1. Atlas RM and Bartha R., Microbial Ecology: Fundamentals & Applications. 4<sup>th</sup> edition, 2000, Benjamin/Cummings Science Publishing, USA.
2. Atlas RM., Microbiology: Fundamentals and Applications. 2<sup>nd</sup> Edition, 1989, MacMillan Publishing Company, New York.
3. Madigan MT, Martinko JM and Parker J., Brock Biology of Microorganisms. 12<sup>th</sup> edition, 2009, Pearson/ Benjamin Cummings.
4. Lynch JM & Hobbie JE., Microorganisms in Action: Concepts & Application in Microbial Ecology, 1988, Blackwell Scientific Publication, U.K.
5. Maier RM, Pepper IL and Gerba CP., Environmental Microbiology. 2<sup>nd</sup> edition, 2009, Academic Press.

#### Environment and Microorganisms Lab (BMI123A)

- 1) Isolation of microbes from soil samples.
- 2) Isolation of microbes from water samples.
- 3) Isolation of microbes from air.
- 4) Determination of dissolved oxygen (DO) of water samples.
- 5) Determination of biological oxygen demand (BOD) of water samples.
- 6) Determination of chemical oxygen demand (COD) of water samples.
- 7) Bacteriological examination of water by multiple tube fermentation test (multiple tube test)
  - (a) Presumptive coli form test, (b) Confirmed coli form test, and (c) Completed coli form test.
- 8) Isolation of *Rhizobium* from root nodule.
- 9) Demonstration of ammonification.
- 10) Demonstration of nitrification.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI124A	Eco-Restoration and Development	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

CO1- Understand the basic concept of land degradation and apply the knowledge to degraded

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lands conservation.

CO2- Understand the necessity of soil conservation and role of microbes in improvement of soil fertility.

CO3- Understand the basic concept of green environment techniques and apply the knowledge to production of eco development and environmental friendly products.

CO4- Understand the PGPR bacteria and their role in eco friendly environment and bio-control of plant pathogen.

CO5- Understand the Microbial transformation, accumulation and concentration of metals, metal leaching, extraction, exploitation of microbes in copper and uranium extraction

#### Unit -I

Degraded lands: agricultural practices and land degradation, Mining and its impact on soil quality Conservation of degraded lands, Rehabilitation of mine soils and salt affected soils.

#### Unit -II

Soil Conservation: Biological reclamation techniques Bio fertilizers, microrhizae, Vermi composting, afforestation, Organic farming, Bio remediation.

#### Unit -III

Approaches for environmental awareness and education, Eco development and environmental friendly products and technologies. Green environment techniques.

#### Unit -IV

PGPR bacteria: biofertilizers, microbial insecticides and pesticides, bio-control of plant pathogen, Integrated pest management; development of stress tolerant plants, biofuel; mining and metal biotechnology.

#### Unit -V

Microbial transformation, accumulation and concentration of metals, metal leaching, extraction; exploitation of microbes in copper and uranium extraction, use of bioreactors for bioremediation.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	1	3	3	3	3
CO2	3	3	2	2	2	2	3
CO3	1	3	1	2	2	2	2
CO4	3	2	1	3	1	1	2

CO5	2	2	2	2	1	2	3
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3= Highly Related; 2= Medium; 1 = Low

#### Suggested Readings:

1. Tyler Miller Jr. G. 1990. Living in the Environment. Wadsworth Publishing Company, Belmont California.
2. Cunningham. W.P., 1994, Understanding Our Environmental : An Introduction W.C. Brown Publishers, Oxford.
3. Singh J.S., 1993, Restoration of degraded lands, Rastogi Publications, Meerut.
4. Singh J.S., Singh S.P. and Gupta S.R., 2006, Ecology Environment and Resource Conservation, Anamaya Publishers, New Delhi.

#### Eco-Restoration and Development Lab (BMI125A)

- 1) Bacteriological examination of water by multiple tube fermentation test
- 2) Isolation of *Rhizobium* from root nodule.
- 3) Demonstration of ammonification.
- 4) Demonstration of nitrification.
- 5) Analysis of pesticides residues using TLC
- 6) Demonstration of soil conservation techniques
- 7) Demonstration of water conservation techniques
- 8) Demonstration of Biogas plant

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI126A	Environmental Monitoring	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

CO1- Understand the basic concept of environmental monitoring and apply the knowledge to monitor the different aspect of environment.

CO2- Understand the sampling process for air monitoring and devices used for the air monitoring.

CO3- Understand the basic concept of water quality monitoring and physical and chemicals characteristics of water.

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CO4- Understand the biological aspects of environment monitoring and bio indicators used for environmental monitoring

CO5- Understand the EIA – Aims, objectives and methods and Geographical Information System Remote sensing and application in environment

#### Unit -I

Environment monitoring : Concept, aims, measurement and data collection on Meteorological parameters – solar radiation, temperature Humidity, precipitation, wind direction and speed. Plume behaviour, wind rose – a brief idea.

#### Unit -II

Chemical aspect of air quality monitoring : sampling of gaseous and suspended particulate matter ; basic considerations, devices and methods used : absorption, adsorption, condensation, sedimentation, filtration, Impingement, electrostatic precipitation, centrifugal methods.

#### Unit -III

Water quality monitoring : water quality parameters, Physical and chemicals characteristics of water : Colour, turbidity, odour and taste, total solids, conductivity, pH, acidity, alkalinity, hardness, Dissolved Oxygen, Biological Oxygen Demand and Chemical Oxygen demand

#### Unit -IV

Biological aspects of Environment Monitoring: Bio indicators of environmental monitoring Microbiological quality of water Bio indicators of water quality Vegetation monitoring – a brief idea.

#### Unit -V

EIA – Aims, objectives and methods EIA case studies river valley, projects and thermal power plants Geographical Information System Remote sensing and application in environment

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	3	2	3	3
CO2	3	1	2	2	3	3	2
CO3	3	3	3	3	3	2	2
CO4	2	2	2	1	2	3	3
CO5	2	3	2	2	3	2	2

3= Highly Related; 2= Medium; 1 = Low

#### Suggested Readings:

1. Khopkar, S.M. 1993 : Environmental Pollution Analysis, Wiley Eastern Limited New York
2. Rao M.N. and H.V.N. Rao, 1989 : Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi
3. Wild A., 1993 : Soils and the Environment, Cambridge University Press, Cambridge.

4. Tyler Miller Jr. G. 1990. Living in the Environment. Wadsworth Publishing Company, Belmont California.
5. Botkin, D.B and Keller E.A., 1982: Environmental Studies : The earth as a living plant. Charles E. Merrill, Publishing Co. London.

#### **Environmental Monitoring Lab (BMI127A)**

1. Determination of dissolved oxygen (DO) of water samples.
2. Determination of biological oxygen demand (BOD) of water samples.
3. Determination of chemical oxygen demand (COD) of water samples.
4. Determination of Conductivity in drinking water sample
5. Determination of turbidity in drinking water sample
6. To determine the concentration of iron in water sample by spectrophotometric method
7. Evaluation of Disinfectant – Phenol co-efficient test

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI048A	Waste Management	4	1	4	2	5

#### **Course outcome (CO)**

On completion of the course, students are able to:

CO1- Understand the municipal solid waste, its sources and types of solid waste- composition and its determinants apply the knowledge for sampling methods of solid waste.

CO2- Understand the collection and transfer of solid waste.

CO3- Understand the basic concept of processing techniques and recovery of energy from solid waste.

CO4- Understand the various techniques used for disposal of solid waste including incineration and land filling.

CO5- Understand the basic of biomedical waste and chemical waste and their harmful effect on human.

#### **Unit - I**

Municipal solid waste Definition - Sources and types of solid waste- composition and its determinants of Solid waste-factors influencing generation-quantity assessment of solid wastes- methods of sampling and characterization.

#### **Unit – II**

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Collection and Transfer Collection: Collection of Solid waste – collection services – collection system, equipments – time and frequency of collection – labour requirement – factors affecting collection – analysis of collection system – collection routes – preparation of master schedules.

### Unit-III

Processing Techniques and Recovery of Energy Processing techniques – purposes mechanical volume reduction – necessary equipments – chemical volume reduction – incinerators – mechanical size reduction selection of equipments – components separation – methods – drying and dewatering.

### Unit - IV

Disposal of Solid Wastes Refuse disposal – various methods – incinerations – principle features of an incinerator – site selection and plant layout of an incinerator - sanitary landfill- methods of operation – advantages and disadvantages of sanitary land fill - site selection – reactions accruing in completed landfills– gas and leachate movement and control – equipments necessary.

### Unit V

Biomedical and chemical wastes Biomedical wastes – Types – Management and handling – control of biomedical wastes Chemical wastes – Sources – Domestic and Industrial -Inorganic pollutants – Environmental effects – Need for control – Treatment and disposal techniques – Physical, chemical and biological processes – Health and environmental effects

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	2	1	1	2
CO2	2	2	1	1	2	1	1
CO3	2	2	2	2	2	2	1
CO4	2	2	1	2	3	1	1
CO5	3	1	1	1	2	2	2

3= Highly Related; 2= Medium; 1 = Low

#### Suggested Reading:

- George Tchobanoglous et al, "Integrated Solid Waste Management" McGraw - Hill, 1993. Tchobanoglous Thiesen Ellasen; Solid Waste Engineering Principles and Management, McGraw - Hill 1997.

- R.E.Landrefh and P.A.Rebers," Municipal Solid Wastes-Problems & Solutions".Lewis, 1997.
- Manual on Municipal Solid waste Management, CPHEEO, Ministry of Urban Development, Govt. Of India, New Delhi, 2000.
- Blide A.D.& Sundaresan, B.B,"Solid Waste Management in Developing Countries", INSDOC, 1993.
- Ecology Science and Practice; Claude Fourie, Christian Ferra, Paul Medori, Tean Devaux, Oxford and IBH Publishing Co (Pvt) LTD, special Indian edition.
- Principles of Ecology- P.S.Verma, V.K.Agarwal.S.Chand & Company (Pvt) LTD 1989

#### **Waste Management Lab (BMI049A)**

1. Determination of pH of MSW
2. Determination of nutrient value (NPK)
3. Lab scale study on vermin-composting
4. Lab scale study of aerobic and anaerobic digesting of solid wastes.
5. Vermi composting of organic wastes.
6. Demonstration of Effluent treatment plant.
7. Demonstration of medical waste collection method.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI128A	Environmental Legislation and Policy	4	1	4	2	5

#### **Course outcome (CO)**

On completion of the course, students are able to:

CO1- Understand the Legal definitions of environmental pollution, natural resource, biodiversity, forest, sustainable development.

CO2- Understand the legal act related to environmental law (British India and Independent India).

CO3- Understand the Indian act relevant to Forest, Wildlife, Water, Air and Motor Vehicle.

CO4- Understand the National Green Tribunal act, scheme and labeling of environment friendly products and Ecomarks.

CO5- Understand the International laws and policy and Case studies in India Stockholm Conference and role of central and state pollution control boards.

#### **UNIT I**

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National Green Tribunal. Legal definitions (environmental pollution, natural resource, biodiversity, forest, sustainable development); Article 48A (The protection and improvement of environment and safeguarding of forests and wildlife); Article 51 A (Fundamental duties).

## UNIT II

British India: Indian Penal Code 1860, Forest Act 1865, Fisheries Act 1897; Independent India: Van Mahotsava 1950, National Forest Policy 1952, Orissa River pollution and prevention Act 1953.

## UNIT III

Legislative Instruments The Indian Forest Act 1927; The Wildlife (Protection) Act 1972; The Water (Prevention and Control of Pollution) Act 1974; The Forests (Conservation) Act 1980; The Air (Prevention and Control of Pollution) Act 1981; The Environment (Protection) Act 1986; Motor Vehicle Act 1988.

## UNIT IV

The Public Liability Insurance Act 1991; Noise Pollution (Regulation and Control) Rules 2000; The Biological Diversity Act 2002; The Schedule Tribes and other Traditional Dwellers (Recognition of Forests Rights) Act 2006; The National Green Tribunal Act 2010; scheme and labeling of environment friendly products, Ecomarks.

## UNIT V

International laws and policy and Case studies in India Stockholm Conference 1972; United Nations Conference on Environment and Development 1992; Rio de Janeiro (Rio Declaration, Agenda 21); Convention on Biological Diversity, Montreal Protocol 1987; Kyoto Protocol 1997; Copenhagen and Paris summits. 19 Role of Ministry of Environment, Forests & Climate; role of central and state pollution control boards.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	0	0	3	0	3	3
CO2	1	1	0	2	2	2	3
CO3	2	0	1	3	1	3	2
CO4	1	0	0	3	1	2	3
CO5	2	1	0	2	0	2	3

3= Highly Related; 2= Medium; 1 = Low

**Suggested Readings:**

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1. Divan, S. & Rosencranz, A. 2001. Environmental Law and Policy in India. Oxford University Press.
2. Venkat, A. 2011. Environmental Law and Policy. PHI Learning Private Ltd. Reference Books:
3. Abraham, C.M. 1999. Environmental Jurisprudence in India. Kluwer Law International.
4. Agarwal, V.K. 2005. Environmental Laws in India: Challenges for Enforcement. Bulletin of the National Institute of Ecology 15: 227-238.
5. Divan, S. & Rosencranz, A. 2002. Environmental Law and Policy in India: Cases, Materials and Statues (2nd edition). Oxford University Press.
6. Gupta, K.R. 2006. Environmental Legislation in India. Atlantic Publishers and Distributors.
7. Leelakrishnan, P. 2008. Environmental Law in India (3rd edition). LexisNexis India.
- Naseem, M. 2011. Environmental Law in India Mohammad. Kluwer Law International

#### Environmental Legislation and Policy Lab (BMI129A)

1. A case study of any environmental issue relevant to India.

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI130A	Microbial Ecology	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO 1 Understand the basic concepts within the field of microbial ecology and environmental microbiology.
- CO 2 Understand and Interpret the various ecological and evolutionary principles that impact microbes.
- CO 3 Analyze and design experimental approaches used in the field of microbial ecology.
- CO 4 Understand functional ubiquity and diversity observed among different microbes.
- CO 5 Apply the arguments that researchers in microbial ecology make based on evidence.

#### Unit 1

Origin of life: A brief history of the physical origin of the Earth, Chemical and Cellular evolution; Microbial Diversification: Consequences for Earth's Biosphere; Endosymbiotic origin of eukaryotes.

#### Unit 2

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Microbial Ecology vs. Macroecology, Basic concept of Ecosystem and Biosphere, Concept of habitat and niche, Concept of population growth and community dynamics in microbe, Basic concept of food chain-food web and energy flow.

### Unit 3

Physiological ecology of microorganisms: Adaptation to environmental condition, Abiotic growth limiting factors-Leibig's law of minimum, Shelford law of tolerance. Microbial community succession-biofilm communities.

### Unit 4

Quantitative Ecology: Microbial diversity, OTU, Diversity indices (Shannon, Shimpson), Alpha and beta diversity, Richness and evenness, Samples and samplings, Concept of culturability, Significance of Biogeochemical cycles-Carbon, Nitrogen, Phosphorous, Sulphur.

### Unit 5

Development of microbial communities: r and k strategies. Determination of total and viable microbial number, Molecular analysis of function and diversity of microbial community, Metagenomics and microbiomics

### Microbial Ecology Lab (BMI131A)

- 1) Types of media – differential, selective, synthetic.
- 2) Isolation and enumeration of microbes from soil sample by serial dilution agar plating method or by viable plate count method.
- 3) Direct microscopic count.
- 4) To obtain axenic culture of microbes by streak, spread, pour plate methods.
- 5) Techniques for preservation of microbial cultures.
- 6) To preserve microbes by freeze drying (lyophilization).
- 7) Carbohydrate estimation by Anthrone method.
- 8) Protein estimation by Lowry's, Bradford and
- 9) To plot bacterial growth curve by spectrophotometer.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course	Program Outcome
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Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	3	1	1
CO2	2	1	2	1	2	2	1
CO3	3	1	1	2	3	3	2
CO4	2	3	2	2	2	1	3
CO5	2	1	3	1	1	1	1

#### Suggested readings:

1. Environmental Microbiology and Biotechnology by Singh and Dwivedi. New Age Int. Sci. Publication.
2. Environmental Microbiology by Riana.
3. Microbiology by Prescott, Harley and Klein. TMH Publication.
4. Brock Biology of Microorganisms. Prentice Hall Publication.
5. General Microbiology by Stanier. MacMillan Education Ltd.
6. Environmental Microbiology: Principles and Applications. Patrick K. Jjemba.
7. Encyclopedia of Environmental Microbiology, 6 Vol. Set. Willey Publication.
8. Microbial Ecology by Alexander. Willey Publication

Course code	Course Title	L	P	Contact Hr	Contact Hr	Total Credit
BMI132A	Agro-Environment Microbiology	4	1	4	2	5

#### Course outcome (CO)

On completion of the course, students are able to:

- CO 1 Understand the basic concepts of Ethanol fermentation, agro and forest-feedstocks to fermentable sugars, sugars to ethanol.
- CO 2 Understand the alternative ethanol producing organism-Zymomonas mobilis.
- CO 3 Understand the single cell protein, mycoprotein, rDNA technology and its application in Agriculture.
- CO 4 Understand the functional of degradation of lignocellulosic waste and biocomposting methods.
- CO 5 Understand the biodegradation and biotransformation of Xenobiotics compounds.

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### Unit I

Ethanol fermentation, agro and forest-feedstocks to fermentable sugars, sugars to ethanol (yeasts, substrate range, substrate utilization), Ethanol tolerance, flocculation and cell recycle, stillages.

### Unit II

Alternative ethanol producing organism-Zymomonas mobilis (Carbohydrate utilization, ED pathway used by the organism, its tolerance to ethanol); Clostridial fermentations.

### Unit III

Single cell protein, mycoprotein, rDNA technology and its application in Agriculture, Environment and healthcare, GMO's and GEM's- Role of Agrobacterium, Ti Plasmid, transgenic crops, issues related to transgenic organisms,

### Unit IV

Degradation of lignocellulosic waste, Biocomposting-different methods, conditions, different types of compost, conditions for production of compost, Leaching of metal from ores- Bioleaching, organisms involved and their usage.

### Unit V

Biodegradation and biotransformation of Xenobiotics including pesticides, chlorinated and nitrated aromatic compounds, phenolic compounds, polycyclic aromatic compounds.

### Agro-Environment microbiology Lab (BMI133A)

- 1) Identification of Fungal Contaminants in Plant Tissue
- 2) Identification of Disease Causing Fungal Pathogen of Fruit Plants
- 3) Identification of Pathogens Causing MD-2 Pineapple Fruit Rot
- 4) Microbial Analysis of Food Items
- 5) Bacteriological Examination of Water by Multiple Tube Fermentation Test
- 6) Microbiological Examination of Milk
- 7) Analyze the bacterial colonies in rotten fruit.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	2	1	2	3	1
CO2	2	2	2	0	3	1	1
CO3	3	3	2	1	1	2	2
CO4	2	1	2	2	2	2	3
CO5	2	1	3	1	1	1	1

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### **Suggested Readings:**

1. Waste Water Microbiology by Garbiel, Bitton. Wiley Publication.
2. Biopesticides: A Biotechnical Approach by S R Joshi. New Age Publication.
3. Microbial Ecology by Atlas and Bartha.
4. Soil Organic Matter and Biological Activity. Martinus Nigholf W Junk Publisher.
5. Introduction to Environmental Microbiology by Michel Wiley Liss Publication.
6. Advances in Microbial Ecology. K C Marcell, Plenum Press.

### **Open elective-I Human Microbial Disease Management (BMI134A)**

Course learning outcomes: By the conclusion of this course, the students

CO1. Understanding of practical aspects diagnosis of common human infections.

CO2. Understanding of preventive measures for human infections by the use of antibiotics and vaccines.

#### **Unit I**

Human Diseases: Infectious and non-infectious diseases, microbial and nonmicrobial diseases, Deficiency diseases, occupational diseases, Incubation period, mortality rate, nosocomial infections Sign and Symptoms of common diseases.

#### **Unit II**

Microbial diseases: Respiratory microbial diseases, gastrointestinal microbial diseases, Nervous system diseases, skin diseases, eye diseases, urinary tract diseases, Sexually transmitted diseases: Types, route of infection, clinical systems and general prevention methods, study of recent outbreaks of human diseases (SARS/ Swine flu/Ebola) – causes, spread and control, Mosquito borne disease – Types and prevention.

#### **Unit III**

Therapeutics of Microbial diseases: Treatment using antibiotics: beta lactam antibiotics (penicillin, cephalosporins), quinolones, polypeptides and aminoglycosides. Judicious use of antibiotics, importance of completing antibiotic regimen, Concept of DOTS, emergence of antibiotic resistance, current issues of MDR/XDR microbial strains.

#### **Unit IV**

Treatment using antiviral agents: Amantadine, Acyclovir, Azidothymidine. Concept of HAART. Vaccines: Importance, types, vaccines available against microbial diseases, vaccination schedule (compulsory and preventive) in the Indian context.

#### **Unit V**

Prevention of Microbial Diseases: General preventive measures. Importance of personal hygiene, environmental sanitation and methods to prevent the spread of infectious agents transmitted by direct contact, food, water and insect vectors.

#### Reference Books

1. Ananthanarayan R and Paniker CKJ. Textbook of Microbiology. 7th Edition. University Press Publication. (2005).
2. Brooks GF, Carroll KC, Butel JS and Morse SA. Jawetz, Melnick and Adelberg's Medical Microbiology. 24th edition. McGraw Hill Publication. (2007).
3. Goering R, Dockrell H, Zuckerman M and Wakelin D. Mims Medical microbiology. 4th edition. Elsevier. (2007).
4. Drexler M; What You Need to Know About Infectious Disease. National Academies Press (US); 2010.

#### Open elective-II Microbial Products (BMI135A)

Course learning outcomes: By the conclusion of this course, the students

CO1. Understanding of practical aspects of production of biofertilizers.

CO2. Understanding of practical aspects of the production of biopesticides/bioinsecticides.

#### Unit I

Biofertilizers: General account of the microbes used as biofertilizers for various crop plants and their advantages over chemical fertilizers. Symbiotic N<sub>2</sub> fixers: Rhizobium - Isolation, characteristics, types, inoculum production and field application, legume/pulses plants Frankia - Isolation, characteristics, Alder, Casuarina plants, non-leguminous crop symbiosis

#### Unit II

Cyanobacteria as bio-fertilizers- Isolation, characterization, mass multiplication, Role in rice cultivation, Crop response, field application. Non - Symbiotic Nitrogen Fixers. Free living Azospirillum, Azotobacter free isolation, characteristics, mass inoculums, production and field application



### Unit III

Phosphate Solubilizers :Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application. PGPR – Isolation and Characterization; mass production and application.

### Unit IV

Mycorrhizal Bio-fertilizers: Importance of mycorrhizal inoculum, types of mycorrhizae and associated plants, Mass inoculum production of VAM, field applications of Ectomycorrhizae and VAM.

### Unit V

Bioinsecticides :General account of microbes used as bioinsecticides and their advantages over synthetic pesticides, Bacillus thuringiensis, production, Field applications. Viruses – cultivation and field applications.

#### Suggested Reading:

1. Atlas RM and Bartha R., Microbial Ecology: Fundamentals & Applications. 4<sup>th</sup> edition, 2000, Benjamin/Cummings Science Publishing, USA.
2. Atlas RM., Microbiology: Fundamentals and Applications. 2<sup>nd</sup> Edition, 1989, MacMillan Publishing Company, New York.
3. Madigan MT, Martinko JM and Parker J., Brock Biology of Microorganisms. 12<sup>th</sup> edition, 2009, Pearson/ Benjamin Cummings.
4. Lynch JM & Hobbie JE., Microorganisms in Action: Concepts & Application in Microbial Ecology, 1988, Blackwell Scientific Publication, U.K.
5. Maier RM, Pepper IL and Gerba CP., Environmental Microbiology. 2<sup>nd</sup> edition, 2009, Academic Press.
6. Eugene L. Madsen. Environmental Microbiology: From Genomes to Biogeochemistry. I Edition, Wiley Black well Publishing. (2008).
7. Agrios, G.N. Plant pathology. Harcourt Asia Pvt. Ltd. (2000).
8. Buchanan.B.B., Grissem, W. and Jones, R.L Biochemistry and Molecular Biology of Plants. I.K. International Pvt. Ltd. (2000).

#### Open Elective-III Biosafety and IPR (BMII36A)

##### Course outcome (CO)

On completion of the course, students are able to:

- CO1 Analyze and understand the working in a microbiology laboratory taking all safety measures, handling of live bacteria, disposal of infectious waste, care of the equipment requiring safety audit
- CO2- Understand the knowledge of basic concepts related to IPR.
- CO3- Understand and apply knowledge of patent filing, and some well-known/well-publicized case studies related to IPR

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CO4 -Understand and apply grant of patent and patenting authorities

CO5-Understand the agreements and Treaties

#### Unit I

Biosafety: Introduction; biosafety issues in biotechnology; Biological Safety Cabinets & their types; Primary Containment for Biohazards; Biosafety Levels of Specific Microorganisms AERB/RSD/RES guidelines for using radioisotopes in laboratories and precautions.

#### Unit II

Biosafety Guidelines: Biosafety guidelines and regulations (National and International); GMOs/LMOs- Concerns and Challenges; Role of Institutional Biosafety Committees (IBSC), RCGM, GEAC etc. for GMO applications in food and agriculture; Environmental release of GMOs; Risk Analysis; Risk Assessment; Risk management and communication; Overview of International Agreements - Cartagena Protocol.

#### Unit III

Introduction to Intellectual Property: Patents, Types, Trademarks, Copyright & Related Rights, Industrial Design and Rights, Traditional Knowledge, Geographical Indications- importance of IPR – patentable and non patentables – patenting life – legal protection of biotechnological inventions – World Intellectual Property Rights Organization (WIPO)

#### Unit IV

Grant of Patent and Patenting Authorities: Types of patent applications: Ordinary, PCT, Conventional, Divisional and Patent of Addition; An introduction to Patent Filing Procedures; Patent licensing and agreement; Patent infringement- meaning, scope, litigation, case studies, Rights and Duties of patent owner.

#### Unit V

Agreements and Treaties: GATT, TRIPS Agreements; Role of Madrid Agreement; Hague Agreement; WIPO Treaties; Budapest Treaty on international recognition of the deposit of microorganisms; UPOV & Brene conventions; Patent Co-operation Treaty (PCT); Indian Patent Act 1970 & recent amendments.

#### Suggested Readings

1. Private Power, Public Law: The Globalization of Intellectual Property Rights By Susan K. Sell Cambridge University Press, 2000
2. Essentials of Intellectual Property: Law, Economics, and Strategy By Alexander I. Poltorak; Paul J. Lerner Wiley, 2011 (2nd edition)
3. M K Sateesh .Bioethics and Biosafety . Kindle Edition
4. Diane O. Fleming, Debra L. Hunt Biological Safety: Principles and Practices, 4th Edition. ASM 2006
5. Shomini Parashar, Deepa Goel, IPR, Biosafety and Bioethics Pearson India 2013



**JECRC<sup>TM</sup>**  
**UNIVERSITY**  
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**School of Science**

**Course Structure and Syllabus**

**M.Sc. (Microbiology)**  
**(2022-2024)**

**Academic Programmes**

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Suniti R. Kashni



The curriculum and syllabus for M.Sc. Program conforms to outcome based teaching learning process. In general, several outcomes have been identified and the curriculum and syllabus have been planned in such a way that each of the courses meets one or more of these outcomes. Program outcomes illustrate the students are expected to know and be able to do by the time of graduation. These relate to the skills, understanding, and behaviors that students acquire as they progress through the program. Further each course in the program brings out clear instructional objectives which are mapped to the student outcomes.

The student outcomes are:

1. An ability to apply profound understanding of science, zoology, botany and microbiology
2. An ability to design and perform experiments, as well as to analyze and interpret data
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4. An ability to function on multidisciplinary teams
5. An ability to identify, formulate, and solve microbiological problems
6. An understanding of professional and ethical responsibility
7. An ability to communicate effectively
8. The broad education necessary to understand the impact of biological solutions in global, economic, environmental, and societal context
9. A recognition of the need for, and an ability to engage in life-long learning
10. A knowledge of contemporary issues
11. An ability to use the techniques, skills, and modern microbial tools necessary for microbiological practice.



#### PROGRAM OUTCOMES (POs)

- PO1. To acquire recent technical knowledge in basic and applied biological sciences.
- PO2. Understanding microbiology in medical, industrial, agriculture, food and environmental basis of life.
- PO3. Demonstrate practical skills/competencies in the laboratory including ethical implication of microbial research and the use of good laboratory practices and biosafety.
- PO4. To develop scientific communication, writing skills, problem solving, and innovative thinking in youth with respect to microbiology.
- PO5. To apply the knowledge of microbiology in health, medicine, environment and sustainable development.
- PO6. Competent in practical and project based skills for a career in research and entrepreneurship in fields of microbiology.
- PO7. To gain knowledge of essential facts, concepts, principles and theories relating to the subject areas identified and to recognize, analyze problems and plan strategies for their solution.

Rashmi

Dr. P.

P.

Prashant

**JECRC UNIVERSITY**  
**FACULTY OF SCIENCE**  
**SESSION 2022-2024**

Details of Scheme for M. Sc. Microbiology with various Courses & their credits with contact Hours

**M.Sc. Microbiology Semester- I**

Subject Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
MMI 001A	Bacteriology	4	-	-	4			4	Core
MMI 002A	Instrumentation	4	-	-	4			4	Core
MMI 020A	Principles of Biochemistry	4	-	-	4			4	Core
MMI 004B	Virology, Mycology and Phycology / Swayam portal/ MOOCs	4	-	-	4			4	Elective Theory
MMI 021A	Practical I	0	0	12	0	0	6	6	Compulsory Practical
	<b>Total</b>	<b>12</b>		<b>2</b>	<b>12</b>	<b>0</b>	<b>6</b>	<b>22</b>	
		<b>12</b>		<b>2</b>	<b>12</b>	<b>0</b>	<b>6</b>	<b>22</b>	

**M.Sc. Microbiology Semester- II**

Subject Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
MMI 022A	Industrial microbiology	4	-	-	4			4	Core
MMI 007A	Molecular biology and microbial genetics	4	-	-	4			4	Core
MMI008A	Immunology	4	-	-	4			4	Core
MMI 014A	Applied Environmental microbiology/Swayam portal/ MOOCs	4	-	-	4			4	Elective Theory
MMI 023A	Practical II	0	0	12	0	0	6	6	Compulsory Practical
		<b>12</b>		<b>2</b>	<b>12</b>	<b>0</b>	<b>6</b>	<b>22</b>	

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### M.Sc. Microbiology Semester- III

Subject Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
MMI 011A	Medical Microbiology	4	-	-	4			4	Core
MMI 012A	Genetic Engineering	4	-	-	4			4	Core
MMI 024A	Food and Dairy Microbiology	4	-	-	4			4	Core
MMI025A	Biostatistics and Bioinformatics/ Swayam portal/ MOOCs	4	-	-	4			4	Elective Theory
MMI 026A	Practical III	0	0	12	0	0	6	6	Compulsory Practical
		12		2	12	0	6	22	

### M.Sc. Microbiology Semester- IV

Subject Code	Subject	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
					L	T	P		
MMI016A	Review Report/ Scientific writing	0	-	-	0			4	Core
MMI017A	Dissertation	0	-	-	0			16	Core
MMI018A	Seminar	0	-	-	0			2	Core
	<b>Total</b>	0	-	-	0			22	

### Total Credits

Credits	I Sem	II Sem	III Sem	IV Sem	Total
	22	22	22	22	88

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MMI 001A	BACTERIOLOGY	4-0-0 [4]
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### Course outcome

- CO 1 Understand the classical and modern trends in classification with reference to Bergey's manual of systematic bacteriology
- CO 2 Understand and apply the Ultra structure of bacteria, nutritional, bacterial endospores and sporulation.
- CO 3 Apply and Understand general account of eubacteria (Gram + & -) and archaebacteria (methanotrophs, halophiles and sulphur bacteria).
- CO 4 Understand and apply the Cultivation of Bacteria: growth curve and environmental factors affecting growth.
- CO 5 Apply and Analyze account of oxygenic and anoxygenic photosynthesis and the different types pigments molecule involved in photosynthesis

<b>UNIT 1</b>	<b>Classification :</b> Classification of microorganisms- introduction, Haeckel's three kingdom concept, Whittaker's five kingdom concept, three domain system of classification. Modern trends in classification (ribotyping, NA hybridization, RNA fingerprinting). Classification and salient features of bacteria according to Bergey's manual of systematic bacteriology(a brief outline) Morphological types of bacteria . Nutritional classification of bacteria.
<b>UNIT 2</b>	<b>Structure of bacteria :</b> Cell wall structure and synthesis, cell membrane,. Flagella and motility, chemotaxis Pili, Fimbriae, Cell inclusions like Glycogen granules, Volutin granules, Carboxysomes, magnatosomes, chlorosomes, gas vacoules, Slime sheet and capsule. Endospore structure and formation stages of sporulation, activation germination and outgrowth of bacterial endospores, poly- $\beta$ -hydroxyl butyrate, nucleic acids
<b>UNIT 3</b>	<b>Eubacteria and Archaebacteria:</b> General characters and structure of Spirochetes, cyanobacteria, purple and green bacteria, rickettsia, Chlamydia, budding bacteria and sheathed bacteria. Gram positive bacteria- endospore forming bacteria, actinomycetes, mycobacteria. Archaebacteria-methanotrophs, halophiles and sulphur bacteria.
<b>UNIT 4</b>	<b>Microbial Growth :</b> The definition of growth, growth curve, measurement of growth and growth yields, Synchronous growth, Continuous, Batch and Fed Batch Culture; Growth as affected by environmental factors like temperature, acidity, alkalinity, water availability oxygen and pH, activity of water, radiations, osmotic pressure and gaseous environment, maintenance, preservation, Control of microorganisms: physical and chemical methods. Mode of action of antibiotics, Antimicrobial drug resistance - Mechanism and spread.
<b>UNIT 5</b>	<b>Microbial Physiology :</b> Photosynthesis: Oxygenic photosynthetic microbes and anoxygenic photosynthetic microbes. Brief account of photosynthetic and accessory pigments-chlorophyll and bacteriochlorophylls, rhodopsin, carotenoids, phycobiliproteins; oxygenic-anoxygenic photosynthesis.

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	2	1	1	1
CO2	2	2	1	2	2	2	1
CO3	3	2	3	2	3	1	1
CO4	2	2	2	3	2	3	2
CO5	3	2	2	3	1	2	2

3 = Highly Related; 2 = Medium; 1 = Low

***Suggested Readings***

1. Atlas RM (1989) Basic and Practical Microbiology, Mac Millan Company New York.
2. Brock TD, Madigan MT, Martinko JM, Dunlap PV, Clark DP (2012) Biology of Microorganisms, Prentice Hall, USA.
3. Prescott ML, Klein AD, Harley JP (2008) Microbiology (7<sup>th</sup> Edition), Mc Graw Hill Companies
4. Atlas RM (1989) Microbiology Fundamentals and Applications (2<sup>nd</sup> edition), Maxwell Macmillan International edition
5. Cappuccino JG and Sherman N (2006) Microbiology-a Laboratory Manual (6<sup>th</sup> Edition), Addison Wesley, Pearson education, Inc.
6. Satynarayana T & Johri (2005) Microbial diversity: current perspectives and potential applications, B.N. I.K. International Pvt. Ltd.
7. Moat AG, Foster JW and Spector M (2002) Microbial Physiology (4<sup>th</sup> Edition), Wiley Liss publications
8. Brown AE (2005) Benson's Microbiological application: Laboratory Mannual in general th Mirobiology (9<sup>th</sup> Edition), Mc Graw Hill
9. Talaro KP and Talaro A (2002) Foundation in Microbiology (4<sup>th</sup> Edition), Mc Graw Hill
10. Stanier RY, Ingharam JL, Wheelies ML and Painter PR (1999) General Microbiology, Mac Millan Education Ltd
11. Alcamo IE, Jones and Barlett (2001) Labo ratory Fundamentals of Microbiology, publishers
12. Colwd D (1999) Microbial Diversity, Academic press
13. Pelczar MJ, Chan ECS, Kreig NR (2006) Microbiology (5<sup>th</sup> Edition), Tata Mc Graw Publication

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MMI 002A	Instrumentation	4-0-0 [4]
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- CO 1 Understand the construction of principle and applications of microscopy and various types of microscope and their use.
- CO 2 Understand the Principle, sedimentation analysis & RCF of centrifugation and various type of centrifuges.
- CO 3 Understand the Principle, techniques of chromatography and various types of chromatography techniques.
- CO 4 Understand the Principle, factors affecting and types of electrophoresis.
- CO 5 Understand the Spectroscopy technique and Radioisotopic Techniques.

<b>UNIT 1</b>	<b>Microscopy:</b> construction of a microscope, Principle and applications of light microscopy (bright field, dark field, phase-contrast, interference, fluorescence, polarization microscopy). Electron microscopy- TEM, SEM, Scanned probe microscopic techniques (STEM, AFM). Confocal, Steriomicroscope (Basic)
<b>UNIT 2</b>	<b>Centrifugation:</b> Principle, sedimentation analysis & RCF, ultracentrifugation, High speed centrifuge, Zonal & Isopycnic centrifuge: Preparative (differential and density gradient) and analytical centrifuges.
<b>UNIT 3</b>	<b>Chromatography:</b> Principle, techniques of chromatography (Paper chromatography, TLC, Column chromatography), types of chromatography (GC, HPLC, Fast performance liquid chromatography, Adsorption chromatography, Partition chromatography, Gel filtration, Ion-exchange chromatography and Affinity chromatography).
<b>UNIT 4</b>	<b>Electrophoresis:</b> Principle, factors affecting electrophoresis, types of electrophoresis - Agarose gel electrophoresis, PAGE, SDS-PAGE, 2-D electrophoresis, Pulsed field gel electrophoresis, isoelectric focussing, immuno electrophoresis, Isotechophoresis Immunodiffusion.
<b>UNIT 5</b>	<b>Spectroscopy:</b> Beer-Lambert law, UV-Vis spectroscopy, fluorescence spectroscopy, IR spectroscopy, Raman spectroscopy, Atomic absorption spectroscopy, NMR, ESR, Flame emission photometry, flow cytometry. <b>Radioisotopic Techniques:</b> Principle and applications of radiation techniques (Radioisotopes; nature of radioactivity, types of radioactive decay, unit of radioactivity), detection and measurement of radioactivity (Geiger-Muller counter, Solid and liquid scintillation counter, Propotional counter, Film batch pocket dosimetry, autoradiography).



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	1	1	3	3
CO2	2	0	2	1	1	2	2
CO3	3	0	3	0	1	2	2
CO4	2	1	2	0	1	3	2
CO5	3	1	3	1	1	3	1

3 = Highly Related; 2 = Medium; 1 = Low

***Suggested Readings***

1. Narayanan P (2000) Essentials of Biophysics, New Age Int. Pub. New Delhi
2. Ninfa AJ, Ballou DP (2009) Fundamental Laboratory Approaches for Biochemistry and Biotechnology (2<sup>nd</sup> Edition) Fitzgerald science press, Inc.
3. Venn RF, Taylor and Francis (2003) Principles and Practice of Bioanalysis (2<sup>nd</sup> Edition), CRC publisher
4. Wilson K and Walker J (2007) Principles and Techniques of Biochemistry and Molecular Biology (6<sup>th</sup> Edition), Cambridge University Press
5. Webster JG (2004) Bioinstrumentation, John Wiley & Sons Inc.
6. Notting B (2003) Methods in Modern Biophysics, Springer Verlag Berlin Heidelberg New York
7. Scopes R K (2004) Protein Purification Principles and Practice (3<sup>rd</sup> Edition), spring International
8. Hames GG (2005) Spectroscopy for the Biological Sciences, John Wiley & Sons Inc.

MMI020A	Principles of Biochemistry	4-0-0 [4]
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**Course Outcomes**

- CO 1 Describe the chemical foundations of biology with reference to pH, buffers, bioenergies and hierarchy of molecules.
- CO 2 Describe a general account of types, structural and metabolic pathway of amino acids.
- CO 3 Explain general account of types, structural and metabolic pathway of carbohydrates.
- CO 4 Describe the Classification, Structure, functions, catabolism and anabolism of saturated and unsaturated fatty acids.
- CO 5 Describe the Enzyme Kinetics and the mechanism of enzyme catalysis and Factors affecting enzyme activity as well as enzyme inhibition

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UNIT 1	<b>Chemical foundations of Biology:</b> pH, pK, acids, bases, buffers, weak bonds, chemical bonds, Bioenergetics: Principles of thermodynamics: free energy, important energy, rich molecules, standard free energy change, concept of redox reactions. Principles of self assembly, Hierarchy of molecular organization of living systems.
UNIT 2	<b>Amino acids and proteins:</b> Structure and chemistry of Amino acids, Classification, Chemical Reactions and Physical Properties, Proteins-purification and criteria for homogeneity, structural organization of proteins- primary, secondary, tertiary and quaternary structure. Ramachandran plot. Protein sequencing, Protein folding & stability, Levinthal's paradox, glyco and lipo protein structure and function. Degradation and reconstruction.
UNIT 3	<b>Carbohydrates:</b> Classification and reactions of aldehyde and ketone group, types, structural features (ring structure, tautomeric forms, mutarotation) of carbohydrates. Metabolism of carbohydrates, glycolysis, Krebs cycle, terminal oxidation/oxidative phosphorylation, reverse TCA cycle, gluconeogenesis, mechanism of ATP synthesis.
UNIT 4	<b>Lipids:</b> Classification, Structure and functions, Biosynthesis of saturated and unsaturated fatty acids, Metabolism of Lipid and fat bodies: Beta-oxidation and channeling of the products to ATP production: minor pathway of fatty acid oxidation, (alpha and omega oxidation), Biosynthesis of saturated and unsaturated fatty acids, denovo and salvage pathways, Degradation of Purines and pyrimidines pathways.
UNIT 5	<b>Enzymes &amp; Enzyme Kintetics:</b> Rate of reactions, specific activity, molecular activity, Km, K, Michaelis Menten & Line weaver Burk plot and Bisubstrate Reaction, Eaidi-Hofstee plot & Hanes-Woolf plot, enzyme inhibition, mechanism of enzyme catalysis (acid-base electrostatic, metal ion, free radicals, transition state binding and covalent, proximity and orientation effects, Contribution of strain). Factors affecting enzyme activity, enzyme inhibition. Allosteric, Iso-, Co-enzymes, Immobilized ezymes & cells and their applications.

#### Suggested Readings:

1. Gottschalk G. Bacterial Metabolism, Springer,
2. Caldwell DR. Microbial Physiology and Metabolism, 2<sup>nd</sup> ed., Star
3. Moat AG, Foster JW & Spector MP. Microbial Physiology, 4<sup>th</sup> ed., John Wiley and Sons
4. Nelson DL & Cox MM. Lehninger's Principles of Biochemistry, 5<sup>th</sup> ed., WH Freeman & Company
5. Berg JR, Tymoczko CZ & Stryer L. Biochemistry, 6<sup>th</sup> ed., W.H. Freeman and Company
6. Madigan MT, Martinko JM, Stahl DA & Clark DP. Brock Biology of Microorganisms, 13<sup>th</sup> ed., Benjamin Cummings.
7. Prescott LM, harley JP & Klein DA. Microbiology, McGraw Hill International Edition, USA.
8. Atlas RM, Parks LC & Brown AI.. Laboratory Manual of Experimental Microbiology. Mosby-Year Book, Inc., Missouri.
9. Brown AE. Benson's microbiological applications. TataMacGrawHill

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10. White D, Drummond J, Fuqua C The Physiology and Biochemistry of Prokaryotes .4<sup>th</sup> Edition. Oxford University Press.
11. Cohen G N Microbial Biochemistry. 2nd Edition. Springer.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	1	2	1	0
CO2	2	2	2	2	1	0	0
CO3	3	2	2	2	1	0	1
CO4	2	3	2	3	2	1	0
CO5	1	1	1	1	1	1	1

3= Highly Related; 2 = Medium; 1= Low

***Suggested Readings***

1. Voet D, Voet JG and Pratt CW (2004) Fundamentals of Biochemistry (3<sup>rd</sup> Edition) John Wiley and Sons, New York
2. Nelson DL and Cox MM (2004) Lehninger Principle of Biochemistry (4<sup>th</sup> Edition). Wiley publisher
3. Wilson K and Walker J (2007) Principles and Techniques in Biochemistry and Molecular Biology (6<sup>th</sup> Edition), Cambridge University Press
4. Elliot WH and Elliot DC (2005) Biochemistry and Molecular Biology (3<sup>rd</sup> Edition), Oxford University Press
5. Rawn JD (2004) Biochemistry, 1<sup>st</sup> Indian Reprint, Panama Publishing Corporation

MMI 004B	VIROLOGY, MYCOLOGY AND PHYCOLOGY	4-0-0 [4]
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**Course outcome**

- CO 1 Understand the history, nomenclature, classification, morphology, ultra structure, cultivation and composition-viral genome and virus related agents (viroids, virusoids, prions).
- CO 2 Analyze the viruses of plants, cyanobacteria, bacteriophage, algae and fungi their infection, transmission of plant virus with and without vectors.
- CO 3 Understand the history, classification, nutrition, characteristic and classes of fungi.
- CO 4 Evaluate the general feature and importance of families of algac.
- CO 5 Describe economic importance of algae and lichen as well as their ecology.

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<b>UNIT 1</b>	<b>Brief outline on discovery of viruses:</b> nomenclature and classification of viruses[LHT system, classification as per VII report of the international committee on taxonomy of viruses], distinctive properties of viruses; morphology & ultra structure; capsids & their arrangements; types of envelopes and their composition-viral genome, their types and structure, virus related agents (viroids, virusoids, mycoplasma, prions) cultivation of viruses in embryonated eggs, experimental animals, cell cultures; Primary & secondary cell cultures; suspension cell cultures and monolayer cell cultures, cell certain, cell lines and transgenic systems.
<b>UNIT 2</b>	<b>Viruses:</b> Classification and nomenclature, different types and effects of viruses on plants and animals in context of external appearance; histology, physiology and cytology; Viruses of cyanobacteria, algae and fungi. Transmission of plant virus with vectors (insects, nematodes, fungi) and without vectors (contact, seed and pollens), Prevention of crop loss due to virus infection- virus free planting material; vector control. Bacteriophage, lysogenic and lytic cycle of bacteriophage.
<b>UNIT 3</b>	<b>Mycology:</b> General characteristics of fungi, Classification of fungi, according to Ainsworth and Alexopolus and Mims with the general aspects of Major division of fungi. Type study of class oomycetes, zygomycetes, ascomycetes, basidiomycetes and deuteromycetes, Homothallism, Heterothallism, Heterokaryosis, Sex Hormones in Fungi. Fungi as insect symbiont. Mycotoxins and Mycotoxicoses. Economic importance of fungi.
<b>UNIT 4</b>	<b>Phycology:</b> General features and classification of algae. Occurrence, thallus organization and reproduction in Chlorophyceae, Euglenophyceae, Phaeophyceae, Rhodophyceae, Xanthophyceae, Pyrrophyceae and diatoms. Algal ecology & biotechnology. Economic importance of algae.
<b>UNIT 5</b>	<b>Lichens:</b> Lichen- ascolichen, basidiolichen, deuterolichen. Economic Importance of lichen.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

<b>Course Outcome</b>	<b>Program Outcome</b>						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	1	0	1	0
CO2	3	2	1	2	1	0	0
CO3	3	2	1	0	0	0	1
CO4	3	3	2	3	2	1	0
CO5	2	2	1	1	0	0	0

3= Highly Related; 2 = Medium; 1= Low



### ***Suggested Readings***

1. Dimmock, NJ, Easton AJ and Leppard KN (2001) Introduction to Modern Virology (5<sup>th</sup> Edition), Blackwell publishing, USA.
2. Levy JA, Owens OS and Conrat HF (1994) Virology (3<sup>rd</sup> Edition), PrenticeHall, Englewood cliff, New jersey
3. Mathews RE (1992) Functionals of plant virology, Academic press, San Diego
4. Topley and Wilson (1995) Text Book on principles of Bacteriology, virology and Immunology, Edward Arnold, London
5. Lennetter (1984) Diagnostic procedures for viral and Rickettsial diseases. American public Health association, NY
6. Hayes W (1985) The genetics of Bacteria and their viruses, Blackwell Scientific Publishers, London
7. Atlas RM (1985) Principles of microbiology, Mosby Year Book, Inc. Missouri 63146
8. Ayan RA and Paniker CCJ (2003) Textbook of Microbiology (6<sup>th</sup> Edition). Orient Longman Pvt Ltd
9. Mehrotra RS and Aneja KR (1990) An Introduction to Mycology, New Age International Publishers
10. Moore E, Kenneth L and Smith M (1999) Fundamentals of Fungi, Prentice Hall 11. Plant viruses, Universal Book Stall, New Delhi
12. Walkey DGA (1985) Applied Virology-International Books & Periodicals supply service, New Delhi
13. Alexopoulos CJ and Mims CW (1979) An Introduction to Mycology (3<sup>rd</sup> Edition), Wiley Eastern Ltd., New Delhi

### **MMI021 Practical I**

**Credits: 12**

1. Instrumentation and general lab introduction
2. To determine the acid value of the given oil sample.
3. To prepare biologically important buffers (phosphate and acetate).
4. To separate and identify amino acids by using TLC.
5. To separate and identify carbohydrates using TLC.
6. To find out the concentration of amino-acids in the given sample using ninhydrin.
7. To estimate the presence of carbohydrates.
8. To estimate the presence of Amino acids.
9. To identify of various Algal members.
10. To prepare potato dextrose Agar medium.
11. To check Oligodynamic effect (effect of heavy metals) on the given bacterial sample.
12. To check the given bacterial culture for amylase (starch hydrolysis) activity.
13. To check the given bacterial culture for protease (protein hydrolysis) activity.

14. To check the given bacterial culture for cellulase (carboxymethyl cellulose hydrolysis) activity.
15. To determine effect of U.V. rays on bacteria.
16. To classify and identify various fungal members.
17. To examine symptoms produced in plants due to virus infection.
18. To examine viral diseases of plants/animals/human (Specimen/photographs)
19. To prepare models of different type of viruses (Photographs/sketches).
20. To stain Endospore.
21. To perform the Gram's staining of bacteria.
22. To check the given bacterial culture for its tryptophan utilizing activity.
23. To estimate the total proteins present in the given sample using lowry's method.
24. To Isolate and identify airflora.
25. To Isolate and identify fungi from sewage water.
26. To Isolate and identify soil flora by sprinkle method & serial dilution method.
27. To perform the pure culture isolation methods.
28. To evaluate alcohol as disinfectant.
29. To find out the size of the given spore.
30. To estimate the carbohydrate present in the given sample using Anthrone reagent.
31. To find out the thermal death time of the given bacterial samples.
32. To study the effect of pH on microbial growth
33. To determine the bacterial growth in liquid medium by growth curve.
34. To perform simple bacterial staining.
35. To perform the capsule staining of given bacterial samples.
36. To check the given bacterial culture for its Citrate utilizing activity.
37. To check the given bacterial culture for its MRVP activity.
38. To study the effect of osmotic pressure on microbial growth.



MMI022A	Industrial Microbiology	4-0-0 [4]
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**Course outcome**

- CO 1 Understand the Introduction to microbial products and fermentation processes.  
 CO 2 Understand and apply the Fermentation system and Media optimization; Batch cultivation, continuous cultivation, multistage chemostat, feedback systems, types of fed-batch cultures, open and closed systems  
 CO 3 Apply and Understand general account of eubacteria (Gram + & -) and archaeobacteria (methanotrophs, halophiles and sulphur bacteria).  
 CO 4 Understand and apply the Downstream processing: Downstream processing for filtration (DSP) cell disruption, liquid-liquid extraction, solvent recovery, supercritical fluid extraction, various chromatography techniques in product recovery  
 CO 5 Apply and Analyze Biotechnological applications of microbes in the commercial production of various products

<b>UNIT 1</b>	<b>Introduction to industrial microbiology:</b> Introduction to microbial products and fermentation processes, sources of industrially important microorganisms, Industrially important microorganisms, preservation techniques for microbial cultures, inoculum development, microbial strain improvement, high throughput screening methods, recombinant DNA technology in strain improvement.
<b>UNIT 2</b>	<b>Fermentation systems:</b> Batch cultivation, continuous cultivation, multistage chemostat, feedback systems, types of fed-batch cultures, open and closed systems. <b>Media Optimization:</b> Substrates for industrial fermentation, media optimization strategies like Plackett–Burman design, response surface methodology. Immobilized cell reactor, solid state fermentation.
<b>UNIT 3</b>	<b>Design and types of fermenters:</b> Basic components of a fermenter, fermenter construction materials, designing of laboratory and industrial scale fermenters, types of impellers, mechanical seal, types of baffle and spargers, sampler design, foam controller, types of fermenter like stirred tank, bubble column, airlift, hollow fibers chambers, packed beds, fluidized beds, perfusion cultures, photo-bioreactors and animal cell culture bioreactor. Different types of sterilization strategies, sterilization of large scale bioreactors.
<b>UNIT 4</b>	<b>Downstream processing:</b> Downstream processing for filtration (DSP) cell disruption, liquid-liquid extraction, solvent recovery, supercritical fluid extraction, various chromatography techniques in product recovery, diafiltration, ultrafiltration and reverse osmosis, drying (lyophilization and spray drying), whole broth processing and crystallization, upstream processing and product recovery.
<b>UNIT 5</b>	<b>Biotechnological applications of microbes in the commercial production of the following:</b> Alcoholic beverages: Beer, Whisky, Organic acids: Citric, lactic and acetic

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acid.; Microbial enzymes: Cellulases, amylases, proteases and lipases.; Antibiotics: penicillin, tetracycline; Amino acids: Glutamic acid, lysine.

#### Suggested Readings:

1. Principles of Fermentation Technology by P. Stanbury, A. Whitaker, S. Hall. 3rd edition. Butterworth-Heinemann.
2. Bioprocess Engineering: Basic Concepts by M. L. Shuler, F. Kargi, 2nd edition. Pearson Education India.
3. Modern Industrial Microbiology & Biotechnology by N. Okafor. 1st edition. CRC Press, USA.
4. Fermentation Microbiology and Biotechnology edited by E.M.T. El-Mansi, C.F. Bryce, A.L. Demain, A.R. Allman. 3rd edition. CRC Press.
5. Microbial Biotechnology: Fundamentals of Applied Microbiology by A.N. Glazer, H. Nikaido. 2nd edition. Cambridge University Press.
6. Pharmaceutical Biotechnology: Concepts and Applications by G. Walsh. John Wiley & Sons Ltd.
7. Pharmaceutical Biotechnology: Fundamentals and Applications by J.A.D. Crommelin, R.D. Sindelar, B. Meibohm. 4th Edition. Springer.
8. Reed G. Industrial Microbiology CBS Publisher.
9. Cruger & Cruger. Microbial Biotechnology, Panima Press

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	1
CO2	2	2	2	2	2	2	2
CO3	3	2	2	3	1	1	1
CO4	3	3	3	3	1	1	1
CO5	2	1	1	1	3	3	1

3 = Highly Related; 2 = Medium; 1 = Low

MM1007A	MOLECULAR BIOLOGY AND MICROBIAL GENETICS	4-0-0 [4]
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Course outcome

- CO1 Understand the prokaryotic and eukaryotic gene structure and function.
- CO2 Understand mechanism of prokaryotic and eukaryotic transcription.
- CO3 Understand the different tools and mechanisms of transcriptional regulation.
- CO4 Understand the Bacterial genetics in reference to molecular mapping, gene transfer mechanisms i.e. transformation, transduction.
- CO5 Understand general account of Bacteriophages eg. Lytic phages, Lysogenic phages and their uses in microbial genetics.

UNIT 1	<b>Prokaryotic and Eukaryotic gene structure and function:</b> Structure and properties of nucleic acids, Central dogma of molecular biology, Prokaryotic genome and its organization, Eukaryotic genome structure and chromosome organization Replication in Prokaryotes and Eukaryotes. Enzymes and accessory proteins involved in DNA Replication.
UNIT 2	<b>Prokaryotic &amp; Eukaryotic transcription:</b> (Initiation, Elongation & Termination), general apparatus of transcription, RNA Polymerase, General & Specific Transcription Factors, Regulatory elements & mechanism of transcription regulation, Post transcriptional gene silencing (PTGS), Modifications in RNA.
UNIT 3	<b>Prokaryotic and Eukaryotic Translation:</b> the translation machinery, Mechanism of initiation, elongation, termination, Regulation of translation, Co & post translational modification of proteins, Localization of proteins, synthesis of secretory & membrane proteins, protein targeting and trafficking in mitochondria, chloroplast & peroxisomes.
UNIT 4	<b>Bacterial genetics:</b> Molecular mapping of genome, genetic and physical mapping, map based cloning. Gene transfer mechanisms-Transformation- molecular mechanism, mapping and other uses of transformation, Transduction- generalized transduction, co-transduction and linkage, mapping by cotransduction, specialized transduction, specialized transducing phage as a cloning vehicle. Conjugation- molecular mechanism
UNIT 5	<b>Bacteriophages:</b> , Lytic phages-T7 and T4. Lysogenic phages lambda phage, and P1, M13 and F, Ø X174 life cycles, Phage MU and their uses in microbial genetics. Role of microbial genetics in vaccine designing. Microbial genetics and design of vaccines. BCG and design of vaccine for TB and leprosy. DNA vaccines. design and advantages.

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**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	2	3	3	2	1
CO2	1	2	1	2	3	2	2
CO3	0	3	1	3	3	2	1
CO4	0	2	1	2	2	3	1
CO5	1	2	1	2	2	3	2

3 = Highly Related; 2 = Medium; 1 = Low

**Suggested Readings**

1. Maloy KS, Cronan JE and Freifelder D (1994) Microbial Genetics (2<sup>nd</sup> Edition, Jones and Bartlett Publishers
2. Snyder L and Champness W (2003) Molecular Genetics of Bacteria, ASM Press, Washington, D.C.
3. Malacinski GM and Freifelder D (2005) Essentials of Molecular Biology (3<sup>rd</sup> Edition) Jones and Bartlett Publishers
4. Sambrook J, Fritsch EF and Maniatis I (2001) Molecular Cloning: a Laboratory Manual (3<sup>rd</sup> Edition), Cold Spring harbor Laboratory Press, New York
5. Dabre PD (1988) Introduction to Practical Molecular Biology, John Wiley & Sons Ltd., Yourk
6. Brown TA (1999) Genomes, John Wiley and sons (ASIA) PTE Ltd
7. Alberts B, Bray DJ, Raff M and Roberts K(1994) Watson Molecular Biology of the Cell (2<sup>nd</sup> Edition), Garland publishing. Inc., New York
8. Baker W, Gann B and Losick L (2003) Molecular Biology of the Gene (5<sup>th</sup> Edition), Pearson Education
9. Darnell J, Lodish H and Baltimore D (1994) Molecular Cell biology (2<sup>nd</sup> Edition), Scientific American Books, USA
10. Malacinski GM and Freifelder D (1998) Essentials of Molecular Biology, Jones & Bartlett Publishers Inc.
11. Winnacker (2003) From Genes to Clones, Panima Publishing Corporation, New Delhi/Bangalore,
12. Russell and Peter J (2003) Genectics – A molecular approach, Pearson publisher
13. Lewin B (2007) Gene IX (9<sup>th</sup> Edition), Ox ford University Press. U.K.
14. Walker JM and Rapley R (2007) Molecular Biology and biotechnology (4<sup>th</sup> Rev.).A comprehensive desk reference, VCH Publishers, Inc., New York

MM1008A	<b>Immunology</b>	4-0-0 [4]
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**Course outcome**

- CO 1 Understand the immune system comprising innat & adaptive immunity also organization and structure of lymphoid organs.
- CO 2 Understand the cellular and molecular aspect of immune system.
- CO 3 Analyze the antigen- antibody interactions and the advanced concepts in Immunology.
- CO 4 Understand the organ and systemic specific autoimmune disease.
- CO 5 Understand the autoimmunity and different models of auto immune disease treatment of autoimmune disorders.

<b>UNIT 1</b>	<b>Introduction to immune system:</b> Phylogeny of immune system, Innate and acquired immunity, Clonal nature of immune response. Cells of the Immune system; Hematopoiesis and differentiation, Lymphocyte trafficking, B-lymphocytes, T-lymphocytes, Macrophages, Dendritic cells, NK and Lymphokine activated killer cells, Eosinophils, Neutrophils and Mast Cells. Organization and structure of lymphoid organs
<b>UNIT 2</b>	<b>Cellular and molecular aspects:</b> Nature and biology of antigens and super antigens. Immunoglobulin: structure, types and their function, Major histocompatibility complex, B-Cell Receptor and T-Cell Receptor, generation and diversity, Complement system. Immune response & its regulation Antigen processing and presentation, generation of Humoral and Cell mediated immune responses, B- and T- cell maturation, activation and differentiation. Cytokines and their role in immune regulation, T-cell regulation, MHC restriction
<b>UNIT 3</b>	<b>Antigen- antibody interactions:</b> Precipitation, Immunodiffusion, Immunoelectrophoresis, Agglutination, RIA, ELISA, Immunofluorescence. Advanced concepts in Immunology: Hypersensitivity, Autoimmunity, Immunity of infectious agents (intracellular parasites, helminthes and viruses), Hybridoma Technology and Monoclonal antibodies and their applications.
<b>UNIT 4</b>	<b>Transplantation:</b> organ specific autoimmune disease, systemic autoimmune diseases, graft rejection, evidence and mechanism of graft rejection, prevention of graft rejection, Vaccine development and immunization programme, AIDS and other immunodeficiencies
<b>UNIT 5</b>	<b>Autoimmunity:</b> immunosuppressive drugs, HLA and disease, mechanism of immunity to tumor antigen, Autoantibodies in human pathogenic mechanism, experimental models of autoimmune disease treatment of autoimmune disorders.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**



Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	2	3	2	1
CO2	3	2	3	1	2	1	1
CO3	2	2	2	2	2	2	1
CO4	2	2	2	2	1	2	1
CO5	2	2	1	1	1	1	1

3 = Highly Related; 2 = Medium; 1 = Low

#### Suggested Readings

1. Thomas J and Barbara KA (2006) Kuby's Immunology (4<sup>th</sup> Edition), -R.A. Goldsby, Osbarne, (Freeman) & Co. New York
2. Roitt IM and Peter J. Delves (2001) Roitt's Essential Immunology (10<sup>th</sup> Edition), Blackwell Science, 2001
3. Lydyard P, and Fanger M (2003) Instant Notes on Immunology (2<sup>nd</sup> Edition), Viva Books Pvt. Ltd.
4. Abbas AK, Litchman AH (2005) Cellular and Molecular Immunology (5<sup>rd</sup> edition), Saunders
5. Wise D J and Carter GR (2001) Immunology: A Comprehensive Review, Iowa State University Press
6. Levinson W and Jawetz E (2002) Medical Microbiology and Immunology (7<sup>th</sup> Edition), Mc Graw Hill

<b>MMI014A</b>	<b>APPLIED ENVIRONMENTAL MICROBIOLOGY</b>	<b>4-0-0 [4]</b>
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#### Course outcome

- CO1 Understand the aerobic treatment of industrial effluents and municipal waste through microorganisms
- CO2 Understand and analyze the anaerobic processes i.e. composting, vermiculture and methanogenesis.
- CO3 Understand the Biodegradation of natural compounds as well as xenobiotics ex situ and in-situ bioaccumulation and biomagnifications.
- CO4 Understand the biodeterioration and bioleaching of paper, wood, paint and other metals.
- CO5 Understand the concept of biofertilizers, Biopesticides and Bioplastics.

<b>UNIT 1</b>	<b>Waste management: Treatment of industrial effluents and municipal waste through micro-or ganisms. Aerobic Processes: Oxidation pools, Rotating</b>
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	Biological Discs, Rotating Drums, Trickling filter, Activated sludge process
<b>UNIT 2</b>	<b>Anaerobic Processes:</b> Anaerobic digestion, Anaerobic filter, upflow an aerobic sludge blanket reactors. Indicator microorganisms. Solid wastes: Sources and management composting, vermiculture and Methane Production.
<b>UNIT 3</b>	<b>Biodegradation of natural compounds:</b> (cellulose, hemicelluloses, lignin, chitin,). Biodegradation of xenobiotics in environment – Organisms involved in degradation of chlorinated hydrocarbons, substituted simple aromatic compounds, polyaromatic hydrocarbons, pesticides, synthetic polymers, detergents and hydrocarbons Bioremediation- <i>ex situ</i> and <i>in situ</i> . bioaccumulation, biomagnifications.
<b>UNIT 4</b>	<b>Biodeterioration and Bioleaching:</b> Definition, biodeterioration of paper, wood, paint, textiles, leather, metals (corrosion).Control of biodeterioration. Microorganisms and metal pollutants- metal bioavailability in environment, mechanism of microbial metal resistance and detoxification, metal- microbe interaction, Bioleaching of metals, Microbial enhanced oil recovery. <b>Biomass waste management of plant's residues:</b> Lignocellulolytic microorganisms, enzymes and their biotechnological applications in: (i) biopulping, (ii) biobleaching, (iii) textiles (iv) biofuels, (v) animal feed production.
<b>UNIT 5</b>	<b>Biofertilizers:</b> Definition and types of biofertilizers, Mass cultivation and methods of inoculation of microbial inoculants – (Rhizobium, Azotobacter, & Asospirillum.) Cyanobacteria –Azolla– Anabaena association and its role in rice cultivation Quality control and ISI specifications for Rhizobium cultures. Mycorrhizal Relationship, Biopesticides and Bioplastics

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	2	3	2	1
CO2	3	2	3	1	2	3	2
CO3	3	2	3	2	3	2	3
CO4	3	2	2	2	2	2	1
CO5	2	2	1	2	1	2	2

3 = Highly Related; 2 = Medium; 1 = Low

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### ***Suggested Readings***

1. Thakur IS (2006) Environmental Biotechnology – Basic concepts and applications, I K International publications
2. Maier RM, Pepper IL and Gerba CP (2000) Environmental Microbiology, Academic Press. (2000)
3. Michel R (1999) Introduction of Environmental Microbiology, Prentice-Hall
4. Atlas RM, Bartha R (2005) Microbial Ecology- Fundamentals & Applications, (4<sup>th</sup> Edition), Pearsrson Publication
5. Ignacimuthu S, SEN A (2001) Microbials in Integrated Pest Management, (special Indian edition), Oxford and IBH Publishing Co. Pv. Ltd.
6. Allsopp D and Seal KJ, Gaylarde C (2003) Introduction to Biodeterioration (2<sup>nd</sup> Edition), Cambridge University Press
7. Rao S (1988) Biofertilizers in Agriculture (2<sup>nd</sup> Edition), Oxford & IBH Pub. Co
8. John AM (1977) Introduction to soil microbiology Wiley & Sons. Inc., New York
9. Deshmukh AM (1988) Biofertilizers and Biopesticides, Technosciences Publications

### **MMI023A Practical II**

**Credits: 12**

1. To isolate plasmid DNA.
2. To perform Ouchterlony double diffusion
3. To determine antibody concentration using ELISA
4. To determine antigen concentration using Sandwich ELISA
5. To examine restriction digestion of DNA
6. To isolate rhizospheric microflora.
7. To determine R : S ratio of soil.
8. To isolate microorganisms from soil, water and air
9. To detect MPN coliforms for determination of the purity of potable water.
10. To determine biological oxygen demand (BOD) of sewage sample.
11. To determine chemical oxygen demand (COD) of sewage sample.
12. To isolate and identify common microorganisms spoiling food (Fungi and bacteria).
13. To prepare fermented foods (Sauerkraut).
14. To isolate and identify Rhizobium from root nodules of leguminous plants.
15. To isolate and identify Azotobacter from soil.
16. To detect ammonification by bacteria.



17. To isolate the microorganism from extreme condition (salt or chemical influent).
18. Isolation and identification of coli forms from Water by Presumptive, Confirmed & Completed test
19. Detection of siderophore production by microorganisms.
20. To check the presence of coliform bacteria using LBCP broth.
21. To check the presence of coliform bacteria (E.coli) using EMB agar (confirmatory test).
22. To study DNA profile of the given sample by using Agarose gel electrophoresis.
23. Water analysis for total bacterial population by standard plate count (SPC) method.
24. Isolation of phosphate solubilising microorganisms from soil.
25. Isolation of an antibiotic producer microorganism from soil.
26. Determination of total dissolved solids of water.
27. To perform the fermentation of carbohydrates by microorganisms.
28. To perform Radial Immunodiffusion (RID) by Mancini's technique.
29. To isolate Genomic DNA of bacteria
30. To perform the electrophoresis of bacterial genomic DNA.
31. PCR: Amplification of 16S rRNA gene from E.coli by domain specific primers
32. Isolation of bacterial protein by SDS PAGE.
33. Widal test using tube agglutination reaction
34. Agglutination reaction with reference to blood grouping.
35. Pregnancy testing by using immunological methods.

MMI011A	MEDICAL MICROBIOLOGY	4-0-0 [4]
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Course outcome

- CO 1 Understand the Classification of medically important micro organisms and Normal microbial flora of human body
- CO 2 Apply the knowledge for diagnostic of important bacterial diseases including their pathogenicity.
- CO 3 Understand the Pathogenic fungi-*Candida albicans* Protozoan diseases – Malaria, Amoebiasis
- CO 4 Understand the general detail of Epidemiology, life cycle, pathogenicity, diagnosis, prevention and treatment of RNA viruses and DNA animal viruses.

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CO 5 Brief account of available vaccines, Antifungal drugs, antiviral drugs and their mode of action.

<b>UNIT 1</b>	<b>Normal micro flora and factors responsible for pathogenesis:</b> Classification of medically important micro organisms; Normal microbial flora of human body; role of the resident flora. Entry of pathogens into the host; colonization and mechanism of bacterial adhesion establishment, spreading, tissue damage and anti-phagocytic factors; factors predisposing to infections, types of toxins and their structure; mode of action.
<b>UNIT 2</b>	<b>Pathogenic bacteria I:</b> Diagnostic features of important diseases including their pathogenicity and control. Pyogenic cocci- <i>Staphylococci</i> , <i>Streptococci</i> , <i>Neisseria meningitidis</i> , <i>N. gonococcus</i> Gram positive cocci- <i>Clostridium tetani</i> , <i>Mycobacteria-M. tuberculosis</i> , <i>M. leprae</i>
<b>UNIT 3</b>	<b>Fungi and Protozoan:</b> Diagnostic features of important diseases including their pathogenicity and control. Enteric Gram negative bacteria- <i>Salmonella</i> , <i>Shigella</i> , <i>Vibrio cholera</i> , <i>E. coli</i> <i>Spirochaetes- Treponema palladium</i> <i>Chlamydiae- Trachoma</i> , Rickettsial diseases, Diseases caused by <i>Mycoplasma</i> , Pathogenic fungi- <i>Candida albicans</i> Protozoan diseases – Malaria, Amoebiasis
<b>UNIT 4</b>	<b>Animal viruses:</b> Epidemiology, life cycle, pathogenicity, diagnosis, prevention and treatment of RNA viruses- Picorna virus family- Poliomyelitis, influenza, Mumps, Measles, DNA viruses; Pox virus- Variola and Vaccinia, Herpes virus- Varicella Zoster virus, Hepatitis viruses, Arthropod borne (arbo) Viral disease- Dengu, Swine flu.
<b>UNIT 5</b>	<b>Chemotherapy and Antimicrobial agents:</b> Mode of action of penicillin, Sulfa drugs, streptomycin, tetracycline and other broad spectrum antibiotics. Antifungal drugs, antiviral drugs. Brief account on available vaccines

### Suggested Readings

1. Salyers AA and Whitt DD (2002) Bacterial Pathogenesis-A Molecular Approach (2<sup>nd</sup> Edition), ASM Press
2. Irving W, Boswell T and Aldeen AD (2005) Instant Notes Medical Microbiology, Taylor and Francis group,
3. Timbury MC (1971) Notes of Medical virology (3<sup>rd</sup> Edition) Churchill Livingstone, London
4. Roberts JR, Evan C and Nester MT (2011) Microbiology A Human Perspective (7<sup>th</sup> Edition), Brown Publishers
5. Ananthnarayanan R and Paniker CKJ (2006) Text book of Microbiology, Orient Longman
6. Levinson W and Jawetz E (2008) Medical Microbiology and Immunology: Examination and Board Review (10<sup>th</sup> Edition), Mc Graw Hill

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7. Kayser FH and Beniz KA (2005) Medical Microbiology vol. 1 Microbial infection, vol. 2, Thieme
8. Mackie T J (1996) Practical Medical microbiology (14th Edition), Churchill Livingstone
9. Agrios G N (2005) Plant Pathology (5<sup>th</sup> Edition), Academic Press
10. Smith KM (2012) Plant viruses (3<sup>rd</sup> Edition), Elsevier

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES :**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	2	3	3	1	2
CO2	0	2	1	2	2	1	2
CO3	0	3	1	2	2	0	1
CO4	1	3	1	1	3	1	3
CO5	1	2	2	1	3	1	1

3 = Highly Related; 2 = Medium; 1 = Low

<b>MMI012A</b>	<b>GENETIC ENGINEERING</b>	<b>4-0-0 [4]</b>
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**Course outcome**

- CO 1 Understand the of scope and milestone in genetic engineering as well as Basic tools & techniques used in recombinant DNA technology as well as different vectors and their expression.
- CO 2 Understand and apply the Principle and uses of nucleic acid hybridization.
- CO 3 Apply and Analyze the sequencing gene DNA and genomic library.
- CO 4 Describe the molecular mapping and physical mapping of genome as well as RAPD, RFLP, AFLP and other molecular marker techniques.
- CO 5 Understand and apply strategies of gene delivery and classify the target gene replacement and the gene expression.

<b>UNIT 1</b>	<b>Tools of genetic engineering:</b> Scope and milestones in genetic engineering. Basic tools and techniques used in recombinant DNA technology: Restriction endonuclease, DNA modifying enzymes, cloning vectors: plasmids, bacteriophage, cosmid, phagemids, <i>in vitro</i> construction of vectors, expression vectors, Different Blotting techniques,
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UNIT 2	<b>Principle and uses of nucleic acid hybridization:</b> Principle and applications of polymerase chain reaction. Patenting of cloned life forms. Site directed mutagenesis and protein engineering, <i>in vitro</i> DNA synthesis, <i>in vitro</i> transcription and translation.
UNIT 3	<b>Sequencing of genes DNA and genomic library:</b> m- RNA enrichment, reverse transcription, Linkers, Adaptors, Screening of cDNA and genomic library, Sequencing and mapping: Sequencing vector, fluorescent tagging, Automated DNA sequencing, Pyrosequencing. Restriction mapping and map construction, Application of sequence information for identification of defective genes.
UNIT 4	<b>Molecular Mapping of Genome:</b> Genetic and physical mapping, Genome sequencing: genome size, organelle genome, YAC, BAC libraries, strategies of genome sequencing, Analysis of genetic variations: RAPD, RFLP, AFLP and other molecular marker techniques, application of RFLP in forensic studies, disease prognosis, genetic counselling, pedigree analysis etc.
UNIT 5	<b>Strategies of gene delivery:</b> Agrobacterium mediated transformation, electroporation, particle bombardment, microinjection, Gene therapy: Target gene replacement, gene knockout technique, computer aided drug designing. Gene expression DNA and protein microarray technology, RNase protection assay, Reporter gene assay, northern blotting and S1 nuclease assay, Heterologous gene expression in bacteria, yeasts, insects, mammals and plants. codon optimization.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	2	2	2	2
CO2	2	2	3	1	1	2	1
CO3	2	3	2	2	2	1	1
CO4	1	2	2	1	2	2	2
CO5	1	1	3	2	1	1	2

3 = Highly Related; 2 = Medium; 1 = Low

**Suggested Readings**

1. Sambrook J, Fritsch EF (2000) Maniatis Molecular Cloning: a Laboratory Manual, Cold Spring Harbor Laboratory Press, New York
2. Glover DM and Hames BD (1995) DNA Cloning: a practical Approach, IRL Press Oxford



3. Cseke LJ, Kirakosyan A, Kaufman PB and Westfall MV (2011) Molecular and Cellular Methods in Biology and Medicine (3<sup>rd</sup> Edition), CRC Press, Florida
4. Desmond ST and Nicholl (2002) An Introduction to Genetic Engineering, Cambridge University Press
5. Carson S and Robertson D (2005) Manipulation and Expression of Recombinant DNA (2<sup>nd</sup> Edition) Academic Press
6. Primrose B and Twyman R (2007) Principles of Gene Manipulation and Genomics (7<sup>th</sup> Edition), Blackwell Publishers
7. Fire A and Nirenberg M (2005) RNA interference Technology- From basic science to drug development, Cambridge Press
8. Berger SL and Kimmel AR (1998) Methods in Enzymology Vol.152, Guide to Molecular Cloning Techniques, Academic press. Inc.
9. Mickliss DA and Greyer GA (1990) DNA Science- A First Course in Recombinant Technology, Cold Spring Harbor Laboratory Press, New York
10. Primrose SB (1994) Molecular Biotechnology (2<sup>nd</sup> Edition), Blackwell Scientific Publishers, Oxford

MMI024A	Food and Dairy Microbiology	4-0-0 [4]
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**Course outcome**

- CO1 Understand the role of microorganism in food microbiology  
 CO2 Understand the spoilage of food and food preservatives.  
 CO3 Analyze the fermented products of food.  
 CO4 Understand the food beverages and enzymes  
 CO5 Understand the Food-borne diseases and poisoning.

<b>UNIT 1</b>	<p><b>Microorganisms important in food microbiology:</b> Taxonomical classification of microbes associated with food products, their phenotypic and biochemical identification. Food associated molds, yeasts, yeast-like fungi and bacteria. General microbiome of food material; Intrinsic and extrinsic factors affecting microbial growth in foods.</p> <p><b>Microbiology of foods:</b> Microbial habitat of specific food materials, adaptations and changes in microbiome of vegetables, fruits, milk, fermented and non-fermented milk products, fresh meats, poultry and non-dairy fermented foods.</p>
<b>UNIT 2</b>	<p><b>Microbial spoilage of foods:</b> Types and causes of spoilage of cereals and cereals products, spoilage of vegetables and fruits, juices, spoilage of meat and meat products, spoilage of fish and other sea foods, spoilage of eggs and other poultry products, spoilage of milk and milk products. Study of microorganisms responsible for spoilage and microbial succession during spoilage. Brief insights into chemical and physical spoilage of foods.</p> <p><b>Food preservation:</b> General principles of food preservation, various classical physical, chemical, and biological methods of preservation. New developments</p>

	in food preservation techniques. Analysis of practical implementation of such techniques. HACCP technology.
<b>UNIT 3</b>	<b>Fermentation processes:</b> Production of fermented milk and milk products, plant-based products, pickles, fish products, and meat products, bread, baker's yeast, Edible mushroom ( <i>Agaricus</i> , <i>Volverella</i> , <i>Pluerotus</i> ). Manufacture of starter cultures from lab to pilot scale. Batch submerged and solid-state fermentation of foods.
<b>UNIT 4</b>	<b>Food beverages and enzymes:</b> Concept of human microbiome, probiotics and prebiotics. Insight into health benefits of fermented milk products. Understanding benefits of tradition and non-traditional fermented foods. Introduction to the concept of bioactive compounds and brief study of such compounds from fermented foods including malt beverages, wines, distilled liquors and vinegar.
<b>UNIT 5</b>	<b>Food-borne diseases:</b> Food borne infections including bacterial, viral and fungal infections. Study of infections due to food borne parasites. In depth study of various types and causes of food intoxication. Botulism, Staphylococcal food poisoning, Clostridium perfringens food poisoning, <i>Bacillus cereus</i> gastroenteritis, Salmonellosis, <i>Escherichia coli</i> diarrhea, and colitis, <i>Vibrio cholera</i> . <b>Fungal poisoning:</b> <i>Aspergillus</i> , <i>Penicillium</i> , <i>Claviceps</i> , <i>Fusarium</i> . Summary of prevention of microbial food infections. Identification and first aid for specific types of food infections.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	2	2	3	2	1
CO2	2	2	1	3	1	3	1
CO3	2	2	1	1	2	3	2
CO4	2	3	2	2	1	2	1
CO5	2	2	1	2	2	2	1

3 = Highly Related; 2 = Medium; 1 = Low

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**Suggested Readings:**

1. Frazier WC, Westoff DC and Vanitha KN. Food Microbiology. 5th edition. McGraw Hill Education.
2. Jay JM, Loessner MJ, Golden DA. Modern Food Microbiology. 7th edition. Springer.
3. Ray B and Bhunia A. Fundamental Food Microbiology. 5th edition. CRC press.
4. Adams MR, Moss MO and McClure P. Food Microbiology. 4th edition Royal Society of Chemistry.
5. Doyle MP and Beuchat LR. Food Microbiology: Fundamentals and Frontiers. 3rd edition. ASM press.
6. Montville T, Matthews K and Kniel K. Food Microbiology: An Introduction 4<sup>th</sup> edition. ASM press.
7. Robinson R K. Dairy Microbiology Handbook, 3rd ed., John Wiley & Sons

MM1025A	BIostatISTICS AND BIOinformatics	4-0-0 [4]
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**Course outcome**

- CO 1 Evaluate the classification and tabulation of data, measures of central tendency, different methods of dispersion.
- CO2 Evaluate the Tests of significance- Chi-square test, t-test, F-test, ANOVA, correlation and regression.
- CO3 Evaluate the types and theorems of probability.
- CO4 Understand the basic of elementary idea of Bioinformatics
- CO5 Evaluate the bioinformatics and their tools use to study genomics.

UNIT 1	Introduction, Scope and application of Biostatistics. Classification and tabulation and graphical presentation of data: frequency distribution. Measure of central tendency- Mean, median and mode, Measures of dispersion - range, mean deviation, standard deviation, coefficient of variation, Skewness and kurtosis.
UNIT 2	Tests of significance: Hypothesis testing, Nulls hypothesis and alternative hypothesis, level of significance. Chi-square test, t-test, F-test, ANOVA- one way and two way classifications. Simple correlation and simple regression.
UNIT 3	Probability: addition and multiplication theorem of probability. A brief idea of normal, Poisson and binomial distribution.
UNIT 4	Elementary idea of Bioinformatics, Biological databases-Overview, modes of database search, mode of data storage (file format), formats of GenBank, EMBL, DDBJ, PDB;
UNIT 5	Phylogenetic Analysis: Introduction to phylogenetic analysis and its

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application. Types of phylogenetic trees, Different approaches of phylogenetic tree construction - UPGMA, Neighbour joining, Maximum Parsimony, Maximum likelihood.

**Genome Annotation:** Concept of genome annotation, methods of gene identification. Tools of gene identification: GenScan, Grail, GeneID and Glimmer.

# **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	3	2	3
CO2	2	3	3	3	2	2	2
CO3	2	2	2	2	2	2	2
CO4	3	3	3	2	2	1	2
CO5	3	1	2	3	1	2	2

3 = Highly Related; 2 = Medium; 1 = Low

## **Suggested Readings**

1. Daniel WW (2014) Biostatistics: A Foundation for Analysis in Health Sciences (10<sup>th</sup> Edition), John Wiley and Sons Inc.
4. Bailey NTJ (1995) Statistical Methods in Biology, Cambridge University Press
5. Campbell RC (1989) Statistics for Biologist, Cambridge University Press
6. Rosner B (2010) Fundamentals of Biostatistics (7<sup>th</sup> Edition), Publishing Corporation
7. Wardlaw AC (2000) Practical Statistics for Experimental Biologists, John Wiley and sons Inc.
8. Baxevanis A.D. and Ouellette (2005) Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins , Third Edition. John Wileyand Son Inc.
9. Mount D.W (2004) Bioinformatics Sequence and Genome Analysis, CSHL Press.
10. Tramontano A (2007) Introduction to Bioinformatics, Chapman & Hall/CRC.
11. Zvelebil, M.and Baum (2008) Understanding Bioinformatics, Chapman & Hall/CRC.

1. To isolate antibiotic resistant microorganisms by replica plating.
2. To isolate antibiotic resistant microorganisms by Gradient plate technique.
3. To enumerate the following in blood sample a. RBC b. WBC
4. To prepare blood smear and determine differential WBC count.
5. To detect Antibiotic sensitivity of a given sample by disc method.
6. To determine MIC of antibiotics
7. To immobilize cell using alginate.
8. To isolate *Lactobacillus* species from curd.
9. To test quality of milk by MBRT.
10. Demonstration of fungal human pathogens (dermatophytes) from skin.
11. Isolation of bacterial flora from the skin.
12. Isolation of microbial flora of the mouth teeth cervices.
13. Isolation of microorganisms of the upper respiratory tract (throat).
14. Demonstration of streaking plates using toothpick.
15. Visit and report formation of STP unit/ vermicomposting unit/Biogas plant unit.
16. Construction of exclusive and inclusive frequency tables.
17. Demonstration and exercises on mean, median and mode.
18. Demonstration and exercises on deviation.
19. Demonstration and exercises on probability.
20. Demonstration and exercises on the testing of hypothesis using student t test.
21. Demonstration and exercises on the testing of hypothesis using Chi-square test.
22. Demonstration and exercise on ANOVA.
23. Demonstration and exercise on correlation.
24. Demonstration and exercise on regression.
25. Introduction to bioinformatics databases i.e. NCBI, EMBL, PDB, DDBJ, Uniprot, KEGG.
26. Exploring the integrated database system at NCBI server and querying the PUBMED and GenBank databases.

27. Exploring the integrated database system at EBI server and searching the EMBL Nucleotide database using the SRS search engine.
28. Sequence alignment by using alignment tool BLAST.
29. Sequence alignment by using alignment tool FASTA.

#### **SEMESTER IV**

##### **MMI016A Review Report**

**Credits: 04**

The review report of M.Sc. IV semester will be based on a detailed review of any one of the topics listed in syllabus in about 100 pages. This review will be evaluated by a supervisor, Head of the Department and any other person appointed by the Dean, SSC.

##### **MMI017A Dissertation**

**Credits: 16**

The dissertation work will involve practical work on a problem suggested by the supervisor of the candidate. The student will submit the dissertation report at the end of IV semester. This dissertation report will be examined by the supervisor of the student, Head of the Department and any other person appointed by Dean, SSC.

##### **MMI018A Seminar**

**Credits: 2**

The seminar will be based on a detailed report of any one of the topic listed in syllabus. This report is handwritten. The assessment of the seminar based on report as well as presentation in form of power point or Prezi. This seminar report will be examined by the supervisor of the student, Head of the Department and any other person appointed by Dean, SSC.

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**DEPARTMENT OF PHYSICS (FACULTY OF SCIENCES)**

**Minutes of Board of Studies - Physics**

**Date: February 27, 2023**

A meeting of Internal Board of Studies (Physics) called to (i) approve redefined the Vision & Mission, (ii) approve the Program Educational Objectives (PEO), (iii) the minor changes in scheme and henceforth with small updates in the curriculum of BSc (Hons) Physics and BSc (Pass) for the batch 2021 and Batch 2022.

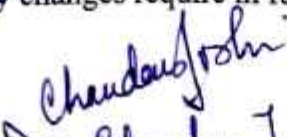
Following members of Board of Studies committee of Physics department were present:


1. Prof. Pranav Saxena (Head & Chairperson)
2. Dr. Chandan Joshi (Associate Professor)
3. Dr. Abhishek Sharma (Associate Professor)

The meeting was chaired by the chairperson and welcomes the other BOS members the meeting was preceded with discussion for the approval on the following agendas:

- (i) Vision & Mission:** The committee approves the redefined the Mission with clear directions along with Vision.
- (ii) Program Educational Objectives (PEO):** To achieve the Missions, the Program Educational Objectives (PEOs) have been introduced which directly aim to the defined Missions and thus mapping of the PEOs with Missions and Program Outcomes are well defined. The committee approves the PEOs for the BSc (Hons) Physics program.
- (iii) BSc (Honors) Physics for the Academic Batch 2021-24:** For the batch 2021-2024 the Study Scheme, Credits, Course Structure and Syllabi content of BSc (Hons) Physics was approved and implemented already in academic session 2021-2022 with the choices of departmental specialization electives (DSE). Due to adoption of NEP-20, open elective courses are also compulsorily running in each course in any program throughout the University. In the current curriculum of BSc (Hons) Physics program, total five Open Electives exist which are not being able to manage in common slots among timetable of all programs running in the University. Thus to address this issue, the scheme of BSc (Hons) Physics program has now been revised (with the guidance of Hon'ble President Sir) where instead of five, only three Open Electives have been kept and thus need to fulfill the total credits of the program some new courses have been introduced. The committee agrees and approves the changes in the study scheme along with the new courses in the curriculum of BSc (Hons) Program for the academic session 2021-24. The approval for the changes in the Study Scheme and curriculum is done for the specialization BSc (Honors) in *Material Science* only as this has been commonly adopted by the students of batch 2021-24. The codes of introduced new courses offered are accordingly redefined with credit structure. The revised study scheme and introduced new courses (enclosed) treated as approved by the BOS. The committee further ensures that remaining courses will remain same as approved in earlier BOS except for any changes in the content of the courses which require in future.

  
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Dr. Chandan Joshi

  
(Dr. Abhishek Sharma)

(iv) **BSc (Honors) Physics for the Academic Batch 2022-25:** For this academic batch, a minor change in the study scheme of BSc (Hons) Physics for academic session 2022-23, is the shuffling of the courses within the semesters has been done in accordance with the other parallel program running in University to manage the open electives. No new course has been introduced. The revised study scheme for the specialization BSc (Honors) in *Material Science* is enclosed herewith treated as approved by the BOS. The courses are there remain as such in the curriculum.

(v) **BSc (Pass) for the Academic Batch 2021-24 and 2022-25:** Keeping uniqueness in the offered Open Electives throughout the University, the committee approves the minor changes in the study scheme of Bsc( Pass) for the academic batch 2021-22 and 2022-25 .

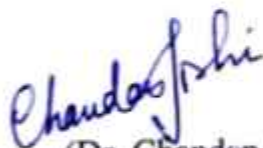
The Chairperson of BOS thanks to the present members for their healthy suggestions and cooperation in revising study schemes and updates.



(Prof. Pranav Saxena)

Head, Chairperson

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**Department of Physics**  
**JECRC University, Jaipur-303905**



(Dr. Chandan Joshi)

Associate Professor



(Dr. Abhishek Sharma)

Associate Professor





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## DEPARTMENT OF PHYSICS

### VISION


To provide an excellent academic environment that motivates and inspires students to excel globally in interdisciplinary areas and innovative contributions with relevance to contemporary problems faced by industry and the society at large.

### MISSION

- To produce globally competent graduate and undergraduate students in wide areas of science and technology.
- To disseminate the comprehensive knowledge and skills with the specialization of Physics at undergraduate and graduate levels.
- To explore substantial scientific and quality scholarly work in the field of research and teaching in Physical Sciences.

  
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## PROGRAM EDUCATION OBJECTIVES (PEOs)

The PEOs are broad statements that describe the program is preparing its undergraduates to the degree. The PEOs of the B.Sc. (Hons) program in Physics are as follows:

**PEO-1:** Facilitate value-based holistic and comprehensive learning by integrating traditional and innovative learning practices to match standards globally and train students to be effective leaders in their chosen fields and career.

**PEO-2:** Emphasize the discipline of Physics to be the most important branch of science to recognize as an individual or team member having specialized knowledge and expertise to identify, formulate, investigate, analyze and implement on the problems in physical sciences.

**PEO-3:** Equip students with skills needed to unleash their hidden talents, creative potential, nurture the spirit of critical thinking and encourage them towards higher education.

**PEO-4:** Emphasize the importance of Physics as the most important discipline for sustaining the existing industries and establishing new ones to create job opportunities at all levels of employment

**PEO-5:** Develop a sense of social responsibility and work ethically in a multidisciplinary environment, to enhance the advancement in physics in general and contribute significantly towards sustainable development of the nation.

## PROGRAM OUTCOMES (POs)

- I. **Disciplinary Knowledge:** Capable of demonstrating good procedural knowledge and systematic understanding of major concepts, theoretical principles and experimental findings in Physics and its different learning subfields and applications.
- II. **Technical Skill:** Acquire the ability to use modern instrumentation and laboratory techniques to design and perform experiments are highly desirable in almost all the fields of physics. Realize the importance of mathematical modeling to understand problems in physical world.
- III. **Critical Thinker and Problem Solver:** Develop a strong analytical skill and will be able to study critically a physics problem, solve the problem using different tools and present the result/conclusion. Develop global competencies in handling the open ended problems belongs to disciplinary fields of physics.
- IV. **Sense of Inquiry:** Capability for asking relevant/appropriate questions relating to the issues and problems in the field of Physics, executing physics experiments, analyze and interpret data/information collected using appropriate methods and report the findings of the experiment to the relevant theories of Physics.
- V. **Digitally Efficient:** Capable of using computers for simulation and computation for better understanding of problems in Physics. Students will be aware of appropriate software for

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 Chaudhary





numerical and statistical analysis of data available now days and will be able to retrieve Physics information from e-libraries and other e-sources available using internet.

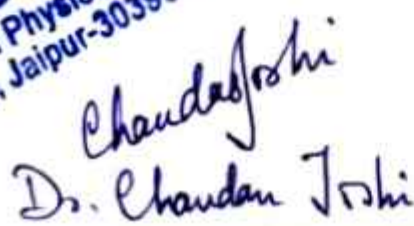
- VI. Skilled Project Manager:** Capable of identifying appropriate resources required for a project, and manage a project through to completion, while observing responsible and ethical scientific conduct with safety measurements.
- VII. Ethical Awareness:** Capable of demonstrating ability to think and analyze rationally and to identify the potential ethical and moral issues in work-related situations, to enhance intellectual property, environmental and sustainability issues, and promoting safe learning and working environment as professional behavior.
- VIII. National and International Perspectives:** Capable of preparing themselves for their appropriate role in contributing towards the national development and projecting our national priorities at the international level pertaining to their field of interest.
- IX. Lifelong Learners:** Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and re-skilling in all areas of Physics

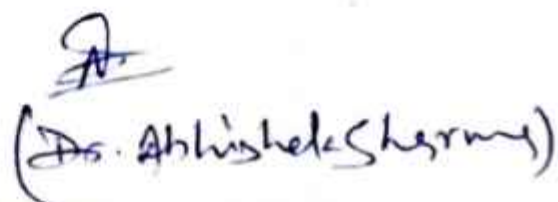
#### Mapping of Program Outcomes (POs ) with Program Educational Objectives (PEOs)

Program Outcomes (POs)	Program Educational Objectives (PEOs)				
	I	II	III	IV	V
PO-1	H	M	M	L	
PO-2		M	H	M	
PO-3	L	M		M	
PO-4		M	H	M	
PO-5		L	H		
PO-6		H	L		L
PO-7	M				H
PO-8	L				H
PO-9		L	H	M	

H: High; M: Moderate; L: Low

  
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DEPARTMENT OF PHYSICS  
FACULTY OF SCIENCE

BSC (HONORS) PHYSICS - STUDY SCHEME FOR BATCH (2021-2024)

Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1	BPH063A	Mechanics	4	0	0	4	4	0	0	4	Core
1	BPH011B	Mechanics (Lab)	0	0	2	2	0	0	1	1	Core
1	BPH006B	Optics	4	0	0	4	4	0	0	4	Core
1	BPH008C	Optics (Lab)	0	0	2	2	0	0	1	1	Core
1	BPH010B	Electricity & Magnetism	4	0	0	4	4	0	0	4	Core
1	BPH012B	Electricity & Magnetism (Lab)	0	0	2	2	0	0	1	1	Core
1	DCA001A	Web Development	2	0	0	2	2	0	0	2	Fundamental
1	DCA002A	Web Development Lab	0	0	2	2	0	0	1	1	Fundamental
1	DEN001A	Communication Skills	2	0	2	4	2	0	1	3	Foundation
1	DIN001A	Culture Education -1	2	0	0	2	2	0	0	2	Foundation
1	DCH101A	Environment Studies	3	0	2	5	3	0	1	4	Fundamental
		<b>Total</b>	<b>21</b>	<b>0</b>	<b>12</b>	<b>33</b>	<b>21</b>	<b>0</b>	<b>6</b>	<b>27</b>	

Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
2	BPH064A	Thermodynamics & Statistical Physics	4	0	0	4	4	0	0	4	Core
2	BPH065A	Thermodynamics & Statistical Physics (Lab)	0	0	2	2	0	0	1	1	Core
2	BPH066A	Mathematical Physics & Relativity	4	0	0	4	4	0	0	4	Core
2		Mathematical Physics & Relativity (Tutorial)	0	1	0	1	0	1	0	1	Core
2	BPH067A	Elements of Modern Physics	4	0	0	4	4	0	0	4	DE1
2	BPH068A	Elements of Modern Physics (Lab)	0	0	2	2	0	0	1	1	DE1
2	BPH069A	Waves & Vibrations	4	0	0	4	4	0	0	4	Core
2	BPH070A	Waves & Vibrations (Lab)	0	0	2	2	0	0	1	1	Core
2	DCA003A	Project Management Lab	0	0	2	2	0	0	1	1	Fundamental
2	DEN002A	Professional Skills	2	0	2	4	2	0	1	3	Foundation
2	DIN002A	Culture Education -2	2	0	0	2	2	0	0	2	Foundation
		<b>Total</b>	<b>20</b>	<b>1</b>	<b>10</b>	<b>31</b>	<b>20</b>	<b>1</b>	<b>5</b>	<b>26</b>	

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DEPARTMENT OF PHYSICS  
FACULTY OF SCIENCE

BSC (HONORS) PHYSICS - STUDY SCHEME FOR BATCH (2021-2024)

S.No.	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1	3	BPH071A	Advanced Mathematical Physics	4	0	0	4	4	0	0	4	Core
2	3	BPH072A	Advanced Mathematical Physics (Lab)	0	0	2	2	0	0	1	1	Core
3	3	BPH073A	Circuit Analysis and Basic Electronics	4	0	0	4	4	0	0	4	Core
4	3	BPH074A	Circuit Analysis and Basic Electronics (Lab)	0	0	2	2	0	0	1	1	Core
5	3	BPH083A	Structure and Properties of Materials	4	0	0	4	4	0	0	4	DE2
6	3	BPH084A	Structure and Properties of Materials (Lab)	0	0	2	2	0	0	1	1	DE2
7	3	DCA004A	Advanced Spread Sheet Lab	0	0	2	2	0	0	1	1	Fundamental
8	3	DEN003A	Life Skills-1(Aptitude)	1	0	2	3	1	0	1	2	Foundation
9	3	DIN003A	Value Education and Ethics-1	1	0	0	1	1	0	0	1	Foundation
10	3		Open Elective-I	3	0	0	3	3	0	0	3	Interdisciplinary
11	3		Open Elective-II	3	0	0	3	3	0	0	3	Interdisciplinary
			<b>Total</b>	<b>20</b>	<b>0</b>	<b>10</b>	<b>30</b>	<b>20</b>	<b>0</b>	<b>5</b>	<b>25</b>	

S.No.	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1	4	BPH017B	Solid State Physics	4	0	0	4	4	0	0	4	Core
2	4	BPH075A	Solid State Physics (Lab)	0	0	2	2	0	0	1	1	Core
3	4	BPH021B	Nuclear and Particle Physics	4	0	0	4	4	0	0	4	Core
4	4		Nuclear and Particle Physics (Tutorial)	0	1	0	1	0	1	0	1	Core
5	4	BPH089A	Mechanics of Materials	4	0	0	4	4	0	0	4	Core
6	4	BPH090A	Mechanics of Materials (Lab)	0	0	2	2	0	0	1	1	Core
7	4	BPH130A	Research Methodology	3	1	0	4	3	1	0	4	DE
8	4	BPH131A	Research Methodology Seminar	0	0	2	2	0	0	1	1	DE
9	4	DCO012A	Vlogging (Lab)	0	0	2	2	0	0	1	1	Fundamental
10	4	DEN004A	Life Skills-2 (Personality Development)	1	0	2	3	1	0	1	2	Foundation
11	4	DIN004A	Value Education and Ethics-2	1	0	0	1	1	0	0	1	Foundation
			<b>Total</b>	<b>17</b>	<b>2</b>	<b>10</b>	<b>29</b>	<b>17</b>	<b>2</b>	<b>5</b>	<b>24</b>	

HEAD  
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*(Dr. Chandan Jodhi)*

*(Dr. Abhishek Sharma)*

DEPARTMENT OF PHYSICS  
FACULTY OF SCIENCE

BSC (HONORS) PHYSICS - STUDY SCHEME FOR BATCH (2021-2024)

S.No.	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1	5	BPH014B	Quantum Mechanics	4	0	0	4	4	0	0	4	Core
2	5	BPH076A	Quantum Mechanics (Lab)	0	0	2	2	0	0	1	1	Core
3	5	BPH093A	Advanced Materials	4	0	0	4	4	0	0	4	DE3
4	5	BPH094A	Advanced Materials (Seminar)	0	0	2	2	0	0	1	1	DE3
5	5	BPH1132A	Renewable And Electrochemical Energy Storage Materials	4	0	0	4	4	0	0	4	DE4
6	5	BPH1133A	Renewable And Electrochemical Energy Storage Materials - Seminar	0	0	2	2	0	0	1	1	DE4
7	5		Open Elective III	3	0	0	3	3	0	0	3	Interdisciplinary
8	5	BPH026A	Project	0	0	12	12	0	0	6	6	DE
9	5	BPH134A	Science of Materials - Seminar	0	0	2	2	0	0	1	1	DE
				15	0	20	35	15	0	10	25	

No.	Semester	Subject code	Subject	Lecture Hours	Tutorial Hours	Practical Hours	Total Hours	Lecture Credit	Tutorial Credit	Practical Credit	Total Credits	Course Type
1		BPH103A	Composite Materials	4	0	0	4	4	0	0	4	DE5
2		BPH104A	Composite Materials (Lab)	0	0	2	2	0	0	1	1	DE5
3	6	BPH111A	Computational Material Science	4	0	0	4	4	0	0	4	DE6
4	6	BPH112A	Computational Material Science (Lab)	0	0	2	2	0	0	1	1	DE6
5	6	BPH118A	Material Characterization Techniques	4	0	0	4	4	0	0	4	DE7
6	6	BPH119A	Material Characterization Techniques (Lab)	0	0	2	2	0	0	1	1	DE7
7	6	BPH126A	Fundamental of Polymer Science	4	0	0	4	4	0	0	4	DE8
8	6	BPH127A	Fundamental of Polymer Science (Seminar)	0	0	2	2	0	0	1	1	DE8
9	6	BPH135A	Material's Synthesis and Characterization - Seminar	0	0	2	2	0	0	1	1	DE
				14	0	10	24	16	0	5	21	

semester VI: \*\*Note: In 6th Semester Student have a Choice either he can go for offered Courses or he may avail Internship in some reputed Institute / Industry or In House

Total Credit	1	2	3	4	5	6	Total
Semester	27	26	25	24	25	21	148

Total Credit

Semester

Credit

HEAD  
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Dr. Chandan Jodhi

(Dr. Abhishek Sharma)



# MECHANICS

CODE: BPH063A

CREDIT(S): 4

## UNIT-I

**Kinematics** – Position, velocity and acceleration (1D and 3D)

**Work and Energy Theorem:** Work and Kinetic Energy Theorem. Conservative and Non-Conservative Forces. Potential Energy. Energy Diagram. Stable and Unstable Equilibrium. Gravitational Potential Energy. Elastic Potential Energy. Force as Gradient of Potential Energy. Work and Potential energy. Work done by Non-conservative Forces. Law of Conservation of Energy.

**Collisions:** Elastic and Inelastic Collisions between particles. Centre of Mass and Laboratory Frames.

## UNIT-II

**Rotational Dynamics:** Angular Momentum of a Particle and System of Particles. Torque. Conservation of Angular Momentum. Rotation about a Fixed Axis. Moment of Inertia. Calculation of Moment of Inertia for Rectangular, Cylindrical, and Spherical Bodies. Kinetic Energy of Rotation. Motion involving both Translation and Rotation.

## UNIT-III

**Elasticity:** Relation Between Elastic Coefficients. Twisting Torque on a Cylinder or Wire.

**Fluid Motion:** Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube.

## UNIT-IV

**Gravitation and Central Force Motion:** Law of gravitation. Inertial and Gravitational Mass. Momentum of variable-mass system: Motion of rocket. Motion of a projectile in Uniform gravitational field, Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse

Potential and Field due to Spherical Shell and Solid Sphere. Motion of a Particle under Central Force Field. Two Body Problem and its Reduction to One Body Problem and its Solution. The Energy Equation and Energy Diagram. Kepler's Laws (Ideas Only). Orbits of Artificial Satellites.

## UNIT-V

**Inertial and Non- Inertial Systems:** Reference Frames: Inertial Frames and Galilean Transformations. Galilean Invariance and Conservation Laws. Non-inertial Frames and Fictitious Forces. Uniformly Rotating Frame. Physics Laws in Rotating Coordinate Systems. Centrifugal forces: Coriolis Force and its Applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems.

## Suggested Books

1. University Physics; F.W Sears, M.W Zemansky, H.D Young 13/e, 1986, Addison Wesley
2. An introduction to Mechanics; Daniel Kleppner, Robert J. Kolenkow, McGraw-Hill, 1973.
3. Theoretical Mechanics; M.R. Spiegel, 2006, Tata McGraw Hill
4. Mechanics Charles Kittel, Walter Knight, Malvin Ruderman, Carl Helmholz, Burton Moyer, Berkeley physics course.
5. Mechanics; D. S. Mathur, S. Chand & Company Limited, 2000.

**Course Outcomes:** After completing this course, students shall be able to-

CO1: Understand laws of motion and their application, various laws of conservation, collisions and idea about center of mass and laboratory frames.

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Dr. Pranav Saxena  
HEAD  
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University of Rajasthan

Chandrajoshi  
(Dr. Chandrajoshi)  
(Dr. Chandrajoshi)

- CO2: Understand of moment of inertia about the given axis for different uniform mass distributions, the basics of kinematics and dynamics linear and rotational motion.
- CO3: Learn the concepts of elastic in constant of solids and viscosity of fluids.
- CO4: Learn skills to understand and solve the equations of Newtonian gravity and central force problem and applications of Kepler's law.
- CO5: distinguish the inertial and non-inertial systems and understand the experiences of fictitious forces in a non-inertial frame.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H		L	H					M
CO2	L	M		H				M	
CO3	M		H				M		L
CO4	L	H	H	M				L	M
CO5	M		M	L				L	

H=High; M=Medium; L=Low

## MECHANICS LAB

CODE: BPH011B

CREDIT: 1

Student has to perform / learn any ten experiments out of the following experiments:-

1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.
2. To determine the height of a building using a Sextant.
3. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
4. To determine the elastic constants of a wire by Searle's method.
5. To find the Torque and angular acceleration of a fly wheel
6. To determine the moment of inertia of fly wheel.
7. To study the torsional oscillation of pendulum in different liquids and determine the rigidity modulus of the suspension wire using torsion pendulum.
8. To verify that energy conservation and momentum conservation can be used with a ballistic pendulum to determine the initial velocity of a projectile, its momentum and kinetic energy
9. To find the Time of flight, Horizontal range and maximum height of a projectile for different velocity, angle of projection, cannon height and environment.
10. To verify the momentum and kinetic energy conservation using collision balls.
11. Study of variation of Momentum, Kinetic energy, Velocity of collision of the objects and the Center of Mass with different velocity and mass and calculation of the Momentum, Kinetic energy, and Velocity after collision.
12. To determine g, the acceleration of gravity at a particular location using Kater's Pendulum

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Dr. Chandan Kumar  
Department of Physics  
University, Jaipur

Chandanjoshi  
(Dr. Chandan Joshi)  
(Dr. Chandan Joshi)



13. To determine the time period of oscillations and acceleration of gravity  $g$  using compound pendulum.
14. To find the viscosity of different liquid by rotating cylinder method.
15. \*To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
16. \*To determine the Young's Modulus of a Wire by Optical Lever Method.

**Suggested Books:**

1. Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced Level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal
4. Engineering Practical Physics, S. Panigrahi & B. Mallick, 2015, Cengage Learning India Pvt. Ltd.
5. Practical Physics, G.L. Squires, 2015, 4th Edition, Cambridge University Press.

**Course Outcomes:** After completion this course, student shall be able to

- CO1: Learn the mechanics of basic instruments and elastic properties (Young Modulus and Modulus of Rigidity)
- CO2: Learn the linear dynamics by performing compound pendulum, rotational dynamics using Flywheel and torsional oscillations.
- CO3: Understand fluid dynamics (verification of Stokes law, Searle method) and mechanics of collisions and projectile motion.
- CO4: To understand the effect of gravity by calculating  $g$  using Kater's and compound pendulum.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	M	M	L	M					
CO2		H	H	L	M	L			
CO3	H		M	M	L	M			
CO4		M		H	M	M			

H=High; M=Medium; L=Low

*[Signature]*  
 Dr. Praveen Kumar  
 Department of Physics  
 JECRC University, JAIPUR  
*[Signature]*  
 (Dr. Nishant Raut)

*[Signature]*  
 Chandan Joshi (Dr. Ashish Sharma)  
 Chandan Joshi



## OPTICS

CODE: BPH006B

CREDIT(S): 4

### UNIT-I

**Geometrical Optics :** Fermat's Principle: Fermat's Principle of Least Time and Extremum Path. Laws of Reflection and Refraction, Laws of Refraction at Spherical Surface, Thin lens Formula.

**Wave Optics:** Nature of Light- Theories of Light. Electromagnetic Nature of Light, Definition of a Wave Front. Propagation of a Wave Front. Huygens Principle of Secondary Wavelets.

### UNIT-II

**Interference:** Interference: Division of Amplitude and Division of Wavefront. Young's Double Slit Experiment. Lloyd's Mirror and Fresnel's Biprism. Phase Change on Reflection: Stoke's treatment. Interference in Thin Films: Parallel and Wedge-shaped Films. Fringes of Equal Inclination (Haidinger Fringes) and Fringes of Equal Thickness (Fizeau Fringes). Newton's Rings: Measurement of Wavelength and Refractive Index. Michelson's Interferometer: (1) Idea of form of fringes (No Theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, (5) Standardization of Meter. Fresnel's Biprism: Non localized fringes, Visibility of fringes.

### UNIT-III

**Fresnel's Diffraction:** Kirchhoff's Integral Theorem, Fresnel-Kirchhoff's Integral formula (Qualitative Discussion), Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Comparison of a Zone plate with a Convex lens. Diffraction due to a Straight Edge, Rectangular Aperture (Slit), Small Circular Aperture, an Opaque Circular Disc. Fresnel's Integrals, Cornu's Spiral: Fresnel Diffraction Pattern due to a Straight Edge.

**Fraunhofer Diffraction:** Diffraction due to a Single Slit, a Double Slit and a Plane Transmission Grating. Rayleigh's criterion of resolution. Resolving Power and Dispersive Power of a Plane Diffraction Grating.

### UNIT-IV

**Polarization:** Electromagnetic nature of light, Polarized light, Plane of vibrations and plane of polarizations, linearly polarized light by (i) reflection (Brewster's law), (ii) refraction, (iii) scattering, (iv) selective absorption, (v) double refraction; Polarizer and Analyzer - Malus law, Huygen's wave theory for double refraction - E Ray and O Ray, positive and negative crystals; production of circularly and elliptically polarized light, Quarter and Half Wave Plates - Analysis of polarized light, Laws of optical activity, Specific Rotation, Lorentz Half shade polarimeter, Biquartz polarimeter.

### UNIT-V

**Coherence:** Wave Train, Temporal Coherence - Coherence length and Coherence time Spectral Purity. Spatial Coherence and Size of the Source. Visibility as a Measure of Coherence, Applications of coherence.

### Suggested Books

1. Fundamentals of Optics; F. A. Jenkins and Harvey Elliott White, McGraw-Hill, 1976.
2. Principles of Optics; B. K. Mathur, 1995, Gopal Printing
3. A Text Book of Optics; N Subrahmanyam, Brij Lal and Avadhanulu, S. Chand.
4. Fundamentals of Optics; H.R. Gulati and D.R. Khanna, R. Chand Publications, 1991.
5. Optics; Eugene Hecht and A R Ganesan, Pearson Education, 2002.
6. Contemporary Optics; A. K. Ghatak & K. Thyagarajan, Plenum Press, 1978.

Dr. Y.K. Vijay

Nam  
(Dr. Nishant Chauhan)

Head of Physics  
JAIPUR

Chandagoshi  
Chandagoshi

(Dr. Nishant Chauhan)



**Course Outcomes:** After the completion of course, student shall be able to

- CO1: Understand geometrical approximation, Fermat's and Huygen's principles, and the paraxial matrix formalism for refractive and reflective surfaces, including Guass thin lens formula.
- CO2: Learn the basic understanding of Interference with different interferometric devices and analytical understanding of fringes formation in various applications.
- CO3: Understand and Analyze the bending of light phenomena due to various zones and optical devices formation of Cornu's spiral and resolving power of instruments.
- CO4: Learn the production of polarized light, role of optical crystals and retardation plates, analysis of specific rotation of light.
- CO5: Learn the importance of coherence in order to produce the quality light source.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H		M						
CO2	H	M	H	M				L	M
CO3		H	M	L				L	
CO4	M	L	H	M					M
CO5	H			L				M	M

H=High; M=Medium; L=Low

## OPTICS LAB

**CODE: BPH008C**

**Credit(s): 1**

Student has to perform / learn any ten experiments out of following experiments:-

1. To determine resolving power of telescope.
2. To determine the wavelength of prominent lines of Mercury by using plane Diffraction Grating.
3. To determine dispersive power of a prism using mercury light source and spectrometer.
4. To determine the specific rotation of glucose/sugar solution by polarimeter.
5. To determine the wavelength of Sodium light using diffraction grating and spectrometer.
6. To determine wavelength of sodium light using Fresnel Biprism.
7. To determine wavelength of sodium light by Newton's rings' experiment.
8. To determine the dispersive power of a plane diffraction grating.
9. To determine transmission coefficient of a semi-transparent glass plate using LB Photometer.
10. To find the Cauchy's constants of a given prism for different pairs of spectral colors using spectrometer.
11. To study of variation of angle of deviation ( $\delta$ ) with angle of incidence ( $i$ ) using a prism and spectrometer and to draw the  $i$ - $\delta$  curve
12. To determine the refractive index of thin glass plate by Michelson's Interferometer.
13. To determine the focal length of the combination of the two lenses separated by a distance
14. To study the polarization of light using He-Ne laser

15. \*To verify the Malus' Law.

16. \*To study the Diffraction pattern due to single slit using laser light.

#### Suggested Books

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11<sup>th</sup> Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4<sup>th</sup> Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

**Course Outcomes:** After completion this course, student shall be able to

- CO1: Acquire thorough fundamental knowledge within interferometry, coherence, polarization and diffraction.
- CO2: To understand various optical phenomena, principles, workings and applications optical instruments like biprism, interferometer, diffraction grating and prism
- CO3: Student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light.
- CO4: The student will get a thorough knowledge of the polarization of light and its changes upon reflection and transmission.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	M	H			L				
CO2	H	M	M			H			M
CO3	M	H	M	M	M				
CO4		H							M

H: High; M: Medium; L: Low

## ELECTRICITY AND MAGNETISM

CODE: BPH010B

CREDIT: 4

### UNIT-I

**Electric Field:** Electric Field and Lines. Electric Field  $E$  due to a Ring of Charge. Electric Flux. Gauss's law. Gauss's law in Differential form. Applications of Gauss's Law:  $E$  due to point charge, an Infinite Line of Charge, Uniformly charged spherically shell and solid sphere, a Charged Cylindrical Conductor, an Infinite Sheet of Charge and Two Parallel Charged Sheets, Two Charged Concentric Spherical Shells. Force on the Surface of a Charged Conductor and Electrostatic Energy in the medium surrounding a Charged Conductor.

### UNIT-II

*Prof. Y.K. Vijay*  
*Dr. Nishant Kumar*  
*Chandragoshi*  
*Dr. Abhishek Sharma*



**Electric Potential:** Line Integral of Electric Field. Conservative Nature of Electrostatic Field. Relation between  $E$  and  $V$ . Electrostatic Potential Energy of a System of Charges. Electric Potential due to Dipole, a Charged Wire, a Charged Disc. Calculation of Electric Field from Potential, Force and Torque on a Dipole. Conductors in an Electrostatic Field. Capacitance of an isolated spherical conductor, Parallel plate, spherical and cylindrical condenser.

#### UNIT-III

**Dielectric Properties of Matter:** Dielectrics: Electric Field in Matter. Dielectric Constant. Parallel Plate. Capacitor with a Dielectric. Polarization, Polarization Charges and Polarization Vector. Electric Susceptibility. Gauss's law in Dielectrics. Displacement vector  $D$ . Relations between the three Electric Vectors. Capacitors filled with Dielectrics.

#### UNIT-IV

**Magnetic Field:** Magnetic Effect of Currents: Magnetic Field  $B$ . Magnetic Force between Current Elements and Definition of  $B$ . Magnetic Flux. Biot-Savart's Law:  $B$  due to (1) a Straight Current Carrying Conductor and (2) Current Loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital law (Integral and Differential Forms):  $B$  due to (1) a Solenoid and (2) a Toroid. Properties of  $B$ . Forces on an Isolated Moving Charge. Magnetic Force on a Current Carrying Wire. Torque on a Current Loop in a Uniform Magnetic Field.

#### UNIT-V

**Magnetic Properties of Matter:** Magnetization vector ( $M$ ). Magnetic Intensity ( $H$ ). Magnetic Susceptibility and permeability. Relation between  $B$ ,  $H$ ,  $M$ . Ferromagnetism.  $B$ - $H$  curve and hysteresis.

**Electromagnetic induction:** Faraday's law (Differential and Integral forms). Lenz's Law. Self and Mutual Induction. Energy stored in a Magnetic Field.

**Maxwell's Equations:** Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves.

#### Reference Books

1. Edward M. Purcell: Electricity and Magnetism, McGraw-Hill Education, 1986.
2. Arthur F. Kip: Fundamentals of Electricity and Magnetism, McGraw-Hill, 1968.
3. D C Tayal; Electricity and Magnetism, Himalaya Publishing House, 1988.
4. J. H. Fewkes & John Yarwood: Electricity & Magnetism, Oxford Univ. Press, 1991.
5. David J. Griffiths: Introduction to Electrodynamics, Benjamin Cummings, 1998 (Also, PHI).

**Course Outcomes:** After completion this course, student shall be able to-

- CO1: Demonstrate the fundamentals of electrostatics and formalism of electric field due to various geometrical charge conductors.
- CO2: Articulate the knowledge of dipole, conductors and capacitors / condenser in terms of electric potential.
- CO3: Describe the properties and behavior of dielectric materials with understanding of Gauss' law.
- CO4: Describe the production of magnetic field due to current carrying elements and magnetic dipole.
- CO5: Explain Faraday-Lenz to articulate the relationship between electric and magnetic fields and behavior of Maxwell laws in different mediums.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

*(Handwritten signatures and names)*  
Vijay, Nishant, Chaudhary, (Dr. Nishant Kumar), (Dr. Abhishek Sharma)



Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1		H	M			L			
CO2	H			L				L	H
CO3	M	H	M		L	M			
CO4	H	H	M	M	L		L		M
CO5			H			L			H

H = Highly Related; M = Medium L = Low

## ELECTRICITY AND MAGNETISM LAB

CODE: BPH012B

CREDIT:1

Student has to perform / learn any ten experiments out of the followings:-

1. To use a Multimeter for measuring (a) Resistances, (b) A/C and DC Voltages, (c) AC and DC Currents, (d) Capacitances, and (e) Frequencies.
2. To convert a Galvanometer into an Ammeter of given range and calibrate it.
3. To convert a Galvanometer into a Voltmeter of given range and calibrate it.
4. To determine specific resistance of a wire by Carrey-Foster's Bridge.
5. To study LCR circuit characteristics.
6. To study L-C transmission line and determine attenuation coefficient.
7. To study R-C transmission line and determine attenuation coefficient.
8. To determine an unknown resistance using *de-Sauty Bridge*.
9. To determine an unknown resistance using *Anderson Bridge*.
10. To determine characteristics of Solar Cell. (Complete Kit)
11. To study charging and discharging of a capacitor and determine time constant.
12. To study the Van De Graff generator to produce accelerated high energy particles.
13. To study the variation of magnetic field with distance along the axis of a circular coil carrying current.
14. To find the horizontal intensity of earth's magnetic field at a place and moment of the bar magnet.
15. To determine the magnetic dipole moment ( $m$ ) of a bar magnet and horizontal intensity ( $B_H$ ) of earth's magnetic field using a deflection magnetometer.
16. To find the temperature coefficient of resistance of a given coil using Wheatstone bridge circuit
17. To determine the self inductance of the coil ( $L$ ) using Anderson's bridge.
18. To calculate the value of inductive reactance ( $X_L$ ) of the coil at a particular frequency using Anderson's bridge.
19. To determine the volume magnetic susceptibility of Manganese sulphate solution at different concentrations using Quincke's method
20. To understand the Barkhausen effect on ferromagnetic material.
21. To study the phenomena of magnetic hysteresis and calculate the retentivity, coercivity and saturation magnetization of a material using a hysteresis loop tracer
22. \*To determine radius of a current carrying coil using Tangent Galvanometer.

### Suggested Books

1. Geeta Sanon: B. Sc. Practical Physics, 1st Edn. (2007), R. Chand & Co.
2. B. L. Worsnop and H. T. Flint: Advanced Practical Physics, Asia Publishing House, New Delhi.
3. Indu Prakash and Ramakrishna: A Text Book of Practical Physics, Kitab Mahal, New Delhi.
4. D. P. Khandelwal: A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.

**Course Outcomes:** After completion this, student shall be able to

CO1: Understand the functioning of various components, and learn to calculate the unknown resistance and coefficients of given circuits.

CO2: Learn the variation of voltage and current in a circuit consisting of multiple elements.

CO3: Understand the mechanism of generating magnetic fields, and understand the properties of magnetic field

CO4: Identify and calculate the properties and behavior of magnetic substances.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	M	H	M	H	M				
CO2	H	L		M	L				L
CO3	M	H	L	L					
CO4		M	H	M					L

H = Highly Related; M = Medium L = Low

*Maus*  
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*(Dr. Anshu Kishore)*

*Chandantoshi*  
(Dr. Chandantoshi)

*Dr. Rangendra*  
HEAD  
Department of Physics  
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# THERMODYNAMICS & STATISTICAL PHYSICS

CODE: BPH064A

CREDIT: 4

## UNIT-I

**Laws of Thermodynamics:** Zeroth Law of Thermodynamics & Concept of Temperature, Concept of Work & Heat, State Functions, First Law of Thermodynamics and its differential form, Internal Energy, First Law & various processes, Reversible and Irreversible Changes. Conversion of Work into Heat and Heat into Work. Heat Engines, Carnot Cycle, Carnot Engine and its Efficiency. Refrigerator and its Efficiency. Second Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence. Carnot's Theorem. Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale.

## UNIT-II

**Entropy:** Change in Entropy, Entropy of a State, Clausius Theorem, Clausius Inequality. Second Law of Thermodynamics in terms of Entropy. Entropy of a Perfect Gas. Entropy of the Universe. Entropy Changes in Reversible and Irreversible Processes. Principle of Increase of Entropy. Impossibility of Attainability of Absolute Zero: Third Law of Thermodynamics. Temperature-Entropy Diagrams. First and second order Phase Transitions.

## UNIT-III

**Thermodynamic Potentials:** Extensive and Intensive Thermodynamic Variables. Thermodynamic Potentials  $U$ ,  $H$ ,  $F$  and  $G$ : Their Definitions, Properties and Applications. Surface Films and Variation of Surface Tension with Temperature. Magnetic Work. Cooling due to Adiabatic demagnetization. Approach to Absolute Zero.

**Maxwell's Thermodynamic Relations:** Derivations and applications of Maxwell's Relations, Maxwell's Relations: (1) Clausius Clapeyron equation, (2) Values of  $C_p - C_v$ , (3)  $TdS$  Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations, (6) Change of Temperature during Adiabatic Process.

## UNIT-IV

**Classical Statistics:** Macrostate & Microstate, Elementary Concept of Ensemble, Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of Equipartition of Energy (with proof) – Applications to Specific Heat and its Limitations, Thermodynamic Functions of a Two-Energy Levels System, Negative Temperature.

## UNIT-V

**Quantum Statistics: Bose-Einstein Statistics:** B-E distribution law, Thermodynamic functions of a strongly Degenerate Bose Gas, Bose Einstein condensation, properties of liquid He (qualitative description). **Fermi-Dirac Statistics:** Fermi-Dirac Distribution Law, Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals.

## Suggested Books

1. Enrico Fermi: Thermodynamics, Courier Dover Publications, 1956.
2. Thermal Physics, S. Garg, R. Bansal and Ghosh, 2nd Edition, 1993, Tata McGraw-Hill
3. Thermal Physics, A. Kumar and S.P. Taneja, 2014, R. Chand Publications.
4. Thermodynamics, Kinetic Theory & Statistical Thermodynamics, Sears & Salinger. 1988, Narosa.
5. Statistical Mechanics, R.K. Pathria, Butterworth Heinemann: 2nd Ed., 1996, Oxford University Press.



6. Statistical Physics, Berkeley Physics Course, F. Reif, 2008, Tata McGraw-Hill
7. Statistical and Thermal Physics, S. Lokanathan and R.S. Gambhir, 1991, Prentice Hall
8. Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009, Springer

**Course Outcomes:** After completion the course, student shall be able to

- CO1: Comprehend the basic concepts of thermodynamics, and apply various laws of thermodynamics to various processes and real systems.
- CO2: Ability to evaluate entropy changes in a wide range of processes and determine the reversibility or irreversibility of a process and other important thermodynamic properties.
- CO3: Understand the thermodynamic potentials and their physical interpretations, Maxwell's thermodynamic relations for various processes
- CO4: Understand the fundamentals of thermodynamic system with their distinguishably or indistinguishably nature, the Gibbs paradox, equipartition of energy and concept of negative temperature.
- CO5: Understand the application of BE and FD statistical distribution law to understand macroscopic properties of degenerate systems.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	L		M					L
CO2		H	L	M					M
CO3	M		M						
CO4	H	L		M					
CO5	M	L		H				L	M

H = Highly Related; M = Medium L = Low

### THERMODYNAMICS AND STATISTICAL LAB

**CODE: BPH065A**

**CREDIT:1**

Student has to perform / learn any ten experiments out of the following experiments:-

1. To study adiabatic changes using Clement and de-Sorme experiment.
2. To determine the mechanical equivalent of heat (J) by Electrical method (Joule's Calorimeter)
3. To verify Newton's cooling law of different materials and different liquid.
4. To determine mechanical equivalent of heat, J, by Callender and Barne's constant flow method.
5. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method.
6. To study the variation of Thermo-Emf of a thermocouple with difference of temperature of its two junctions.
7. To study the phase change
8. To study the heat transfer by radiations of various test elements
9. To find the thermal conductivity of a material by the two slab guarded hot plate method
10. To determine the thermal resistivity of the sample

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Prof. Y.K. Nay

Naam  
(Dr. Nishant Naam)

Chaudhary Jishi  
(Dr. Chaudhary Jishi)

11. To verify Newton's cooling law of different materials and different liquid and draw the cooling curve
12. To determine the overall heat transfer coefficient at the surface of a given vertical metal cylinder by the natural convection method and determine the value of Nusselt number
13. \*To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT).
14. \*To determine the Coefficient of Thermal Conductivity of Cu by Searle's Apparatus.

#### Suggested Books

1. B. L. Worsnop and H. T. Flint: Advanced Practical Physics, Asia Publishing House, New Delhi.
2. Indu Prakash and Ramakrishna: A Text Book of Practical Physics, Kitab Mahal, New Delhi.
3. D. P. Khandelwal: A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
4. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

**Course Outcomes:** After completion this course, student shall be able to

- CO1: Understand the basic concepts of thermodynamic such as temperature, pressure, system, properties, process, state, cycles and equilibrium.
- CO2: Conduct experiments regarding the measurement and calibration of temperatures and pressures in groups.
- CO3: Identify the properties of substances on property diagrams and obtain the data from property tables.
- CO4: Learn energy transfer through mass, heat and work for closed and control volume systems.
- CO5: Learn the application of first Law of Thermodynamics on closed and control volume systems.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	L							
CO2		H	L	M					
CO3	M								L
CO4	L	H		L					M
CO5	M	H		M					M

H = Highly Related; M = Medium L = Low

*M*  
Prof. Y.K. Vijay

*N. Law*  
(Dr. Nishant Law)

*Chandanjoshi*  
(Dr. Chandan Joshi)

*Dr. Pratikshita Shrivastava*



# MATHEMATICAL PHYSICS & RELATIVITY

CODE: BPH066A

Credit: 5 (4L+1T)

## UNIT-I

**Vector Calculus:** Vector Differentiation. Scalar and Vector Fields. Ordinary and Partial Derivative of a Vector w.r.t. coordinates. Space Curves. Unit Tangent Vector and Unit Normal Vector (without Frenet- Serret Formulae). Directional Derivatives and Normal Derivative. Gradient of a Scalar Field and its Geometrical Interpretation. Divergence and Curl of a Vector Field. Del and Laplacian Operators. Vector Identities.

**Vector Integration:** Ordinary Integral of Vectors. Line, Surface and Volume Integrals. Flux of a Vector Field. Gauss' Divergence Theorem, Green's Theorem and Stokes Theorem.

## UNIT-II

**Orthogonal Curvilinear Coordinates:** Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems.

## UNIT-III

**Differential Equations:** First Order Differential Equations and Integrating Factor. Homogeneous Equations with constant coefficients. Particular Integral.

## Calculus of Variations

Variational Calculus: Variational Principle. Concept of Lagrangian. Generalized Coordinates. Definition of Canonical Momenta. Euler-Lagrange's Equations of Motion and its Applications to Simple Problems.

## UNIT-IV

**Tensors:** Transformation of co-ordinates. Einstein's Summation Convention. Relation between Direction Cosines. Tensors: Algebra of Tensors, Sum, Difference and Product of Two Tensors, and Contraction. Quotient Law of Tensors. Symmetric and Anti-symmetric Tensors. Pseudotensors. Invariant Tensors: Kronecker Delta.

## UNIT-V

**The Idea of Space-Time and Minkowski Space.** Geometry of Space-time, space like and time-like interval, Light Cone. Null-Cone representation. Metric Tensor. Four Vector Formalism: Four Velocities, Four Momenta. Transformation of Energy and Momentum

**Special Theory of Relativity:** Galilean Transformations. Postulates of STR. Lorentz Transformations, Simultaneity, Length Contraction. Time Dilation, Twin Paradox. Relativistic Transformation of Velocity, Relativistic Addition of Velocities. Frequency and Wave Number. Mass-Energy equivalence principle. Variation of Mass with Velocity. Relativistic relation between energy and momentum. Relativistic Doppler effect. Relativistic Kinematics.

## Suggested Books

1. Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7th Edn., Elsevier..
2. L. A. Pipes: Applied Mathematics for Engineers & Physicists, McGraw Hill.
3. Mathematical Tools for Physics, James Nearing, 2010, Dover Publications.
4. Fredrick W. Byron and Robert W. Fuller: Mathematics of Classical and Quantum Physics, Dover Publications.
5. Mathematical Physics, Goswami, 1st edition, Cengage Learning
6. Mathematical Physics, H.K. Dass and R. Verma, S. Chand & Company.
7. M. R. Spiegel: Vectors Analysis, Schaum's Outline Series.
8. David J. Griffiths: Introduction to Electrodynamics, Benjamin Cummings, 1998 (Also, PHI).

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Dr. Nishant Raut  
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JAIPIIR

Chandajoshi  
Dr. Chandra Joshi

Dr. Abhishek Sharma

9. Arthur Beiser: Prospects in Modern Physics, McGraw-Hill Book Company (1998).

**Course Outcomes:** After completion this course, students should be able to:

- CO1: Learn the basic mathematical structures of vector calculus in solving the problems in various branches of Physics as well as in engineering  
CO2: Understand and learn the Curvilinear coordinates to analyze the applications in problems with spherical and cylindrical symmetries.  
CO3: Learn the representations and dynamics by partial differential equations and variational principle in solving mathematical problems arising in physics by a variety of mathematical techniques  
CO4: Use the mathematical formalism for connections and general tensors to solve problems of general relativistic nature  
CO5: Acquire the knowledge of light cone, null cone, four vector formalism, understanding of the special theory of relativity and able to perform basic calculations in relativistic kinematics.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	M		L	M				H
CO2	M		H	M					
CO3	M	H				M		M	L
CO4	H	M	M		H				
CO5	M	H	L	M			L		

H = Highly Related; M = Medium L = Low

### ELEMENTS OF MODERN PHYSICS

CODE: BPH067A

CREDIT: 4

#### UNIT -I

Planck's quantum, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De-Broglie wavelength and matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions.

#### UNIT-II

Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle: Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction.)

#### UNIT - III

Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic

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*Dr. Nishant Chauhan*  
*Dr. Praveen Sharma*  
*Department of Physics*  
*University, JAIPUR*  
*Chaudhary Jishi*  
*(Dr. Chaudhary Jishi)*  
*Dr. Jyoti K. Sharma*



function, probabilities and normalization; Probability and probability current densities in one dimension.

#### UNIT-IV

One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension across a step potential & rectangular potential barrier.

#### UNIT-V

**Lasers:** Induced Absorption, Spontaneous and Stimulated emissions, Relationship between Einstein's Coefficients, Principle of Lasing. Metastable State, Optical Pumping and Population Inversion. Components of Laser, Three-Level and Four-Level Lasers. Ruby Laser, He-Ne Laser and Diode laser.

**Holography:** Principle of Holography. Recording and Reconstruction Method. Theory of Holography as Interference between two Plane Waves. Point source holograms, Applications of Holography

#### Suggested Books:

1. Concepts of Modern Physics, Arthur Beiser, 2002, McGraw-Hill.
2. Introduction to Modern Physics, Rich Meyer, Kennard, Coop, 2002, Tata McGraw Hill
3. Introduction to Quantum Mechanics, David J. Griffith, 2005, Pearson Education.
4. Physics for scientists and Engineers with Modern Physics, Jewett and Serway, 2010, Cengage Learning.
5. Modern Physics, G.Kaur and G.R. Pickrell, 2014, McGraw Hill
6. Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, 2004, Macmillan

**Course Outcomes:** After completion this course, student shall be able to

- CO1: Understand the development of quantum mechanics and ability to discuss and interpret experiments that reveal the quantum nature and dual nature of matter.
- CO2: Understand the theory of quantum measurements, wave packets and uncertainty principle.
- CO3: Understand the central concepts of quantum mechanics in the formulation of Wave function and the Schrodinger wave equation.
- CO4: Formulate the basic theoretical problems e.g. one dimensional rigid box, tunneling through potential barrier, step potential, rectangular barrier
- CO5: Understand the basics of lasing and working of different lasers, and learn the technique of Holography.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAMOUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H		M	H	M	L			M
CO2	H		H	H					
CO3	H	L	M	L	M				
CO4	H	M	H	M					M
CO5	H	H	H	M	M	H	L	M	H

H = Highly Related; M = Medium L = Low

*Prof. Y.K. Vijay*

*Dr. Nishant Bhanu*  
*Dr. Pranshu Sene*

*Chandana Jishi*  
*(Dr. Chandana Jishi)*

## ELEMENTS OF MODERN PHYSICS LAB

CODE: BPH068A

CREDIT:1

Student has to perform / learn any eight experiments out of the following:-

1. To determine the Planck's constant using LEDs of at least 4 different colours.
2. To determine the value of  $e/m$  by (a) Magnetic focusing or (b) Bar magnet.
3. To determine the wavelength of laser source using diffraction of single and double slits.
4. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating
5. To experimentally demonstrate the concept of quantization of energy levels according to Bohr's model of atom.
6. To study the phenomenon of Photoelectric effect as a whole; (a) To draw kinetic energy of photoelectrons as a function of frequency of incident radiation, (b) To determine the Planck's constant from kinetic energy versus frequency graph, (c) To plot a graph connecting photocurrent and applied potential, (d) To determine the stopping potential from the photocurrent versus applied potential graph.
7. To study the emission spectra of Hydrogen, Neon and mercury vapours.
8. To experimentally demonstrate the concept of Millikan's oil drop experiment. (a) To find the terminal velocity of the drop, (b) To find the charge on a drop.
9. To determine the wavelength of a laser using the Michelson interferometer.
10. \*To determine work function of material of filament of directly heated vacuum diode.
11. \*To determine the ionization potential of mercury.
12. \*To determine the absorption lines in the rotational spectrum of Iodine vapour.
13. \*To show the tunneling effect in tunnel diode using I-V characteristics.

### Reference Books

1. Concepts of Modern Physics, Arthur Beiser, 2002, McGraw-Hill.
2. Introduction to Modern Physics, Rich Meyer, Kennard, Coop, 2002, Tata McGraw Hill
3. Introduction to Quantum Mechanics, David J. Griffith, 2005, Pearson Education.
4. Physics for scientists and Engineers with Modern Physics, Jewett and Serway, 2010, Cengage Learning.
5. Modern Physics, G.Kaur and G.R. Pickrell, 2014, McGraw Hill
6. Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, 2004, Macmillan

**Course Outcomes:** Student shall be able to

- CO1: Understand and verify the concept of quantization and quantized energy.  
CO2: Learn the properties of Laser and understand the operating principle of some optical instruments.  
CO3: Understand and illustrate the photo-electric effect by performing the various aspects.  
CO4: Get an ability to illustrate the determination of charge of an electron.  
CO5: Understand the process of work function, ionization, absorption with experiments to analyse the results.

*Dr. Nishant Kaur*  
(Dr. Nishant Kaur)  
*Dr. Chandra Joshi*  
(Dr. Chandra Joshi)  
*Dr. Abhishek Sharma*  
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**Dr. Pradeep Kumar**  
**HEAD**  
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# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	M		H	L					
CO2	M	H		L	M				M
CO3	M	H	M	M					
CO4	H	M		L	M				L
CO5	H		M	M					L

H = Highly Related; M = Medium L = Low

## WAVES & VIBRATIONS

CODE: BPH069A

CREDIT: 4

### UNIT-I

**Oscillations in Arbitrary Potential Well:** Simple Harmonic Oscillations. Differential Equation of SHM and its Solution. Amplitude, Frequency, Time Period and Phase. Velocity and Acceleration. Kinetic, Potential and Total Energy and their Time Average Values. Reference Circle. Rotating Vector Representation of SHM.

**Free Oscillations of Systems with One Degree of Freedom:** (1) Mass-Spring system, (2) Simple Pendulum, (3) Torsional Pendulum, (4) Oscillations in a U-Tube, (5) Compound pendulum: Centres of Percussion and Oscillation, and (6) Bar Pendulum.

### UNIT-II

**Driven Oscillations:** Damped Oscillations: Damping Coefficient, Log Decrement.

**Forced Oscillations:** Transient and Steady States, Amplitude, Phase, Resonance, Sharpness of Resonance, Power Dissipation and Quality Factor. Helmholtz Resonator.

**Coupled Oscillators:** Normal Coordinates and Normal Modes. Energy Relation and Energy Transfer. Normal Modes of N Coupled Oscillators.

### UNIT-III

**Wave Motion:** Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave.

**Velocity of Waves:** Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid, in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction.

### UNIT-IV

Elastic Waves in Solid Rod. Pressure Waves in Glass Columns. Transverse Waves in Strings. Waves in Three Dimensions. Spherical Waves. Plane Electromagnetic Waves. Energy and Momentum of Plane EM Waves. Radiation Pressure. Radiation Resistance of free space. EM Waves in dispersive Media. Spectrum of EM Waves.

### UNIT-V

**Ultrasonics:** Production of ultrasonic waves. Echo; Reverberation, reverberation time, Sabine's formula, remedies over reverberation; Absorption of sound, absorbent materials; Conditions for good acoustics of a building; Noise, its effects and remedies. **Piezoelectric effect.** Detection of ultrasonic waves: Piezoelectric detector. Kundt's tube method. Sensitive flame method. Thermal

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 Dr. Prannoy Senapati  
 Chaudhary Jishi  
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detector method. Properties of ultrasonic waves. Cavitation. Acoustic grating. Velocity measurements.

**SONAR:** Non-destructive testing. Pulse echo technique. Transmission technique. Resonance.

Medical Applications: Echocardiograms/Sonogram. Ultrasonic Imaging (Scan display).

### Suggested Books

1. A. P. French: Vibrations and Waves, CBS Pub. & Dist., 1987.
2. N.K. Bajaj, The Physics of Waves and Oscillations, Tata Mc-Graw Hill Education (1988)
3. H.J. Jain, The Physics of Vibrations and Waves, Sixth Edition, Wiley (2005)
4. R.N. Chaudhari, Waves and Oscillations, New Age International (P) Ltd., (2010)
5. K. Uno Ingard: Fundamentals of Waves & Oscillations, Cambridge University Press, 1988.
6. Daniel Kleppner and Robert J. Kolenkow: An Introduction to Mechanics, McGraw-Hill, 1973.
7. Franks Crawford, Waves: Berkeley Physics Course (SIE), Tata McGrawHill, 2007.
8. M. S. Seymour Lipschutz: Schaum's Outline of Vector Analysis, McGraw-Hill, 2009.

**Course Outcomes:** After completion this course, student shall be able to

CO1: Learn the fundamentals of oscillating system having one degree of freedom.

CO2: Understand the concept of resonance and the response of a system (amplitude and phase, power dissipation) as a function of driving force, coupled oscillating system.

CO3: Understand the nature of waves, relationship between the velocity and physical properties of waves and different modes of vibration in stretched string / fluid or in pipe.

CO4: Understand the types of waves, propagation of EM waves in mediums.

CO5: Understand the concept and characteristics of ultrasonic, detection methods and its applications.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H		L	M					
CO2	H	M	M	H	L				M
CO3	H	M	H	H					M
CO4	M		H		L				
CO5	H	M	M	L					M

H = Highly Related; M = Medium L = Low

## WAVES AND VIBRATIONS LAB

CODE: BPH070A

CREDIT: 1

Student has to perform / learn any ten experiments out of the followings:

1. To calculate the natural frequency and damping ratio of a spring-mass system, experimentally; and compare the results with theoretical values.
2. To calculate the natural frequency and damping ratio for free vibration of a single DOF cantilever beam with a lumped mass at free end, experimentally; and compare the results with theoretical values.

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*Dr. Prakash Kumar*

*Chandan Joshi*  
*(Dr. Chandan Joshi)*

*(Dr. Abhishek Sharma)*

3. To calculate the natural frequency and damping ratio for forced vibration of a single DOF cantilever beam with a lumped mass at free end, experimentally; and compare the results with theoretical values
4. To study the Simple Harmonic motion
5. To study simple Damped Harmonic Oscillations
6. To Study Coupled Simple Harmonic Motion
7. To study Nonlinear Oscillations
8. To study Nonlinear Damped Oscillations
9. To study the LC circuit
10. To Study LCR circuit and resonance behavior of circuit.
11. To find the velocity of sound waves in a given rod with Kundt's tube apparatus and also find the Young's modulus of the material of the rod.
12. To calculate the velocity of ultrasonic sound through different liquid media using ultrasonic interferometer
13. To calculate the adiabatic compressibility of the given liquid ultrasonic interferometer
14. To determine the frequency of an electrically maintained tuning fork by, (a) Transverse mode of vibration, (b) Longitudinal mode of vibration

#### Suggested Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

**Course Outcomes:** After completion this course, student shall be able to

- CO1: Develop an understanding of various aspects of harmonic oscillations and waves specially.  
 CO2: Acquire the knowledge of superposition of collinear and perpendicular harmonic oscillations  
 CO3: Understand the dynamics of various types of mechanical waves and their superposition.  
 CO4: Learn the characteristic behavior of coupled, forced and driven oscillators and thereby able to illustrate the Lissajous figures.  
 CO5: Understand the properties of Ultrasonic waves through the experiments.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H			M					
CO2	H	L		M	L				
CO3		H	M	L					M
CO4	L	M	M	M	M				
CO5	H		L	M	L				L
									M

H = Highly Related; M = Medium L = Low

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# ADVANCED MATHEMATICAL PHYSICS

CODE: BPH071A

CREDIT: 4

## UNIT-I

### Dirac-delta function and its properties:

Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function.

## UNIT-II

**Fourier Series:** Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series. Expansion of functions with arbitrary period. Expansion of non-periodic functions over an interval. Even and odd functions and their Fourier expansions. Application. Summing of Infinite Series. Term-by-Term differentiation and integration of Fourier Series. Parseval Identity.

## UNIT-III

**Frobenius Method and Special Functions:** Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations. Legendre, Bessel, Hermite and Laguerre. Properties of Legendre Polynomials: Rodrigues Formula, Generating Function, Orthogonality. Simple recurrence relations. Expansion of function in a series of Legendre Polynomials. Bessel Functions of the First Kind: Generating Function, simple recurrence relations. Zeros of Bessel Functions ( $J_0(x)$  and  $J_1(x)$ ) and Orthogonality.

## UNIT-IV

**Some Special Integrals:** Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function (Probability Integral).

**Theory of Errors:** Systematic and Random Errors. Propagation of Errors. Normal Law of Errors. Standard and Probable Error. Least-squares fit. Error on the slope and intercept of a fitted line.

## UNIT-V

**Partial Differential Equations:** Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Wave equation and its solution for vibrational modes of a stretched string, rectangular and circular membranes. Diffusion Equation.

## Reference Books

1. Mathematical Methods for Physicists: Arfken, Weber, 2005, Harris, Elsevier.
2. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill.
3. Mathematics for Physicists, Susan M. Lea, 2004, Thomson Brooks/Cole.
4. Differential Equations, George F. Simmons, 2006, Tata McGraw-Hill.
5. Partial Differential Equations for Scientists & Engineers, S.J. Farlow, 1993, Dover Pub.
6. Engineering Mathematics, S.Pal and S.C. Bhunia, 2015, Oxford University Press
7. Mathematical methods for Scientists & Engineers, D.A. McQuarrie, 2003, Viva Books

## Course Outcomes

After completion this course, student shall be able to-

- CO1: Learn the Dirac delta function its properties, which have applications in various branches of Physics, especially in quantum mechanics
- CO2: Understand the Fourier analysis of periodic functions and their applications in physical problems such as vibrating strings etc.
- CO3: Understand about the special functions, differential equations and their applications in various physical problems in quantum mechanics.

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*Nand*  
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Department of Physics  
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*Chandrajoshi*  
(Dr. Chandan Joshi)

*Dr. Abhishek Sharma*



- CO4: Understand the beta, gamma and error functions and their applications in doing integrations; learn the basics of errors, their analysis.
- CO5: Acquire knowledge of methods to solve partial differential equations with the examples of important partial differential equations in Physics.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	M	L			H			L
CO2		H	M	M					L
CO3	M	H		M			L		
CO4	M		M	H					M
CO5	M	H	L		M				

H = Highly Related; M = Medium L = Low

### ADVANCED MATHEMATICAL PHYSICS LAB

CODE: BPH072A

CREDIT: 1

**Review of C & C++ Programming fundamentals:** Introduction to Programming, constants, variables and data types, operators and Expressions, I/O statements, scanf and printf, c in and c out, Manipulators for data formatting, Control statements (decision making and looping statements) (If-statement, If-else Statement, Nested if Structure, Else-if Statement, Ternary Operator, Goto Statement, Switch Statement, Unconditional and Conditional Looping, Loop-While, Do-While & FOR Loop, Break and Continue Statements, Nested Loops), Arrays (1D & 2D) and strings, user defined functions, Structures and Unions, Idea of classes and objects

**Programs:** Sum & average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of numbers in ascending descending order, Binary search Random number generation Area of circle, area of square, volume of sphere, value of pi ( $\pi$ )

**Introduction to Numerical Computation Software Scilab:** Introduction to Scilab, Advantages and disadvantages, Scilab environment, Command window, Figure window, Edit window, Variables and arrays, Initialising variables in Scilab, Multidimensional arrays, Subarray, Special values, Displaying output data, data file, Scalar and array operations, Hierarchy of operations, Built in Scilab functions, Introduction to plotting, 2D and 3D plotting (2), Branching Statements and program design, Relational & logical operators, the while loop, for loop, details of loop operations, break & continue statements, nested loops, logical arrays and vectorization (2) User defined functions, Introduction to Scilab functions, Variable passing in Scilab, optional arguments, preserving data between calls to a function, Complex and Character data, string function, Multidimensional arrays (2) an introduction to Scilab file processing, file opening and closing, Binary I/o functions, comparing binary and formatted functions, Numerical methods and developing the skills of writing a program (2).

Generating and plotting of Special functions Legendre Polynomials and Bessel function using User defined functions in Scilab

*(Signature)*  
Dr. Nishant Rana  
Dr. Pragna Saxena  
HEAD  
Department of Physics  
University, JAIPUR

*(Signature)*  
Chandan Jishi  
(Dr. Chandan Jishi)

*(Signature)*  
Abhishek Sharma

**Solution of ODE First order Differential equation Euler:-** Radioactive decay, Current in RC, LC circuits with DC source, Newton's law of cooling, Classical equations of motion  
**Partial Differential Equation-** Wave Equation, Heat Equation, Poisson Equation, Laplace Equation Using Scicos/xcos - Generating Square Wave, Saw-tooth Wave, Sine Wave, Solution of Harmonic Oscillator, Study of beat phenomena and Phase space plots.

**Using C++ /Scilab based simulations experiments based on Mathematical Physics problems-**  
 Examples:

1. Dirac-Delta function: Evaluate  $\frac{1}{\sqrt{2\pi\alpha^2}} \int e^{-\frac{(x-2)^2}{2\alpha^2}} (x+3) dx$  for  $\sigma = 1, 0.1, 0.01$  and show it tends to 5.
2. Fourier Series: Program to sum  $\sum_{n=1}^{\infty} 0.2^n$  and Evaluate the Fourier coefficients of agiven periodic function (Square Wave).
3. Frobenius Method and Special Function:  $\int_{-1}^1 P_n(\mu) P_m(\mu) d\mu = \delta_{n,m}$ . Plot  $P_n(x)$ ,  $J_n(x)$  and show recursion relations.
4. Calculation of error for each data point of observations recorded in experiments done (choose any two).
5. Calculation of least square fitting manually without giving weightage to error. Confirmation of least square fitting of data through computer program
6. Evaluation of trigonometric functions e.g.  $\sin \theta$ . Given Bessel's function at N points find its value at an intermediate point. Complex analysis: Integrate  $\frac{1}{(x^2+2)}$  numerically and check with computer integration.
7. Compute the nth roots of unity for  $n = 2, 3$ , and 4.
8. Find the two square roots of  $-5+12j$ .
9. Solve Kirchoff's Current law for any node of an arbitrary circuit using Laplace's transform.
10. Solve Kirchoff's Voltage law for any loop of an arbitrary circuit using Laplace's transform
11. Perform circuit analysis of a general LCR circuit using Laplace's transform
12. Solve differential equations:
  - a.  $\frac{dy}{dx} = e^{-x}$  with  $y=0$  and  $x=0$
  - b.  $\frac{dy}{dx} + e^{-x} y = x^2$
  - c.  $\frac{d^2 y}{dt^2} + 2 \frac{dy}{dt} = -y$
  - d.  $\frac{d^2 y}{dt^2} + e^{-\frac{dy}{dt}} = -y$
13. The differential equation describing the motion of a pendulum is  $\frac{d^2 \theta}{dt^2} = -\sin^2 \theta$

Prof. Y. K. Vijay

Dr. Nishant Rana  
 Dr. Pradeep Saxena  
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 University, JAIPUR

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(Dr. P. K. Sharma)



The pendulum is released from rest at an angular displacement  $\alpha$ , i.e.  $\theta(0) = \alpha$  and  $\theta'(0) = 0$ . Solve the equation for  $\alpha = 0.1, 0.5$  and  $1.0$  and plot  $\theta$  as a function of time in the range  $0 \leq t \leq 8\pi$ .

#### Reference Books

1. Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd ed., 2006, Cambridge University Press
2. Complex Variables, A.S. Fokas & M.J. Ablowitz, 8th Ed., 2011, Cambridge Univ. Press
3. Computational Physics, D.Walker, 1st Edn., 2015, Scientific International Pvt. Ltd.
4. A Guide to MATLAB, B.R. Hunt, R.L. Lipsman, J.M. Rosenberg, 2014, 3<sup>rd</sup> Edn., Cambridge University Press
5. Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific and Engineering Applications: A.V. Wouwer, P. Saucez, C.V. Fernández. 2014 Springer
6. Scilab by example: M. Affouf 2012, ISBN: 978-1479203444
7. Scilab (A free software to Matlab): H.Ramchandran, A.S.Nair. 2011 S.Chand & Company
8. Scilab Image Processing: Lambert M. Surhone. 2010 Betascript Publishing
9. [www.scilab.in/textbook\\_companion/generate\\_book/291](http://www.scilab.in/textbook_companion/generate_book/291)

**Course Outcomes:** After completion this course, student shall be able to -

- CO1: Learn the basics fundamentals of C & C++ programming.
- CO2: Learn the basics and programming in Scilab software, their utility, advantages and disadvantages.
- CO3: Apply the Scilab software in curve fittings, in solving system of linear equations, generating and plotting special functions such as Legendre polynomial and Bessel functions
- CO4: Apply the Scilab software for solving first and second order ordinary and partial differential equations to understand the wave analysis of the system.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	L	H	H	M				
CO2	M	H	M	L		L			M
CO3	H	H	M	M	L			L	
CO4	L	M	H	L			M		

H = Highly Related; M = Medium L = Low

## CIRCUIT ANALYSIS AND BASIC ELECTRONICS

CODE: BPH073A

CREDIT: 4

### UNIT-I

**Electrical circuit elements:** voltage and current sources, R, C, L, M, I, V, linear, non linear, active and passive elements, inductor current and capacitor voltage continuity, Kirchhoff's laws, Elements in series and parallel, superposition in linear circuits, controlled sources, energy and power in elements, energy in mutual inductor and constraint on mutual inductance.

*Antyik Vijay*  
*Dr. Nishant Kumar*  
*Dr. Pranav Saxena*  
*Chandanshi*  
*(Dr. Chandan John)*  
*(Dr. Abhishek Sharma)*

## UNIT-II

**Network analysis:** Nodal analysis with independent and dependent sources, modified nodal analysis, mesh analysis, notion of network graphs, nodes, trees, twigs, links, co-tree, independent sets of branch currents and voltages.

## UNIT-III

**Network theorems:** Voltage Shift Theorem, Zero Current Theorem, Tellegen's Theorem, Reciprocity, Substitution Theorem, Thevenin's and Norton's theorems, pushing a voltage source through a node, splitting a current source, compensation theorem, maximum power transfer.

## UNIT-IV

**Semiconductors:** Intrinsic and extrinsic semiconductors, Energy Level Diagram. Conductivity and Mobility, carrier statistics, and thermal equilibrium carrier concentration.

**Excess carriers in semiconductors:** Excess carriers, lifetime, and carrier transport by drift and diffusion; Continuity equation and its solution under different injections; Solution of diffusion equation in uniformly doped base long and short base limits.

## UNIT-V

**Theory of PN junctions:** p and n Type Semiconductors.. pn Junction Fabrication (Simple Idea). Barrier Formation in pn Junction Diode. Current Flow Mechanism in Forward and Reverse Biased Diode (Recombination, Drift and Saturation of Drift Velocity). Derivation of Mathematical Equations for Barrier Potential, Barrier Width and Current for Step Junction. P-N junction and its characteristics. Static and Dynamic Resistance. Diode Equivalent Circuit. Ideal Diode. Load Line Analysis of Diodes. Load Line and Q-point

### Suggested Books

1. Basic and Applied Electronics-T.K Bandyopadhyay, Books and Allied Pvt Ltd (2002)
2. V.K.Mehta, "Principles of Electronics", S.Chand & Co
3. B.L.Theraja, "Basic solid state Electronics", S.Chand &Co
4. R. L. Boylestad, L. Nashelsky, Electronic Devices and Circuit Theory, Pearson Education (2006).
5. Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
6. Solid State Electronic Devices, B.G.Streetman & S.K.Banerjee, 6th Edn.,2009, PHI Learning.
7. Electronic Devices & circuits, S.Salivahanan & N.S.Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill

**Course Outcomes:** After completion this course, student shall be able to

- CO1: Apply Kirchhoff's rules to analyze the circuits consisting of parallel and/or series combinations of voltage sources and resistors and understand their graphical relationship.
- CO2: Acquire the knowledge of important terminology like nodes, trees, twigs, links, co-tree, independent sets of branches in a complex circuit.
- CO3: Demonstrate and learn various network theorems and their applications in electrical circuit and electronics.
- CO4: Learn and understand the basics of semiconductors and the role of diffused charged carriers in changing the properties.
- CO5: Demonstrate the current flow mechanism, nature of potential barrier and understand the characteristics of diode by calculating the dynamical variables.

*Prof. Y.K. Vijay*

*Dr. Nishant Bandyopadhyay*  
*Dr. Pramanand*

*Chandanjoshi*  
*(Dr. Chandanjoshi)*



# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	M		L	L				L
CO2	M	H	M						
CO3	L		H	M	L		L		M
CO4	H	M		L					
CO5	M		H	M			L		

H = Highly Related; M = Medium L = Low

## CIRCUIT ANALYSIS AND BASIC ELECTRONICS LAB

CODE: BPH074A

CREDIT: 1

Student has to perform / learn any ten experiments out of the followings:-

1. Verification of Kirchhoff's current law and voltage law using hard ware and digital simulation.
2. Verification of mesh analysis using hard ware and digital simulation.
3. Verification of nodal analysis using hard ware and digital simulation
4. Determination of average value, rms value, form factor, peak factor of sinusoidal wave, square wave using hard ware and digital simulation.
5. Verification of super position theorem using hard ware and digital simulation.
6. Verification of reciprocity theorem using hardware and digital simulation.
7. Verification of maximum power transfer theorem using hardware and digital simulation
8. Verification of Thevenin's theorem using hard ware and digital simulation
9. Verification of Norton's theorem using hard ware and digital simulation
10. Verification of compensation theorem using hard ware and digital simulation
11. Verification of self inductance and mutual inductance by using hard ware.
12. Verification of series resonance using hard ware and digital simulation
13. Verification of parallel resonance using hard ware and digital simulation.
14. Study the diode clipping circuits on breadboard, using discrete components for peak clipping and peak detection. i) Positive and Negative Clipping Circuit, ii) Diode series positive and negative Clipping Circuit.

**Course Outcomes:** After completion this course, student shall be able to

- CO1: Learn the role of Kirchhoff's Law in understanding the distribution of voltage and currents in electric circuits.
- CO2: Acquire the knowledge to distinguish the circuits on the basis of Node and Mesh analysis.
- CO3: Demonstrate the theorems to analyze the network circuits through physical and simulations.
- CO4: Test the properties of parallel and series circuits containing the discrete components.

*Prof. Y.K. Vijay*  
*Dr. Nishant Kumar*  
*Dr. Anand Kumar*  
*HEAD*  
*Chaudhary*  
*(Dr. Abhishek Kumar)*

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES**

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	M		M					
CO2		H	M	L					
CO3	H	M		H	M				M
CO4		M	H		L				M

H = Highly Related; M = Medium L = Low

*[Signature]*  
**Dr. P. K. Sharma**  
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**Dr. Vishant Kumar**

*[Signature]*  
**Chandan Joshi**  
 (Dr. Chandan Joshi)



**PROJECT / DISSERTATION**  
(At University/ Academic Institute/ Research Lab)

**Code: BPH026A**

**Credit: 12**

The objective behind introducing project/dissertation is to get familiar the students with the research methodology. Student shall be assigned to work upon a substantial topic related to any core or specialized courses or topic of current interest enlisted in the curriculum of the UG program. This course shall be mandatory and treated as project/dissertation, and it may consists of *review of some research papers, performing a laboratory experiment, fabrication, working out some problem related to Physics, participation in some ongoing research activity, analysis of data, simulations* etc. The work can be carried out in any thrust areas of Physics (Experimental or Theoretical Physics) under the guidance of faculty members of the department. The Guide will be allotted through the DRC of the department in the beginning of the IV semester.

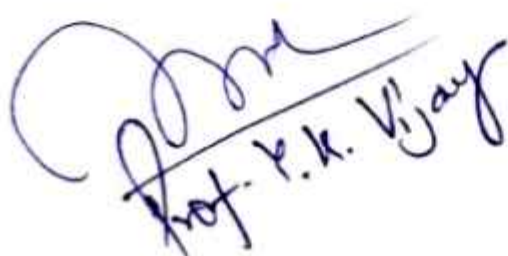
**Assessment:** The internal assessment will be carried out by the respective allotted guide(s) during the semester (at least 2Hrs per week). The external assessment of the project/dissertation work shall be assessed by the External Examiner / panel (nominated by the Chairperson of DRC)/ DRC through the power point presentation by the candidates. The candidates shall require to submit two hard bound copies along with soft copy of the project/dissertation in the department as per the date of submission. The candidates will be awarded marks after defending successfully his/her project/dissertation work. In case of corrections / improvements suggested by the Examiner / committee shall be incorporated by the candidates within 15 days and will have to resubmit his/her work.

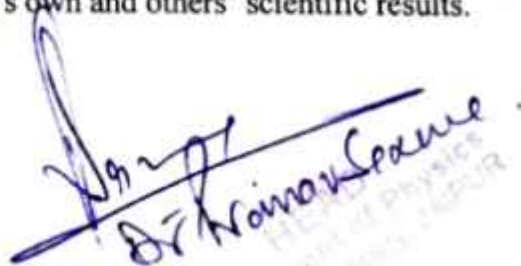
Project/Dissertation shall contain following structure:

1. Cover/Title Page
2. Certificate
3. Acknowledgement
4. Abstract (Executive Summary)
5. Table of contents, List of figures and tables
6. The core chapters-
  - i. Introduction
  - ii. Literature Review
  - iii. Methodology
  - iv. Results
  - v. Discussion
  - vi. Conclusion
7. Reference Lists
8. Appendix

**Course Outcomes:** After this course, student shall be able to-

- CO1: to apply the relevant knowledge and skills, which are acquired within the technical area, to a given problem.
- CO2: formulate the problem within given constraints, even with limited information, independently analyze and discuss and handle complex inquiries/problems within the technical area.
- CO3: Reflect on, evaluate, and critically assess one's own and others' scientific results.

  
Prof. P.K. Vijay

  
Dr. K. Ramesh

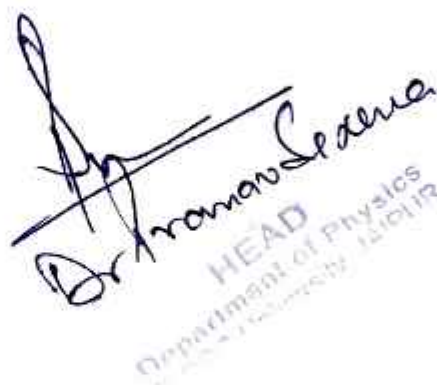
- CO4: Document and present one's own work in a form of technical report with strict requirements on structure, format, and language usage.
- CO5: Be able to identify one's need for further knowledge and continuously develop one's own competencies.

**Mapping course outcomes leading to the achievement of program outcomes and program specific outcomes:**

Course Outcome	Program Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	H	M	M	H					H
CO2	H	H	H	H					M
CO3	M	H		M		M	M	M	
CO4			L		H		H		
CO5						H		H	

H = Highly; M = Moderate; L = Low

  
Prof. Y. K. Vijay

  
Dr. Arunav Sengupta  
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Indian Institute of Technology Kharagpur



# STRUCTURE AND PROPERTIES OF MATERIALS

CODE: BPH083A

Credits: 4

## UNIT I

**Structure of Solids:** Overview of Crystal Structure, Solid Solutions-Hume Rothery Rules, Crystal Imperfections, Point Defects, Line Defects, Surface Defects, Bulk Defects, Critical nucleus size and Critical Free energy, Mechanism of Crystallisation, Homogeneous and Heterogenous Nucleation Growth, Single crystal, Polycrystalline Materials, Basic principles of solidification of metals and alloys.

## UNIT II

**Phase Diagrams:** Phase Rule, Binary Phase diagrams, Isomorphous systems, congruent phase diagrams, Free energy composition curves, Construction, Microstructural changes during cooling, Typical Phase diagrams, Cu-Zn System, Pb-Sn system, Ag-Pt system, Iron-iron carbide Equilibrium Diagram

## UNIT III

**Alloys:** Classification of steels and cast iron, Microstructure, Effect of alloying elements on steel, Ferrous alloys and their applications, Factors affecting conductivity of a metal, Electrical Resistivity in alloys, Thermal conductivity of metals and alloys, High Resistivity alloys,

## UNIT IV

**Ceramics:** Types, Crystal Structures, Silicate Ceramics, Glasses, Glass Ceramics, Functional properties and applications of ceramic materials ( $\text{SiC}$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{Si}_3\text{N}_4$ ), Super hard materials - Tungsten carbide and Boron nitrides - Graphene.

## UNIT V

**Polymers:** Classification of polymer, Mechanisms of polymerization, Copolymers, Defects in polymers, Thermoplastics, Thermosets (PP, PS, PVC, PMMA, PET, PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE), Overview: Liquid Crystal Polymers, Conductive polymers, High Performance fibres, Photonic polymers, Elastomers.

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Dr. Pooja Saxena  
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(Dr. Chandan Joshi)

Dr. Abhishek

1. V. Raghavan, "Materials Science and Engineering", Prentice -Hall of India Pvt. Ltd., 2007
2. Kingery, W. D., Bowen H. K. and Uhlmann, D. R., "Introduction to Ceramics", 2nd Edition, John Wiley & Sons, New York, 1976.
3. F. N. Billmeyer, "Text Book of polymer science", John Wiley & Sons, New York, 1994.
4. William F. Smith, "Structure and Properties of Engineering Alloys", Mc-Graw-Hill Inc., U.S.A, 2nd edition, 1993.
5. W. Bolton, "Engineering materials technology", 3rd Edition, Butterworth & Heinemann, 2001

**Course Outcomes:** At the end of the course, the students will

CO1: To have the knowledge of overview crystal structures and mechanism of crystallization

CO2: Able to understand and classify the phase diagrams.

CO3: Able to recognize basic nomenclature, basic microstructure, and associate terms with the appropriate structure / phenomena.

CO4: To have the knowledge on structure properties correlation in ceramics

CO5: Able to understand the various polymers and its application.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H		L	M					
CO2	M	H							
CO3	H	M	M	L	M				M
CO4	M	H	L						L
CO5	M	H	M		L				L

H = Highly Related; M = Medium L = Low

## STRUCTURE AND PROPERTIES OF MATERIALS LAB

CODE: BPH084A

Credit: 1

Student has to perform the following experiments:-

1. To determine the composition in vapour phase and plot graph between temperature and mole fraction to determine the relative volatility.
2. To study the phase change.
3. To determine and separate the constituents like Copper, Zinc, Tin, Lead, and Iron in brass.
4. To determine the melting point of the given substance and to find out the transition time.
5. To study the phase change of a substance from liquid to solid by plotting the cooling curve.
6. To observe the phases present in the microstructure of stainless steels

Prof Y.K. Vijay

Dr. Nishant Rawat  
Dr. Roman Seena

Chaudhary Ishi  
(Dr. Chaudhary Ishi)

(Dr. Abhishek Shrivastava)



# SOLID STATE PHYSICS

CODE: BPH017B

CREDIT:4

## UNIT-I

**Crystal Structure:** Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis – Central and Non-Central Elements. Unit Cell. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Types of Bonds. Ionic Bond, Covalent Bond, Van der Waals Bond. Diffraction of x-rays by Crystals. Bragg's Law, Atomic and Geometrical Factor.

## UNIT-II

**Elementary Lattice Dynamics:** Lattice Vibrations and Phonons: Linear Monatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Einstein and Debye Theories of Specific Heat of Solids.  $T^3$  Law.

## UNIT-III

**Dielectric Properties of Materials:** Dielectric Polarization. Local Electric Field at an Atom. Depolarization Field. Dielectric Constant. Electric Susceptibility. Polarizability. Classical Theory of Electric Polarizability. Clausius-Mosotti Equation. Normal and Anomalous Dispersion. Complex Dielectric Constant.

## UNIT-IV

**Band Theory of Solids:** Bloch Theorem. Kronig-Penney Model. Effective Mass of Electron, Concept of Holes, Band Gaps. Energy Band Diagram and Classification of Solids. Law of Mass Action. Insulators and Semiconductors (P type and N type). Direct and Indirect Band Gap. Conductivity in Semiconductors, mobility, Hall Effect, Measurement of conductivity (4-probe method) and Hall coefficient.

## UNIT-V

**Magnetic Materials:** Dia-, Para-, Ferri- and Ferromagnetic Materials, Classical Langevin Theory of dia- and Paramagnetic Domains, Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains, Discussion of B-H Curve, Hysteresis and Energy Loss

**Superconductivity:** Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation).

## Suggested Books

1. Charles Kittel: Introduction to Solid State Physics, 7th Edition, John Wiley and Sons, Inc.
2. Elements of Solid State Physics, J.P. Srivastava, 4th Edition, 2015, Prentice-Hall of India
3. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill
4. Solid State Physics, Rita John, 2014, McGraw Hill
5. A. J. Dekkar: Solid State Physics, Macmillan India Limited, 2000.
6. J. S. Blackmore: Solid State Physics, Cambridge University Press, Cambridge.
7. N. W. Ascroft and N. D. Mermin: Solid State Physics, (Harcourt Asia, Singapore 2003).

**Course outcomes:-** After completion this course, students shall be able to-

- CO1: Understand about crystalline and amorphous substances, about lattice structure, concept of Brillouin zones and diffraction of X-rays by crystalline materials.
- CO2: Understand the knowledge of lattice vibrations, phonons and in depth of knowledge of Einstein and Debye theory of specific heat of solids.
- CO3: Acquire the essence of dielectric properties of materials.
- CO4: Demonstrate the formation of bands in solids, and their classification into insulators, conductors and semiconductors, and Hall effects.

*Prof. Y. K. Vijay*

*Dr. Nishant Raut*  
*Dr. Pranshu Saxena*  
*HEAD*  
*Dept. of Physics*  
*Chaudan Joshi*

*Dr. Abhishek Sharma*



CO5: Understand the basics of superconductors. Type I and II superconductors, their properties and physical concept of BCS theory.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	L		M	L				
CO2	M								
CO3	M	L	M	H					M
CO4	H		M	M	L				M
CO5	L	M		M					L

H = Highly Related; M = Medium L = Low

## SOLID STATE PHYSICS LAB

CODE: BPH075A

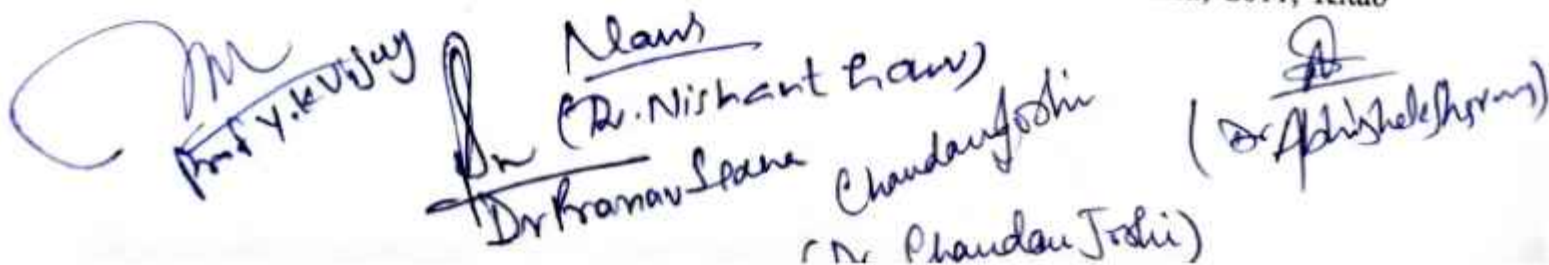
CREDIT: 1

Student has to perform / learn any eight experiments out of the followings:-

1. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to  $150^{\circ}\text{C}$ ) and to determine its band gap.
2. To determine the Hall coefficient of a semiconductor sample.
3. Determine the Bandgap of a semiconductor
4. To plot the characteristics of thermistor and hence find the temperature coefficient of resistance.
5. To study various crystal structures
6. To find the elastic constants of the Perspex beam using Cornus interference method. (i) Young's modulus(Y), (ii) Poisons ratio ( $\sigma$ ), (iii) Bulk modulus (b)
7. To study the phenomena of magnetic hysteresis and calculate the retentivity, coercivity and saturation magnetization of a material using a hysteresis loop tracer
8. To determine the volume magnetic susceptibility of Manganese sulphate solution at different concentrations by Quincke's method.
9. To measure the dipole moment of gaseous and liquid substances using dipolemeter.
10. Estimation of precise lattice parameters of cubic crystal
11. To gain the knowledge of various techniques for structural characterization of materials
12. \*To measure the Magnetic susceptibility of Solids.
13. \*To measure the Dielectric Constant of a dielectric Materials with frequency
14. \*Study the Bragg's Law.

### Suggested Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn., 2011, Kitab Mahal


  
 Dr. Y.K. Vijay, Dr. Nishant Rana, Dr. Prakash, Chandan Joshi, Dr. Prakash Joshi



**Course Outcomes:** After completion this course student shall be able to-

- CO1: Learn the techniques to determine the properties of semiconductors.  
 CO2: investigate the crystal structures and properties of solids  
 CO3: Acquire the knowledge to measure the magnetic susceptibility of magnetic materials and magnetic hysteresis.  
 CO4: Demonstrate the four probe methods to measure electrical conductivity and the hall set up to determine the hall coefficient of a semiconductor.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES**

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	L	L						L
CO2		H		M					L
CO3	H	M	L		M				
CO4		H		M	M				

H = Highly Related; M = Medium L = Low

## NUCLEAR AND PARTICLE PHYSICS

**CODE: BPH021B**

**CREDIT: 5 (4L+1T)**

### UNIT-I

**General Properties of Nuclei:** Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excited states.

**Radioactivity decay:** (a) Alpha decay: basics of  $\alpha$ -decay processes, theory of  $\alpha$ -emission, Gamow factor, Geiger Nuttall law,  $\alpha$ -decay spectroscopy. (b)  $\beta$ -decay: energy kinematics for  $\beta$ -decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion.

### UNIT-II

**Nuclear Models:** Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force.

### UNIT-III

**Nuclear Reactions and Interaction with matter:** Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation. Elementary Idea of (i) Gamma ray interaction through matter, (ii) photoelectric effect, (iii) Compton scattering, (iv) pair production, (v) neutron interaction with matter.

### UNIT-IV

*Prof. Y. K. Verma*  
*Dr. Nishant Kumar*  
*Dr. Praveen Kumar*  
*Chandana Joshi*  
*Dr. Chandana Joshi*  
*Dr. Ashish Kumar*

Department of Physics  
 University, JAIPUR



**Detector for Nuclear Radiations:** Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT) and neutron detector.

**Particle Accelerators:** Accelerator facility available in India: Van-de Graaff Generator (Tandem Accelerator), Linear accelerator, Cyclotron, Synchrotrons.

#### UNIT-V

**Particle physics:** Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm.

#### Suggested Books:

1. Introductory nuclear Physics by Kenneth S. Krane (Wiley India Pvt. Ltd., 2008).
2. Concepts of nuclear physics by Bernard L. Cohen. (Tata McGraw Hill, 1998).
3. Introduction to the physics of nuclei & particles, R.A. Dunlap. (Thomson Asia, 2004).
4. Introduction to High Energy Physics, D.H. Perkins, Cambridge Univ. Press
5. Introduction to Elementary Particles, D. Griffith, John Wiley & Sons
6. Quarks and Leptons, F. Halzen and A.D. Martin, Wiley India, New Delhi
7. Basic ideas and concepts in Nuclear Physics - An Introductory Approach by K. Heyde (IOP Institute of Physics Publishing, 2004).
8. Radiation detection and measurement, G.F. Knoll (John Wiley & Sons, 2000).
9. Physics and Engineering of Radiation Detection, Syed Naeem Ahmed (Academic Press, Elsevier, 2007).
10. Theoretical Nuclear Physics, J.M. Blatt & V.F. Weisskopf (Dover Pub. Inc., 1991)

**Course Outcomes:** After completion this course, student shall be able to-

- CO1: To describe and explain the properties of nuclei and derive the various theoretical formulation of nuclear disintegration.
- CO2: Understand semi empirical mass relation and about the nucleus structure through various models.
- CO3: Develop basic understanding of the interaction of various nuclear radiations with matter in low and high energy.
- CO4: Understand, construct and operate simple detector systems for nuclear radiations and training to work with various types of nuclear accelerators.
- CO5: Demonstrate basic knowledge of elementary particles as fundamental constituent of matter, their properties, and conservation laws during their interactions with matter.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	M		L	H					L
CO2	L								
CO3	H	L	L	M					M
CO4	M	H	M						
CO5	H		M	M					M

H = Highly Related; M = Medium L = Low

*Dr. Y.K. Vijay*

*Dr. Nishant Ramesh*

*Chaudhary Jishi (Dr. Chaudhary Jishi)*

**BSc (Hons) Physics - (III/IV Sem)**  
**Research Methodology**

Code: BPH130A

Credits: 3+1

**Unit I**

**Research objectives, Research process and tools:** Types of research, Development of a research question; Science, pseudoscience and rationalism; Physical science and metaphysics; Literature survey, Identification of knowledge gaps and a research problem; Concept of novelty, Formulation and implementation of a research plan; Serendipity, creativity, discovery and innovation. Design of experiments, testing and characterization; Measurement - Standardization, calibration and sampling; Primary and secondary data.

**Unit II**

**Computer applications and tools:** Computer programming, theory, modeling and simulation; Data acquisition, processing, observation, critical analysis and interpretation; Presentation of data; Reliability and reproducibility; Software for documentation, graphs, graphics, drawing and presentation. Web literature search; International standards, reference data and constants; Library system: Physical cataloguing of books and journals; Online catalogue search; Subscribed books and journals

**Unit III**

**Communicating research results and Research ethics:** Journal paper – types of available publishing services; Research proposal, Report, Thesis; Presentation in Seminar and conference; Journal abbreviations, Bibliography standards; Indices of quality assessment of publications. Ethics code of American Psychological Association; Collaboration, cooperation and teamwork; Research outcome; Intellectual property right, Copy-right, patent, fundamentals of patent filing; Usage of pirated version of literatures and software; Plagiarism – Case Studies, Web based verification.

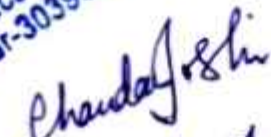
**Unit IV**

**Uncertainties in Measurements, Error Analysis:** Uncertainties in Measurements: Measuring Errors, accuracy and Precision, systematic errors, Random errors, Significant figures and Round off, Uncertainties, Parent and Sample Distributions, Mean, median and mode, Standard Deviation of Distributions. Error Analysis: Instrumental and Statistical Uncertainties, Propagation of Errors, Specific Error Formulas with examples, Application of Error Equations. Numerical Errors.

**Unit V**

**Analytical, Numerical techniques and Statistical, Graphical packages:** Mean deviation, Root mean square deviation, Histogram, Skewness, Kurtosis, Moments, Variance, Chi-square, Correlation, Factor analysis, Mean square weighted deviation, Regression, Time series analysis. Statistical and graphical packages: MS Excel, MATLAB, Microcal Origin / Sigma plot, gnu plot, xmgr – Key Features; Developing algorithms and applications, Tex.

  
**HEAD**  
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University, Jaipur-303905

  
Chaudhary



(Dr. Abhishek Chandra)



### Books Recommended:

1. Research Methods the Basics by Nicholas Walliaman, Taylor and Francis London & New York 2011.
2. Research Methodology- Methods and Techniques 2nd edition. By C R Kothari, New Age Int. Publ. 2004.
3. Data Reduction and Error Analysis for the Physical Sciences 3rd Ed by Philip R Bevington & D Keith Robinson, McGraw – Hill (2003)
4. Numerical Methods by Balagurusamy, Tata McGraw – Hill (2000)
5. Numerical Analysis, 2nd Ed. by Francis Scheid, McGraw-Hill (2009)

**Course Outcomes:** After completion this course, student shall be able to-

- CO1: learn how to plan research objectives and to communicate research findings.  
CO2: learn how to use computer applications and tools in research procedure, necessary statistical tools.  
CO3: learn research utilities, good laboratory practices, and ethical aspects of research.  
CO4: analyze uncertainties in measurements, probability distributions and error analysis.  
CO5: design the report base on interpretation of the data and examine data by statistical approach.

**Mapping of Course Outcomes Leading to the achievement of Program Outcomes (POs) and Program Educational Objectives (PEOs)**

Course Outcomes	Program Outcomes (POs)									Program Education Objectives (PEOs)				
	I	II	III	IV	V	VI	VII	VIII	IX	I	II	III	IV	V
CO1	M			H					M	M		H		M
CO2		H			M		M				H	M		
CO3				M		H		L		M				H
CO4	L		H						M			M	H	
CO5		H			L		L		L		M			M

H = Highly Related; M = Medium L = Low

  
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(Dr. Abhishek Sharma)

## BSc (Hons) Physics - (III/IV Sem)

### Research Methodology - Seminar

Code: BPH131A

Credit: 1

#### Method of Evaluation:

During the seminar session each student is expected to prepare and present the importance, utility and salient features as outcomes of Research Methodology learned in theory. The presentation and discussion must be at least of 20 minutes. Each student is expected to present at least twice during the semester and the student is evaluated based on that. At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report.

**Course Outcomes:** After this course student shall be able-

- CO1:** To use various teaching aids such as projectors, power point presentation and demonstrative models
- CO2:** To review, prepare and present scientific article or a review articles or a publishable research articles
- CO3:** To demonstrate his knowledge learned various important key-factors like, error analysis, analytical, numerical techniques and graphical packages (software's).
- CO4:** Develop their analyzing skill, learn the skill to work in team, helps them to face the placement interviews.
- CO5:** Prepare themselves for their appropriate role in contributing towards the welfare of Society and hence in national development.

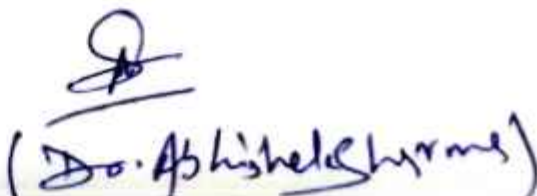
**Mapping of Course Outcomes leading to the achievement of Program Outcomes (POs) and Program Educational Objectives (PEOs)**

Course Outcomes	Program Outcomes (POs)									Program Education Objectives (PEOs)				
	I	II	III	IV	V	VI	VII	VIII	IX	I	II	III	IV	V
CO1		H			H						M			
CO2	H		M	H		L	H		M	H				M
CO3	M	H	M						L		M	H		
CO4	L	M		M		H	M		L		H	M		
CO5		H			H					M				H

H = Highly Related; M = Medium L = Low

  
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Chandan

  
(Dr. Abhishek Sharma)



18. To design a digital to analog converter (DAC) of given specifications
19. To study the analog to digital converter (ADC) IC

**Suggested Books:**

1. Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994, Mc-Graw Hill.
2. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall.
3. Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.
4. Electronic Devices & circuit Theory, R.L. Boylestad & L.D. Nashelsky, 2009, Pearson

**Course Outcomes:** After completion this course, student shall be able to-

- CO1: Learn basic concepts of semiconductor diodes and their applications to rectifiers.  
 CO2: Learn about junction transistor and their applications.  
 CO3: Learn about different types of amplifiers including operational amplifier (Op-Amp) and their applications.  
 CO4: Learn about sinusoidal oscillators of various types and A/D conversion

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H		L	H	M				M
CO2	H	M	M	H	M		L		M
CO3	H	M	L	M	L		L		L
CO4	H	M	M	L					L

H=High; M=Medium; L=Low

**HEAD**  
 Department of Physics  
 F.C.R.C. University, JAIPUR

**MECHANICS OF MATERIALS**

**Code: BPH089A**

**Credits:4**

**UNIT I**

**Stresses and Strains:** Introduction, Properties of materials, Stress, Strain and Hooke's law, Stress strain diagram for brittle and ductile materials, True stress and strain, Calculation of stresses in straight, Stepped and tapered sections, Composite sections, Stresses due to temperature change, Shear stress and strain, Lateral strain and Poisson's ratio, Elastic constants and relations between them.

**UNIT II**

**Analysis of Stress and Strain:** Introduction to three-dimensional state of stress, Stresses on inclined planes, Principal stresses and maximum shear stress, Principal angles, Shear stresses on principal planes, Maximum shear stress, Mohr circle for plane stress conditions.

**Cylinders:** Thin cylinder: Hoop's stress, maximum shear stress, circumferential and longitudinal strains, Thick cylinders: Lames equations.

**UNIT III**

**Shear Force and Bending Moment:** Type of beams, Loads and reactions, Relationship between loads, shear forces and bending moments, Shear force and bending moments of cantilever beams, Pin support and roller supported beams subjected to concentrated loads, uniformly distributed constant / varying loads.

**Stress in Beams:** Bending and shear stress distribution in rectangular, I and T section beams.

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 Dr. Nishant Kumar  
 Dr. Nishant Kumar  
 Dr. Nishant Kumar  
 Dr. Nishant Kumar



#### UNIT IV

**Theories of Failure:** Maximum Principal stress theory, Maximum shear stress theory.  
**Torsion:** Circular solid and hollow shafts, Torsional moment of resistance, Power transmission of straight and stepped shafts, Twist in shaft sections, Thin tubular sections, Thin walled sections.

#### UNIT V

**Columns:** Buckling and stability, Critical load, Columns with pinned ends, Columns with other support conditions, Effective length of columns, Secant formula for columns.  
**Strain Energy:** Strain energy due to axial, shear, bending, torsion and impact load, Castigliano's theorem I and II and their applications.

#### Suggested Books:

1. Mechanics of Materials; J M Gere, B J Goodno, Cengage Eighth edition 2013
2. Fundamentals of Strength of Materials; P N Chandramouli PHI Learning Pvt. Ltd 2013
3. Strength of Materials; R K Rajput S. Chand and Company Pvt. Ltd 2014
4. Strength of Materials; S C Pilli and N Balasubramanya, Cengage 2019
5. Mechanics of Materials; Ferdinand Beer, Russell Johnston, John Dewolf, David Mazurek McGraw Hill Education (India) Pvt. Ltd Latest edition
6. Mechanics of Materials; R C Hibbeler Pearson Latest edition

**Course Outcomes:** At the end of the course, the student will be able to:

- CO1: Understand simple, compound, thermal stresses and strains their relations and strain energy.  
CO2: Analyse structural members for stresses, strains and deformations.  
CO3: Learn the structural members subjected to bending and shear loads.  
CO4: Analyse shafts subjected to twisting loads.  
CO5: Analyse the short columns for stability.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H		L	M					
CO2	H		L	M					
CO3	H		M	L					
CO4	H		M	L					
CO5	H		L	L					

H = Highly Related; M = Medium L = Low

Department of Physics  
IECRC University, JAIPUR

### MECHANICS OF MATERIALS LAB

CODE: BPH090A

Credit: 1

Requisites: Finite Element Analysis Software, MATLAB Software, Computers with necessary accessories

Student has to perform any twelve experiments out of the followings:

1. IZOD impact Test – To find the impact resistance of mild steel and cast iron.
2. CHARPY Impact Test - To find the impact resistance of mild steel and cast iron
3. Shear Force and Bending Moment diagrams for simply supported beams with point load

Prof. Y.K. Vijay

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N. Nishant Kumar

Dr. Abhishek

4. Shear Force and Bending Moment diagrams for simply supported beams with uniformly distributed load
5. Shear Force and Bending Moment diagrams for Cantilever supported beams with point load
6. Shear Force and Bending Moment diagrams for Cantilever supported beams with uniformly distributed load
7. Mohr's Circle
8. To find the angle of twist and to obtain some of the mechanical properties of the given material by conducting torsion test.
9. To develop an understanding of stress-strain curves of materials, and learn how to use them to determine various mechanical properties of ductile and brittle materials
10. To determine the compressive strength of given sample.
11. To determine the Column stability using boundary conditions.
12. Force and Stress analysis using link elements in Trusses, cables etc.
13. Stress and deflection analysis in beams with different support conditions.
14. Stress analysis of flat plates and simple shells.
15. Stress analysis of axi-symmetric components.
16. Thermal stress and heat transfer analysis of plates.
17. Thermal stress analysis of cylindrical shells.
18. Vibration analysis of spring-mass systems.
19. Model analysis of Beams.

**Suggested Books:**

1. The Mathworks, Inc, "The student Edition of Matlab", student Edition, The MATLAB curriculum series, 1997
2. Rudra Pratap, "Getting started with MATLAB", 1st Edition, Oxford University Press, 2010

**Course Outcomes:** After completion this course, student shall be able to-

- CO1: Make use of software and analytical tools for various applications in the field of manufacturing the materials.
- CO2: Acquire the knowledge in the area of testing of materials and components of structural elements experimentally
- CO3: Learn the techniques and simulation modeling to understand the mechanics of materials under the forces applied.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES**

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	M	H			H				
CO2	H	M		L					M
CO3	M	H		M	H			L	M

H = Highly Related; M = Medium L = Low

*Prof. Y.K. Vijay*

*Dr. Nishant Lax*

*Dr. Abhishek Sharma*

*Dr. Hemant Sene*  
Department of Physics  
JECRC University, JAIPUR

*Chandan Joshi*  
(Dr. Chandan Joshi)



# QUANTUM MECHANICS

CODE: BPH014B

CREDIT: 4

## UNIT-I

**Time dependent Schrodinger equation:** Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Interpretation of Wave Function Probability and probability current densities in three dimensions; Conditions for Physical Acceptability of Wave Functions. Normalization. Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. Position, momentum and Energy operators; commutator of position and momentum operators; Expectation values of position and momentum. Wave Function of a Free Particle.

## UNIT-II

**Time independent Schrodinger equation:** Hamiltonian, stationary states and energy eigen values; expansion of an arbitrary wave function as a linear combination of energy eigen functions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states; Application to spread of Gaussian wave-packet for a free particle in one dimension; wave packets, Position-momentum uncertainty principle.

## UNIT-III

**Bound States in an Arbitrary Potential:** continuity of wavefunction, boundary condition and emergence of discrete energy levels; application to one-dimensional problem-square well potential; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions using Frobenius method; Hermite polynomials; ground state, zero point energy & uncertainty principle.

## UNIT-IV

**Quantum theory of hydrogen-like atoms:** time independent Schrodinger equation in spherical polar coordinates; separation of variables for second order partial differential equation; angular momentum operator & quantum numbers; Radial wave functions from Frobenius method; shapes of the probability densities for ground & first excited states; Orbital angular momentum quantum numbers  $l$  and  $m$ ; s, p, d, ... shells.

## UNIT-V

**Atoms in Electric & Magnetic Fields:** Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton.

**Atoms in External Magnetic Fields:-** Qualitative Discussion: Normal and Anomalous Zeeman Effect, Paschen Back and Stark Effect.

### Suggested Books:

1. A Text book of Quantum Mechanics, P.M. Mathews and K.Venkatesan, 2nd Ed., 2010, McGraw Hill
2. Quantum Mechanics, Robert Eisberg and Robert Resnick, 2nd Edn., 2002, Wiley.
3. Quantum Mechanics, Leonard I. Schiff, 3rd Edn. 2010, Tata McGraw Hill.
4. Quantum Mechanics, G. Aruldas, 2nd Edn. 2002, PHI Learning of India.
5. Quantum Mechanics, Bruce Cameron Reed, 2008, Jones and Bartlett Learning.
6. Quantum Mechanics: Foundations & Applications, Arno Bohm, 3rd Edn., 1993, Springer
7. Quantum Mechanics for Scientists & Engineers, D.A.B. Miller, 2008, Cambridge University Press



**Course Outcomes:** After completion this course, student shall be able to-

- CO1: Explain the microscopic phenomena, quantum theory formulation through Schrodinger equation, and understand the Operator Mechanism in Quantum Mechanics
- CO2: Interpret the wave function of quantum particle and probabilistic nature of its location, construction of Gaussian wave packet.
- CO3: Demonstrate the quantum behavior of a particle under various potential conditions, phenomena of quantum harmonic oscillator in terms of Hermite polynomials.
- CO4: Learn the techniques of separation of variables, and concept of theory of angular Momentum and its application to Hydrogen-like Atom for its spectrum analysis.
- CO5: Interpret the influence of electric and magnetic fields on atoms in understanding Stark effect and Zeeman Effect respectively.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	L	M						M
CO2	H	M	M	H					
CO3		H		M					L
CO4	H	M	M	M					L
CO5	M		L						

H = Highly Related; M = Medium L = Low

### QUANTUM MECHANICS LAB

**CODE: BPH076A**

**CREDIT: 1**

Student has to perform ten programs/simulations out of the followings:

1. To write programme to evaluate scalar potential due to electric charge.
2. To compute and plot electric potential due to two point charges.
3. To plot electric field vector due to electric charge(s).
4. To write programme to evaluate Schrödinger's equation of motion.
5. To write a program to calculate the energy eigen values for harmonic oscillator (first 3 energies)
6. To write programme to evaluate Heisenberg's equation of motion.
7. To write a program to calculate probability of quantum mechanical tunneling.

*Use C/C++/Scilab for solving the following problems based on Quantum Mechanics like-*

8. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom:

$$\frac{d^2 y}{dx^2} = A(r)u(r), \text{ where } A(r) = \frac{2m}{\hbar^2} [V(r) - E] \text{ and } V(r) = \frac{-e^2}{r}$$

Here, m is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wavefunctions. Remember that the ground state energy of the hydrogen atom is  $\approx -13.6$  eV. Take  $e = 3.795$  (eVÅ)<sup>1/2</sup>,  $\hbar c = 1973$  (eVÅ) and  $m = 0.511 \times 10^6$  eV/c<sup>2</sup>.

9. Solve the s-wave radial Schrodinger equation for an atom:

*Handwritten signatures and names:*  
 Dr. Nishant B. Raw  
 Dr. Pranav Saxena  
 Chaudhary  
 Dr. Abhishek Sharma

$$\frac{d^2 y}{dx^2} = A(r)u(r), \text{ where } A(r) = \frac{2m}{\hbar^2} [V(r) - E] \text{ and } V(r) = \frac{-e^2}{r} e^{-r/a}$$

where  $m$  is the reduced mass of the system (which can be chosen to be the mass of an electron). Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wavefunction. Take  $e = 3.795 \text{ (eV}\cdot\text{\AA)}^{1/2}$ ,  $m = 0.511 \times 10^6 \text{ eV}/c^2$ , and  $a = 3 \text{ \AA}, 5 \text{ \AA}, 7 \text{ \AA}$ . In these units  $\hbar c = 1973 \text{ (eV}\cdot\text{\AA)}$ . The ground state energy is expected to be above  $-12 \text{ eV}$  in all three cases.

10. Solve the s-wave radial Schrodinger equation for a particle of mass  $m$ :

$$\frac{d^2 y}{dx^2} = A(r)u(r), \text{ where } A(r) = \frac{2m}{\hbar^2} [V(r) - E]$$

$$\text{For the anharmonic oscillator potential } V(r) = \frac{1}{2}kr^2 + \frac{1}{3}br^3$$

for the ground state energy (in MeV) of particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose  $m = 940 \text{ MeV}/c^2$ ,  $k = 100 \text{ MeV fm}^{-2}$ ,  $b = 0, 10, 30 \text{ MeV fm}^{-3}$ . In these units,  $\hbar c = 197.3 \text{ MeV fm}$ . The ground state energy  $I$  expected to lie between 90 and 110 MeV for all three cases.

11. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen molecule:

Where  $\mu$  is the reduced mass of the two-atom system for the Morse potential

$V(r) = D(e^{-2\alpha r'} - e^{-\alpha r'})$ ,  $r' = \frac{r - r_0}{r_0}$ . Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function.

Take:  $m = 940 \times 10^6 \text{ eV}/c^2$ ,  $D = 0.755501 \text{ eV}$ ,  $\alpha = 1.44$ ,  $r_0 = 0.131349 \text{ \AA}$

### Suggested Books

1. An introduction to computational Physics, T.Pang, 2nd Edn., 2006, Cambridge Univ. Press
2. Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific &
3. Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernández. 2014 Springer.
4. Scilab (A Free Software to Matlab): H. Ramchandran, A.S. Nair. 2011 S. Chand & Co.
5. A Guide to MATLAB, B.R. Hunt, R.L. Lipsman, J.M. Rosenberg, 2014, 3rd Edn., Cambridge University Press
6. Scilab Image Processing: L.M. Surhone. 2010 Betascript Publishing ISBN: 978-6133459274

**Course Outcomes:** After completion this course, student shall be

- CO1: Acquire the skill of doing computational programming using software and languages.  
 CO2: Demonstrate the nature of potential and fields due to a isolated charge by simulations.  
 CO3: Understand the fundamentals of quantum mechanics through simulations and able to demonstrate the techniques for estimating the ground state energy, wave functions and simple harmonic oscillator using Schrodinger equations.  
 CO4: Breakdown the quantum mechanical problems of one dimensional and three dimensional potentials, and Hydrogen like atoms.

Prof. Y.K. Vijay

Dr. Nishant Rana  
 Dr. Ramesh Chandra Joshi  
 HEAD  
 Department of Physics  
 JAI PUR

Dr. Abhishek Sharma



# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1		H	M	M	H				M
CO2	L	H	L						
CO3		H	M	M	H				L
CO4		M	H	M	L				L

H = Highly Related; M = Medium L = Low

*[Signature]*  
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Department of Physics  
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*[Signature]*  
Dr. Nishant Kumar

*[Signature]*  
(Dr. Abhinav Singh)

*[Signature]*  
Prof. Y.K. Vijay

Chandau Joshi  
CDr. Chandan Joshi

# ADVANCED MATERIALS

Credits: 4

CODE: BPH093A

## Unit I

**Photonic Materials:** Need for New Photonic Materials, composite materials for nonlinear optics, nanostructured waveguides for nonlinear optics quantum and nonlinear optics for advanced imaging applications.

**Spintronic Materials:** Modelling the growth of Mn on semiconductor substrates, Dilute magnetic semiconductor nanocrystals, Advances in wide bandgap materials for semiconductor spintronics

## Unit II

**Plasmonics:** Metallic Nanoparticles and Nanorods, Metallic Nanoshells. Local Field Enhancement, Subwavelength Aperture Plasmonics, Plasmonic Wave Guiding. Applications of Metallic Nanostructures. Radiative Decay Engineering

## Unit III

**Smart Materials and Systems:** Thermoresponsive materials, piezoelectric materials, electrostrictive and magnetostrictive materials, Magnetic materials, superparamagnetism in metallic nanoparticles, Giant and colossal magnetic materials, ferrofluids, ER and MR fluids, biomimetic materials, smart gel, shape memory alloys and polymers.

## Unit IV

**Advanced Materials:** Bimetallic Catalysts, Graphite Intercalation Compounds as catalysts, Carbides, Nitrides, and Borides for Catalysis, Complex Catalysts on Inorganic Supports. Zeolite Structures as Drug Delivery Systems and Biomedical applications.

## Unit V

**Nanomaterials:** Amorphous, Crystalline, microcrystalline, quasicrystalline and nanocrystalline materials- historical development of nanomaterials, Nanomaterials classification (Gleiter's Classification) properly changes done to size effects, Hall - petch, inverse Hall- petch effects, polymeric nanostructures

**Zero and 1 Dimensional Nanomaterials:** Nanoparticles - Properties - Processing - Liquid state processing - Sol-gel process, wet chemical synthesis - Vapour state processing - PVD, CVD, Aerosol processing, solid state processing, Application of nanoparticles. Carbon nanotubes: Structure of CNT and classification - Processing - Solid carbon based production techniques.

## Suggested Books

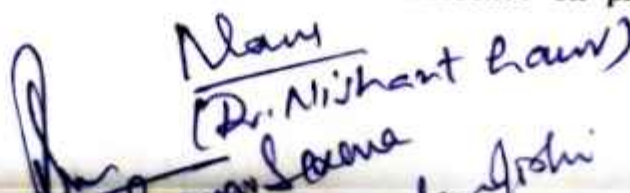
1. Solid State Physics, A. J. Dekkar, Prentice Hall Inc.
2. Elementary Solid State Physics: Principles and applications, M. A. Omar, Addison-Wesley.
3. Advanced Materials in Catalysis, Frank Bolz, Academic Press, 1977
4. Advanced Healthcare Materials Tiwari, A. (ed) (2014), John Wiley & Sons, Inc., Hoboken, NJ, USA.
5. Charles P. Poole Jr., Frank J. Ownes, 'Introduction to Nanotechnology', Wiley Interscience, 2003.
6. G Timp (ed), "Nanotechnology", AIP press/Springer, 1999.
7. Mark Ratner and Daniel Ratner, "Nano Technology", Pearson Education, New Delhi, 2003.
8. G. Wilde, "Nanostructured Materials", Elsevier, 2008.

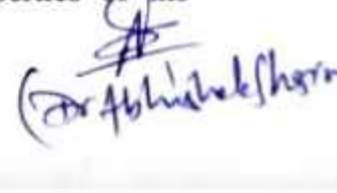
**Course Outcomes:** After completion this course, student shall be able to-

CO1: Understand the crystal structure and characterization of various nanomaterials

CO2: Evaluate the characteristic crystal structure and their influence on properties of the materials.

  
V.K. Vijay

  
Dr. Nishant Kumar

  
Dr. Abhishek Sharma



CO3: Demonstrate their knowledge in advanced material science which helps in applications of various materials in industry and to society.

CO4: Able to understand and describe the development of nanomaterials and its classification

CO5: Able to understand the synthesis routes of zero and one dimensional nanomaterials.

# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	M	H	L	H				L	
CO2	H	L		M	M			M	
CO3	L	M	M	M	L	L	H	H	M
CO4	H	M	L	M		M	M	H	H
CO5	H	M	L	M	M	L	M	H	H

H = Highly Related; M = Medium L = Low

HEAD

Department of Physics

## ADVANCED MATERIALS - SEMINAR

CODE: BPH094A

Credit: 1

### Method of Evaluation:

During the seminar session each student is expected to prepare and present a topic on advance materials or latest ongoing research on smart materials, for duration of about 15 minutes. Each student is expected to present at least twice during the semester and the student is evaluated based on that. At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report.

**Course Outcomes:** After this course student shall be able-

CO1: To use various teaching aids such as projectors, power point presentation and demonstrative models

CO2: To review, prepare and present scientific article or a review articles or a publishable research articles

CO3: Develop their analyzing skill, learn the skill to work in team, helps them to face the placement interviews.

CO4: Prepare themselves for their appropriate role in contributing towards the welfare of Society and hence in national development.

# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1		H			H				
CO2	H		M	H					
CO3	L	M		M		L	H		M
CO4			L			H	M		L
								H	

H = Highly Related; M = Medium L = Low

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## Renewable and Electrochemical Energy Storage Materials

Code: BPH132A

Credit: 4

### UNIT-I

**Solar Energy and Solar Cells:** Solar Spectrum, Solar constant, Passive conversion –Materials for Renewable energy conversion, Photovoltaics- Silicon (Si) solar cells, Crystalline/ Semicrystalline/ Amorphous Si solar cells, Thin film solar cells.

### UNIT-II

**Photoelectrochemical and Organic cells:** Semiconductor electrochemistry - Photo electrolysis, photochemical cells, photo catalysis, Mechanism- electron transfer: Factors affecting electron transfer. Organic solar cells- bilayer, Bulk heterojunction, polymer solar cells, perovskite based solar cells, hybrid solar cells. Efficiency; limiting factors

### UNIT-III

**Batteries:** Primary and Secondary cells, Chemistry and materials used in Leclanche/Dry/Alkaline cell, Silver cell, Mercury cell, Lead-acid battery; Ni-Cd battery, Ni Metal Hydride (Ni-MH) battery, Ni-Hydrogen battery, Lithium-ion/Lithium-polymer/ Li-S battery, Metal-air batteries and its applications; Charge-Discharge characteristics, Energy/power density, overcharging, Mechanics of battery cells and materials, Manufacturing of batteries. Battery safety and Abuse tolerance, Coupling with other energy storage devices

### UNIT-IV

**Super/Ultracapacitors:** Fundamentals of Electrochemical Supercapacitors, Electrode and electrolyte interfaces and their capacitances, Charge-Discharge characteristics, Energy/power density, Design, Fabrication, operation and evaluation, Thermal management; Supercapacitor stack manufacturing and construction, Coupling with batteries and fuel cells; Applications

### UNIT-V

**Fuel cells:** Overview of key fuel cell technologies- various types of fuel cells, materials for electrodes, catalyst, electrolytes and other components, working mechanisms, hydrogen generation and storage; limitations, recent progress in fuel cells.

### Suggested Books:

1. B.K. Hodge, Alternate Energy Systems and Applications, John Wiley & sons, Inc., 2010.
2. Alan J. Heeger, Niyazi Serdar Sariciftci and Ebinazar B. Namdas, Semiconducting and Metallic Polymers, Oxford Univ Press 2010.
3. W. Streicher and M. Kaltschmitt (Ed.) Renewable energy. Technology, economics and environment, Springer, 2007.
4. A.J. Bard, L.R. Faulkner, Electrochemical Methods, Fundamentals and Application. Wiley, 2001.
5. C. Daniel and Jurgen O. Besenhard, Handbook of Battery Materials, Wiley-VCH Verlag, 2011
6. K.E. Aifantis, S.A. Hackney, and R. V. Kumar (Ed.) High Energy Density Lithium Batteries Materials Engineering, Applications, WILEY-VCH Verlag GmbH & Co. KGaA 2010

**Dr. HEAD**  
Department of Physics  
JGU University, Jaipur-302002

Chaudhary  
Dr. Chaudhary Ishi (Dr. Ashish Sharma)



7. A.Yu, V. Chabot, and J. Zhang, Electrochemical Supercapacitors for Energy Storage and Delivery Fundamentals And Applications, Taylor & Francis Group, 2013
8. X. Moya David and Muñoz-Rojas(Ed.), Materials for Sustainable Energy Applications Conversion, Storage, Transmission, and Consumption, 2016, Pan Stanford Publishing Pvt. Ltd.

**Course Outcome:** On completion of the course, the students shall be

- CO1:** Equipped with the awareness, understanding the importance of switching to renewable energy sources for future energy needs.
- CO2:** Able to demonstrate the knowledge of materials for renewable energy conversion and technologies
- CO3:** To discuss the performance characteristics and manufacturing techniques of batteries
- CO4:** To understand the electrochemical supercapacitors, design, fabrication, operation and analysis of electrochemical energy storage systems
- CO5:** Acquire the knowledge of various fuel technologies to develop materials for energy storage systems


**Mapping of Course Outcomes (COs) leading to the achievement of Program Outcomes (POs) and Program Educational Objectives (PEOs)**

Course Outcomes	Program Outcomes (POs)									Program Education Objectives (PEOs)				
	I	II	III	IV	V	VI	VII	VIII	IX	I	II	III	IV	V
CO1			H	M		L	M			M		M	H	
CO2		H		M					M		H		M	
CO3	M		H		L			M				H	M	
CO4	H	M		M							M		H	
CO5		M	H							M			H	M

H = Highly Related; M = Medium L = Low

  
**HEAD**  
 Department of Physics  
 JECRC University, Jaipur-303905

  
 Dr. Chandan Joshi

  
 (Dr. Ashish Sharma)

## Renewable and Electrochemical Energy Storage Materials – SEMINAR

Code: BPH133A

Credit: 1

### Method of Evaluation:

During the semester, each student is expected to prepare and present a seminar on topics from Renewable and Electrochemical Storage materials, for duration of about 20 minutes. Each student is expected to present the progress at least twice during the semester (insem exam) and the student is evaluated based on that on account of internal assessment. At the end of the semester, he/she has to present extensive seminar cumulatively and submit a comprehensive report on assigned topics and assessment will be done accordingly.


**Course Outcomes:** After this course student shall be able-

- CO1: understand the environmental impacts of current energy utilization and the importance of switching to the renewable and electrochemical energy sources for a sustainable future.
- CO2: to demonstrate the knowledge of available materials and technologies for tapping renewable and electrochemical energy resources.
- CO3: to explore the processes of production and applications of electrochemical energy storage systems.


**Mapping of Course Outcomes leading to the achievement of Program Outcomes (POs) and Program Educational Objectives (PEOs)**

Course Outcomes	Program Outcomes (POs)									Program Education Objectives (PEOs)				
	I	II	III	IV	V	VI	VII	VIII	IX	I	II	III	IV	V
CO1			H	M				M	L	H	M			L
CO2	H	M		M							M	H		
CO3						M	L	H					H	M

H = Highly Related; M = Medium L = Low

  
**HEAD**  
Department of Physics  
JECRC University, Jaipur-302005

  
Dr. Chaudan Joshi

  
(Dr. Mishra Shyam)

## Science of Materials – SEMINAR

Code: BPH134A

Credit: 1

### Method of Evaluation:

During the semester, each student is expected to prepare and present a seminar on topics from the courses they are taught including mechanical and electrical properties of materials important to their use in various engineering and research fields for duration of about 20 minutes. Each student is expected to present the progress at least twice during the semester (insem exam) and the student is evaluated based on that on account of internal assessment. At the end of the semester, he/she has to present extensive seminar cumulatively and submit a comprehensive report on assigned topics and assessment will be done accordingly.

**Course Outcomes:** After this course student shall be able-

**CO1:** to recognize the important aspects of the materials used in modern research and engineering applications.


**CO2:** to explain the underlying principle of materials science: "structure leads to properties.

**CO3:** to identify the role of thermally activated processes in many of these important things.

**Mapping of Course Outcomes (COs) leading to the achievement of Program Outcomes (POs) and Program Educational Objectives (PEOs)**

Course Outcomes	Program Outcomes (POs)									Program Education Objectives (PEOs)				
	I	II	III	IV	V	VI	VII	VIII	IX	I	II	III	IV	V
CO1			M	H					M		H		M	
CO2	H			M	L						M			
CO3		M	L				L		L			M	L	

H = Highly Related; M = Medium; L = Low

  
**HEAD**  
Department of Physics  
JECRC University, Jaipur-303905

  
Dr. Chandan Joshi

  
(Dr. Abhishek Sharma)



# COMPOSITE MATERIALS

CODE: BPH103A

Credits: 4

## UNIT I



**Introduction to Nanocomposites** Definition of composite material, Classification based on matrix and topology, Constituents of composites, Interfaces and Interphases, Distribution of constituents, Nano-composites. Advantage of composite materials, mechanical properties, Thermal, electrical and electronic and optical properties. Super hard nanocomposites-designing and mechanical properties - stress-strain relationship, toughness, strength, and plasticity.

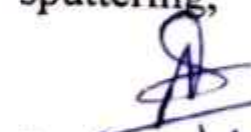
## UNIT II

**Ceramic Nanocomposites** Ceramic based nanoporous composites, metal matrix nanocomposites, natural nano-biocomposites, bio-mimetic nanocomposites and biologically inspired nanocomposites, nanocomposites for hard coatings, DLC coatings, thin film nanocomposites, modelling of nanocomposites, synthesis of various nanocomposites materials, sputtering, mechanical alloying.

## UNIT III

  
Prof. Y.K. Vijay

  
Nash  
(Dr. Nishant Lax)  
  
Dr. Chandrajoshi  
(Dr. Chandrajoshi)

  
Dr. Abhishek

**Polymer Nanocomposites** Introduction to polymer composites, Processing of nanoparticles, binding mechanisms in nanoparticles, dispersion of nanoparticles, and stabilization of nanoparticles. Processing and fabrication of polymer nanocomposites, Melt blending, solvent casting, In-situ polymerization, solution polymerization, template synthesis, high shear mixing. Homogeneous/heterogeneous nucleation, plasma promoted nucleation.

#### UNIT IV

**Natural Nanocomposites:** Spider silk, bones, shells; organic-inorganic nanocomposite formation through self-assembly. Biomimetic synthesis of nanocomposite material; use of synthetic nanocomposites for bone teeth replacement. Bioactive nanocomposites in bone grafting and tissue engineering, inorganic/polymer nanocomposites for dental restoration and bone replacement applications.

#### UNIT V

**Bio ceramics** for implant coating Calcium phosphates-hydroxyapatites Ti6Al4V and other biomedical alloys, implant tissue interfacing-metal organic CVD-use of tricalcium phosphate-biomimetic and solution based processing- osteoporosis- osteo plastic, regeneration of bones by using bio compatible ceramics, bio interactive hydro gels- PEG coating and surface modifications, PEG hydrogels patterned on surfaces- PEG based hydrogels.

#### Suggested Books:

1. Strong, A.B., "Fundamentals of Composite Manufacturing", SME, 1989
2. Sharma, S.C., "Composite materials", Narosa Publications, 2000.
3. Chawla K. K., "Composite materials", Second Edition, Springer – Verlag, 1998
4. P.M. Ajayan, L.S. Schadler and P.V. Braun, "Nanocomposite Science and Technology" WileyVCH GmbH Co. 2003.
5. Ed A.D. Pomogailo and V.N.Kestelman, "Metalopolymer Nanocomposites", Springer-Verlag, 2005. 4.
6. Kenneth E.Gonsalves, Craig R. Halberstadt, Cato T. Laurencin, Lakshmi S. Nair, "Biomedical nanostructures" John-Wiley & Sons, 2008.
7. Steven S Saliterman, Fundamentals of Bio-MEMS and Medical Microdevices, 2006

**Course Outcomes:** After completion this course, students shall be able to-

CO1: Learn the basic concept and classification of composite materials with their properties.

CO2: Acquire the knowledge in various ceramics metal composites and its processing methods.

CO3: Learn the knowledge in polymer based composites and its processing methods.

CO4: Demonstrate the knowledge of Natural and Bio composite materials and its importance to society.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	M			L					
CO2	H	M							
CO3	H	L		M					
CO4	M			M				M	L

H = Highly Related; M = Medium L = Low

*Prof. Y.K. Vijay*

*Dr. Prakash Sene*  
*Dr. Nishant Kumar*  
*Chandru Joshi*  
*(Dr. Chandru Joshi)*

*(Dr. Anshu)*



## COMPOSITE MATERIALS LAB

CODE: BPH104A

Credit:1

Student has to perform the following experiments through demonstrations-

1. Preparation of Continuous Fiber reinforced Polymer Composites
2. Preparation of Dis-Continuous Fiber reinforced Polymer Composites
3. Study of Tensile strength and young's modulus of FRP composites
4. Study of Flexural strength of FRP composites
5. Study of Hardness of FRP composites
6. Study of drop weight impact testing
7. Preparation of Al-SiC composites by stir casting method
8. Study of microstructure, hardness and density of Al-SiC composite
9. Study of Tensile strength of Al-SiC composites
10. Environmental Testing (Humidity and temperature)

**Course Outcomes:** After completion this course, student shall be able to-

CO1: Learn the fabrication processes of different composite materials and the mechanical characterization of these materials.

CO2: Acquire the knowledge of preparing the composite materials.

CO3: Demonstrate the structural properties of composite materials.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H		M	M					
CO2	M	H	L	M					L
CO3	M	H	L						L

H = Highly Related; M = Medium L = Low

## GALAXIES AND UNIVERSE

CODE: BPH105A

Credits: 4

### UNIT I

**The Milky Way:** Basic Structure and Properties of the Milky Way, Nature of Rotation of the Milky Way (Differential Rotation of the Galaxy and Oort Constant, Rotation Curve of the Galaxy and the Dark Matter, Nature of the Spiral Arms), Stars and Star Clusters of the Milky Way, Properties of and around the Galactic Nucleus.

### UNIT II

**Classification of Galaxies:** Galaxy Morphology, Hubble's Classification of Galaxies, Elliptical Galaxies (The Intrinsic Shapes of Elliptical, de Vaucouleurs Law, Stars and Gas). Spiral and Lenticular Galaxies (Bulges, Disks, Galactic Halo) The Milky Way Galaxy, Gas and Dust in the Galaxy, Spiral Arms, Active Galaxies.

### UNIT III

**Principles of Relativity:** Overview of Special Relativity-Space time interval and Lorentz metric four vectors, Introduction to general relativity (GR) - equivalence principle - notions of curvature - gravitation as a manifestation of the curvature of space time. Curved surfaces. Schwarzschild solution; Gravitational red shift, the bending of light and gravitational lensing.

Prof. V. K. V. V.

Dr. Nirhant Kumar

Dr. Sandeep Kumar

Dr. Abhishek Kumar

# COMPUTATIONAL MATERIAL SCIENCE

CODE: BPH111A

Credits: 4

## UNIT I

**Introduction** A Brief History of the Finite Element Method - Basic Steps in the Finite Element Method- Theory vs Computer Applications of FEA. Matrices - basic matrix problems, Simultaneous linear algebraic equations - Basic problems. Nodes-Elements-Types of Elements- Element Characteristics

## UNIT II

**One Dimensional Problem:** Discretization - Local and global Numbering- Approximate functions- Coordinate systems-Shape Functions - Two node Linear: bar and link element. Trusses & Beams- Finite element formulation - Solid Mechanics problems on Bar, Shaft, Stepped Shaft, Tapper shaft and Trusses - Heat Transfer Problems on Fin and Composite Wall.

## UNIT III

**Dimensional Problems:** Introduction- Plane Stress - Plane Strain - Triangular Elements - Coordinate System - Shape; Function -Finite Element Formulation - Rectangular Elements -Coordinate System - Shape; Function -Finite Element Formulation- Axisymmetric Elements- Coordinate System - Shape; Function -Finite Element Formulation. Elements used by any finite element analysis (FEA)

## UNIT IV

**Dynamic Analysis:** Introduction - Basic Equations in Vibration -Types of Vibration- Mass matrices - Undamped free vibration -Finite Element Formulation (2node 1D element)

## UNIT V

**Selected Applications in Materials Science:** Materials modeling and simulation across the length scale and applications: Modeling property prediction through first principle calculations. Monte Carlo Method for simulating nucleation and growth of grains in materials.

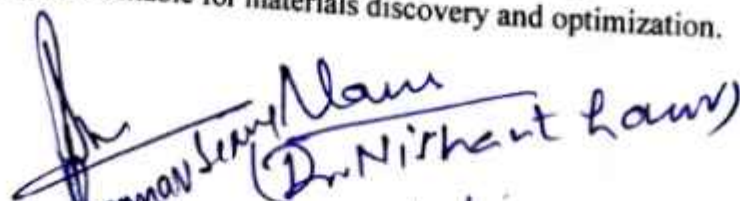
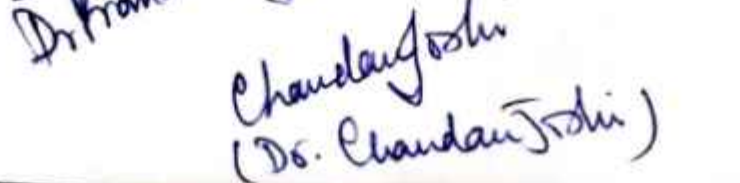
### Suggested Books:

1. Erdogan Madenci and Ibrahim Guven, The Finite Element Method And Applications In Engineering Using ANSYSR, The University of Arizona 2006, Springer Science Business Media, LLC
2. Robert D.Cook, Finite Element Modeling for Stress Analysis, John Wiley & Sons, Inc. 1995.
3. Saeed Moaveni, "Finite Element Analysis Theory and Application with ANSYS", Prentice Hall, Upper Saddle River, New Jersey, 2008
4. Bathe K.-J. and Wilson E. L. Numerical Methods in Finite Element Analysis. - Prentice-Hall, Inc., 1976.
5. Dierk Raabe, Computational Materials Science-The Simulation of Materials Microstructures and Properties, WILEY-VCH Verlag GmbH. 1998.
6. Rao S. S. The Finite Element Method in Engineering. - Pergamon Press, 1989.

**Course Outcomes:** After completion this, student shall be able to

- CO1: Gain an understanding of the theory behind computations and various tools relevant to the design of future materials
- CO2: Use of Mathematical equation to predict the properties of materials
- CO3: Use the software for better understanding of dynamical analysis of materials
- CO4: Become aware of the various tools available for materials discovery and optimization.

  
Prof. Y.K. Vijay

  
Dr. Nishant Kumar  
  
Chandan Joshi  
(Dr. Chandan Joshi)

  
Abhishek Sharma



# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	M	L						
CO2	L	H		M	L				L
CO3	M	H	L	M	M				M
CO4	L	H	M		H				M

H = Highly Related; M = Medium L = Low

## COMPUTATIONAL MATERIALS SCIENCE LAB

CODE: BPH112A

Credit: 1

### A. SIMULATION

1. MATLAB basics, Dealing with matrices, Graphing-Functions of one variable and two Variables
2. Use of Matlab to solve simple problems in vibration
3. Mechanism Simulation using software

### B. ANALYSIS

1. Force and Stress analysis using link elements in Trusses, cables etc.
2. Stress and deflection analysis in beams with different support conditions.
3. Stress analysis of flat plates and simple shells.
4. Stress analysis of axi – symmetric components.
5. Thermal stress and heat transfer analysis of plates.
6. Thermal stress analysis of cylindrical shells.
7. Vibration analysis of spring-mass systems.
8. Model analysis of Beams.
9. Harmonic, transient and spectrum analysis of simple systems

**Course Outcomes:** After completion this course, student shall be able to

CO1: Learn the software tools needed to analyze the dimensional problems of materials

CO2: have the exposure to different applications of simulation and analysis tools.

CO3: Make use of software for simulation and analysis for various applications

# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	M	H	M	L					
CO2	H	M	L	M	M				M
CO3	L	H	M		M				L

H = Highly Related; M = Medium L = Low

*Prof. Y.R. Vijay*

*Dr. Nishant Chauhan*  
*Dr. Chandra Joshi*  
*(Dr. Chandra Joshi)*

*(Dr. Abhishek Sharma)*

8. Write a program using 8085 to arrange the number in ascending and descending order to check numbers 1's and 0's in a given number
9. Write a program using 8085 to find GCD of two numbers
10. Write a program using 8085 to find LCM of two numbers
11. Write a program using 8085 to add N two digit BCD numbers
12. Write a program to interface Keyboard with 8085.
13. Write a program to interface Temperature measurement module with 8085.
14. Interfacing of 8051 microcontroller with various display devices
15. Interfacing of 8051 microcontroller with Analog-to-Digital and Digital-to-Analog converter.
16. Interfacing of 8051 microcontroller with DC motor.
17. Write a program for Traffic light Control using 8051.
18. Write a program for Elevator control using 8051.

#### Suggested Books:

1. Embedded Systems: Architecture, Programming & Design, R.Kamal, 2008, Tata McGraw Hill
2. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G.Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
3. Embedded Microcomputer System: Real Time Interfacing, J.W.Valvano, 2000, Brooks/Cole
4. Embedded System, B.K. Rao, 2011, PHI Learning Pvt. Ltd

**Course Outcomes:** After completion this course, student shall be able to-

CO1: Acquire the knowledge of microprocessor based system performance.

CO2: Demonstrate the operation of microcontrollers and their role in I/O port programming.

CO3: Learn the arithmetic operations, ADC, DAC and microcontroller based system.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	L							
CO2	L	H	M	L	H				
CO3	M		L		H				

H=High; M=Medium; L=Low

## MATERIAL CHARACTERIZATION TECHNIQUES

CODE: BPH118A

Credits: 4

### UNIT I

**X-Ray based characterization** Principles and applications of X-ray diffraction, powder (polycrystalline) and single crystalline XRD techniques; DebyeScherrer equation to treat line broadening and strain induced in nanoparticles and ultra-thin films. Rotating anode and synchrotron based X-ray diffraction for probing structure. X-ray photoelectron spectroscopy - basic principle, Introductory idea of X-ray absorption techniques: XANES, EXAFS.

### UNIT II

*Prof. Y.K. Vijay*

*Dr. Nishant Chandra*  
*Chandani Joshi*  
*(Dr. Chandan Joshi)*

*Dr. Abhishek Sharma*



UNIT III

## UNIT IV

## UNIT V

**Suggested Books:**

- Course Outcomes:** At the end of the course, students will be able to:  
CO1: Demonstrate the principle, synthesis, and reactions of organic compounds.

CO2: Acquire the knowledge of principle, construction and working of scanning and transmission electron microscopy

CO4: Understand the temperature dependence behavior of magnetic substances.  
CO5: Understand the electrical properties of materials.

CO5: Understand the electrical properties of materials.

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	M	H	M	M					
CO2	H	L	M	L	L				
CO3	H	M	L	M	L				
CO4	M	L		L					
CO5	H	L	L	L					

H = Highly Related; M = Medium L = Low

H = Highly Related; M = Medium L = Low

M  
Prof H.K. Vijay  
Dr. Prakash Singh  
Name  
(Dr. Nishant Kumar)  
Chaudhary John

(Dr. Phishek Sharma)

## MATERIAL CHARACTERIZATION LAB

CODE: BPH119A

Credit: 1

Student has to perform the following experiments-


1. Production and measurement of X- Rays: (i) Study the effect of Voltage and current on spectra (ii) Study the effect of filters
2. Phase identification by XRD: Study about the about phase identification of different samples through XRD analysis
3. Indexing Powder Method: (i) To determine the lattice parameters of powder specimen, (ii) Determine precisely lattice parameters of these samples by using extrapolation curve fittings
4. Indexing of Diffraction Patterns (Ring Pattern & Spot Pattern)
5. Basics of Scanning Electron Microscopy: Secondary Electron and BSE imaging mode
6. Feature Size measurement: Porosity, Grain, and Reinforcement
7. Effect of Beam voltage on conducting and insulating samples
8. Basic operations of Transmission Electron Microscope (Imaging and Diffraction Pattern)
9. Electron Diffraction for various materials
10. Sample Preparation for TEM analysis (Bulk metal, Powder sample, Brittle material)
11. Cross-sectional Sample Preparation
12. To study the operating principle of Atomic Force Microscopy (AFM) and its usefulness.
13. Surface topography of materials (Metallic and ceramic) using AFM to estimate the level of roughness.
14. To study and obtain the high resolution images of CNT coated with Sn- based materials using AFM.
15. Magnetic Material characterization via Hysteresis


### Suggested Books:

1. Characterization of Nanostructure materials by XZ.L.Wang, Instrumental Methods of Analysis, 7th edition- Willard, Merritt, Dean, Settle
2. Scanning Probe Microscopy: Analytical Methods (NanoScience and Technology)-Roland Wiesendanger
3. X-Ray Diffraction Procedures: For Polycrystalline and Amorphous Materials, 2nd Edition Harold P. Klug, Leroy E. Alexander
4. Transmission Electron Microscopy: A Textbook for Materials Science (4-Vol Set)- David B. Williams and C. Barry Carter
5. Physical Principles of Electron Microscopy: An Introduction to TEM, SEM, and AEM - Ray F. Egerton.

**Course Outcomes:** After this course student shall be able-

- CO1: Understand the physics behind the various metallographic techniques.  
CO2: Describe the principle, construction and working of XRD techniques and analysis the X-ray diffraction data  
CO3: Describe the principle, construction and working of various electron microscopies.

  
Prof. Y.K. Vijay

  
Nishant  
(Dr. Nishant Kumar)  
Pranav Saurav  
Chaudhary

  
Dr. Abhishek Sharma



# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	L		L	M				
CO2	L	H	M	M	H		L		M
CO3	L	H	L	M	H	H			L

H = Highly Related; M = Medium L = Low

## PLANETARY AND ATMOSPHERIC SCIENCE

CODE: BPH120A

Credits: 4

### UNIT-I

Overview of Solar system: Dynamics: Two-body problem, Three-Body Problem (Lagrangian points) - Resonances - Tidal forces - Solar energy balance and transport: Radiative Equilibrium

### UNIT-II

**Planetary Atmospheres:** Structure, Composition, Atmospheric Escape - Planetary surfaces: Surface morphology - Impact cratering; Minor Bodies: Meteorites, Asteroids, Comets, Minor planets, Trans-Neptunian Objects, Centaurs - Planetary rings

### UNIT-III

**Planet Formation:** Evolution of protoplanetary disks, Growth of solid bodies, Formation of Terrestrial and Giant planets, Extrasolar Planets: Detection techniques, Estimating planetary masses, sizes, orbital parameters Habitable zones: factors influencing habitable zone, continuously habitable zone, Missions to study Planets and Overview of Extrasolar planet

### UNIT-IV

**Atmosphere:** The Neutral atmosphere, atmospheric nomenclature, geopotential height, expansion and contraction, fundamental forces in the atmosphere, apparent forces, atmospheric composition, solar radiation interaction with the neutral atmosphere, climate change, atmospheric aerosols.

### UNIT-V

**Atmospheric Waves and Detection:** Surface water waves, wave dispersion, acoustic waves, buoyancy waves, propagation of atmospheric gravity waves (AGWs) in a nonhomogeneous medium, Qualitative idea of Lamb waves, Rossby waves; Various type of atmospheric radars, Application of radars to study atmospheric phenomena, Lidar and its applications, Application of Lidar to study atmospheric phenomenon.

### Suggested Books:

1. Planetary Sciences by Imke de Pater and Jack J. Lissauer, 2015
2. Exoplanetary Atmospheres: Theoretical Concepts and Foundations by Kevin Heng, 2017
3. Introduction to Astrochemistry: Chemical Evolution from Interstellar Clouds to Star and Planet Formation by Satoshi Yamamoto, 2017
4. Fundamental Planetary Science: Jack Lissauer & Imke de Pater (Latest Edition) - Cambridge University Press
5. Physics of the Upper Atmosphere edited by J. A. Ratcliffe, Cavendish Laboratory, University of Cambridge. Academic Press New York and London (1960).
6. Source book on the Space Sciences - Samuel Glasstone, Princeton, New Jersey.
7. Introduction to Ionospheric Physics - Henry Rishbeth and Owen K. Garriot.
8. Climatology, An atmospheric Science - John E. Oliver and John J. Hindore.



# FUNDAMENTALS OF POLYMER SCIENCE

CODE: BPH126A

Credits: 4

## Unit-I

**Basic concepts** - Molecular forces - chemical bonding - Molecular weight studies - molecular weight distribution-configuration-conformation-Tacticity-Transitions in polymers-viscoelasticity-types of macromolecules-classification of polymers.

## Unit-II

**Structure and Mechanical properties:** Crystalline nature of polymers, factors affecting crystallization, crystallization and melting, melting: factors affecting. The glassy state and glass transition. Tensile, flexural, compressive, abrasion, endurance, fatigue, hardness, tear, resilience, impact, toughness.

## Unit-III

**Mechanism of Polymers:** General characteristics of chain growth polymerisation, initiators, generation of initiators, free radical, anionic and cationic polymerization, ring opening polymerization, General characteristics of step growth polymerization, mechanism of step growth polymerization, coordination polymerization.

**Polymerization techniques:** Homogeneous polymerization techniques- Bulk, Solution, Heterogeneous polymerization techniques- Emulsion, Suspension, solid phase polymerisation.

## Unit-IV

**Polymer solutions:** Thermodynamics of polymer solutions, Solution properties of polymers, Solubility parameter, Conformation of polymer chains in polymer solutions, Flory-Huggins theory, Flory-Krigbaum theory, Solution viscosity, Osmotic pressure, Molecular size and molecular weight.

**Polymer Degradation :** Types of degradation: Thermal, mechanical, ultrasonic and photodegradation, oxidative and hydrolytic degradation, Biodegradable polymers.


## Unit-V

**Industrial Polymers:** Production, properties and applications of industrial polymers; PP, PE, PVC, PS, polyamide, polyacrylates, polyester (PET, PBT). General purpose rubbers: NR, SBR, NPR, EPDM etc.

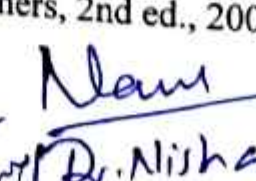
**Electrically and Photoactive Polymers:** Conjugated polymers, intrinsically conductive polymers, Polymers with piezoelectric, pyroelectric and ferroelectric properties, Polymers in insulators, telecommunications and FET. Photo conducting polymers, polymers used in optical applications, photo resists and semiconductor fabrication, Light emission in polymers, Semi conducting materials as light emitting materials.

## Suggested Books:

1. F. W. Billmeyer, Textbook of polymer science, 3rd ed., John Wiley & Sons, Asia, New Delhi, 1994.
2. G. Odian, Principles of Polymerization, 4th ed., Wiley-Interscience, 2004
3. R. J Young and P. A. Lovell, Introduction to Polymers, 2nd ed., 2004

  
Prof. Y. K. Vijay

  
Dr. Pranav

  
Dr. Nishant  
Chandak

  
Dr. Ashish



4. P. Gosh, Polymer Science and Technology, Mc-Graw Hill, 2002.
5. Robert William Dyson, Speciality Polymers, 2nded., Blackie Academic & Professional, 1998
6. Manas Chanda, Salil K. Roy, Industrial Polymers, Specialty Polymers, and their Applications, CRC Press, 2008
7. Johannes Karl Fink, Hand book of Engineering and Specialty Polymers, John Wiley & Sons, Vol.2, 2011.

**Course Outcomes:** After completion this course, student shall be

- CO1: Able to understand the importance of the polymers as an important class of materials  
 CO2: Able to acquire the basic knowledge, structure-property relationship and mechanical properties of polymers.  
 CO3: Able to learn the mechanism and techniques for synthesis of polymers with specified properties.  
 CO4: Able to understand the basics of polymers solutions and possible ways of degradation.  
 CO5: Aware of the potential of polymers in electric, electronic, optical and structural applications.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1	H	L		L					
CO2	H	M	L	M					L
CO3	M	H		M	L				
CO4	M	L	M	M				H	
CO5	H	M	L	M	L			M	L

H = Highly Related; M = Medium L = Low

### FUNDAMENTALS OF POLYMER SCIENCE - SEMINAR

CODE: BPH127A

Credit: 1


#### Method of Evaluation:

During the semester, seminar session of each student is expected to prepare and present a topic on advance materials or latest ongoing research on smart materials, for duration of about 15 minutes. Each student is expected to present at least twice during the semester and the student is evaluated based on that on account of internal assessment. At the end of the semester, he / she has to produce a comprehensive report on his / her topic of seminar and assessment will be done.

**Course Outcomes:** After this course student shall be able-

- CO1: To use various learning aids such as computer, e-resources, tools for presentation and demonstrative models.  
 CO2: To develop the critical analyzing skill to review, prepare and present scientific review articles or a publishable article.  
 CO3: To develop a professional approach and ability to work in team or individual to compile the project/seminar with meaningful outcomes.

  
 Prof. Y.K. Vijay

  
 Dr. Nishant Chandra  
 Chandra Goshi

  
 Dr. Anishet Sharma

# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes	Program Outcomes (POs)								
	I	II	III	IV	V	VI	VII	VIII	IX
CO1		H		M	M				
CO2	H	M	H	L			L		M
CO3			L			H			L

H = Highly Related; M = Medium L = Low

## ASTRONOMICAL TECHNIQUES

CODE: BPH128A

Credits: 4

### UNIT-I

**Telescope:** Types of telescopes, telescope mounting systems, optical telescopes, Infrared, Ultraviolet, X-ray and Gamma-ray telescopes. Schmidt telescopes. Solar telescopes. Idea of designing and construction of a simple optical telescope. Sky charts and their importance.

### UNIT-II

**Detectors:** Classification of detectors, characteristics of detectors. Detectors for optical and infrared wavelength regions, working principle of Charge Coupled Device (CCD). Application of CCD for stellar imaging, photometry and spectroscopy.

### UNIT-III

**Photometry:** Astronomical photometry- simple design of an astronomical photometer, Observing technique with a photometer, Correction for atmospheric extinction.

**Spectroscopy:** Astronomical spectroscopy- Spectral classification. Simple design of astronomical spectrograph. Radial velocity measurements.

### UNIT-IV

**Radio Astronomical Techniques:** Electromagnetic spectrum, Radio window, Antenna parameters. Various types of antennas, Qualitative-Non-steerable, partially steerable and fully steerable radio telescopes. construction of a simple radio telescope. Receiver systems and their calibration. Overview - Radio Interferometer, MST Radar for Ionospheric studies.

### UNIT-V

**Optical Techniques:** Ray optical theory of image formation-Paraxial approximation and Doppler shifts; Diffraction theory of image formation- Airy pattern, two point resolution, Rayleigh criterion, Marechal criterion.

**Stellar Interferometry:** Michelson Stellar Interferometer, Fizeau-Stephen Interferometer

### Suggested Books

7. C.R.Kitchin: Astrophysical Techniques (4th edition).
8. Ian S. McLean: Electronic Imaging in Astronomy: Detectors and instrumentation (2nd edition).
9. Steve B. Howell: Handbook of CCD Astronomy (2nd edition).
10. A. E. Roy and D. Clarke: Astronomy Principles and Practice (Part-3, 4th edition).
11. W. A. Hiltner (Ed): Astronomical Techniques.
12. Gordon Walker: Astronomical Observations - an Optical Perspective (Cambridge Univ Press).

**Course Outcomes:** After completing this course, student shall be able to  
CO1: Acquire the detailed knowledge of telescopes and their functionality.

*Dr. Anand...*  
*Prof. Y.K. Vijay*

*Man*  
*(Dr. Nishant Chauhan)*  
*Phandayshi*

*(Dr. Anish)*



## Materials Synthesis and Characterization – SEMINAR

Code: BPH135A

Credit: 1

### Method of Evaluation:

During the semester, each student is expected to prepare and present a seminar on topics from the various synthesization processes and characterization techniques in detail for the duration of about 20 minutes. Each student is expected to present the progress at least twice during the semester (insem exam) and the student is evaluated based on that account of internal assessment. At the end of the semester, he/she has to present extensive seminar cumulatively and submit a comprehensive report on assigned topics and assessment will be done accordingly.

**Course Outcomes:** After this course student shall be able-


- CO1: To demonstrate the fundamental principles of the synthesis and characterization techniques presented in the course.
- CO2: To understand the requirements for various samples and acquire the sufficient knowledge to operate the instruments used for synthesis and characterization.
- CO3: To learn the ethics for becoming researcher to produce unbiased analysis.


**Mapping of Course Outcomes (COs) leading to the achievement of Program Outcomes (POs) and Program Educational Objectives (PEOs)**

Course Outcomes	Program Outcomes (POs)									Program Education Objectives (PEOs)				
	I	II	III	IV	V	VI	VII	VIII	IX	I	II	III	IV	V
CO1	H			M	L				M	H	M			
CO2		H	M	M				L				H	M	
CO3					M	M	H		L			H		M

H = Highly Related; M = Medium L = Low

  
**HEAD**  
Department of Physics  
JECRC University, Jaipur-303905

  
Dr. Chandan Joshi

  
(Dr. Ashish Kumar)



**JECRC<sup>TM</sup>**  
**UNIVERSITY**  
BUILD YOUR WORLD

## School of Pure and Applied Sciences

### Course Structure and Syllabi

### M. Sc. (Physics)

### Academic Programmes: 2018-2020

Total Credits for Batch 2018-20: 112

1. Minimum Credits required: 101
2. Total relaxation: 11 Credits
3. No relaxation in Core and Fundamental subjects
4. Option of relaxation can be availed in Specialized, Interdisciplinary and General subjects

Credit Scheme (Category wise)						
Course(s)	Foundation	Core	Specialized	Interdisciplinary	General	Total Credits
Credits	28	28	56	-	-	112

Credit Scheme (Semester wise)					
Semester	First	Second	Third	Fourth	Total Credits
Credits	28	28	28	28	112

*(Prof. Deepak Bhatnagar)*  
*(Dr. Manish Gupta)*  
*(Dr. Manish Gupta)*

*(Atalok Pandya)*  
*(Dr. Chandan Joshi)*  
*(Dr. Chandan Joshi)*

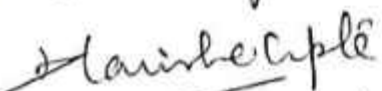
*(Dr. Manish Kumar)*




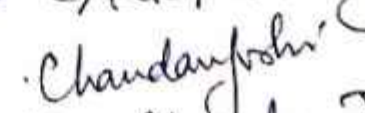
## Course Structure: M. Sc. Physics


SEMESTER – I				Category
Code	Title of Course	Contact Hours	Credits	
MPH1001B	Classical Mechanics	3L-1T	4	F
MPH1002B	Quantum Mechanics-I	3L-1T	4	F
MPH1003B	Classical Electrodynamics-I	3L-1T	4	F
MPH1004B	Mathematical Physics	3L-1T	4	F
MPH1005B	Classic Experiments in Physics (Ten Great Experiments)	18 Hours	12	F
Total Credits			28	
SEMESTER – II				
MPH1006B	Statistical Mechanics	3L-1T	4	C
MPH1007B	Quantum Mechanics-II	3L-1T	4	C
MPH1008B	Electrodynamics-II	3L-1T	4	C
MPH1009B	Computational Physics	3L-1T	4	S
MPH1010B	Advanced Physics Lab	18 Hours	12	S
Total Credits			28	
SEMESTER – III				
MPH011B	Nuclear Physics	3L-1T	4	C
MPH012B	Quantum Mechanics-III (Relativistic Quantum Mechanics)	3L-1T	4	C
MPH013B	Advanced Solid State Physics	3L-1T	4	C
MPH014B	Solar Energy: Alternative Sources of Energy	3L-1T	4	S
MPH015B	Nuclear Physics Lab	18 Hours	12	S
Total Credits			28	
SEMESTER – IV				
MPH016B	Quantum Field Theory	3L-1T	4	S
MPH017B	Instrumentation Techniques			
	Elective-1	3L-1T	4	S
	Elective-2	3L-1T	4	S
MPH031B	Project Work at any University/ Academic Inst./ Research Lab		12	S
MPH032B	Seminar (Presentation of Project Work)		4	C
Total Credits			28	
Total Credits of All Four Semesters			112	
A student has to opt one of the two papers viz., MPH0160A or MPH0170A.				
Student has to opt a pair of elective papers from one of the groups in the prescribed list.				

  
 (Prof. Deepak Bhatnagar)

  
 (Dr. Manish Gupta)

  
 (Alok Pandya)

  
 (Dr. Chandan Joshi)

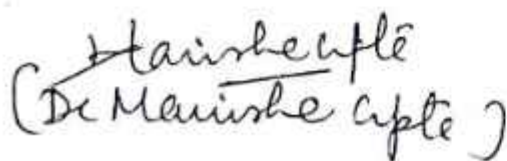
  
 (Dr. Manish Kumar)

Students have to opt for any one of the following four Elective Groups

Elective Group	Course Code	Course/Paper
Elective Group-1	MPH018B	General Theory of Relativity and Cosmology
	MPH019B	Astrophysics
Elective Group-2	MPH020B	Ionospheric Physics
	MPH021B	Atmospheric Physics and Weather Science
Elective Group-3	MPH022B	Particle Physics-I
	MPH023B	Particle Physics-II
Elective Group-4	MPH024B	Condensed Matter Physics-I
	MPH025B	Condensed Matter Physics-II
Elective Group-5	MPH026B	Digital Electronics
	MPH027B	Microwave Electronics

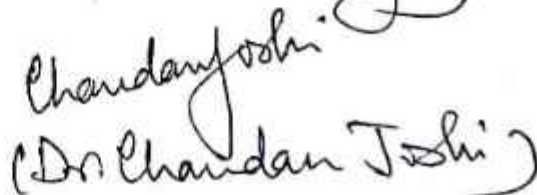


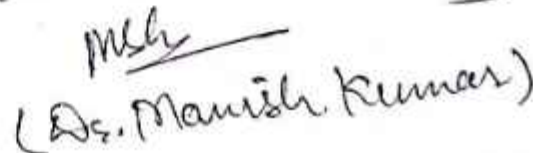
(Prof. Deepak Bhatnagar)

  
(Dr. Manisha Apte)



(Atalok Pandya)

  
(Dr. Chandan Joshi)

  
(Dr. Manish Kumar)



## M. Sc. Physics

### Objectives

Physics being one of the oldest academic disciplines is fundamental and foremost to all natural sciences. It has been influential through advances in its understanding that have translated into new technologies. The story of physics is also about people who thought out of the box. The progress of science, and Physics in particular is rooted in addressing fundamental questions about the Nature and to test the validity of a hypothesis or a physical theory, using a methodical approach to compare the implications of the theory in question with the associated conclusions drawn from experiments and observations conducted to test it.

The M.Sc. Physics course is aimed at imparting a rigorous study program at post graduate level covering both depth and breadth of all relevant areas. The course structure is designed with a due emphasis on wider conceptual base, including experiments and modern computational techniques. The three courses on Quantum Mechanics and one on Quantum Field Theory assure us of comprehensive and futuristic education that can pave way for Upcoming and Cutting Edge Technologies that mushroom from the laboratories of Physics and transform the society of tomorrow. The program aims to train future generations of physicists with specialization in one of the frontier areas of research, e.g. in Astrophysics and Cosmology/ Atomic and Nuclear Physics/ Atmospheric Physics and Weather Science/ Quantum Information Sciences/ Energy Studies etc.

The M.Sc. Physics is a (post) graduate Four Semester Course spanning over two years duration.

- Semester Exchange and Project Work: Students of M.Sc. Physics Course will have a choice of studying one semester (Fourth Semester) at University of Alabama Systems, USA (which has three campuses namely: UA Birmingham, UA Huntsville, and UA Tusculussa). It is pertinent to mention that JECRC University has an academic collaboration with the University of Alabama Systems, USA.

\*\* Alternatively, a student can visit University of Alabama for his/her Project Work as well.

Prof. Deepak Bhatnagar  
(Dr. Manish Gupta)

Alok Pandya  
Chandan Joshi  
(Dr. Chandan Joshi)

MSK  
(Dr. Manish Kumar)

## PEO-I

Graduates will demonstrate proficiency in critical thinking and analysis as they relate to physics problems in core theoretical areas of mechanics, electromagnetism, quantum mechanics, and statistical mechanics.

## PEO-II

Graduates will demonstrate familiarity with the major fields of modern physics research.

## PEO-III

Graduates will demonstrate capability for conducting independent research.

## Program Outcome(PO's)

A postgraduate of the M.Sc. (Physics) Program will demonstrate:

M.Sc Physics students of JECRC University will keep the ability to:

**PO1.Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

**PO2.Effective Communication:** Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

**PO3. Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings.

**PO4. Effective Citizenship:** Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

**PO5. Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

**PO6. Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.

Prof. Deepak Bhargava

(Dr. Manish Gupta)

(Atlok Panigrahy)

(Dr. Chandan Joshi)

(Dr. Manish Kumar)



**PO7. Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context sociotechnological changes.

**Program Specific Outcome:**

*Programme specific objectives are to:*

**PSO-I** The course structure is designed with a due emphasis on wider conceptual base, including experiments and modern computational techniques.

**PSO-2.** With the importance of "Energy Crisis" in the world, a course on "Energy Studies and Non-Conventional Energy Sources" has been prescribed in the syllabus of M.Sc. III Semester to update the students with problems, challenges and the possible solutions of the energy crisis.

**PSO-3.** The program aims to train future generations of physicists with specialization in one of the frontier areas of research, e.g. in Astrophysics and Cosmology/ Atomic and Nuclear Physics/ Atmospheric Physics and Weather Science/ Quantum Information Sciences/ Energy Studies etc.

## Semester-I

**MPH001B: Classical Mechanics**

**Credit(s):4**

### Unit-I

**Lagrangian and Hamiltonian Dynamics:** Constraints, holonomic and non-holonomic constraints, D'Alembert's Principle and Lagrange's Equation, velocity dependent potentials, simple applications of Lagrangian formulation, Hamilton Principle, Calculus of Variations, Derivation of Lagrange's equation from Hamilton's principle. Extension of Hamilton's Principle for nonconservative and nonholonomic systems, Method of Lagrange's multipliers, Conservation theorems and Symmetry Properties, Noether's theorem. Conservation of energy, linear momentum and angular momentum as a consequence of homogeneity of time and space and isotropy of space.

### Unit-II

Generalized momentum, Legendre transformation and the Hamilton's Equations of Motion, simple applications of Hamiltonian formulation, cyclic coordinates, Routh's procedure, Hamiltonian Formulation of Relativistic Mechanics, Derivation of Hamilton's canonical Equation from Hamilton's variational principle. The principle of least action.

### Unit-III

**Inertia Tensor:** Inertial tensor, Moment and Product of Inertia. Rotational Dynamics. Pseudo forces. Coriolis forces. Similarity transformations.

(Prof. Deepak Bhatnagar)

(Alok Parajya)

(Dr. Manish Kumar)

(Dr. Manish Kumar)

(Dr. Chandan Toolin)

#### Unit-IV

**Canonical transformation, integral invariant of Poincare:** Lagrange's and Poisson brackets as canonical invariants, equation of motion in Poisson bracket formulation. Infinitesimal contact transformation and generators of symmetry, Liouville's theorem, Hamilton-Jacobi equation and its application.

#### Unit-V

**Action angle variable adiabatic invariance of action variable:** The Kepler problem in action angle variables, theory of small oscillation in Lagrangian formulation, normal coordinates and its applications. Orthogonal transformation, Euler's theorem, Eigenvalues of the inertia tensor, Euler equations, force free motion of a rigid body.

#### Suggested Readings

1. Herbert Goldstein, C. Poole, John Safko: Classical Mechanics, Pearson.
2. L. D. Landau and E.M. Lifshitz: Mechanics, Butterworth-Heinemann.
3. A. Raychoudhary: Classical Mechanics, Oxford University Press
4. N. C. Rana and P. S. Joag: Classical Mechanics, Tata McGraw Hill.
5. Ronald L. Greene: Classical Mechanics with Maple, Springer

CO-1 Have a deep understanding of Newton's laws

CO-2 Be able to solve the Newton equations for simple configurations using various methods,

CO-3 to enable student to learn and to apply concepts learnt in this subject in real life.

CO-4 to enable students to learn the idea of Small Oscillations and to explore its further applications and importance in advancement of technologies

CO-5 Understand the foundations of force free motion of rigid body

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		H			L			L		
CO2				L			M			H
CO3	M								M	

Prof. Deepak Bhatnagar  
Hansraj College

Allok Pandya  
Praduman Joshi

MSR  
(Dr. Manish)



CO4					H				H	
CO5		L	M			H		M		

6. H = Highly Related; M = Medium L = Low

## MPH002B: Quantum Mechanics- I

Credit(s):4

### Unit-I

**Linear spaces and Operators:** Vector spaces, Linear independence, Bases, dimensionality and Isomorphisms. Linear transformations, inverses, matrices, similarity transformations, Eigenvalues and Eigenvectors. Inner product, orthogonality and completeness, complete orthogonal set, Gramm-Schmidt orthogonalization procedure, Eigenvalues and Eigenvectors of Hermitian and Unitary transformations, diagonalization. Function space and Hilbert space. Complete orthonormal sets of functions.

### Unit-II

**Structure of Quantum mechanics:** Postulates of QM, Hilbert space; Hermitian and unitary operators; Orthonormality, completeness and closure. Dirac's bra and ket notations. Matrix Representation and change of basis. Operators and observables, significance of eigenvector and eigenvalues, Commutation relation; Uncertainty principle for arbitrary Operators.

### Unit-III

**Quantum Linear Harmonic Oscillator:** Creation and annihilation operators. Occupation number. Quantization of creation and annihilation operators. Number operator. Coherent states and time-evolution of coherent states.

### Unit-IV

**Angular Momentum-I:** Orbital angular momentum and Quantum Mechanics of rotations. Orbital angular momentum operators and their properties. Theory of Hydrogen-like atoms. Quantum Mechanics of rotations. Infinitesimal rotations. Euler angles. Three-dimensional oscillators. Rotation-vibration spectra of diatomic molecules.

### Unit-V

**Angular Momentum-II:** Total angular momentum. Angular momentum operators:  $\hat{J}_x, \hat{J}_y, \hat{J}_z, \hat{J}, \hat{J}^2$  and  $\hat{J}_+, \hat{J}_-$ . Angular momentum eigen-values. Angular momentum matrices corresponding to spin half particles: Pauli's spinors and their properties. Spin angular momentum. Stern-Gerlach experiment. Larmor's precession. Total angular momentum and spin-orbit ( $L-S$ ) coupling. Addition of angular momentum. Clebsch-Gordan coefficients. Selection rules.

(Prof. Deepak Bhatnagar) (Alok Parida) msh  
 (Dr. Manish Cipte) (Dr. Chandan Joshi) (Dr. Manish Kumar)

### Suggested Readings

1. Ashok Das and A.C. Melissinos: Quantum Mechanics- A Modern Approach, Gordon and Breach Science Publishers.
2. Albert Messiah: Quantum Mechanics, Dover Publications
3. L. I. Schiff: Quantum Mechanics, Mc-Graw Hill.
4. Claude Cohen-Tannoudji, Bernard Diu, Frank Laloe: Quantum Mechanics, Wiley.
5. J. J. Sakurai: Modern Quantum Mechanics, Pearson Education.
6. E. Merzbacher: Quantum Mechanics, John Wiley.

CO-1: Understand the fundamentals of Quantum Mechanics specifically the 'Operator Mechanism in Quantum Mechanics'.

CO-2: Understand the 'Premise and Postulates of Quantum Mechanics' and make them understand Dirac's 'Bra and Ket representation'.

CO-3: Understand the theory of 'Quantum Linear Harmonic Oscillator' and 'The Idea of Creation and Annihilation Operators'.

CO-4: Understand- 'Theory of Angular Momentum in Quantum Mechanics' and apply it to 'Hydrogen-like Atom' and 'Spectroscopic Techniques'.

CO-5: Understand and apply the mathematical techniques of 'Total Angular Momentum' including 'selection rules' and 'Clebsch-Gordon Coefficients'.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H			L			L	
CO2		L			L			M		
CO3	M									M
CO4						H				H
CO5			L	M			H		M	

H = Highly Related; M = Medium L = Low

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Chandanjodhi

Dr. Manish Kumar



**MPH003B: Classical Electrodynamics – I**

**Credit(s):4**

**Unit-I**

**Electromotive force:** Ohm's law, Electromotive force, Motional EMF

**Faraday's law:** Electromagnetic induction, Inductance, Energy in Magnetic fields

**Unit-II**

**Maxwell's equations:** Maxwell equations for Electromagnetic fields in matter and vacuum (by conventional methods), Electro-magnetic waves, Boundary conditions

**Potential formulation:** Four potentials; Divergence-less and curl-less quantities, Gauge transformations, Coulomb's gauge and Lorentz' force, Lorentz' force in potential forms

**Unit-III**

**Electromagnetism (Without Matter and Medium)**

**Relativistic electrodynamics using potential formulation:** Field tensor and Electrodynamics in tensor notations, *Maxwell's equations in potential formulation*, Relativistic transformations of electro-magnetic fields

**Unit-IV**

**Dipole radiations:** Retarded potentials, Electric dipole radiations, Magnetic dipole radiations, Radiation from an arbitrary distribution of charges

**Radiation from a point charge:** Lienard-Wiechert potentials, The fields of a point charge in motion, Power radiated by a point charge

**Unit-V**

**Radiation reaction:** The Abraham-Lorentz' formula, The physical origin of the radiation reaction.

**Special radiative processes:** Bremstrahlung, Synchrotron radiations, Cerenkov radiations.

**Suggested Readings**

1. L. D. Landau & Lifshitz: Classical Theory of Electrodynamics; Pergamon Press.
2. L. D. Landau & Lifshitz: Electrodynamics of continuous media; Pergamon Press.
3. J. D. Jackson: Classical Electro-dynamics; John Wiley.
4. David J. Griffiths: Introduction to Electro-dynamics; Prentice Hall.
5. Panofsky & Phillip: Classical electrodynamics and magnetism

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(Alok Pantya)

(Dr. Manish Kumar)



- CO1: Explain classical electrodynamics based on Maxwell's equations including its formulation in covariant form.
- CO2: Solve the electromagnetic problems with the help of electrodynamic potentials and superpotentials, and make a detailed account for gauge transformations and their use
- CO3: Formulate and solve electrodynamic problems in relativistically covariant form in four-dimensional spacetime.
- CO4: Calculate the electromagnetic radiation from localised charges which move arbitrarily in time and space, taking into account retardation effects.
- CO5: Calculate the electromagnetic radiation from radiating systems, like oscillating electric and magnetic dipoles (aerials, localised charge and current distributions)

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H				M		L	H		
CO2		H	H			M			L	
CO3		M		L	H			M		
CO4		H	M		L				M	
CO5			H	L		M			M	

H = Highly Related; M = Medium L = Low

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Manish Upde  
(Dr. Manish Upde)

Chandran Joshi  
(Dr. Chandran Joshi)

Manish  
(Dr. Manish Kumar)

**MPH004B: Mathematical Physics**

**Credit(s):4**

**Unit-I**

**Special Mathematical Techniques:** Dirac Delta Function, Green's Function, Gamma and Beta function, Sterling's formula.

**Unit-II**

**Complex Variables:** Functions of complex variable, Limits and continuity, differentiation, Analytical functions, Cauchy- Riemann conditions, Cauchy Integral theorem, Cauchy integral formula, Derivatives of analytical functions, Liouville's theorem, Power series Taylor's theorem, Laurent's theorem, Calculus of residues -poles, essential singularities and branch points, residue theorem, Jordan's lemma, singularities on contours of integration, evaluation of definite integrals. Analytic continuation. Saddle Point Function.

**Unit-III**

**Second Order Differential Equations and Special functions:** Separation of variables-ordinary differential equations, singular points, series solutions leading to Legendre, Bessel, Hermite, Laguerre as solutions. Orthogonal properties and recurrence relations of these functions. Spherical harmonics and associated Legendre polynomials. Hermite polynomials. Sturm-Liouville systems and orthogonal polynomials. Wronskian-linear independence and linear dependence.

**Unit-IV**

**Integral Transforms:** Fourier Transforms: Development of the Fourier integral from the Fourier Series, Fourier and inverse Fourier transform: Simple Applications: Finite wave train, Wave train with Gaussian amplitude, Fourier transform of derivatives, solution of wave equation as an application. Convolution theorem. Intensity in terms of spectral density for quasi monochromatic EM Waves, Momentum representation.

**Unit-V**

**Applications of integral transforms:** Application of Fourier transform to diffraction theory: diffraction pattern of one and two slits. Laplace transforms and their properties, Laplace transform of derivatives and integrals, derivatives and integral of Laplace transform. Convolution theorem. Impulsive function, Application of Laplace transform in solving linear, differential equations with constant coefficient with variable coefficient and linear partial differential equation.

**Suggested Readings**

1. George Arfken: Mathematical Methods for Physicists, Academic Press.
2. L. A. Pipes: Applied Mathematics for Engineers & Physicists, McGraw Hill.
3. Merle C. Potter and Jack Goldberg: Mathematical Methods, PHI.
4. Fredrick W. Byron and Robert W. Fuller: Mathematics of Classical and Quantum Physics,

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*(Alok Parida)*

*(Dr. Manish Kumar)*



- Dover Publications.  
5. Tulsı Dass and S.K. Sharma: Mathematical Methods in Classical and Quantum Physics, Orient Longman.

CO-1: apply special mathematical function appropriately in solving problems in physics, understand the Dirac Delta and other distributions and be able to derive their various properties  
CO-2: use Fourier transform to obtain the Fourier series of periodic functions in physics; and apply transform methods to solve elementary differential equations of interest in physics and engineering.

CO-3: be fluent in the use of Fourier and Laplace transformations to solve differential equations, apply techniques of complex variables, to the study of special functions of mathematical physics

CO-4: solve partial differential equations with appropriate initial or boundary conditions; and understand Group theory, special unitary groups

CO-5: have confidence in solving mathematical problems arising in physics by a variety of mathematical techniques

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H	H		L		H		
CO2			L			M		H		
CO3		H					H		L	
CO4					M					M
CO5		L			M		L		M	

H = Highly Related; M = Medium; L = Low

MPH005B: Classic Experiments in Physics

Credit(s): 12

#### (Ten Great Experiments in Physics)

Students have to perform any ten experiments

1. Frank-Hertz' experiment to determine Planck's constant.

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Chandanyoshi

2. *Millican's Oil Drop experiment* to determine  $e/m$  of electron.
3. *Thomson's experiment* to determine  $e/m$  of electron.
4. *Bragg's experiment* of diffraction of X-Ray.
5. *Compton Effect*: Study of Compton scattering of  $\gamma$ -rays.
6. *Faraday's experiment*: Electromagnetic Induction and Laws of Electrolysis.
7. *Joule's experiment*: Determination of mechanical equivalent of heat.
8. *Davisson Germer's experiment*:
9. *Stern-Gerlach experiment*: Study of spin of particles.
10. *Michelson's Interferometer*: Experiment of interference with Michelson's Interferometer.
11. *Hall effect*: To study *Hall effect* and determine *Hall coefficient*.
12. *Foucault's Pendulum*: Determination of time period of rotation of the Earth.

### ***Suggested Readings***

Morris H. Shamos: Great Experiments in Physics, Dover Publications Inc. (New York 1959).

CO-1. How to determine the crystal structure, lattice parameter and crystallite size?

CO-2. Measurement and analysis of various laws of physics.

CO-3. Determination of time period of rotation of the Earth.

CO-4. Determine *Hall effect* and *Hall coefficient*.

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3

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 (Dr. Manish Apte) (Chandanjoshi) (T. D.)



CO1			L			M		H		
CO2		H					H		L	
CO3					M					M
CO4		L			M		L		M	

H = Highly Related; M = Medium; L = Low

### Semester-II

MPH006B: Statistical Mechanics

Credit(s): 4

#### Unit-I

**Elementary Probability Theory:** Preliminary concepts, Random walk problem, Binomial distribution, mean values, standard deviation, various moments, Gaussian distribution, Poisson distribution, mean values. Probability density, probability for continuous variables.

**Extensive and Intensive Variables:** laws of thermodynamics, Legendre transformations and thermodynamic potentials, Maxwell relations, applications of thermodynamics to (a) ideal gas, (b) magnetic material, and (c) dielectric material. The laws of thermodynamics and their consequences.

#### Unit-II

**Statistical Description of System of Particles:** State of a system, microstates, ensemble, basic postulates, behavior of density of states, density of state for ideal gas in classical limit, thermal and mechanical interactions, quasi-static process. Statistical thermodynamics: Irreversibility and attainment of equilibrium, Reversible and irreversible processes. Thermal interaction between macroscopic systems, approach to thermal equilibrium, dependence of density of states on external parameters, Statistical calculation of thermodynamic variables.

#### Unit-III

**Canonical and Grand Canonical Ensembles:** Concept of statistical distribution, phase space, density of states, Liouville's theorem, systems and ensemble, entropy in statistical mechanics. Connection between thermodynamic and statistical quantities micro canonical ensemble, equation of state, specific heat and entropy of a perfect gas, using micro canonical ensemble. Canonical ensemble, thermodynamic functions for the canonical ensemble, calculation of mean values, energy fluctuation in a gas, grand Canonical ensemble, thermodynamic functions for the grand canonical ensemble, density fluctuations.

#### Unit-IV

**Partition Functions and Statistics:** Partition functions, Properties, partition function for an ideal gas & calculation of thermodynamic quantities, Gibbs Paradox, validity of classical approximation, translational, rotational & vibrational contributions to the partition function of an ideal diatomic gas. Specific heat of a diatomic gas, ortho & para Hydrogen. **Maxwell-Boltzmann Gas Velocity and Speed Distribution:** Chemical potential, Free energy and connection with thermodynamic variables, First and Second order phase transition; phase equilibrium.

#### Unit-V

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 (Dr. Manish Gupta)  
 (Dr. Chandan Joshi) (Dr. Manish Kumar)

dipole and electric-quadrupole moments; and their comparison with experimental data; configuration mixing; single particle transition probability according to the shell model; selection rules; approximate estimates for the transition probability and Weisskopf units; Nuclear isomerism.

#### Unit-V

**Collective Nuclear Model:** Collective variable to describe the cooperative modes of nuclear motion; Parametrization of nuclear surface; A brief description of the collective model Hamiltonian (in the quadratic approximation); Vibrational modes of a spherical nucleus, Collective modes of a deformed even-even nucleus and moments of, inertia; Collective spectra and electromagnetic transition in even nuclei and comparison with experimental data; Nilsson model for the single particle states in deformed nuclei.

**Nuclear gamma and beta decay:** Electric and magnetic multipole moments and gamma decay probabilities in nuclear system (no derivations), Reduced transition probability, Selection rules; zero-zero transition. General characteristics of weak interaction; nuclear beta decay and lepton capture; electron energy spectrum and Fermi- Kurie plot; Fermi theory of beta decay (parity conserved selection rules Fermi and Gamow-Teller) for allowed transitions; ft-values; General interaction Hamiltonian for beta decay with parity conserving and non conserving terms; Forbidden transitions ,Experimental verification of parity violation; The V-A interaction and experimental evidence.

#### Suggested Readings

1. J. M Blatt and V. E. Weisskopf: Theoretical Nuclear Physics.
2. R. D. Evans: The Atomic Nucleus, McGraw-Hills, 1955.
3. H. Enge: Introduction to Nuclear Physics, Addition-Wesley, 1970.
4. E. Segre: Nuclei and Particles, Benjamin, 1977.
5. W. E. Burcham: Elements of Nuclear Physics, ELBS, Longman, 1988.
6. B. L. Cohen: Concept of Nuclear Physics, Tata Mc-Graw Hills, 1988.
7. I. Kaplan: Nuclear Physics, Addison Wesley, 1963.
8. R. M. Singru: Introductory Experimental Nuclear Physics.
9. M. K. Pal: Nuclear Structure: Affiliated East-West Press, 1982.
10. R. R. Roy and B. P. Nigam: Nuclear Physics, Willey-Easter, 1979.

CO-1: To impart knowledge about basic nuclear physics properties

CO-2: understanding of related reaction dynamics.

CO-3: basic properties of nucleus and nuclear models

CO-4: to study the nuclear structure properties.

CO-5: various aspects of nuclear reactions will give idea how nuclear power can be generated.

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[Dr. Manish Chipli]

*शालोक*  
*Chandanjoshi*  
(Dr. Chandan Joshi)

*MSK*  
(Dr. Manish Kumar)



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		H		M				H		
CO2			L			M		M		
CO3	M		L				H		L	
CO4					M					M
CO5		L			H				H	

H = Highly Related; M = Medium; L = Low

**MPH012B: Quantum Mechanics-III**

**Credit(s): 4**

**(Relativistic Quantum Mechanics)**

**Unit-I**

**Relativistic Formulation of Quantum Mechanics:** Attempt for relativistic formulation of quantum theory, The Klein-Gordon equation, Probability density and probability current density, solution of free particle KG equation in momentum representation, interpretation of negative probability density and negative energy solutions.

**Unit-II**

Dirac equation for a free particle, properties of Dirac matrices and algebra of gamma matrices, non-relativistic correspondence of the Pauli equation (inclusive of electromagnetic interaction). Solution of the free particle. Dirac equation, orthogonality and completeness relations for

Dirac spinors, interpretation of negative energy solution.

**Unit-III**

**Symmetries of Dirac Equation :** Lorentz covariance of Dirac equation, proof of covariance and derivation of Lorentz boost and rotation matrices for Dirac spinors, Projection operators involving four

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(Atalok Pandya)

(Dr. Manish Cipta)

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(Dr. Manish Kumar)



momentum and spin, Parity (P), Charge conjugation(C), time reversal (T) and CPT operators for Dirac spinors, Bilinear covariants, and their transformations behaviour under Lorentz transformation, CP, T and CPT, expectation values of coordinate and velocity, involving only, positive energy solutions and the associated problems, inclusion of negative energy solution, Zitterbewegung, Klein paradox.

#### Unit-IV

**The Quantum Theory of Radiation:** Classical radiation field, transversality condition, Fourier decomposition and radiation oscillators, Quantization of radiation oscillator, creation, annihilation and number operators; photon states, photon as a quantum mechanical excitations of the radiation field, fluctuations and the Uncertainty relation, validity of the classical description, matrix element for emission and absorption, spontaneous emission in the-dipole approximation.

#### Unit-V

Rayleigh scattering, Thomson scattering and the -Raman effect, Radiation damping and Resonance fluorescence.

Quantization of identical Bosons.

#### Suggested Readings

1. Ashok Das and A.C. Millissions: Quantum Mechanics- A Modern Approach (Garden and Breach Science Publishers).
2. E. Merzbaker: Quantum Mechanics, Second Edition (John Wiley and sons)
3. Bjorken and Drell : Relativistic Quantum Mechanics (MGraw Hill).
4. J. J. Sakuri: Advanced Quantum Mechanics (John Wiley).

CO-1: Understand the basic tenets of 'Relativistics Quantum Mechanics'

CO-2: Understand Dirac's equation and practice of Algebra of Dirac's matrices.

CO-3: Understand and realize the symmetries of Dirac's equation.

CO-4: Understand 'theory of radiation quantization' to the students.

CO-5: Understand techniques of 'quantization of identical Bosons'.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3

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(Dr. Manish Kumar)

(Dr. Chandan Joshi)

(Dr. Manish Kumar)

CO1		H		M				H		
CO2			L			M		M		
CO3	M		L				H		L	
CO4					M					M
CO5		L			H				H	

H = Highly Related; M = Medium; L = Low

MPH013B: Advanced Solid State Physics

Credit(s): 4

### Unit-I

**Lattice Vibrations and Thermal Properties:** Interrelations between elastic constants  $C_{11}$ ,  $C_{12}$  and  $C_{44}$  wave propagation and experimental determination of elastic constant of cubic crystal, vibrations of linear mono and diatomic lattices, Determination of phonon dispersion by inelastic scattering of neutrons.


### Unit-II

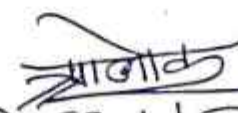
**Band Theory:** Block theorem, Kronig Penny model, effective mass of electrons, Wigner-Seitz approximation, NFE model, tight binding method and calculation of density for a band in simple cubic lattice, pseudo potential method.

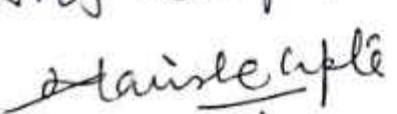
### Unit-III

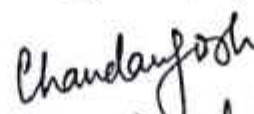
**Semiconductors:** law of mass action, calculation of impurity conductivity, ellipsoidal energy surfaces in Si and Ge, Hall effect, recombination mechanism, optical transitions and Shockley-Read theory excitons, photoconductivity, photo-Luminescence. Point line, planar and bulk defects, colour centres, F-centre and aggregate centres in alkali halides. **Theory of Metals:** Fermi-Dirac distribution function, density of states, temperature dependence of Fermi energy, specific heat, use of Fermi-Dirac statistics in the calculation of thermal conductivity and electrical conductivity, Wiedemann-Franz ratio, susceptibility, width of conduction band, Drude theory of light, absorption in metals.


### Unit-IV

  
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 (Aalok Pandya)

  
 (Dr. Manish Gupta)

  
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**Magnetism:** Larmor diamagnetism. Paramagnetism, Curie Langevin and Quantum theories. Susceptibility of rare earth and transition metals. Ferromagnetism: Domain theory, Weiss molecular field and exchange, spin waves: dispersion relation and its experimental determination by inelastic neutrons scattering, heat capacity. Nuclear Magnetic resonance: Conditions of resonance, Bloch equations. NMR-experiment and characteristics of an absorption line.

## Unit-V

**Superconductivity:** (a) Experimental results: Meissner effect, heat capacity, microwave and infrared properties, isotope effect, flux quantization, ultrasonic attenuation, density of states, nuclear spin relaxation, Gorter and AC and DC, Josephson tunnelling. (b) Cooper pairs and derivation of BCS Hamiltonian. Results of BCS theory. High  $T_c$  superconductors. Superconductivity at room temperature. Applications of Superconductors: SQUIDS. Cryotrons. Magnetic-Levitation.

**Spin Waves and Plasma:** The idea of plasmons.

### Suggested Readings

1. Charles Kittel, Introduction to Solid State Physics, 7th Edition, John Wiley and Sons, Inc.
2. A. J. Dekkar, Solid State Physics, Macmillan India Limited, 2000.
3. J. S. Blackmore, Solid State Physics, Cambridge University Press, Cambridge.
4. N. W. Ascroft and N. D. Mermin, Solid State Physics, (Harcourt Asia, Singapore 2003).
5. S. O. Pillai, Solid State Physics, Wiley Eastern.

CO1. have an understanding in different approaches to study band structures of solids

CO2. have an understanding of the properties of metals on the basis of the free electron gas models.

CO3. have an understanding of the essence of lattice vibrations and thermal properties.

CO4. have an understanding of magnetic phase transitions and magnetic structure properties and gain basic understanding on magnetic resonance (NMR).

CO5. have an understanding of the basic knowledge on (low temperature) superconductivity in type I and type II super conductors.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome	Program Specific Outcome
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		H	H		M			H		
CO2				L			M	M		
CO3	M			L					L	
CO4						M				M
CO5		L	L			H			H	

H = Highly Related; M = Medium; L = Low

MPH014B: Solar Energy and Energy Studies

Credit(s): 4

#### Unit-I

**Heat conduction:** Differential equation of heat conduction, Initial and boundary conditions. methods of solving heat conduction problems : separation of variable method for one dimension, steady and non steady state method: Theory and measurement of thermal conductivity and thermal diffusivity by transient plane source techniques.

#### Unit-II

**Convective Heat Transfer:** Theory of convective heat transfer, Laminar and turbulent flow, Boundary layer theory. Heat transfer in duct.

**Characteristics of solar Radiation:** Solar radiation at the earth surface, direct, diffuse and global radiation, Elements of solar radiations geomatary, empirical equations for predicting the availability of solar radiations, computation of insulations on a tilted surface. Atmospheric attenuation, solar radiation measurements.

#### Unit-III

**Flat Plate solar collectors:** Selective absorber surfaces. Transparatent plates. Collector energy losses. Thermal analysis of flat plate water and air heating collectors. Collector performance testing. Simple appliances working with flat plate collectors: solar cooker; water heater, air dryer and stills.

#### Unit-IV

**Concentrating collectors:** Optical concentration, flat plate collectors with plane reflectors, cylindrical parabolic concentrating collectors. Tracking requirements.

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(Dr. Manish Gupta)

(Dr. Chandan Joshi) (Dr. Manish Kumar)



**Thermal Energy Storage and Solar Thermal Devices:** Water storage. Stratification of water storage, Packed bed storage. Phase change storage. Chemical storage. Solar pond. Economics of solar energy appliances. Efficiencies in different storages. space conditioning.

#### Unit-V

**Solar space conditioning:** Energy requirements in buildings, Performance and design of Passive system architecture, Absorption refrigeration cycle, Performances of solar absorption air conditioning.

**Essentials of wind energy:** Classifications and Description of Wind machines. Performances of wind machine (solidity factor  $\gamma$  (Lamda); Energy in the wind.

#### Suggested Readings

1. Heat Conduction: M. Necati Ozisik-John Wiley & Sons.
2. Hand Book of Heat transfer Application: Edited by Warren M. Rohsenow, James P. Harnou and Ejup N. Ganic.
3. Conduction of Heat in Solids: H.S., Carslaw and J.C. Jaeger, Oxford Clarendon Press 1959.
4. Heat and Mass Transfer: A Luikov, Mir Publishers Moscow.
5. Thermal conductivity of Solids: J.E. Parrot and Audrey D. Stuckers : Pion Limited, London.
6. Solar energy Thermal Processes : Duffie and Beckman. Wiley & Sons. New York.
7. Solar Energy Engg.: Jui Sheng Haieh, Prentice Hall, New Jersey.

CO-1: explain the principles that underlie the ability of various natural phenomena to deliver solar energy

CO-2: outline the technologies that are used to harness the power of solar energy

CO-3: discuss the positive and negative aspects of solar energy in relation to natural and human aspects of the environment.

CO-4: will design the solar devices and different types of collectors.

CO-5: analyze the different modes of heat transfer.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		H	H		M			H		
CO2				L			M	M		

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Harsh Gupta  
[Dr. Manish Gupta]

Atul Pandya

Chandrayoshi  
[Dr. Chandrayoshi]

Manish Kumar  
(Dr. Manish Kumar)

**Formulation of Quantum Statistics:** Density Matrix, ensembles in quantum statistical mechanics, simple applications of density matrix. Theory of simple gases: Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac gases. Statistics of occupation numbers, Evaluation of partition functions, Ideal gases in the classical limit.

#### Ideal Bose

**System:** Thermodynamic behavior of an Ideal Bose gas, Bose-Einstein condensation. Thermodynamics of Black body radiation, Stefan-Boltzmann law, Wien's displacement law. Specific heat of solids (Einstein and Debye models).

**Ideal Fermi System:** Thermodynamic behavior of an ideal Fermi gas, degenerate Fermi gas, Fermi energy and mean energy, Fermi temperature, Fermi velocity of a particle of a degenerate gas. **Black Holes, White Dwarfs and Chandrasekhar Limit.**

#### Suggested Readings

1. F. Reif: Fundamentals of Statistical and Thermal Physics, McGraw Hill.
2. K. Huang: Statistical Mechanics, John Wiley & Sons.
3. L. D. Landau and E. M. Lifshitz: Statistical Physics, Butterworth-Heinemann.
4. Richard P. Feynman: Statistical Mechanics, West View Press.

CO1. define and discuss the concepts of microstate and macrostate of a model system

CO2. define and discuss the concepts and roles of entropy and free energy from the view point of statistical mechanics

CO3. define and discuss the Boltzmann distribution and the role of the partition function

CO4. apply the machinery of statistical mechanics to the calculation of macroscopic properties resulting from microscopic models of magnetic and crystalline systems

CO5. define the Fermi-Dirac and Bose-Einstein distributions; state where they are applicable; understand how they differ and show when they reduce to the Boltzmann distribution.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H		M			H		H		
CO2		L			M			M		
CO3		L					H		L	
CO4				M						M
CO5	L			H		L			H	

H = Highly Related; M = Medium; L = Low  
MPH007B: Quantum Mechanics- II

Credit(s): 4

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### Unit-I

**Density Matrices:** Basic definition and properties. Pure and Mixed states.

**Quantum Entanglement and Quantum Teleportation (Introduction)**

**Quantum Computing:** Basic Idea of Quantum Computation and Quantum Information Theory.

### Unit-II

#### Approximation Methods

**Time Independent Approximation Methods:** Variational Methods, WKB method, tunneling.

**Perturbation Theory:** Non-degenerate perturbation theory, degenerate case, Stark effect, Zeeman effect and other examples.

### Unit-III

**Time-dependent Perturbation Theory:** Interaction Picture; Constant and harmonic perturbations; Fermi Golden rule; Sudden and adiabatic approximations. Beta decay as an example.

### Unit-IV

**Scattering Theory:** Differential cross-section, scattering of a wave packet, integral equation for the scattering amplitude, Born approximation, method of partial waves, low energy scattering and bound states, resonance scattering.

### Unit-V

**Symmetry in Quantum Mechanics:** Symmetry Operations and Unitary Transformations, conservation principles, space and time translation, rotation, space inversion and time reversal, symmetry and degeneracy.

**Identical Particles:** Meaning of identity and consequences; Symmetric and anti-symmetric wavefunction; incorporation of spin, symmetric and antisymmetric spin wave function of two identical particles, Slater's determinant, Pauli exclusion principle.

#### Suggested Readings

1. Claude Cohen-Tannoudji, Bernard Diu, Frank Laloe: Quantum Mechanics, Wiley.
2. Albert Messiah: Quantum Mechanics, Dover Publications.
3. S. Flugge: Quantum Mechanics, Springer.
4. L. I. Schiff: Quantum Mechanics, Mc-Graw Hill.
5. J. J. Sakurai: Modern Quantum Mechanics, Pearson Education.
6. E. Merzbacher: Quantum Mechanics, John Wiley.

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Dr. Manish Kupte (Dr. Manish Kupte)

Chandans Joshi (Dr. Chandans Joshi) (Dr. Manish Kumer)



CO-1: Understand the idea of 'Quantum Computers', 'Quantum Entanglements', 'Quantum Information Theory' and train them with techniques of 'Density Matrices'.

CO-2: Understand various 'Time Independent Approximation Methods in Physics' such as 'WKB Approximation', 'Variational Method', and ''.

CO-3: Understand 'Time Dependent Perturbation Methods' including 'Fermi's Golden Rule of Quantum Mechanics'.

CO-4: Understand nitty-gritty of 'scattering theory'.

CO-5: Understand 'symmetries in Quantum Mechanics' and conservation of symmetries.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			H			L			L	
CO2		L			L			M		
CO3	M									M
CO4						H				H
CO5			L	M			H		M	

H = Highly Related; M = Medium L = Low

#### MPH008B: Classical Electrodynamics-II

Credit(s): 4

(Classical Electrodynamics in Matter and Medium)

##### Unit-I

##### Special techniques for calculating potentials

**Laplace's Equation:** Laplace's equation in one dimension. Laplace's equation in two dimensions. Laplace's equation in three dimensions. Boundary conditions and Uniqueness theorems. Conductors and second uniqueness theorem

##### Unit-II

**The Method of Images:** The classic image problem. The induced surface charge. Other image problems

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Hanselupte  
(Dr. Manshelupte)

Aalok Parashar  
Chandan Joshi  
(Dr. Chandan Joshi)

msk  
(Dr. Manish Kumar)

**Multi-pole Expansion:** Approximate potentials at large distances. The monopole and dipole terms. Origin of coordinates in multi-pole expansion. The electric field of an electric charge

### Unit-III

#### Electro-magnetic waves in conducting and non-conducting media

**Electro-magnetic waves in non-conducting media:** Monochromatic plane waves in vacuum. Energy and momentum of electro-dynamic waves. Propagation through linear media. Reflection and transmission at normal and oblique incidence

### Unit-IV

**Electromagnetic Waves in Conductors:** The modified wave equation. Monochromatic plane waves in conducting media. Reflection and transmission at conducting surface

**Dispersion:** The frequency dependence of  $\epsilon$ ,  $\mu$  and  $\sigma$ . Dispersion in non-conductors. Free electrons in conductors and plasma

**Guided waves:** Wave guides. TE waves in rectangular wave-guides. The coaxial transmission lines

### Unit-V

#### Magneto-Hydrodynamics and Plasma Physics

Introduction and definitions. MHD equations. Magnetic Diffusion: Viscosity and Pressure. Pinch effect: instabilities in pinched plasma column. Magneto-hydrodynamics waves. Plasma Oscillations: Short wave length limit of plasma oscillations and Debye shielding distance

#### Suggested Readings

- 1 L. D. Landau & Lifshitz: Classical Theory of Electrodynamics; Pergamon Press.
- 2 L. D. Landau & Lifshitz: Electrodynamics of continuous media; Pergamon Press.
- 3 J. D. Jackson: Classical Electro-dynamics; John Wiley.
- 4 David J. Griffiths: Introduction to Electro-dynamics; Prentice Hall.
- 5 Panofsky & Phillip: Classical electrodynamics and magnetism.
- 6 N. N. Rao: Elements of Engineering Electromagnetics, Pearson Education.

CO1: Explain classical electrodynamics based on Maxwell's equations including its formulation in covariant form.

CO2: Solve the electromagnetic problems with the help of electrodynamic potentials and superpotentials, and make a detailed account for gauge transformations and their use

CO3: Formulate and solve electrodynamic problems in relativistically covariant form in four-dimensional spacetime.

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CO4: Calculate the electromagnetic radiation from localised charges which move arbitrarily in time and space, taking into account retardation effects.

CO5: Calculate the electromagnetic radiation from radiating systems, like oscillating electric and magnetic dipoles (aerials, localised charge and current distributions)

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H				M		L	H		
CO2		H	H			M			L	
CO3		M		L	H			M		
CO4		H	M		L				M	
CO5			H	L		M			M	

H = Highly Related; M = Medium L = Low

MPH009B: Computational Physics

Credit(s): 4

Students are required to learn the following computational exercises using MATLAB/Mathematica/other tools with at least two from each unit.

- Evaluation of integrals
- To write programmes to solve differential equations
- To write programme to evaluate Schrödinger's equation of motion.
- To write programme to evaluate problem of 'Quantum Linear Harmonic Oscillator'.
- To write programme to evaluate Heisenberg's equation of motion.
- Stochastic methods, especially Monte Carlo methods.
- Specialized partial differential equation methods, for example the finite difference method and the finite element method

(viii) The matrix eigen value problem – the problem of finding eigen values of very large matrices, and their corresponding eigenvectors (eigen states in quantum physics).

(ix) Understanding Molecular dynamics by computational means. Understanding Computational fluid dynamics.

(x) Understanding Computational Magneto-hydrodynamics

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 (Dr. Manish Apte) (Dr. Chandan Joshi) (Dr. Manish Kumar)

### *Suggested Readings*

1. Andi Klein and Alexander Godunov, Introductory Computational Physics (2006)
2. Rubin H. Landau, José Páez and Cristian C. Bordeianu and A Survey of Computational Physics: Introductory Computational Science.

1. demonstrate knowledge in essential methods and techniques for numerical computation in physics
2. apply Monte Carlo method and other simulation methods to solve deterministic as well as probabilistic physical problems
3. employ appropriate numerical method to interpolate and extrapolate data collected from physics experiments
4. use appropriate numerical method to solve the differential equations governing the dynamics of physical systems
5. formulate and computationally solve a selection of problems in physics, use the tools, language (MATLAB/C++) and conventions of physics to test and communicate ideas and explanations

### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		H		M				H		
CO2			L			M		M		
CO3	M		L				H		L	
CO4					M					M
CO5		L			H				H	

H = Highly Related; M = Medium; L = Low

**MPH010B: Advanced Physics Lab**

**Credit(s): 12**

**Students have to perform any ten experiments**

1. Complete study of characteristics of Photovoltaic Cells (Solar Cells).

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*(Dr. Manish Gupta)*  
*(Dr. Manish Kumar)*  
*(Dr. Chandan Joshi)*  
*(Dr. Manish Kumar)*



2. To study temperature variation of resistivity for a semi-conductor and to obtain band gap using *Four Probe method*.
3. To verify *Hartmann's formula* using constant deviation spectrograph.
4. To study *ESR* and determine *g-factor* for a given spectrum.
5. To find *e/m* of electron using *Zeeman effect*.
6. To determine *internal friction* at the *grain boundaries of solids* using *torsional pendulum*.
7. To study a *driven mechanical oscillator*.
8. To study *coupled pendulums*.
9. To study the *dynamics of a lattice* using electrical analog.
10. To study the variation of rigidity of a given specimen as a function of the temperature.
11. Verification of *Bragg's law* using microwaves.
12. Study of analog to digital and digital to analog conversion.

CO-1. How to determine the lattice structure, lattice parameter and crystallite size?

CO-2. Measurement and analysis of various laws of physics.

CO-3. Determination of characteristics of Photovoltaic Cells (Solar Cells).

CO-4. Determine *Zeeman effect*.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1			L			M		H		
CO2		H					H		L	
CO3					M					M
CO4		L			M		L		M	

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(Dr. Manish Kumar)

## Semester-III

### MPH011B: Nuclear Physics

Credit(s): 4

#### Unit-I

**Interaction of radiation and charged particle with matter (No derivation):** Law of absorption and attenuation coefficient; Photoelectric effect, Compton scattering, pair production; Klem-Nishima cross sections for polarized and unpolarized radiation, angular distribution of scattered photon and electrons, Energy loss of charged particles due to ionization, Bremstrahlung; energy target and projectile dependence of all three processes, Range-energy curves; Straggling.

#### Unit-II

**Nucleon-Nucleon Scattering and Potentials :** Partial wave analysis of the neutron-proton scattering at low energy assuming central potential with square well shape, concept of the-scattering length, coherent scattering of neutrons by protons in (ortho and para) Hydrogen molecule; conclusions of these analyses regarding scattering lengths, range and depth of the potential; the effective range theory (in neutron-proton scattering) and the shape independence of nuclear potential; A qualitative discussion of Proton- Proton scattering at low energy; General features of two-body scattering at high energy Effect of exchange forces: Phenomenological Hamada- Johnston hard core potential and Reid hard core and soft core potentials; Main features of the One Boson Exchange Potentials (OBEP) no derivation.

#### Unit-III

**Two Nucleon system and Nuclear Forces:** General nature of the force between nucleons, saturation of nuclear forces, charge independence and spin dependence, General forms of two nucleon interaction, central, noncentral and velocity dependent potentials, Analysis of the ground state ( $3S_1$ ) of Deuteron using a square well potential, range-depth relationship, excited states of deuteron, Discussion of the ground state of Deuteron under noncentral force, calculation of the electric quadru-pole and magnetic dipole moments and the D-state admixture.

**Experimental Techniques:** Gas filled counters; Scintillation counter, Cerenkov counters; Solid state detectors; Surface barrier detectors; Electronic circuits used with typical nuclear detectors; Multiwire proportion chambers; Nuclear emulsions, techniques of measurement and analysis of tracks; Proton synchrotron; Linear accelerations; Acceleration of heavy ions.

#### Unit-IV

**Nuclear Shell Model:** Single particle and collective motions in nuclei: Assumptions and justification of the shell model, average shell potential, spin orbit coupling; single particle wave functions and level sequence; magic numbers; shell model predictions for ground state parity; angular momentum, magnetic

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Allok Paragya

Chandan Joshi

Dr. Chandan Joshi

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Dr. Manish Kumar



CO3	M			L					L	
CO4						M				M
CO5		L	L			H			H	

H = Highly Related; M = Medium; L = Low

**MPH015B: Nuclear Physics Lab**

**Credit(s): 12**

**(Experiments in Nuclear Physics)**

**Students have to perform all ten experiments**

1. To study G.M. detector characteristics and determine operating voltage of a G.M. tube.
2. To study random nature of radioactive decay using G.M. counter.
3. To determine the resolving time of G.M. counting set up (single and double source methods).
4. To study the absorption of  $\beta$  - particles and determine end point energy using G.M. counter.
5. To determine absorption coefficient of  $\gamma$  - rays.
6. Study of secular equilibrium in radioactive decay.
7. To determine end point energy of  $\beta$  - particles using Scintillation counter.
8. To study Compton scattering of  $\gamma$  - rays using Scintillation counter.
9. Study of absorption curve of  $\alpha$  - particles using semiconductor detectors.
10. Study of specific energy loss and straggling of  $\alpha$  - particles using semiconductor detectors.

***Suggested Readings***

1. Nuclear Detectors: Knoll.

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*(Dr. Manish Chopra)*

*(Atalok Pandya)*  
*(Dr. Chandan Joshi)*

*(Dr. Manish Kumar)*



2. Experimental Nuclear Physics: S.S. Kapoor and Ramamurthy; Tata McGraw Hill.

- CO-1: to train the students for advanced techniques in nuclear physics  
 CO-2: how to operate a GM counter?  
 CO-3: how to find the absorption coefficient of different materials?  
 CO-4: how to handle nuclear materials and nuclear safety management

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1		H	H		M			H		
CO2				L			M	M		
CO3	M			L					L	
CO4						M				M

**Semester-IV**

**MPH016B: Quantum Field Theory**

**Credit(s): 4**

**Unit-I**

**Scalar and vector fields:** Classical Lagrangian field theory, 'Euler-Lagrange's equation, Lagrangian density for electromagnetic field. Occupation number representation for simple harmonic oscillator, linear array of coupled oscillators, second quantization, of identical bosons, second quantization of the real Klein Gordan field and complex, Klein-Gordan field, the meson propagator.

**Unit-II**

The occupation number representation for fermions, second quantization of the Dirac field, the fermion propagator, the electromagnetic interaction and gauge invariance, covariant quantization of the free electromagnetic field, the photon propagator.

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 Dr. Manish Gupta  
 Dr. Manish Gupta  
 Dr. Chandan Toshi  
 Dr. Chandan Toshi  
 Dr. Manish Kumar

### Unit-III

**S-matrix formulation:**  $S$ -matrix expansion. Wick's theorem. Diagrammatic representation in configuration space, the momentum representation, Feynman diagrams of basic processes, Feynman rules of QED.

### Unit-IV

**Specific Processes:** Applications of  $S$  matrix formalism: the Coulomb scattering, Bhabha scattering, Moller scattering, Compton scattering and pair production. Weak interaction by means of V-A theory.

### Unit-V

**Path Integral Formalism:** Applications

### Suggested Readings

1. F. Mandal & G. Shaw: Quantum Field Theory, John Wiley.
2. J. M. Ziman: Elements of Advance Quantum Theory, Cambridge University Press.

CO1: Understand the basics of quantum field theory and provide some motivation for the use of fields to describe fundamental particle physics; apply abstract concepts to real-world situations.

CO2: Understand the notion of a path integral in quantum mechanics and field theory and the connection between the path integral formalism and the operator (scattering) formalism.

CO3: Demonstrate an understanding of field quantisation and the expansion of the scattering matrix

CO4: Quantize a free scalar field theory using canonical quantization and derive Feynman diagrams.

CO5: Use the language of Feynman diagrams in quantum field theory for electromagnetic processes, and calculate amplitudes, cross sections of scattering of particles based on Feynman diagrams.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3

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CO1	H					M				L
CO2		L			H				M	
CO3	L				H			M		
CO4		L	H							M
CO5			M			M				H

H = Highly Related; M = Medium L = Low

## MPH017B: Instrumentation techniques

Credit(s): 4

### Unit-I Classification

Absolute and Secondary instruments, indicating instruments, control, balancing and damping, construction details, characteristics, errors in measurement.

**Wattmeters:** Induction type, single phase and three phase wattmeter's, compensations.

**Energy meters:** AC Induction type single phase and three phase energy meter compensation, creep, error, testing.

**Frequency meters:** Vibrating reed type, electrical resonance type

**Transducer:** Strain Gauges, Thermistors, Thermocouples. Linear Variable Differential Transformer (LVDT) Capacitive Transducers, Piezo-Electric transducers. Optical Transducer, Torque meters, inductive torque transducers, electric tachometers, photo electric tachometers.

### Unit-II

#### Electronic Instruments

**CRO:** Block Diagram, sweep generation, vertical amplifiers, use of CRO in measurement of frequency, phase, Amplitude and rise time of a pulse.

**Digital Multimeter:** Block diagram, principle of operation, Accuracy of measurement

#### Electronic Voltmeter:

Transistor Voltmeter, Block diagram, principle of operation, accuracy of measurement: metering amplifier.

### Unit-III

#### Power Semiconductor Devices

**Power Diodes:** Types, characteristics

**Thyristors:** SCR, Static V-I characteristics of SCR, two transistor analogy of SCR, dynamic characteristics of SCR, Gate characteristics of SCR, Thyristor ratings, DIAC, TRIAC, GRO, UJT.

**Power Transistor:** Power BJT, Power MOSFETS, IGBT.

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Dr. Manish Kumar

**Triggering Circuits:** R- Triggering, R-C Triggering, UJT triggering, Design of UJT triggering circuit, Cosine law triggering, triggering circuit using pulse train.

**Thyristor commutation circuits:** Class-A, Class-B, Class-C, Class-D, Class-E, Class-F commutation circuits. Series and parallel operation of thyristors, protection of thyristors :  $di/dt$  protection,  $dv/dt$  protection, design of snubber circuit, overvoltage protection, over current protection.

#### Unit-IV

##### Sensors and Transducers

**Basic concepts and Classification:** Introduction, System Configuration, Problem Analysis, Basic Characteristics of Measuring Devices, Calibration

**Transducer classification:** Introduction, Electrical Transducer, Classification, Basic Requirements of a Transducer. Introduction, Principles of Transduction, Digital Transducers, Level Measurements

**Strain Measurement:** Introduction, Factors affecting Strain Measurements, Types of Strain Gauges, Theory of Operation of Resistance Strain Gauges, Types of Electrical Strain Gauges, Materials for Strain Gauges, Gauging Techniques and Other Factors, Strain Gauge Circuits, Temperature Compensation, Applications.

#### Unit-V

**Pressure Transducer:** Introduction, Diaphragms, Other Elastic Elements, Transduction Methods, Force- Balance Transducer, Solid State Devices, Thin Film Pressure Transducers, Piezoelectric Pressure Transducer, Vibrating Element Pressure Sensors, Pressure Multiplexer, Pressure Calibration

**Temperature Transducer:** Introduction, Temperature Scales, Mechanical Temperature Sensors, Resistance- Type Temperature Sensors, Platinum Resistance Thermometer, Thermistors. Thermocouples, Solid-State Sensors, Quartz

Thermometer, Temperature Measurement by Radiation Methods, Optical Pyrometer, Calibration of Thermometers.

**Force and Torque transducer:** Introduction, Force-Measuring Sensor- Load Cell, Effect of Temperature Variations, Dynamic Response of Elastic Transducers, Digital Force Transducers, Force-Balance Device, Hydraulic Load Cell, Electronic Weighing System, Torque Measurement.

**Vibration Transducers:** Introduction, Characteristic of Vibration, Analysis of Vibration- Sensing Devices, Vibration- Sensing Devices, Signal Conditioners, Shock Measurements, System Characteristics, Vibration Exciters, Calibration.

##### *Suggested Readings*

1. A Course in Elec. & Electronic Measurement and Instrumentation: A.K. Sawhney Dhanpat Rai & Sons, New Delhi, 1995.
2. Electronic Instrumentation and measurement techniques: W.O. Cooper, Prentice Hall of India Limited, New Delhi, 1992.
3. Electronic measurement & Instrumentation systems: Larry Jones & A foster Chin
4. Electronic measurement & measuring Instruments: Golding & Waddis A H Wheeler & Company, Calcutta, 1993.

*(Handwritten signatures and names)*  
f. Deepak Bhatnagar  
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Manish Upte  
Alok Pandya  
Chandan Joshi  
(Dr. Chandan Joshi)  
Msh  
(Dr. Manish Kumar)



5. Instrumentation Devices & Systems : C.S. Rangan, G.R. Sarma, V.S.V. Mani, 2nd Edition, Tata McGraw Hill publishers.

6. Instruments and Transducers: D.V.S. Murty, PHI.

7. Power Electronics: M.H. Rashid, Pearson Publication

8. Cengage Power Electronics Principles and Applications: Jacob, Learning.

9. Power Electronics: V.R. Murty, Oxford Publication

CO-1: An ability to apply knowledge of mathematics, science, and engineering

CO-2: An ability to design and conduct experiments, as well as to analyze and interpret data

CO-3: An ability to design a system, component, or process to meet desired needs within realistic constraints

CO-4: An ability to function on multidisciplinary teams

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3	L				H			M		
CO4		L	H							M

MPH018B: General Relativity and Cosmology

Credit(s): 4

#### General Theory of Relativity

Principle of equivalence. Metric formulation and tensor nature of gravitational field. Geodesic motion in curved space-time. Gradient, divergence, curl, and curvature and torsion in General Relativity. Bianchi identity and curvature tensor. Einstein's field equation and gravitation. Schwarzschild metric and solutions of Einstein's equation. Three crucial tests of Einstein's theory of gravitation. Killing vectors. Theory of gravitational waves. Singularities of Schwarzschild metric and Penrose diagrams. Ray-Chaudhary equation.

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 Chandan Joshi  
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## Cosmology

Einstein's model of Universe. De-Sitter Universe. Friedman-Robertson-Walker-Lemaitre model of the Universe. Big-Bang and the Physics of the early Universe. Particle and the Nucleo-synthesis in the early Universe. Various phase transitions and time-line of the Universe. Inflationary cosmology and generation of density perturbations. Alternative cosmologies: Quasi-Steady State Theory of the Universe.

### Suggested Readings

1. S. Weinberg: General Relativity, Gravitation and Cosmology, Wiley.
2. Peacock J. A.: Cosmological Physics, Cambridge University Press.
3. Meissner, Kip Thorn and John Wheeler, Gravitation and Cosmology, Benjamin Feeman.
4. J. V. Narlikar: Introduction to Cosmology, Cambridge University Press.

CO-1: describe the science of cosmology and its relation to other fields of science

CO-2: identify and describe cosmology's current unanswered questions

CO-3: explain how the scientific method and quantitative arguments are used in cosmology

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3	L				H			M		

2. Deepak Bhatnagar) (Aalok Panjya)  
Manish Cupte  
(Manish Cupte)  
Chandam Joshi  
(Dr. Chandam Joshi)  
Mishra  
(Dr. Manish Kumar)



## MPH019B: Astrophysics

Credit(s): 4

### Astrophysics: Overview

The structure, origin, and evolution of the major components of the Universe: planets, stars, and galaxies. Formation of the Sun and planets.

Luminosity and magnitudes of stars. Saha's ionisation equation.

Astrophysical processes: Basics of electromagnetic radiations; Statistical mechanics of Astrophysical phenomena; Radiative processes; Spectra; Neutral fields and plasma in Astrophysics.

Stellar evolution; X-ray sources, Binary stars, Pulsars, Quasars and other compact stars. The origin and search for life in the Universe.

### Structure Formation and the Evolution of the Universe

Structure formation in the early Universe. Galaxy formation. Elliptical and spiral galaxies. Rotational curves of galaxies and signatures of dark matter. Physics of the inter-stellar and inter-galactic media. Star formation. Radiative transfer and stellar mechanics. Chandrasekhar limit and life-cycles of stars: Supernovae-Adult stars-Red Giants-Black Holes/White Dwarfs. The idea of White holes and Brown Dwarfs.

### Suggested Readings

1. Arbab Rai Chaudhary: Astrophysics for Physicists, Cambridge University Press.
2. T. Padmanabhan: Theoretical Astrophysics-I, Cambridge University Press.
3. T. Padmanabhan: Theoretical Astrophysics-II, Cambridge University Press.
4. T. Padmanabhan: Theoretical Astrophysics-III, Cambridge University Press.

CO-1: Describe the features of objects in the Solar System (i.e. Sun, planets, moons, asteroids, comets, planetary interiors, atmospheres, etc.) giving details of similarities and differences between these objects

CO-2: detail the presently accepted formation theories of the solar system based upon observational and physical constraints

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*(Signature)*  
Dr. Manish Kumar

*(Signature)*  
Alok Paragya

*(Signature)*  
Chandan Joshi  
(Dr. Chandan Joshi)

*(Signature)*  
Manish Kumar



CO-3: detail changes which are observed when viewing the sky daily, weekly, monthly, annually and longer period of time and demonstrate an understanding of the reasons behind any observed changes


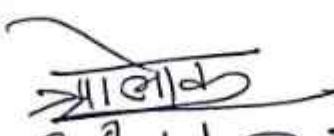

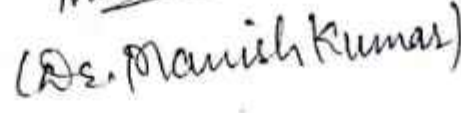
CO-4: demonstrate an understanding of the basic properties of the Sun and other stars

CO-5: explain stellar evolution, including red giants, supernovas, neutron stars, pulsars, white dwarfs and black holes, using evidence and presently accepted theories

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3	L				H			M		
CO4		L	H							M
CO5			M			M				H

H = Highly Related; M = Medium L = Low

  
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 Dr. Manish Kumar  
  
 Dr. Manish Kumar

## MPH020B: Ionospheric Physics

Credit(s): 4

**Sun:** Structure of Sun. Thermonuclear Reactions in the core of the Sun. Convection and radiative transfer. Photosphere, Chromosphere and Corona. Nanoflares. Sun Spots and Solar Cycle. Solar Cycle and Weather on the Earth.

**Ionosphere:** Production of Ionosphere. Different layers of the Ionosphere. Photochemical reactions in the Ionosphere. Loss reactions. Equation of continuity. Air Glow and Aurora.

**Morphology of the Ionosphere:** Morphology of the D, E, F1 and F2 regions.

**Passage of the Electromagnetic waves through Ionosphere:** Dispersion. A wave in the continuous medium of specific dielectric constant. Polarization of E-M waves. Curves of  $R(X)$ . Quasi-Longitudinal (QL) and Quasi-Transverse (QT) approximations.

The Role of Ionosphere in the communication of Radio waves. The *Skip* distance.

**Magnetosphere:** Formation of the Earth's Magnetosphere. Its role in controlling the Solar wind, plasma particles and protecting life on the Earth. Physics of the Magnetosphere associated phenomena.

### Suggested Readings

1. C. Donald Ahrens: Essentials of Meteorology (3<sup>rd</sup> Edition).
2. James R. Holton: Dynamic Meteorology (4<sup>th</sup> Edition), Elsevier- Academic Press.

CO-1: detail the main features and formation theories of the various types of observed galaxies, in particular the Milky Way

CO-2: explain the evolution of the expanding Universe using concepts of the Big Bang and observational evidence

CO-3: use information learned in class and develop observation skills to be able to explain astronomical features

CO-4: observations obtained via telescopic observations or data provided through computer simulations

MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

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Dr. Manish Apte (Dr. Chandan Joshi) (Dr. Manish Kumar)

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3		L	H							M
CO4			M			M				H

H = Highly Related; M = Medium L = Low

  
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 Dr. Allok Pandya

  
 Dr. Chandan Joshi

  
 Dr. Manish Kumar

Mainshetle  
 (Mainshetle)



**MPH021B: Atmospheric Physics and Weather Science**

**Credit(s): 4**

**Atmosphere and its constituents:** Synoptic observations- surface and upper air. Preparation of weather charts and their analysis, Diurnal variation of temperature, pressure, relative humidity, clouds etc.

**Tropical meteorology :** Easterly Waves, ET-ITCZ, Inversion.

**Extratropical Meteorology:** Air mass, Fronts- Frontogenesis and Frontolysis, Extratropical Cyclones and Anticyclones, Jet Streams

**Synoptic systems:** Winter - Western disturbance, Rossby Waves,

Westerly Jet Stream, Fog, Cold Wave etc. Summer - Thunderstorms, Dust storms, Heat wave, Cyclonic disturbances. Monsoon - Onset, Activity, Withdrawal, Breaks,

Depressions, Easterly Jet Stream. Post Monsoon - Cyclones in the Indian Seas, N.E. Monsoon.

**Global Climatology:** Global distribution of pressure and temperature at m.s.l. in winter and summer, distribution of annual rainfall and its variability, distribution of moisture and clouds. Vertical distribution of temperature. General circulation of atmosphere.

Development of monsoons. Major categories of world climates.

**Indian Climatology** - Different seasons, Distribution of Means Sea level

Pressure/temperature in different seasons, Wind circulation and temperature distribution over India in lower, middle and upper troposphere in different seasons. Indian rainfall in different seasons. Indian summer monsoon, onset, withdrawal, rainfall distribution, inter annual variability of monsoon. Main synoptic pressure systems causing weather over India in different seasons.

**Suggested Readings**

1. Atmosphere, Weather and Climate R.J. Barry and R.G. Chorley (Methuen Publication)
2. South West Monsoon" by Y.P. Rao (IMD Publication) .
3. An Introduction to Meteorology by S. Pettersen
4. Elements of meteorology by Miller, Thompson and Paterson
5. General Meteorology by H.R. Byer
6. Monsoon by P.K. Das
7. Tropical Meteorology by T.N. Krishnamurthy
8. Tropical Meteorology by Riel.
9. Tropical Meteorology Vol 1, 2, 3, by G.C. Asnani

*(Bhatnagar)*

*(Suresh)*

*(Bhatnagar)*

*(Atalok Parashya)*

*(Msh)*

*(Chandan John)*  
*(Dr. Chandan John)*

*(Dr. Manish Kumar)*

CO-1: identify the requirements and limitations of instrumentation for modern astrophysical observations;

CO-2: apply physics principles to the interpretation of a broad range of astrophysical observations;

CO-3: explain the basic issues involved in present day astrophysical investigations;


CO-4: demonstrate an understanding of our present picture of the cosmos on a large scale.


**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

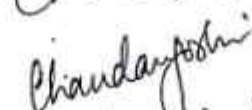
Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3		L	H							M
CO4			M			M				H

1. H = Highly Related; M = Medium L = Low

  
Dr. Deepak Bhatnagar)

  
Dr. Manish K. Pte)

  
Dr. Allok Pandya)

  
Dr. Chandan Joshi)

  
Dr. Manish Kumar)



**MPH022B: Particle Physics- I**  
**Credit(s): 4**

**Elementary particles and the fundamental forces.** Quarks and leptons. The mediators of the electromagnetic, weak and strong interactions. Interaction of particles with matter; particle acceleration, and detection techniques. Symmetries and conservation laws.

**Bound states.** Discoveries and observations in experimental particle physics and relation to theoretical developments. Symmetries, group theory, The group SU(2), Finite Symmetry Group: P and C, SU(2) of Isospin, The group SU(3)

**Quark and Antiquark states:** Mesons, Three quark states: Baryon, color factors, Asymptotic freedom. Charged and neutral weak interactions. Electroweak unification.

**Decay rates and Cross sections:** Feynman diagrams Introduction to Feynman integrals. The Dirac equation. Feynman rules for quantum electrodynamics (no derivation). Moller scattering, trace theorems and properties of gamma matrices, helicity representation at high energies., the electron propagator, the photon propagator.

**Structure of Hadrons:** form factors, e-p scattering, inelastic e-p scattering, Bjorken scaling, Partons, gluons, deep inelastic scattering, evolution equations for parton densities.

**QCD:** Electron positron annihilation into hadrons, heavy quark production, three jet events, QCD corrections, Perturbative QCD, Drell-Yan process

**Weak Interactions:** Parity violation, V-A form of weak interaction, Nuclear beta decay, muon decay, pion decay, charged current neutrino electron scattering, neutrino quark scattering, weak neutral currents, the Cabibo angle, weak mixing angles, CP invariance.

***Suggested Readings***

1. Francis Halzen and Allan D. Martin, Quarks and Leptons: An Introductory Course in Modern Particle Physics, John Wiley and Sons
2. B.R. Martin and G. Shaw, Particle Physics, 2nd edition, J. Wiley and Sons (1997).
3. The Review of Particle Physics, (Particle Data Group)
4. David Griffiths: Introduction to Elementary Particles.
5. Byron Roe: Particle Physics at the New Millennium.
6. Donald Perkin: Introduction to high energy physics.

**CO1:** Basic knowledge nuclear and particle physics. Knowledge and understanding of the elementary particle interactions. Capability of relating the theory predictions and measurements.

**CO2:** Conservation laws in nuclear and particle physics, to determine which nuclear processes and particle processes are allowed and why?

*[Handwritten signatures and names]*  
(Dr. Deepak Bhargava) (Alok Pandya)  
(Dr. Chandan Joshi) (Dr. Manish Kumar)

CO3: the Symmetries and Group Theory, bound states of matter and antimatter; the concept of Feynman diagrams to estimate the rate of particle physics processes, for instance in neutrino scattering

CO4: Quantitatively comparison of theory and experiments for scattering and disintegration processes (Decay rates and cross sections). Formulate the basic elements of calculations of cross sections and decay rates in particle physics

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3		L	H							M
CO4			M			M				H

H = Highly Related; M = Medium L = Low

**MPH023B: Particle Physics- II**

**Credit(s): 4**

**Gauge Symmetries:** U(1) Local gauge invariance and QED, Non-abelian gauge invariance and QCD, massive gauge bosons, spontaneous breakdown of symmetry, the Higgs mechanism.

**Local gauge invariance and Yang-Mills fields:** Lagrangian of the Spontaneous symmetry breaking and the Higgs mechanism, The Weinberg-Salam model and beyond.

**Standard Model of Particle Physics:** Unified models of weak and electromagnetic interactions, flavor group, flavor-changing neutral currents. Weak isospin.

**Quark and lepton mixing:** CP violation. Neutrino oscillations. CKM quark mixing matrix, GIM mechanism, rare processes, neutrino masses, seesaw mechanism

**QCD confinement and chiral symmetry breaking,** instantons, strong CP problem

Dr. Deepak Bhatnagar  
Dr. Manish Cupte  
Dr. Chandan Joshi  
Dr. Manish Kumar



### Suggested Readings

1. Francis Halzen and Allan D. Martin, **Quarks and Leptons: An Introductory Course in Modern Particle Physics**, John Wiley and Sons
2. B.R. Martin and G. Shaw, **Particle Physics**, 2nd edition, J. Wiley and Sons (1997).
3. Particle Data Group, **The Review of Particle Physics**,
4. David Griffiths, **Introduction to Elementary Particles**
5. Byron Roe **Particle Physics at the New Millennium**
6. Donald Perkin, **Introduction to high energy physics**).
7. Martin and Shaw, **Particle Physics**

CO1: to understand the role that global and local symmetries play in modern elementary particle physics and to become acquainted with the concept of symmetry breaking;

CO2: Explain the important properties of elementary particles, and their interactions, in the Standard Model of particle physics. Describe essential experimental results which have lead to the formulation of the Standard Model.

CO3: to introduce the experimental motivation and theoretical framework of the Standard Model (SM) for Electroweak (EW) and Strong interactions (QCD)

CO4: to understand the theoretical framework of Neutrino physics, Higgs mechanism, CKM mass mixing matrix, experiments from accelerators physics

CO5: to develop tools to enable the quantitative calculation of tree-level electroweak cross-sections; to provide a foundation for more advanced studies in particle physics.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3	L				H			M		
CO4		L	H							M
CO5			M			M				H

H = Highly Related; M = Medium L = Low

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Dr. Manish Gupta  
Dr. Manish Gupta  
Dr. Chandan Joshi  
Dr. Chandan Joshi  
Dr. Manish Kumar

**Structure Factor:** Static structure factor and its relation with the pair correlation function. Determination of structure factor by X-ray and neutron scattering. Inelastic neutron scattering and dynamic structure factor, space time correlation function and its relation with dynamic structure factor, properties of space time correlation function. Langevin's equation for Brownian Motion and its modifications. Velocity autocorrelation function, mean square displacement, Relation between velocity autocorrelation function and diffusion coefficient.

**Liquid Metals:** Metallic interactions-Kinetic energy, electrostatic exchange and correlation, Pseudopotential formalism, diffraction model, structure factor, form factor for local and nonlocal potentials, energy eigen states, dielectric screening, Energy wave number characteristics, calculation of phonon dispersion of liquid metals, Band structure energy in momentum and direct space, Ziman's resistivity formula, Green function method for energy bands in liquid metals.

**Quantum Liquids:** Distinction between classical and quantum liquids, criteria for freezing, phase diagram of He-4, He-1 and He-2 Tisza's two fluid model, entropy filter, Fountain effect, superfluid film vehicle, Viscosity and specific heat of He-4, first sound, second sound, third sound and fourth sound, Landau theory: Rotons and Phonons, t-matrix theory of superfluid He. Basic differences in superfluidity in He-3 and He-4.

**Exotic Solids:** Structure and symmetries of liquids, liquid crystals and amorphous solids. Aperiodic solids and quasicrystals; Fibonacci sequence, Penrose lattices and their extension to 3-dimensions, Special carbon solids, Fullerenes and tubules; formation and characterization of fullerenes and tubules. Single wall and multiwall carbon tubules. Electronic properties of tubules. Carbon nanotubule based electronic devices Definition and properties of nanostructured materials. Methods of synthesis of nanostructured materials. Special experimental techniques for characterization of nanostructured materials. Quantum size effect and its applications.

#### References Books

1. Egelestaff: In Introduction to the Liquid State (Chapters 2, 3, 5, 6, 7 and 8.)
2. Hansen and McDonald : Theory of Simple Liquids, (Chapters 3, 5, 7, and 9).
3. D. Pines and P. Nozier: The Theory of Quantum Liquid.
4. W.A. Harrison: Pseudopotentials in the Theory of Metals Benjamin.
5. March, Young and Saupenthal - Many Body Problems.
6. March and Tosi: Atomic Motions in Liquids.
7. March, Tosi and Street: Amorphous Solids and the Liquid State, Plenum, 1985.
8. Dugdale: Electrical Properties of Metals and Alloys.

CO-1 Explain the significance and value of condensed matter physics, both scientifically and in the wider community

CO-2 Critically analyse and evaluate experimental strategies, and decide which is most appropriate for answering specific questions

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 Dr. Manish Gupta (Dr. Chandan Joshi)  
 (Dr. Manish Kumar)



CO-3. Research and communicate scientific knowledge in the context of a topic related to condensed matter physics, in either a technical or non-specialist format

CO-4. Apply key analysis techniques to typical problems encountered in the field

CO-5. Gain and apply discipline-specific knowledge, including self-directed research into the scientific literature.

# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3	L				H			M		
CO4		L	H							M
CO5			M			M				H

H = Highly Related; M = Medium L = Low

## MPH025B: Condensed Matter Physics-II

Credit(s): 4

**Phase Transformation and Alloys:** Equilibrium transformation of first and second order. Equilibrium diagrams. Phase rule. Interpretation of phase diagrams. Substitutional solid solutions. Vegard's law, intermediate phases, Hume-Rothery rules. Interstitial phases (carbides, nitrides, hydrides, borides). Martensitic transitions. structure factor of liquid metal alloys, behaviour of  $s(q)$ , radial distribution function  $g(r)$  and relationship between  $s(q)$  and  $g(r)$

**Disordered Systems:** Disorder in condensed Matter, Substitutional, positional and topographical disorder. Short and long range order. Spinning, sputtering and ion-implantation techniques, glass transition, glass formation ability, nucleation and growth processes. Anderson model for random system and electron localization, mobility edge, qualitative application of the idea of amorphous semiconductors and hopping conduction. Metglasses, Models for structure of metalglasses. Structure factor of binary metallic glasses and its relationship with the radial distribution functions. Discussion of electric, magnetic and mechanical properties of glassy system.

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Dr. Chandan Joshi

Dr. Manish Kumar

Dr. Manish Cupte

**Structure determination/characterization:** Basic theory of X-ray diffraction. Indexing of Debye-Scherrer patterns powder samples, examples from some cubic and non-cubic symmetries. Neutron diffraction-basic interactions, cross section, scattering length and structure factor. Mossbauer effect, hyperfine parameters-Isomer shift, quadrupole splitting and Zeeman splitting. Application of Valence and coordination, site symmetry magnetic behaviour. Discussion in context of Fe<sup>57</sup>.

**Electronic Structure Determination:** Basic principles of X-ray, photo-emission and positron annihilation techniques. qualitative discussion of experimental arrangement and typical results for both simple as well as transition metals.

#### **Suggested Readings (for Condensed Matter Physics I & II)**

1. Egelstaff: An introduction to the liquid state (Chapters 2, 3, 5, 6, 7 and 8).
2. Hansel and Mc Donald: Theory of Simple liquids (Chapters 3, 5, 8 and 9).
3. D.Pines and P. Nozier- The theory of quantum liquids.
4. W.A. Harrison: Pseudo potentials in the theory of metals.
5. March, Yound and Saupenthe: Many Body Problems.
6. March and Tosi: Atomic Motions in Liquids.
7. March, Tosi and Street: Amorphous solids and the Liquids State, Plenum, 1985.
8. Dugdale: Electrical Properties of Metals and Alloys.
9. M. Shimoji: Liquid Metals.
10. P.I. Taylor: A. Quantum Approach to the Solid State, Prentice Hall.

CO-1 Explain the significance and value of condensed matter physics, both scientifically and in the wider community

CO-2 Critically analyse and evaluate experimental strategies, and decide which is most appropriate for answering specific questions

CO-3 . Research and communicate scientific knowledge in the context of a topic related to condensed matter physics, in either a technical or non-specialist format

CO-4. Apply key analysis techniques to typical problems encountered in the field

CO-5. Gain and apply discipline-specific knowledge, including self-directed research into the scientific literature.

#### **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	

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CO3	L				H			M		
CO4		L	H							M
CO5			M			M				H

11. H = Highly Related; M = Medium L = Low

MPH026B: Digital Electronics

Credit(s): 4

**Analog Circuits:** Integrated Circuits (Qualitative Treatment only): Active and Passive components. Discrete Circuit Component. Wafer. Chip. Advantages and Drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (Basic Idea and Definitions Only). Classification of ICs. Fabrication of Components on Monolithic ICs. Examples of Linear and Digital ICs.

**Operational Amplifiers** (Use Black Box approach): Basic Characteristics of Op-Amps. Characteristics of an Ideal Op-Amp. Feedback in Amplifiers. Open-loop and Closed-loop Gain. Frequency Response. CMRR. Virtual ground.

**Applications of Op-Amps:** (1) Inverting and Non-inverting Amplifiers, (2) Adder, (3) Subtractor, (4) Unity follower, (5) Differentiator, (6) Integrator, (7) Zero Crossing Detector.

**Timers** (Use Black Box approach): 555 Timer and its Applications: Astable and Monostable Multivibrator.

**Digital Circuits:** Difference Between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND AND NOR Gates. Exclusive OR and Exclusive NOR Gates.

**Boolean algebra:** De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map.

**Data processing circuits:** Basic Idea of Multiplexers, De-multiplexers, Decoders, Encoders, Parity Checkers.

**Memories:** Read-only memories (ROM), PROM, EPROM.

**Arithmetic Circuits:** Binary Addition. Binary Subtraction using 2's Complement Method).

Half Adders and Full Adders and Subtractors (only up to Eight Bits).

**Sequential Circuits:** RS, D, and JK Flip-Flops. Level Clocked and Edge Triggered Flip-Flops.

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preset and Clear Operations. Race-around Conditions in JK Flip-Flops. Master-Slave JK Flip-Flop (As Building Block of Sequential Circuits).

**Shift registers:** Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out, and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).

**Counters:** Asynchronous and Synchronous Counters. Ring Counters. Decade Counter. D/A and A/D conversion: D/A converter – Resistive network. Accuracy and Resolution.

### Suggested Books

1. D. P. Leach & A. P. Malvino: Digital principles and applications (Glencoe, 1995).
2. Thomas L. Floyd: Digital Fundamentals, 3rd Edition, Universal Book Stall, India, 1998.
3. Robert F Coughlin and Frederick F Driscoll: Operational Amplifiers and Linear Integrated Circuits, 4th Edition, PHI, 1992.
4. R. A. Gayakwad: Op-Amps and Linear Integrated Circuits, Pearson, 2000.

CO-1 Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.

Co-2 To understand and examine the structure of various number systems and its application in digital design.

CO-3 The ability to understand, analyze and design various combinational and sequential circuits.

CO-4 Ability to identify basic requirements for a design application and propose a cost effective solution.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3		L	H							M
CO4			M			M				H

H = Highly Related; M = Medium L = Low

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 (Dr. Manish Gupta)  
 (Dr. Chandan Joshi) (Dr. Manish Kumar)



## MPH027B: Microwave Electronics and Communication

Credits: 4

**Microwave Wave Guides:** Rectangular wave guides: TE, TM and TEM modes in wave guides, power transmission in wave guide, power losses in wave guide, excitation modes in wave guide, Characteristics of standard wave guides.

**Microwave Components:** microwave cavities, microwave attenuators, Scattering parameters, E-H tuner, directional coupler, circulators and isolators, Phase shifter.

**Microwave Tubes:** Linear beam: klystrons, reflex klystrons, TWTs. Microwave Crossed Field Tubes: Magnetrons, forward wave crossed field amplifier (FWCFA), high power gyrotrons. (Operating principle, construction & analytical treatment of above mentioned microwave tubes.)

**Microwave Solid State Devices:** Microwave tunnel diodes, microwave FETs, gunn effect diodes, RWH Theory, LSA diodes, Impatt diodes, PIN diodes, ruby laser, MESFETs and HEMT. (Operating principle, construction and analytical treatment of above mentioned microwave devices.)

**Microwave Measurements:** Detection of microwave power: measurement of microwave low and high power, thermister parameters, thermister mounts, barreters, direct reading barreters bridges, Measurement of wavelengths: single line cavity coupling system, Transmission cavity-wave meter and reaction wavemeter, measurement of VSWR, measurements of attenuation, input impedance.

**Microwave Antennas:** Different types of antennas.

**Modulation and Demodulation:** Types of Modulation. Amplitude Modulation. Modulation Index. Analysis of Amplitude Modulated Wave. Sideband Frequencies in AM Wave. CE Amplitude Modulator. Demodulation of AM Wave using Diode Detector. Idea of Frequency, Phase, and Digital Modulation.

### Suggested Readings

1. R.E.Collin: Foundation of Microwave Engg, McGraw Hill.
2. Samul Liao: Microwave Devices and Circuit, PHI.
3. Sisodia and Raghuvanshi: Microwave Circuits and Passive Devices, Wiley Eastern.
4. David M. Pozar, Microwave Engineering, John Wiley & Sons, Inc.
5. Roddy.D.: "Microwave Technology" Reston Publications (1986).
6. Chatterjee R. "Microwave Engineering" East West Press (1988).
7. Rizzi.P. "Microwave Engineering Passive circuits". Prentice Hall (1987).

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8. Clock.P.N. "Microwave Principles and Systems" Prentice Hall (1986).

CO-1 This course provides the foundation education in microwave devices, amplifier and oscillators. It also includes RF filter design and mixer.

CO-2 To discuss the microwave amplifiers and oscillators basic operation, characteristics, parameters, limitations, various microwave components like E&H plane Tee, Magic tee & phase shifters.

CO-3. Analyze and design basic microwave amplifiers, particularly klystrons, magnetron, and RF filters, basic RF oscillator and mixer models.

CO-4 Become proficient with microwave measurement of power, frequency and VSWR, impedance for the analysis and design of circuits

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3		L	H							M
CO4			M			M				H

H = Highly Related; M = Medium L = Low

**MPH031B: Project (Dissertation)**

**Credit(s): 12**

Work at any University/ Academic Inst./ Research Lab

**MPH032B: Seminar (Presentation of Project Work)**

**Credit(s): 4**

Dr. Deepak Bhatnagar) (Atalok Paruiya)  
 Dr. Manish Gupta) (Dr. Chandan Joshi) (Dr. Manish Kumar)  
 Dr. Manish Gupta)

CO-1: be able to apply the relevant knowledge and skills, which are acquired within the technical area, to a given problem.

CO-2: within given constraints, even with limited information, independently analyze and discuss complex inquiries/problems and handle larger problems on the advanced level within the technical area.

CO-3: Reflect on, evaluate, and critically assess one's own and others' scientific results.

CO-4: Be able to document and present one's own work, for a given target group, with strict requirements on structure, format, and language usage.

CO-5: Be able to identify one's need for further knowledge and continuously develop one's own competencies.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome							Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	H					M				L
CO2		L			H				M	
CO3		L	H							M
CO4			M			M				H

H = Highly Related; M = Medium L = Low

*Prof. Deepak Bhatnagar*

Prof. Deepak Bhatnagar

Dr. Manish Gupta

Dr. Manish Gupta

*Dr. Allok Pandya*

Dr. Allok Pandya

Dr. Chandan Joshi

Dr. Chandan Joshi

Dr. Manish Kumar

Dr. Manish Kumar



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**School of Sciences**

**Department of Zoology**

**Course Structure and Syllabi**

**M.Sc. Zoology**  
**(Session 2022-2024)**

*For*  
*Shirish Kumar*  
*2022*



**JECRC UNIVERSITY**  
**SCHOOL OF SCIENCES**  
**SESSION 2022-2024**

**M.Sc. Zoology**

**Details of Scheme for M Sc. (Zoology) with various Courses and their credits with contact hours are given below:**

**Semester-I**

S. N.	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Biosystematics, Taxonomy and Evolution	MZO001B	4	-	-	4	0	0	4	Core
2	Structure and Function of Invertebrates	MZO002A	4	-	-	4	0	0	4	Core
3	Biochemistry	MBI001A	4	-	-	4	0	0	4	Core
4	Molecular Biology & Biotechnology	MZO009B	4	-	-	4	0	0	4	Core
5	Laboratory Exercises of Biochemistry, Molecular biology, Taxonomy & Invertebrates	MZO005C	-	-	12		0	6	6	Core Practical
			16		12	16		6	22	

**Semester II**

S.No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Biology of Chordates & Immunology	MZO006B	4	-	-	4			4	Core
2	Tools and Techniques	MZO007B	4	-	-	4			4	Core
3	General Physiology	MZO008A	4	-	-	4			4	Core
4	Fundamentals in Quantitative Research Methods	MZO033A	4	-	-	4			4	Core
5	Laboratory Exercises of	MZO010C	-	-	12			6	6	Core Practical



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	Immunology, Physiology, quantitative research methods & Chordates								
			16		12	16		6	22

### Semester III

S. No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Genetics & Developmental Biology	MZO011B	4	-	-	4			4	Core
2	Ethology & Applied Zoology	MZO012C	4	-	-	4			4	Core
3	Laboratory Exercises of genetics, developmental biology, ethology & applied Zoology	MZO017B	-	-	4			2	2	Core Practical
<i>A student has to choose one Discipline elective from each of the following two groups</i>										
<b>Group-A: Entomology.</b>										
4	Insect Diversity, Society and Insect Physiology	MZO031A	4	-	-	4			4	DE
5	Insect Toxicology and Ecology	MZO032A	4	-	-	4			4	DE
6	Agricultural & Medical Entomology	MZO026A	4	-	-	4			4	DE
7	Practicals in Entomology	MZO027A	-	-	8			4	4	DE Practical

Group-B: Environmental Biology									
8	Principles of Ecology	MZO028B	4	-	-	4		4	DE
9	Environment & Natural Resources	MZO015A	4	-	-	4		4	DE
10	Eco-toxicology & Biodiversity conservation	MZO016B	4	-	-	4		4	DE
11	Laboratory Exercises of Environmental Biology	MZO017C	-	-	8		4	4	DE Practical
			20		12	20	6	26	

#### Semester IV

S.No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Project / Dissertation	MZO021B	0	-	0	0		0	16	Core
2	Seminar	MZO022A	0	-	0	0		0	2	Core
3	Review Report/Scientific Writing	MZO029A	0		0	0		0	3	Core
									21	

	I Sem	II Sem	III Sem	IV Sem	Total
Credits	22	22	26	21	91

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**JECRC UNIVERSITY  
SCHOOL OF SCIENCES  
DEPARTMENT OF ZOOLOGY**

**Programme Educational Objectives:**

The programme **M.Sc. in Zoology** aims to equip students with recent advances in Zoology from organismic to reductionist biology. It also aims to empower students to understand the challenges of society and the country that falls into the realms of Zoology, such as Aquaculture, Reproductive health, Behaviour and Biological time keeping, Cancer Biology, Microbiome and their roles in health and diseases, Bioremediation of pollutants and pesticides, etc.

This course is designed to ignite the inquisitive mind to enter into research in interdisciplinary areas. In this program, the student gains an in-depth study of various invertebrate and vertebrate specimens. The purpose of this program is:

- To acquaint students with the identification, systematics, life history, anatomy, and adaptive strategies of the invertebrate and vertebrates and to expose them to field techniques used in their study.
- To inculcate in the students an understanding, appreciation and respect for the other animals which share our planet.
- To make students aware of the various disciplines encompassed by the field of zoology and to encourage them to pursue those areas that interests them through further reading and coursework.
- To understand the systemic and functional morphology of various groups of chordates.
- To know the principles of genetics, pedigree analysis and population genetics.
- To generate up-to-date knowledge on environmental conservation and management through a comprehensive understanding of the components of ecosystem, biological cycles, habitat ecology, resource ecology, pollution and its management.
- To comprehend the chemical constituents of living matter, chemistry of food stuffs and their transformation in animal systems, the energy changes associated with these transformation and hormonal regulation.

**PROGRAM OUTCOMES (PO's)**

**PO1. Disciplinary Knowledge and Skills:** Capable of demonstrating (i) comprehensive knowledge and understanding of major concepts, theoretical principles and experimental findings in Zoology and its different subfields (animal diversity, principles of ecology, comparative anatomy and developmental biology of vertebrates, physiology and biochemistry, genetics and evolutionary biology, animal biotechnology, applied Zoology, aquatic biology, immunology, reproductive biology, and insect, vectors and diseases), and other related fields of study, (ii) ability to use modern instrumentation including detailed and recent update knowledge about the tools and techniques used in zoology.

**PO2. Skilled communicator and digitally literate:** Ability to impart complex technical knowledge relating all areas in zoology in a clear and concise manner in writing and oral skills. Able to describe the Biological applied solutions, capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources and to use appropriate software for analysis of data.

**PO3. Critical thinker and problem solver:** Ability to have critical thinking and efficient problem solving skills in the basic and advanced areas of Zoology (animal diversity, principles of ecology, comparative anatomy and developmental biology of vertebrates, physiology and biochemistry, genetics and evolutionary biology, animal biotechnology, applied Zoology, aquatic biology, immunology, reproductive biology, insect, vectors and diseases etc.).

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**PO4. Sense of inquiry:** Capability for asking relevant/appropriate questions relating to issues and problems in the field of zoology, and planning, executing and reporting the results of a theoretical or experimental investigation.

**PO5. Skilled project manager:** Capable of identifying/mobilizing appropriate resources required for a project, and manage a project to completion, while observing responsible and ethical scientific conduct; and safety and laboratory hygiene regulations and practices. Also acquaint with the instruments used in biological field.

**PO6. Ethical awareness/reasoning and Environmental Sustainability:** Capable of conducting their work with honesty and precision thus avoiding unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, and appreciating environmental and sustainability issues and adopt objective, unbiased and truthful actions in all aspects of work. Research ethics committee expects them to declare any type of conflict of interest that may affect the research. Any plan to withhold information from researchers should be properly explained with justification in the application for ethical approval. Understand the issues of environmental contexts and sustainable development.

**PO7. Self-directed, Team player and Life-long Learners:** Acquire the ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. Capable of working effectively and interact respectfully with diverse teams in classroom, laboratory and in industry and field-based situations. The broad skills and the deeper knowledge in the field would make them highly successful and excellent researcher in advanced areas of research in the Biological sciences. Capable of acquiring knowledge and skills through self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling.



**JECRC UNIVERSITY**  
**SCHOOL OF SCIENCES**  
**DEPARTMENT OF ZOOLOGY**  
**Session 2022-24**

**M.Sc. ZOOLOGY**

<b>SEMESTER -I</b>		
<b>Code</b>	<b>Title of Course</b>	<b>Credits</b>
MZO001B	Biosystematics, Taxonomy and Evolution	4
MZO002A	Structure and Function of Invertebrates	4
MBI001A	Biochemistry	4
MZO009B	Molecular Biology and Biotechnology	4
MZO005C	Laboratory Exercises of Biochemistry, Molecular Biology, Taxonomy & Invertebrates	6
	<b>Total Credits</b>	<b>22</b>
<b>SEMESTER -II</b>		
MZO006B	Biology of Chordates & Immunology	4
MZO007B	Tools and Techniques	4
MZO008A	General Physiology	4
MZO033A	Fundamentals in Quantitative Research Methods	4
MZO010C	Laboratory Exercises of Immunology, Physiology, Quantitative Research Methods & Chordates	6
	<b>Total Credits</b>	<b>22</b>
<b>SEMESTER -III</b>		
MZO011B	Genetics & Developmental Biology	4
MZO012C	Ethology & Applied Zoology	4
MZO017B	Laboratory Exercises of genetics, developmental biology, ethology & applied Zoology	2
	<i>A student has to choose one group of Discipline elective from the following two groups</i>	
	<b>Discipline Elective Group A - ENTOMOLOGY</b>	
MZO031A	Insect Diversity, Society and Insect Physiology	4
MZO032A	Insect Toxicology and Ecology	4
MZO026A	Agricultural & Medical Entomology	4
MZO027A	Practicals in Entomology	4
	<b>Discipline Elective Group B - ENVIRONMENTAL BIOLOGY</b>	
MZO028B	Principles of Ecology	4
MZO015A	Environment & Natural Resources	4
MZO016B	Eco-toxicology & Biodiversity conservation	4
MZO017C	Laboratory Exercises of Environmental Biology	4
	<b>Total credits</b>	<b>26</b>
<b>SEMESTER -IV</b>		
MZO021B	Project / Dissertation	16
MZO022A	Seminar	2
MZO029A	Review Report/Scientific Writing	3
	<b>Total credits</b>	<b>21</b>
	<b>Total Credits of all 4 Semesters</b>	<b>91</b>

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**JECRC UNIVERSITY  
SCHOOL OF SCIENCES  
DEPARTMENT OF ZOOLOGY  
M. Sc. ZOOLOGY (Session 2022-24)**

**SEMESTER-I**

Code	Title of Course	Credits
MZO001B	Biosystematics, Taxonomy and Evolution	4
MZO002A	Structure and Function of Invertebrates	4
MBI001A	Biochemistry	4
MZO009B	Molecular Biology & Biotechnology	4
MZO005C	Laboratory Exercises of Biochemistry, Molecular Biology, Taxonomy & Invertebrates	6
	<b>Total Credits</b>	<b>22</b>

**MZO001B: BIOSYSTEMATICS, TAXONOMY AND EVOLUTION** Credit(s): 4

**Unit I**

Definition and basic concepts of biosystematics and taxonomy- Importance and applications of biosystematics in biology. Material basis of biosystematics-different attributes, Trends in biosystematics

Definition and understanding of various taxonomic categories. Species concepts and species categories –subspecies and infra species. Modern trends in taxonomy- Chemotaxonomy. Cytotaxonomy. Molecular taxonomy. Neotaxonomy. Theories of biological classification. hierarchy of categories

**Unit II**

Taxonomic procedures; collection, preservation, curation and process of identification. Different kinds of systematic Publications. Taxonomic characters of different kinds. Quantitative and Qualitative analysis of variation. Process of typification, different zoological types and their significance.

**Unit III**

Taxonomic Keys: their kinds, merits and demerits. Use of taxonomic keys. International Code of Zoological Nomenclature (ICZN). Interpretation and application of important rules, Zoological nomenclature and formation of scientific names of different taxa. Evaluation of biodiversity indices. Shannon-Weinner index, dominance index.

**Unit IV**

Concepts of evolution and theories of organic evolution with an emphasis on Darwinism, Neo-Darwinism: Gene pool, Gene frequency, Hardy-Weinberg law of genetic equilibrium. Destabilizing forces- Natural selection, Mutation, Genetic drift, Migration. Micro and Macro-evolution.

**Unit V**

Genetics of speciation- Isolation; and role in evolution. Genetics of quantitative traits in populations. Analysis of quantitative traits. Quantitative traits and natural selection. Genotype-environment interactions. Inbreeding depression and heterosis. Molecular analysis of quantitative traits. Phenotypic

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plasticity. Molecular phylogenetics. How to construct phylogenetic trees. Phylogenetic inference- Distance methods, parsimony methods, maximum likelihood method. Immunological techniques.

**Course outcome (CO) :** On completion of the course, students are able to:

CO-1 Understand Definition and basic concepts of biosystematics and taxonomy.

CO-2 Critically analyse the Taxonomic procedures and Taxonomic characters

CO-3 Understand the concept of taxonomic keys, Zoological nomenclature

CO-4 Understand the process of evolution, Lamarckism, Neo-Lamarckism, Darwinism, Neo-Darwinism, Hardy-Weinberg law, destabilizing forces.

CO-5 Understand the concept of Speciation, Isolation, Quantitative traits and Molecular phylogenetics.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	2	1	0	0	2
CO2	3	0	2	1	0	0	2
CO3	3	0	2	1	0	0	2
CO4	3	1	2	2	0	2	0
CO5	3	0	2	1	0	2	0

3 = Highly Related; 2 = Medium 1 = Low

#### Suggested Readings

- Principle of Animal Taxonomy; G.G Simpson. Oxford IBH Publishing Company.
- Elements of Taxonomy. E. Mayer.
- Theory & Practice of Animal Taxonomy. V.C. Kapoor. Oxford & IBH Publishing Co.Pvt. LTD.
- Advancement in Invertebrate Taxonomy & Biodiversity. Rajeev Gupta. AgrobiosInternational.
- Evolution of the vertebrates, Colbert. E.H. John Wiley and Sons Inc., New York.
- Genes and Evolution. Jha A.P. John Publication, New Delhi
- Evolutionary Genetics. Smith, J.M. Oxford University Press, New York.
- Evolution and population genetics, Rashmi Sisodia, Paragon, International Publishers.
- Evolutionary Biology, Futuyama, D.J. Suinuaer Associates, INC Publishers, Sunderland.
- A Primer of Population Genetics. Hart, D.L. suinuaer Associates, Inc, Massachusetts.
- Species Evolution-The role of chromosomal change. King, M. Cambridge University Press. Cambridge.
- Evolution and Genetics Merril, D.J. Holt, Rinehart and Winston, Inc.
- Evolution. Strickberger, M.W. Jones and Barlett Publishers, Boston London

### MZO002A: STRUCTURE & FUNCTION OF INVERTEBRATES Credit(s):4

#### Unit I

Organization of Body: Uni and multi cellular organisms,

Body cavity: Acoelome, Pseudocoelome, Coelome (schizo and enterocoelous)

Fate of Blastopore (Protostome, Deuterostome) and Blastomeres (Determinate and Indeterminate blastomeres)  
Type of cleavage (Spiral and Radial)

## Unit II

Type of symmetry: Body planes, Asymmetry, Radial, biradial, bilateral symmetry  
Segmentation: Pseudo, superficial and metameric  
Locomotion: Flagellar, ciliary movement in Protozoa and Hydrostatic movement in coelenterate, annelid and echinodermata,

## Unit III

Nutrition and Digestion in invertebrates and lower Metazoa. Filter Feeding in Polychaeta, Mollusca and Echinodermata.  
Respiration: respiratory organs in invertebrates (Gills, book lungs and trachea). Mechanism of respiration, respiratory pigments.

## Unit IV

Excretion: Excretory organs in invertebrates (Coelomoducts, Nephridia and Malpighian tubules, organ of bojanus, green gland), Mechanism of excretion  
Nervous System : Primitive type (Coelenterata and Echinodermata) and Advanced type (Annelida, Arthropoda (Crustacea and insecta) and Mollusca (Cephalopoda))

## Unit V

Reproduction: Asexual (*Paramecium*, *Obelia*) and sexual reproduction (annelida, arthropoda and mollusca)  
Larval forms of invertebrates, Evolutionary significance of larval forms.

**Course outcome (CO) :** On completion of the course, students are able to:

- CO-1 Critically analyse the organization, complexity, coelom and cleavage patterns in non-chordates.
- CO-2 Understand the types of symmetry and segmentation, locomotion in invertebrates.
- CO-3 Understand the process of digestion and respiratory organs in invertebrates.
- CO-4 Understand the process of excretion and nervous system in invertebrates.
- CO-5 Understand the modes of reproduction in invertebrates and Evolutionary significance of larval forms

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	2	1	0	0	2
CO2	3	0	2	1	0	0	2
CO3	3	0	2	1	0	0	2
CO4	3	0	2	1	0	0	2
CO5	3	0	2	1	0	0	2

3 = Highly Related; 2 = Medium 1 = Low

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### ***Suggested Readings***

- Invertebrate structure and function. Barrington, E.J.W. Thomas Nelson and Sons Ltd. London.
- Invertebrate Zoology Barnes, RD. W.B.Saunders Co., Philadelphia
- A Biology of higher invertebrates, Russel-Hunter, WD. McMillan Co. Ltd., London
- Text book of Zoology. Parker, T.J., Haswell. W.A.Macmillan Co., London.
- Invertebrates Richard C. Brusca , Gary J. Brusca and Nancy J. Haver

### **MBI001A: BIOCHEMISTRY**

**Credit(s): 4**

#### **Unit- I**

**Chemical foundation of biology:** pH, acids, bases, Buffers, Henderson and Hasselbach equation, pKa, pKb. Preparation of buffers, chemical bonding, properties of water, Gibbs free energy, High energy compounds, ATP Cycle, classification of high energy compounds, Structure of ATP, ATP Production, Chemoosmotic theory

#### **Unit-II**

**Carbohydrates:** Classification and properties of carbohydrates, mono (glucose, galactose and fructose) di (lactose, maltose, and sucrose), poly (starch, glycogen, cellulose). Physical and chemical properties of carbohydrates. Carbohydrate derivatives: mureins, glycoproteins, glycolipids, peptidoglycan. Mutarotation, Ozone formation etc. Role of carbohydrates in signaling, glycosylation of other biomolecules. Metabolism of carbohydrates, Glycolysis, TCA, Gluconeogenesis, Glycogenesis, Glycogenolysis, glyoxalate cycle and their regulations, anaerobic oxidation of glucose, alternative oxidation pathway of glucose (HMP, PPP pathway etc.)

#### **Unit-III**

**Lipids:** Classification, Structure and biological function of fatty acids, triacylglycerols, phospholipids, steroids. Physico-chemical properties and analysis of fats and oils, Structure and functions of prostaglandins, thromboxanes, cholesterol, properties of oil and fats, acid value, iodine number, Saponification number, beta, alpha, and omega oxidation of fatty acids, cholesterol biosynthesis, fatty acids synthesis, oxidation of odd chain fatty acids, Ketone bodies production and degradation

#### **Unit IV**

**Amino acids:** Classification; Structure and physicochemical properties; Peptides Peptide bonds, Proteins-Classification, Primary structure of proteins and its sequence determination

**Proteins:** Secondary (Ramachandran plot), tertiary and quaternary structural features of proteins; Primary structure, Bonds responsible for protein stability. Myoglobin, hemoglobin, fibrous proteins (collagen, keratins, silk fibroin), transamination, urea cycle, deamination oxidative and non oxidative, regulation of urea cycle. Vitamins and Co-enzyme (biological and biochemical functions).

#### **Unit V**

**Nucleic Acids:** Structure of purines, pyrimidine, nucleosides, and nucleotides. Structure, properties and functions of nucleic acids (DNA, RNA), Different forms of DNA and RNA. Three dimensional structure of tRNA, De novo synthesis of purine and pyrimidine and its degradation. Salvage pathway.

**Enzymes-** Nomenclature, Holoenzyme, Apo enzyme, Co enzyme, Kinetics of Enzyme, Mechanism of their action, MM equation, Line Weaver Burk Plot, Inhibition of Enzyme, Reversible, Irreversible and Feed Back

**Course outcome (CO):** On completion of the course, students are able to:

- CO-1 Describe the basics of biomolecules and
- CO-2 Illustrate basis of carbohydrates and its metabolism
- CO-3 Illustrate basis of lipids and its metabolism

- CO-4 Recognize amino acid structures and illustrates the function and metabolism of proteins.  
CO-5 Describe nucleic acids, DNA, RNA and enzymes.

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	2
CO2	3	2	3	1	2	2	1
CO3	3	2	2	1	2	2	2
CO4	2	3	3	2	2	1	2

1-Low, 2-Medium, 3-High

**Suggested Readings**

1. Textbook of Biochemistry. 1968 by West and Todd (MacMillan)
2. Principles of Biochemistry. 1993 by A.L. Lehninger, Nelson and Cox (C.B.S., India).
3. Principles of Biochemistry General Aspects. 1983 by Smith et al., (McGraw Hill)
4. Biochemistry (2nd edition) by Donald Voet and Judith Voet.
5. Biochemistry (4th edition) by L. Stryer (Free man).
6. Textbook of Biochemistry with Clinical Correlation (4th edition) by Thomas M. Devlin.
7. Biochemistry by Zubay.
8. Nucleic acid Biochemistry and Molecular Biology by Main Waring et al., (Blackwell).
9. Biochemistry, 2nd edition by Albert L. Lehninger. 1978. Kalyani Publishers, New Delhi.
10. Biochemical calculations, Irwin H. Segel, John Wiley and sons Inc
11. Organic Chemistry, DJ Cram and GS Hammond

**MZO009B: MOLECULAR BIOLOGY & BIOTECHNOLOGY Credit(s): 4**

**Unit I**

Nucleic acids –DNA & RNA, DNA replication: modes of replication, Prokaryotic and eukaryotic DNA replication, Mechanics of DNA replication, Enzymes and Accessory proteins involved in DNA replication, Models of DNA replication, Inhibitors of DNA replication, DNA repair mechanisms

**Unit II**

Transcription in prokaryotes and eukaryotes: Structural organisation and life span of mRNA; rRNA & tRNA, Mechanism of transcription in prokaryotes and eukaryotes. Post transcriptional modification of RNA- Capping, Polyadenylation, Splicing, RNA editing.

**Unit III**

Genetic code : Characteristics of genetic code, Start codons and stop codons, Degeneracy of the code: Wobble hypothesis  
Translation in prokaryotes and eukaryotes: Aminoacylation of tRNA & initiation, elongation and termination of protein synthesis, Translational inhibitors, Post- translational modification of proteins: protein folding (role of chaperones) and biochemical modifications.

**Unit IV**

Bacterial genetics: Molecular mapping of genome, genetic and physical mapping, Gene transfer mechanisms-Transformation- molecular mechanism, mapping and other uses of transformation, Transduction- generalized transduction, co-transduction and specialized transduction. Bacterial conjugation, Chromosome transfer in other bacteria. Plasmids and Transposons: types and properties.

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## Unit V

Molecular markers in genome analysis (RFLP, RAPD and AFLP).

Principle and technique of genetic engineering: Cutting and joining of DNA molecules. Cloning strategies, gene library and cDNA. Application of recombinant DNA technology, Recombination selection and screening. Nucleic acid probes and their application. Transgenic animals and knock outs. Animal Cloning. Stem cell: types and applications.

**Course outcome (CO) :** On completion of the course, students are able to:

CO1 Understand the structure of nucleic acid, replication process and DNA repair mechanism.

CO2 Analyze the mechanism of transcription in prokaryotes and eukaryotes.

CO3 Explain the translational process for prokaryotes and eukaryotes.

CO4 Understand about Bacterial genetics and Gene transfer mechanisms.

CO5 Understand the concept of Molecular markers in genome analysis, molecular markers, transgenesis and stem cells.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	3	1	0	0	2
CO2	3	0	3	1	0	0	2
CO3	3	0	3	1	0	0	2
CO4	3	0	3	1	0	0	2
CO5	3	0	3	1	0	0	2

3 = Highly Related, 2 = Medium, 1 = Low

### Suggested Readings

- Benjamin Lewin : Genes, Vol. VIII, Pearson Prentice Hall, Singapore
- Elliott, W. H and Elliott, D. C. : Advanced molecular Biology, Viva Books, New Delhi
- Freifelder, D. : Molecular Biology, Narosa Publishing House, New Delhi
- Russel, P. J. : Cell and Molecular Biology, Cengage learning
- Molecular Biology of the Gene. J.D Watson, N.H. Hopkins, J.W. Roberts, J.A. Steiz and AM Weiner The Benjamin/Cummings Pub. Co., Inc., California.
- De Robertis E.D.P. and De Robertis Jr, E.M.F., Cell and Molecular Biology. K. M. Varghese Cop. Bombay.
- Molecular Biology of the Cell (2nd Edition) B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts, and J.D. Watson, Garland publishing. Inc., New York, 1994.
- Cell & Molecular Biology, (8th edition), E D P Roberties & E M F Roberties, Lippincott Williams & Wilkins, 2005.
- The cell, (5th edition), R C Swanson and P C Webster . Prentice hall of India Pvt. Ltd., 1990.
- Cell and Molecular Biology, (3rd edition), P Sheeler and D E Bianchi, John Wiley & Sons, Inc, 1987 Cell and Molecular Biology: Concepts and Experiments, (4th edition), G Karp, John Wiley & sons, Inc., 2005.
- The cell. A Molecular Approach, (4th edition), G H Cooper and R E Hausman, ASM Press, 2007.
- Gene VII, Indian eds. Lewin, B. Oxford university press, Bombay

### MZO005C: Laboratory Exercises of Biochemistry, Molecular Biology, Taxonomy & Invertebrates Credit(s): 6

1. To study and assess taxonomic diversity in a habitat. (grassland, arid land, wet land etc.)

2. To study and identify at least 6-10 orders of insects (upto order level only) by the use of taxonomic keys.
3. To study zooplanktons in different water samples collected from ponds etc.
4. To study methods of Collection, Preservation and curation of specimens.
5. To prepare dichotomous (simple bracket) keys; minimum ten sets from the identified specimens.
6. To identify, classify & study distinguishing features of representatives from :  
Phylum Protozoa- Polystomella, Opalina, Paramecium(Fission & conjugation), Vorticella, Euglena.
7. To identify, classify & study distinguishing features of representatives from :  
Phylum Porifera-Sycon L.S & T.S, Spicules, Spongin fibres, Leucosolenia, Euplectella
8. To identify, classify & study distinguishing features of representatives from :  
Phylum Cnidaria- Obelia,( polyp & Medusa), Millepora, Physalia, Pennatula, Metridium, Madrepora, Alcyonium, Gorgonia, Aurelia.
9. To identify, classify & study distinguishing features of representatives from :  
Phylum Helminthes- Ascaris, Taenia, Planaria
10. To identify, classify & study distinguishing features of representatives from :  
Phylum Annelida- Aphrodite, Leech, Polygordius, Chaetopterus, Neries, Heteroneries, Arenicola.
11. To identify, classify & study distinguishing features of representatives from :  
Phylum Arthropoda- Peripatus, Balanus, Lepas, Limulus, Eupagurus, Julus, Scolopendra, Praying mantis.
12. To identify, classify & study distinguishing features of representatives from :  
Phylum Mollusca- Pinctada, Cypraea, Octopus, Nautilus.
13. To identify, classify & study distinguishing features of representatives from :  
Phylum Echinodermata- Echinus, Holothuria, Antedon, Asterias, ophiothrix
14. To identify and study the larval Stages: Planula, Redia, Miracidium, Sporocyst, Cercaria, Metacercaria Trochophore,
15. To identify and study the larval Stages: Nauplius, Zoea, Mysis, Velligar, Bipinnaria, Echinopluteus, Auricularia, Tornaria
16. To prepare permanent slides of - Hydra, Obelia,
17. To prepare permanent slides of - paramecium, different zooplanktons.
18. To Determine pH of different solutions.
19. To identify unknown carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose, Dextrin & Starch) by suitable tests.
20. To perform the qualitative estimation of proteins in various tissues/food materials.
21. To perform the qualitative estimation of carbohydrate in various tissues/food materials.
22. To perform the qualitative estimation of lipid in various tissues/food materials.
23. To perform the quantitative estimation of glycogen in given sample.
24. To perform the quantitative estimation of glucose in given sample.
25. To perform the quantitative estimation of ascorbic acid in given sample.
26. To estimate the quantitative estimation of sialic acid in given sample.
27. To perform the quantitative estimation of total proteins in given sample.
28. To perform the quantitative estimation of Total lipid and phospholipids in given sample.
29. To perform the quantitative estimation of cholesterol in given sample.
30. To perform the quantitative estimation of Acid phosphatase in given sample.
31. To perform the quantitative estimation of alkaline phosphatase in given sample.
32. To separate proteins and DNA by agarose electrophoresis.
33. To separate proteins and isoenzymes on SDS-PAGE and PAGE.
34. To separate amino acids by paper chromatography.
35. To separate phospholipids by TLC.
36. To prepare salivary gland chromosomes from Drosophila / Chironomous larva and stain with acetocarmine/aceto-orcein/ fuelgen.
37. To estimate DNA by Diphenyl Amine method.
38. To estimate RNA by Orcinol method.
39. To estimate Protein by Lowry's method.
40. To isolate RNA from Yeast.



## SEMESTER-II

MZO006B	Biology of Chordates & Immunology	4
MZO007B	Tools And Techniques	4
MZO008A	General Physiology	4
MZO033A	Fundamentals in Quantitative Research Methods	4
MZO010B	Laboratory Exercises of Immunology, Physiology, quantitative research methods & Chordates	6
	<b>Total Credits</b>	<b>22</b>

### MZO006B: BIOLOGY OF CHORDATES & IMMUNOLOGY Credit(s): 4

#### Unit I

Origin and outline classification of the chordates.  
Salient features and Interrelationships of Hemichordata, Urochordata and Cephalochordata.  
Life – histories of- *Pyrosoma*, *Salpa*, *Doliolum* and *Oikopleura*

#### Unit II

General characters of Agnatha: Ostracoderms and Cyclostomes.  
A general account of the Dipnoi, Difference between chondrichthyes & Osteichthyes.  
Parental care in Amphibia, Neoteny in Amphibia  
Living reptiles: a brief account of Rhynchocephalia.  
Birds. Origin of flight: Flight adaptations. Flightless Birds.  
Origins of mammals: Primitive mammals (Prototheria and Metatheria).

#### Unit III

General account on adaptive radiations in chordates (fishes, amphibians, mammals)  
Development and physiology of extra-embryonic membranes in amniotes.  
Evolution of viviparity, Placentation.  
Metamorphosis in Amphibia, Endocrine control of metamorphosis.  
Regeneration: Morphological and histological process in amphibian limb regeneration.

#### Unit IV

Immunology: Introduction- Innate and adaptive immunity, Cells and organs of the immune system (Primary lymphoid organs, Secondary lymphoid organs, B-lymphocytes, T-lymphocytes and Antigen presenting cells), Humoral and cell-mediated immune responses (CMI), Antigenicity, immunogenicity and Haptens, Factors influencing immunogenicity, Recognition of antigen by B-and T-lymphocytes, Antigens,

#### Unit V

Antibodies: Structure and functions of Antibody Molecules, Molecular structure of Ig, Immunoglobulin classes (IgG, IgM, IgE and IgD and their biological activities).  
Antigen-Antibody Interactions: Strength of Antigen Antibody Interactions, Cross reactivity, precipitation reactions, agglutination reactions,  
Immune effector Mechanisms: Cytokines & Antagonists, Complement System

**Course outcome (CO):** On completion of the course, students are able to:

CO-1 Understand the classification of Chordates and life-histories of *Pyrosoma*, *Salpa*, *Doliolum* and *Oikopleura*.

CO-2 Understand the concepts of parental care, neoteny, flight adaptations, flightless birds, primitive mammals.

CO-3 Analyze the development and physiology of extra-embryonic membranes in amniotes, evolution of viviparity, metamorphosis and regeneration.

CO4 Understand the concept of Immunology, Mechanism of immunity, Immunity regulating cells, Antigens

CO5 Understand the basic structure, classes and function of Antibodies, Antigen-Antibody interaction, complement system

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	3	1	0	0	2
CO2	3	0	3	1	0	0	2
CO3	3	0	3	1	0	0	2
CO4	3	0	3	1	0	0	2
CO5	3	0	3	1	0	0	2

3 = Highly Related, 2 = Medium, 1 = Low

#### Suggested Readings

- Comparative anatomy of vertebrates. Kent. C.G.
- The Biology of Hemichordata and Protochordata. Barrington, E.J.W. Olter and Boyd Edinhourgh.
- Vertebrate Paleontology. Romer. A.S. University of Chicago Press, Chicago.
- Chordata structure and function. Waterman. A.J. Macmillan Co. New York.
- Vertebrate evolution. Joysey. K.A. and T.S. Kemp. Oliver and Boyd. Edinburgh.
- The Phylogeny of vertebrate. Lovtrup. S. John Wiley and Sons. London
- Kuby Immunology, Goldsby R.A., Kindt Thomas J., Osbarne B.A., WH Freeman & Company, (2000).
- Roitt's essential Immunology, Roitt I.M. and Delves P.J., Blackwell Science Ltd., (2001).

### MZO007B: TOOLS AND TECHNIQUES

Credit(s): 4

#### Unit I

Principle and application of:- Light & electron microscopy  
Principle, types and applications of Centrifugation

#### Unit II

Principle, types and applications of:- Electrophoresis  
Principle, types and applications of:- Chromatography,

#### Unit III

Spectrophotometry : X-ray diffraction, Lamberts – Beer's Law and Colorimetry, Flow cytometry  
Principle and application of : radiation techniques in biology, Radioisotopes and half-life of isotopes, Geiger Muller counter, Scintillation Counter, Autoradiography,

#### Unit IV

Principles and technique of :- Nucleic acid hybridization and cot curves, Blotting techniques (southern, northern and western), Polymerase chain reaction  
Assay: Definition and types - Chemical assays, Biological assays-in vivo and in vitro assays.  
Principles of cytological and cytochemical techniques: Fixation & staining



## Unit V

Cell Culture techniques: Design of tissue culture laboratory, Culture media preparation and cell harvesting methods, cell cloning  
Immuno-techniques -Detection of molecules using ELISA, RIA, Western Blot, Immuno-precipitation, Monoclonal antibodies-Hybridoma Technology and Applications, Production of monoclonal antibodies, Clinical uses of monoclonal antibodies

**Course outcome (CO):** On completion of the course, students are able to:

- CO1 Understand the Principle and applications of Light & electron microscopy, Centrifugation
- CO2 Describe and compare different types of electrophoresis and chromatographic techniques.
- CO3 Acquire skills to analyze spectrometric and radiation techniques, autoradiography.
- CO4 Understand the Principles of blotting techniques, types of Assays, cytochemical techniques.
- CO5 Understand the concept of Cell Culture techniques, Immuno-techniques, monoclonal antibodies.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	1	0	0	2
CO2	3	1	3	1	0	0	2
CO3	3	1	3	1	0	0	2
CO4	3	1	3	1	0	0	2
CO5	3	1	3	1	0	0	2

3 = Highly Related, 2 = Medium, 1 = Low

## Suggested Readings

- Animals Cell Culture - A practical approach, John R.W.Masters, IRL Press.
- Introduction to Instrumental analysis. Robert Braun. McGraw Hill International Edition
- Principles and Techniques of Biochemistry and Molecular Biology, (6th edition), K Wilson and J Walker (editor), Cambridge University Press,
- Cell and Molecular Biology, P Sheeler and D E Bianchi, John Wiley & Sons, Inc,
- Essentials of Biophysics, P Narayanan, New Age Int. Pub. New Delhi.
- Bioinstrumentation, J G Webster, John Wiley & Sons Inc.
- Methods in Modern Biophysics, B Notting, Springer Verlag Berlin Heidelberg New York,
- Spectroscopy for the Biological Sciences, G G Hames, John Wiley & Sons Inc.

## MZO008A: GENERAL PHYSIOLOGY

Credit(s): 4

### Unit I

Digestion and Metabolism: Nature of food-stuff, various types of digestive enzymes and their action in alimentary canal, Absorption and assimilation of food, control of digestion.  
Circulatory system: Composition and function of blood, blood groups, Haemopoiesis, blood clotting, homeostasis, anatomy of heart structure, Myogenic heart, cardiac cycle, ECG – its principle and significance.

### Unit II

Mechanism of breathing, Physiology of respiration, Oxygen and Carbon dioxide transport in blood, The role of hemoglobin, control of breathing. Gas Exchange and Acid-base Balance: Respiratory organs (lungs).  
Excretory system: Osmoregulation in aquatic and terrestrial environments, physiology of Excretion -Functional architecture of nephron, formation and regulation of nitrogenous end products, formation of urine and its hormonal control, Role of kidney in osmoregulation, counter- current multiplier system.

### Unit III

Muscle Function and Movement: Types and properties of muscles, Anatomy of muscle, Regulation of contraction, Excitation-contraction coupling, Molecular theory of muscle contraction, Cori cycle. Nervous system: Functional architecture of neurons, Origin and propagation of nerve impulse through neuron (myelinated, non-myelinated), Action potential, Synapses and neurotransmitters, Reflex arc and reflex action.

### Unit IV

Sensory Transduction: Auditory receptors, Chemoreceptors; taste and smell, Mechanoreceptors, Vision and Photoreception, Thermoreception.

Stress Biology : Basic concepts of environmental stress and strain, Adaptation, Acclimation and acclimatization, Concept of Homeostasis, Physiological response to oxygen deficient stress.

### Unit V

Endocrinology: Hormones as messengers. Classification of hormones, endocrine glands (Pituitary, pancreas, adrenal, thyroid, testes, ovary).

Neuroendocrine system and neurosecretion, General principles, structure and hormone action.

**Course outcome (CO) :** On completion of the course, students are able to:

CO1 Understand the Physiology of Digestion & Circulation.

CO2 Understand the Physiology of Respiration & Excretion.

CO3 Understand the Physiology of muscle contraction & nerve impulse and Reflex Action.

CO4 Understand the concept of Sensory Transduction and Stress Biology.

CO5 Understand the Physiology & Types of Endocrine glands.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	3	1	1	0	2
CO2	3	0	3	1	1	0	2
CO3	3	0	3	1	1	0	2
CO4	3	0	3	1	1	0	2
CO5	3	0	3	1	1	0	2

3 = Highly Related, 2 = Medium, 1 = Low

### Suggested Readings

- Animal Physiology Mechanisms & Adaptation, Eckert, R.W.H. Freeman & Company, New York
- General and Comparative Animal Physiology, Hoar, W.S. Prentice Hall of India.
- Animal Physiology: adaptation and Environment, Schiemdt Neilsen. Cambridge
- Environmental and Metabolic Animal Physiology, Prosser, C.L. Wiley-Liss Inc., New York.
- General and Comparative Endocrinology, E.J.W. Barrington. Oxford. Clarendon Press.
- Comparative Vertebrate Endocrinology. P.J. Bentley. Cambridge University Press.
- Text Book of Endocrinology, R.H. Williams. W.B. Saunders.
- Endocrine Physiology. C.R. Martin. Oxford Univ. Press.
- Comparative Endocrinology, A. Gorbman et al. John Wiley & Sons.

### MZO033A: FUNDAMENTALS IN QUANTITATIVE RESEARCH METHODS Credit(s):4

#### Unit I

Introduction: Biostatistics: Definition, Terms, Applications & Role of biostatistics in modern research.



Data collection: Types of data: Primary, secondary, qualitative, quantitative  
Methods of data collection and classification: Types of sampling method- Advantages and disadvantages of census and sampling method, Classification of data, Tabulation, Methods of classification, Class intervals- exclusive and inclusive method,  
Diagrammatic and graphical presentation of data, Bar diagram – (types), Pie diagram, Histograms, Frequency polygon, Frequency curve (types- skewness, kurtosis, ogive)

#### Unit II

Statistical Methods: Measures of central tendency and dispersal, Mean, median, mode, quartile; Range, Mean deviation, Quartiles deviation, variance, Standard deviation, Standard error, degree of freedom, Standard error of mean.

Probability distributions: Basic concepts and definition; Laws of probability, Probability distribution: Binomial, Poisson and Normal

#### Unit III

Correlation and Regression : Types of correlation, Methods to measure correlation, types of Regression analysis, differences between regression and correlation analysis.

Statistical inference: Difference between parametric and non-parametric statistics; Testing of hypothesis, Errors, Student's t-test, F-test, Testing goodness of Fit, Chi-square test, Chi-square distribution and characteristics, Applications of Chi-square test. Yate's correction. Analysis of Variance (ANOVA) One-way classification. Two-way classification.

#### Unit IV

Basic Concepts of Research : Introduction, definition and characteristics and objective of research, types of research (Descriptive vs analytical; applied vs fundamental; quantitative vs qualitative; conceptual vs empirical), research approaches, significance of research, research methods versus methodology, research in decision making, role of research in various areas, limitations of research, Literature-review and its consolidation; Library research; field research; laboratory research, formulation of a research problem and hypothesis testing

#### Unit V

Data Collection and Documentation of Observations: Maintaining laboratory record; Tabulation and generation of graphs. Imaging of tissue specimens and application of scale bars. The art of field photography.

Overview of Biological Problems: History; Key biology research areas, Model organisms in biology (A brief overview)

Ethics and Art of Scientific Writing: Authors, acknowledgements, reproducibility, plagiarism, Numbers, units, abbreviations and nomenclature used in scientific writing. Writing references. Power-point presentation. Poster presentation. Scientific writing and ethics, Introduction to copyright-academic misconduct / plagiarism.

**Course outcome (CO) :** On completion of the course, students are able to:

CO-1 Understand the Functions, scope and application of biostatistics, Data Classification and Graphical presentation of frequency distribution.

CO-2 Understand the measures of central tendency and dispersion like Computation of arithmetic mean, mode and median, Standard Deviation, Standard error of mean and Probability distributions.

CO-3 Understand the concept of correlation and regression, student's 't' test, F-test, chi-square test, ANOVA

CO-4 Understand the concept of research and different types of research in the context of biology and to have basic awareness of Scientific Methods and Research

CO-5 Develop competence on data collection and process of scientific documentation and Analyze the ethical aspects of research and Evaluate the different methods of scientific writing and reporting

15



# MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	2	1	0	0	2
CO2	3	0	2	1	0	0	2
CO3	3	0	2	1	0	0	2
CO4	3	3	2	2	0	0	2
CO5	3	2	3	2	1	3	2

3 = Highly Related; 2 = Medium 1 = Low

## Suggested Readings

- Agarwal, B.L. (1996) Basic statistics, New Age International(P) Ltd. Publishers, New Delhi.
- Bailey, N.T.J. (1981) Statistical methods in Biology, Hodder and Stongtton, London.
- Campell, R.C. (1978), Statistics for biologists. Blacker and Sons Publishers, Bombay.
- Gupta, C.B. and Gupta, V. (2002) Statistical methods. Ika's Publishing House, New Delhi.
- Rostogi, V. B. (2009) Fundamentals of Biostatistics. Ane's Students Edition New Delhi.
- Dawson, C. (2002). Practical research methods. UBS Publishers, New Delhi.
- Stapleton, P., Yondeowei, A., Mukanyange, J., Houten, H. (1995). Scientific writing for agricultural research scientists – a training reference manual. West Africa Rice Development Association, Hong Kong.
- Ruzin, S. E. (1999). Plant microtechnique and microscopy. Oxford University Press, New York, U.S.A.
- S. C. Gupta. Fundamentals of Statistics. Himalaya Pub. House.

## MZO010: LABORATORY EXERCISES OF IMMUNOLOGY, QUANTITATIVE RESEARCH METHODS & CHORDATES

Credit(s): 6

- To identify, classify & study distinguishing features of representatives from : Lower Chordates: Salpa, Doliolum, Botrylus, Herdmania, and Amphioxus.
- To identify, classify & study distinguishing features of representatives from : Cyclostomata: Petromyzon, Myxine, Pisces: Pristis, Trygon, Chimaera, Polydon,
- To identify, classify & study distinguishing features of representatives from : Pisces: Acipenser, Amia, Lepidosteus, Protopterus, Lepidosiren, Neoceratodus, Notopterus,
- To identify, classify & study distinguishing features of representatives from : Pisces : Exocoetis, Echinoides, Pleuronectes, Diodon, Tetradon, Ostracion,
- To identify, classify & study distinguishing features of representatives from : Syngnathus, Hippocampus, Anguilla, Labeo.
- To identify, classify & study distinguishing features of representatives from : Amphibia: Ichthyophis, Necturus, Proteus, Ambystoma, Axolotl,
- To identify, classify & study distinguishing features of representatives from : Amphibia: Siren, Alytes, Pipa, Bufo, Hyla, Rhacophorus.
- To identify, classify & study distinguishing features of representatives from : Reptilia: Testudo, Chelonea, Sphenodon, Calotes, Hemidactylus, Phrynosoma, Draco, Varanus,
- To identify, classify & study distinguishing features of representatives from : Reptilia: Chamaeleon, Cobra, Hydrophis, Viper, Pit Viper, Krait, Eryx, Gavius, alligator, crocodile.
- To identify, classify & study distinguishing features of representatives from : Aves: Talor Bird, Indian koel, Jungle fowl, Pavo cristatus, Columba, parrot, Wood packer, ostrich, Archéopteryx.
- To identify, classify & study distinguishing features of representatives from : Mammals: Ornithorhynchus, Echidna, Macropus, Hedgehog, Manis, Loris, Bat.

11. To identify and study the permanent slides of: Lower Chordates: *Herdmania* spicules, ascidian tadpole larva, *Amphioxus* T. S. passing through oral hood, pharynx, testes, ovary, intestine and caudal regions. Ammocoete larva (whole mount).
12. To identify and study the permanent slides of: Pisces: Placoid scale, Cycloid scale, Ctenoid scale.
13. To identify and study the permanent slides of: Amphibia: V S skin of Frog, T S passing through stomach, duodenum, intestine, liver, pancreas, lung, kidney, testes, ovary.
14. To identify and study the permanent slides of: Reptilia: V S skin of lizard.  
Aves: V S skin of bird, contour feather, down feather.
15. To identify and study the permanent slides of: Mammals: V S skin of mammals, T S passing through stomach, intestine, liver, pancreas, kidney.
16. To identify and study the permanent slides of: Mammals: testes, ovary, thyroid gland, adrenal gland, pituitary gland, lung, bone, spinal cord.
17. To study a comparative account of Skull of Frog, Varanus, Fowl and Rabbit.
18. To study a comparative account of pectoral girdle of Frog, Varanus, Fowl and Rabbit (both articulated and disarticulated).
19. To study a comparative account of pelvic girdle of Frog, Varanus, Fowl and Rabbit (both articulated and disarticulated).
20. To study a comparative account of forelimb of Frog, Varanus, Fowl and Rabbit (both articulated and disarticulated).
21. To study a comparative account of hindlimb of Frog, Varanus, Fowl and Rabbit (both articulated and disarticulated).
22. To perform the Differential leucocytes count.
23. To separate serum from blood.
24. To Study the Double immuno diffusion test using specific antibody and antigen.
25. To identify blood groups in man.
26. To demonstrate agglutination reaction.
27. To demonstrate ELISA technique.
28. To determine haemoglobin in given blood samples.
29. To enumerate the RBC in given blood samples.
30. To enumerate the WBC in given blood samples.
31. To enumerate the MCV, MCH, MCHC of the given sample of blood.
32. To determine the blood clotting time, erythrocyte sedimentation rate, haemolysis and crenation.
33. To study and prepare frequency tables, bar diagrams, histograms, frequency curves, ogives and pie diagrams.
34. To calculation standard deviation and coefficient of variation.
35. To estimate significance between samples using Student's t-test, F-test and Chi-square test..
36. To plot regression lines and calculate correlation and regression analysis.
37. To study analysis of variance (One-way & Two-way classification).
38. Introduction to the statistical software like R and SPSS
39. Use of excel sheet and graph pad Prism for data processing.
40. Use of search engines like Pub-Med, Scopus, Science direct for reference material collection and management.

### SEMESTER-III

MZO011B	Genetics & Developmental Biology	4
MZO012B	Ethology & Applied Zoology	4
MZO017B	Laboratory Exercises of genetics, developmental biology, & ethology & applied Zoology	2
Discipline Elective Group A - ENTOMOLOGY *		
MZO031A	Insect Diversity, Society and Insect Physiology	4
MZO032A	Insect Toxicology and Ecology	4
MZO026A	Agricultural & Medical Entomology	4
MZO027A	Practicals in Entomology	4





Ageing- cellular and extra cellular aging. Causes- Wear and tear, Oxidative damage, Mitochondrial genome damage, genetically programmed ageing.

**Course outcome (CO) :** On completion of the course, students are able to:

- CO1 Understand the concept of Reproductive Genetics, mutation and teratology..
- CO2 Understand the concept of Molecular Diagnosis, Prenatal Diagnosis, Genetic counseling, Eugenics, Euthenics, Euphenics
- CO3 Understand the Basic concepts of development, Environmental regulation of animal development and sex determination.
- CO4 Understand the process of gametogenesis and Cellular and Molecular basis of development.
- CO-5 Understand the concept of Embryogenesis and Organogenesis, ageing.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	3	1	2	0	2
CO2	3	0	3	1	2	2	2
CO3	3	0	3	1	0	0	2
CO4	3	0	3	1	0	0	2
CO5	3	0	3	1	0	0	2

3 = Highly Related, 2 = Medium, 1 = Low

#### Suggested Readings

- Gardnor: Principles of Genetics
- Pierce Benjamin: Genetics- A Conceptual Approach
- Scriver *et al.*: The metabolic and molecular basis of inherited diseases. 8th edition, McGraw-Hill.
- Stratchan, T. and Read, A.P.: Human molecular Genetics. John Wiley, New York
- Tomarin Robert, H: Principles of Genetics
- Development Biology S.F. Gilbert, Sinauer Associates Inc., Massachusetts
- An Introduction to embryology, Balinsky, B.I.: W.B. Saunders Comp.
- Developmental Biology. R.M Twyman. Viva Books Private Limited. New Delhi.
- Principles of Development. Wolpert, L. Oxford University Press, Oxford, UK.
- Berril, N. J. Developmental biology.
- Snustad, D. P., J. M. Simmons & J. B. Jenkins. Principles of Genetics.
- Development Biology. Berrill, N.J. McGraw Hill book Com. New York.
- Modern Embryology: Bodemer, C.W.: Holt Reinchart and Winstom, Inc. New York. Chicago.

#### MZO012C: ETHOLOGY AND APPLIED ZOOLOGY

Credit(s): 4

##### Unit I

Introduction of Ethology: Aims of Behavioural research. Diversity of animal behaviour, Historical perspective, Mechanism of behavior: Neural control of behavior, sensory processes and perception, Complex behavior: Instinct and learning, Concepts of Ethology: Fixed Action Pattern, ASE, Sign Stimulus, Innate Releasing Mechanism.

##### Unit II

Orientation: Mechanism of orientation: primary and secondary orientation; kinesis and taxis. Learning: Definition and forms: habituation, classical conditioning, operant conditioning, latent learning, social learning, Imprinting.



Homeostasis and behavior, Hormonal regulation of behaviours. Brain and behaviour.

### Unit III

Behavioural genetic; Parental care and mating systems

Altruism: reciprocal altruism, group selection, kin selection and inclusive fitness.

Social organization: Dominance hierarchies and Territoriality, Animal communication: Dance language of Honey bee, Migration: Fish (Catadromous and Anadromous), Birds.

### Unit IV

Economic importance of Protozoa and Helminthes, Arthropods, Mollusca.

Important insect pest and their management.

Edible Freshwater and Marine Fishes of India and products of fishing industry, Fishes diseases

### Unit V

A brief account of sericulture, apiculture, vermiculture, lac culture and pearl culture.

Pisciculture, Prawn fisheries, Poultry, Basic concepts in dairy sciences

**Course outcome (CO) :** On completion of the course, students are able to:

CO1 Demonstrate knowledge of key concepts in animal behavior

CO2 Understand the concepts of orientation, learning and Hormonal regulation of behaviour.

CO3 Understand the concept of Parental care and mating systems, Altruism and Sociality in animal systems.

CO4 Understand and study the economical importance of Protozoa, Helminthes, Arthropods, Mollusca and a basic idea of IPM, Recognize Edible Freshwater and Marine Fishes of India

CO5 Understand general topics like vermiculture, Apiculture, Sericulture, lac culture, Pearl culture. Pisciculture, prawn culture, poultry, dairy industry

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	3	1	0	0	2
CO2	3	0	3	1	0	0	2
CO3	3	0	3	1	0	0	2
CO4	3	0	3	1	1	0	2
CO5	3	0	3	1	1	0	2

3 = Highly Related, 2 = Medium, 1 = Low

### Suggested Readings

- An Introduction to Animal Behaviour (6th Edition). Aubrey Manning and Marian Stamp Dawkins, Cambridge University Press.
- Animal Behaviour: An Evolutionary Approach, 9th Edition. John Alcock, Sinauer Associate Inc., USA, 2009.
- Animal Behaviour (11th Edition). Dustin R. Rubenstein and John Alcock, Sinauer Associate Inc., USA, 2018.
- Neuroscience of Emotion: A New Synthesis. Ralph Adolphs and David J. Anderson, Princeton University Press, 2018.
- Economic Zoology by G.S Shukla & V.B. Upadhyay, 1991-92 Rastogi Publications, Meerut.
- A hand book on Economic Zoology by Jawid Ahsan and Subhas Prasad Sinha, S. Chand & company Ltd. Ramnagar.
- Dennis, H. (2009). Agricultural Entomology. Timber Press (OR).
- Hafez, E. S. E. (1962). Reproduction in Farm Animals. Lea & Fabiger Publisher

- Dunham R.A. (2004). Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications. U.K.
- Pedigo, L.P. (2002). Entomology and Pest Management, Prentice Hall.
- Manning An introduction to behaviour Edward. Arnold.London
- Animal behaviour,R.A. Publication Mc Graw Hill Co.New York.
- Animal Societies and Evolution : Scientific Ameridan Publications.
- Animal behaviour : Mac Farland D. Publications,ILBS.
- Animal behaviour : Werlace, R.A. Publ. Goodyear Publishin Co Inc.
- Grizimek's encyclopaedia of Ethology.
- Hand book of Ethological method Laharen.Publ.Garland STPM Press.
- Animal behaviour- Reena Mathur, Rastogi Publications Meerut.

**MZO017B: LABORATORY EXERCISES OF GENETICS, DEVELOPMENTAL BIOLOGY, ETHOLOGY & APPLIED ZOOLOGY** Credit(s): 2

1. To study Karyotyping of normal human cells.
2. To study Karyotyping of abnormal human cells.
3. To study the developmental stages of Frog.
4. To study the developmental stages of Chick embryo.
5. To study the chick embryo culture.
6. To study the life cycle and developmental stages of *Drosophila melanogaster*.
7. To study the sex chromatin.
8. To prepare slide of salivary gland , polytene chromosome from *Drosophila* larva.
9. To study various meiotic stages in Grass hopper – (testes –squash preparation).
10. To study various mitotic stages in onion root tip by squash preparation.
11. To study chromosomal basis of Inheritance.
12. Isolation of mitochondria from liver tissue by differential centrifugation.
13. To study the geotaxis, phototaxis, chemotaxis and hydrotaxis of earthworm.
14. To study the Fixed action pattern in spider.
15. To study the Territorial behaviour in stray dogs.
16. To study and prepare slides of protozoan species of economic importance.
17. To study selected species of Platyhelminthes of economic importance.
18. To study the characters of Mites, Ticks, Spiders, Insects.
19. To study the Life cycle of silk worm.
20. To study the Life cycle of honey bee.
21. To study the Life cycle of mosquitos.
22. To Visit a fish industry/Poultry farm/ Dairy/ Leather industry etc.
23. To prepare and study protozoan culture.

**Discipline Elective**

**Group A - ENTOMOLOGY**

**MZO031A: INSECT DIVERSITY, SOCIETY & INSECT PHYSIOLOGY** Credits-4

**Unit I**

Introduction to insects and their biology: Morphology: external features and their articulation. Comparative study of head-antennae, mouth parts; thorax – legs, wings; abdominal appendages, genitalia of the different orders of insects



## Unit II

Historical development of classification of insect: basis of insect classification; classification of insects up to sub orders and up to super families in economically important groups

Insect Society: group of social insects and their social life. Evolution of sociality; Social organization and social behaviour in honey bee, ants, termites, aphids and wasps

## Unit III

Integumentary system: Structure, function & formation, Growth, Moulting and Metamorphic development, hormonal influence, Sclerotization.

Respiratory system: Tracheal system and physiology of gas exchange.

## Unit IV

Digestive & Excretory system: Alimentary tract, digestive and excretory physiology, Malpighian tubules, osmoregulation.

Circulatory system: Open circulatory system, hemolymph, hemocytes, Immunity and thermoregulation

## Unit V

Reproductive system: Female & Male reproductive systems; Usual and unusual modes of reproduction.

Nervous system: Components of the nervous system, Sensing the environment - Sensory receptors, vision & acoustics.

Endocrine system: Insect hormones- with reference to metamorphosis & reproduction

**Course outcome (CO) :** On completion of the course, students are able to:

CO1 Critically analyze the value and importance of insects, the basic biology and the significant identification characters of the insects belonging to different orders.

CO2 Recognize the insects upto suborders and understand the concept of insect societies and would develop an ability to appreciate their implications on societal impacts.

CO3 Understand the structure and function of various physiological systems like integumentary and Respiratory system operating in insects

CO4 Understand the properties, processes, and functions of insect systems like Digestive, Excretory and Circulatory system.

CO5 Identify the influence/control (neural and/or hormonal) within each system and develop a sense of how physiology can be infused in major research topics in entomology.

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	3	1	1	0	2
CO2	3	0	3	1	1	0	2
CO3	3	0	3	1	1	0	2
CO4	3	0	3	1	1	0	2
CO5	3	0	3	1	1	0	2

3 = Highly Related, 2 = Medium, 1 = Low

## Suggested Reading:

- A general text book of entomology, Imms, A. D., Chapman & Hall, UK
- Introduction to the study of insects, Borror, D. J., Triplehorn, C. A., and Johnson, N. F., M Saunders College Publication, USA
- Principles of Insect Morphology, Snodgrass, R. E., Cornell Univ. Press, USA



- The Insect Societies. Wilson, E. O., Harvard Univ. Press, UK
- Whitfield, J. B. and A. H. Purcell III. 2014. Daly and Doyen's Introduction to Insect Biology and Diversity. 3rd Edition. Oxford University Press, Oxford, UK.
- The Principles of Insect Physiology, Wigglesworth, Vincent B, Chapman & Hall Ltd. USA.
- The Insects: Structure and function, Chapman, R. F., Cambridge University Press, UK
- Physiological system in Insects, Klowden, M. J., Academic Press, USA
- The Insects, An outline of Entomology, Gullan, P. J., and Cranston, P. S., Wiley Blackwell, UK
- Insect Physiology and Biochemistry, Nation, J. L., CRC Press, USA

## **MZO032A: INSECT TOXICOLOGY AND ECOLOGY**

**Credits-4**

### **Unit I**

Introduction : Definition of pesticides, brief history, pesticides registration, pesticide industries and markets in world and India.

Toxicology of pesticides : LD50 and LC 50 , Dose-response relationship; Carcinogenic, Mutagenic and Teratogenic effects, Method of testing chemicals on insect and evaluation of toxicity.

### **Unit II**

Group characteristics and function of pesticides :Organochlorines, Organophosphorus insecticides, Carbamates, Pyrethroids, other plant origin bio-insecticides, neonicotinoids and nitrogenous insecticides; fumigants; IGRs, attractants, repellents and anti-feedants. Properties of few individual insecticides i.e. DDT, HCH (BHC), Lindane, Endosulfan, Parathion, Malathion, Carbaryl, Cypermethrin, etc.

### **Unit III**

Mode of action : Central Nervous system, Acetylcholinesterase and unknown modes of action.

Metabolism of insecticides: Phase I and Phase II reactions and metabolism of other pesticides.

Toxicological symptoms of Organochlorines, Organophosphorus, Carbamates, Pyrethroids, plant origin insecticides and other bioinsecticides.

### **Unit IV**

Safer pesticides:Next generation molecules to be used as pesticides for plant protection and their chemistry.Nano-pesticides: Use of nanopesticides in plant protection, delivery technology and their behavior in different ecosystem.

Therapy and antidotes: Type and severity of contamination and medical aid.

### **Unit V**

Ecology and biodiversity of insects: Insect biodiversity and their functioning in Terrestrial and aquatic ecosystem, Restoration of terrestrial ecosystem using the soil biota.

Global environmental impact on insects: Impact of global climatic changes on insect behavior, physiology and reproduction.

Toxic chemicals and survival of insects: Impact of Pesticides, Heavy Metals, Pharmaceuticals and other pollutants on insect physiology, their survival, reproduction and biodiversity.

**Course outcome (CO) :** On completion of the course, students are able to:

CO1 Understand the concept of pesticides and Toxicology of pesticides.

CO2 Understand about Group characteristics and function of pesticides, insecticides, bio-insecticides.

CO3 Understand and analyze the Mode of action, metabolism and Toxicological symptoms of insecticides.

CO4 Analyze handling of the pesticides in crop protection and understand the therapy and antidotes at the time of poisoning.

CO5 Understand the biodiversity of insects in different ecosystems and the impact of global climatic changes on insects diversity and their behaviour

## MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	1	0	0	2
CO2	3	1	3	1	0	0	2
CO3	3	1	3	1	0	0	2
CO4	3	1	3	1	0	0	2
CO5	3	1	3	1	0	0	2

3 = Highly Related, 2 = Medium, 1 = Low

### Suggested Reading:

- Toxicology and Risk Assessment: A Comprehensive Introduction, Greim H., and Snyder, R. (ed), John Wiley and Sons, UK
- The Complete Book of pesticide management, Whitford, F., Wiley Interscience, John Wiley and Sons, UK
- Safer Insecticides, Hodgson, E., and Kuhr, R. J., (ed), Marcel Dekker Inc., New York, USA
- Pesticide Application Methods, Matthews, G. A., Blackwell Science, London, UK
- Pesticide Biochemistry and Physiology, Wilkinson, C. F., Plenum Press, New York, UK
- Metabolic pathways of agrochemicals Part II, Roberts, T. R., and Hutson, D. H. The Royal Society of Chemistry, UK
- Chemical Ecology of Insects, Carde, R. T., and Bell, W. J., Chapman & Hall, New York, USA

## MZO026A: AGRICULTURAL & MEDICAL ENTOMOLOGY Credits-4

### Unit I

Agricultural Entomology: Agricultural pests: Pest status and factors responsible for achieving the status of pest, economic injury level, economic threshold, action threshold, pest spectrum, pest complex, carrying capacity, secondary pest outbreak, pest surveillance and sampling.

Insect Plant Interactions - Theory of co-evolution, role of allelochemicals in host plant mediation, tritrophic interaction, host-plant selection by phytophagous insects, establishment of insect population on a plant surface.

### Unit II

Crop pests biology & control: Identification, seasonal history, nature of damage and control measures of pests, of cereals, pulse crops, cotton, vegetables (summer vegetable and winter vegetable), oil seeds, fruit crops, sugarcane and stored grains.

Locusts- different species and phases, phase transition, periodicity, migration, biology and control measures.

### Unit III

Integrated Pest Management: Physical, Cultural, Chemical, Biological control, Genetic methods (SIT, FI sterility, etc) and biotechnological methods of pest control. Biorational methods (Using Pheromones, JH mimics, MH agonists, etc) in pest management.

Stored grain pests: Control and quarantine

Plant resistance to insects: types of resistance, mechanism of resistance-antibiosis, antixenosis, tolerance, factors mediating resistance. Transgenic plants (using genes of *Bacillus thuringiensis*, etc) by recombinant DNA technology, resistance management of Bt crops.

### Unit IV

Medical Entomology: Introduction-Vector biology, medical importance and management of the medically important insects (fleas, lice, bugs, mosquitoes and flies); Modes of Transmission of

For Shrinivisha



arthropod borne communicable diseases; Epidemiology of Vector-Borne diseases through Parasites and Pathogens of Public Health Importance- Occurrence, causative agents, transmission and control of protozoan, bacterial, rickettsial and viral diseases. e.g. Malaria, Leishmaniasis, Sleeping sickness, Filariasis, Plague, Japanese Encephalitis, Yellow fever, Dengue, Chikungunya; Ecto- & endoparasites- of skin. Internal Insect Parasites (myiasis causing insects).

#### Unit V

Control of insect vectors of public health importance; Management of Vector-Borne Diseases by Integrated Vector Management.

Forensic Entomology: Forensically important insects, role of insects/arthropods in criminal investigation, by predicting time and cause of death.

**Course outcome (CO) :** On completion of the course, students are able to:

CO-1 Demonstrate knowledge of key concepts in Agricultural Entomology, Agricultural pests and Insect Plant Interactions

CO-2 Understand the concept of Crop pests biology & control.

CO-3 Understand Integrated Pest Management and Plant resistance to insects.

CO4 Understand Vector biology, medical importance and management of the medically important insects.

CO5 Analyze control and management of insect vectors of public health importance and Forensic Entomology.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	2	0	0	2
CO2	3	1	3	2	0	0	2
CO3	3	1	3	2	0	0	2
CO4	3	1	3	2	0	1	2
CO5	3	1	3	2	0	1	2

3 = Highly Related, 2 = Medium, 1 = Low

#### Suggested Readings:

- Insect Plant Biology, Schoonhoven, L. M., van Loon, J.A., & Dicke, M., Publisher Oxford University Press, USA
- Interrelationship between insects and Plants, Jolivet, P., CRC Press, USA
- Entomology & Pest Management, Pedigo, L. P., Prentice Hall, New Jersey, USA
- Concepts of IPM, Norris, Caswell-Chen and Kogan, Prentice-Hall, USA
- Agricultural insects pests of the tropics and their control, Hill, D. S., Cambridge University Press, UK
- Medical and Veterinary Entomology Mullen, G., Durden, L., Academic Press, USA
- Medical and Veterinary Entomology, Kettle, D. S., Cabi Press, USA
- Medical Entomology for students, Service, M. Cambridge University Press, UK .

#### MZO027A: PRACTICALS IN ENTOMOLOGY

Credits-4

1. Morphology: Study of head and its sclerites of honeybee and cockroach.
2. Study of mouth parts of cockroach, housefly, honeybee, mosquito and butterfly.
3. Study of wings and their venation, Different types of antennae and legs of insects.
4. Study of stinging apparatus of honey bee.

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5. Taxonomy: Identification of insects belonging to different groups up to orders and sub orders.
6. Social Insects: Morphological studies of various castes of *Polistes*, *Apis*, *Camponotus*, and *Odontotermes*.
7. Study of various types of social insects and their nests.
8. Dissection of alimentary canal of *Dysdercus*, honeybee, butterfly and grasshopper.
9. Reproductive system: Dissection of male & female reproductive system of moths; Apyrene & Eupyrene sperm in moths.
10. Filter chamber of homopteran; salivary glands of mosquito, honeybee and *Dysdercus*.
11. Excretory system detection of uric acid in malpighian tubules, uptake of dye in malpighian tubules.
12. Circulation: haemocyte count, estimation of protein in hemolymph.
13. Respiratory system: dissection of butterfly, *Dysdercus* and grasshopper.
14. Nervous system: dissection of *Dysdercus*, butterfly, honey bee and locust, stomodeal nervous system of cockroach and grasshopper.
15. Insect Toxicology: Estimation of LD50 and LC 50 using insects.
16. Pesticide residue analysis of contaminated soil, vegetable and water using TLC, GLC and HPLC.
17. Studies on dissipation of pesticides from soil and half- life estimation.
18. Estimation of uncertainty and variability in pesticide residue analysis.
19. Estimation of acetylcholinesterase activity to evaluate the toxicity of xenobiotic compounds.
20. Ecology: Measuring insect microclimate
21. Agricultural Entomology: Collection and identification of economically important insects and various stages of their life history.
22. Methods of rearing insects in the laboratory.
23. Identification of important insect pests of different crop plants and stored products.
24. Visits to agricultural fields and forests for on spot study of pests and damage caused by them.
25. Vector Biology: Study of life history stages of medically important arthropods, Diptera, Phthiraptera, Siphonoptera.
26. Identification and anatomical studies of major vector species of *Anopheles*, *Culex* and *Aedes*.
27. Field collection of immature stages of mosquitoes. Study of few available pathogens of arthropod-borne diseases.

### Discipline Elective

#### Group B - ENVIRONMENTAL BIOLOGY

#### MZO028B: PRINCIPLES OF ECOLOGY

Credits-4

##### Unit I

Concept of Ecology - Introduction to ecology, evolutionary ecology, environmental concepts – laws and limiting factors, ecological models. Characteristics of population, population size and exponential growth, limits of population growth, population dynamics, life history pattern, fertility rate and age structure. Competition and coexistence, intraspecific and inter-specific interactions, scramble and contest competition model, mutualism and commensalism, prey-predator interactions.

##### Unit II

Ecosystem - Nature of ecosystem, production, food webs, energy flow through ecosystem, adaptation, resilience of ecosystem, ecosystem management. Synecology and autecology, Importance and Scope of Ecology. Ecological Succession



### Unit III

Restoration Ecology, Climate change - Environmental Stresses and their management, global climatic pattern, global warming, atmospheric ozone, acid and nitrogen deposition, coping with climatic variations.

### Unit IV

Bioremediation - Major classes of contaminants. Uptake, biotransformation, detoxification, elimination and accumulation of toxicants.

Factors influencing bioaccumulation from food and trophic transfer.

Chemical Pesticides and human health, industry and hygiene and their disposal.

Impact of chemicals on biodiversity of microbes, animals and plants.

Bioindicator and biomarkers of environmental health.

Biodegradation and bioremediation of chemicals.

### Unit V

Biodiversity - Biodiversity as a natural resource, Global Biodiversity and Indian Biodiversity, biodiversity act and related international conventions. Sustainable development, natural resource management in changing environment. Molecular ecology, genetic analysis of single and multiple population, phylogeography, molecular approach to behavioural ecology, conservation genetics.

**Course outcome (CO) :** On completion of the course, students are able to:

CO1 Understand the fundamental aspects of ecology.

CO2 Understand the concepts of ecosystem and ecological succession.

CO3 Analyze about the impact of anthropogenic activities on the environment like climate change, global warming etc.

CO4 Understand the concept of bioremediation.

CO5 Understand about biodiversity, natural resources and their conservation.

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	3	1	0	1	2
CO2	3	0	3	1	0	1	2
CO3	3	0	3	1	0	1	2
CO4	3	2	3	1	0	1	2
CO5	3	1	3	1	0	1	2

3 = Highly Related, 2 = Medium, 1 = Low

### Suggested Readings:

- Field Sampling: Principles and Practices in Environmental Analysis. 2004. Conklin, A.R. Jr. CRC Press.
- Principles and Standards for Measuring Primary Production. 2007. Fahey, T.J. and Knapp, A.K. Oxford University Press, UK.
- Ecological Modeling. 2008. Grant, W.E. and Swannack, T.M., Blackwell.
- Fundamental Processes in Ecology: An Earth system Approach. 2007. Wilkinson, D.M. Oxford University Press, UK.
- Principles of Terrestrial Ecosystem Ecology. 2011. Chaplin, F.S., Matson, P.A. and Vitousek, P.M. Springer.
- Environmental Chemistry. 2010. Stanley and Manahan, E. CRC, Taylor & Francis. London.

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- Freshwater Ecology: A Scientific Introduction. 2004, Closs, G., Downes, B. and Boulton, A. Wiley-Blackwell publisher, Oxford.

## **MZO015A: ENVIRONMENT & NATURAL RESOURCES**

**Credit(s): 4**

### **Unit I**

Environment and climate, Earth (core, mantle, tectonic plates); Atmosphere- structure and composition;  
Clouds and their formation and Cloud categories;  
Element and factors of climate: External factors: solar radiation, Internal factors.  
Biosphere and Biogeochemical cycles,  
Environmental monitoring and impact assessment.

### **Unit II**

Cause, effects and remedial measure of Air pollution, Water pollution,  
Noise, radioactive and thermal pollution,  
soil pollution.  
Solid waste management.

### **Unit III**

Global warming : Cause of global warming, Impact of global warming – acid rains and ozone depletion, green house effect, Control measures of global warming  
Natural Disasters and their management (floods, earthquake, Cyclones, landslides etc.)

### **Unit IV**

Natural Resources:-Renewable and nonrenewable natural resources.  
Forest, Land, Water, Mineral, Food resources  
Energy resources

### **Unit V**

Biomes of the World, Natural History of Flora & Fauna of India- Major flora & Fauna, Methods of recording Natural History of a place. Agro climatic Zones of India. Human -Wildlife Interactions: Conflict and Co-existence  
Species interactions: Herbivory, Carnivory, parasites, Prey- Predator, Commensalisms, mutualism and Symbiosis

**Course outcome (CO) :** On completion of the course, students are able to:

- CO1 Understand about Environment and climate, Environmental monitoring and impact assessment.  
CO2 Analyze the problems of pollution, its cause, effects and remedial measures.  
CO3 Understand the concept of Global warming, Natural Disasters and their management.  
CO4 Understand the Natural Resources and Energy resources.  
CO5 Understand the concept of biomes of world, human-wildlife & Species interactions.

## **MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:**

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	3	1	0	1	2
CO2	3	0	3	2	0	1	2
CO3	3	0	3	2	0	1	2
CO4	3	0	3	1	0	1	2
CO5	3	0	3	1	0	1	2

3 = Highly Related, 2 = Medium, 1 = Low



**Suggested readings:**

- Bottain : Environmental studies
- Clark : Elements of ecology
- Kormondy : Concepts of ecology
- Odum : Ecology
- Simmons : Ecology of estuaries and costal water
- Pawlosuske : Physico-chemical methods for water
- South Woods : Ecological methods
- Trivedi and Goel : Chemical and biological methods for water pollution studies

**MZO016B: ECO-TOXICOLOGY & BIODIVERSITY CONSERVATION Credit(s): 4**

**Unit I**

Environmental indicators and their role in environmental balance.  
 Toxicology- Basic concepts, toxicological methods.  
 Toxicity testing principles, hazards, risks and their control methods.  
 Food toxicants and their control methods.  
 Monitoring Environment: Abiotic parameters to be monitored for various types of habitats. Keystone species & Indicator species, Continuous & seasonal monitoring

**Unit II**

Pesticides, types, nature and their effects on environment.  
 Important heavy metals and their role in environment.  
 Agrochemical use and misuse, IPM.  
 Occupational Health Hazards and their Control.

**Unit III**

Biodiversity : concept ,principle and significance of biodiversity  
 Causes for the loss of biodiversity, threats to biodiversity  
 Biodiversity hot spots.

**Unit IV**

Wildlife of India according to climatic zones  
 Values of wildlife: positive and negative  
 Wildlife Trade and Laws  
 Wildlife protection Act and its major amendments  
 Endangered and threatened species  
 Red Data Book and its significance  
 Wildlife corridors and wildlife translocation.  
 Biodiversity crisis – habitat degradation, poaching of wild life.

**Unit V**

Conservation of Biodiversity: - In-situ and ex-situ conservation  
 Major protected areas & their importance: National Parks and Sanctuaries  
 Project Tiger, Project Gir Lion and Crocodile breeding project  
 Wildlife in Rajasthan with references to Reptiles, Birds and mammals  
 Study of state bird – and state animal  
 Conserving species of Economic significance  
 People and Conservation

**Course outcome (CO) :** On completion of the course, students are able to:

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- CO1 Demonstrate knowledge of Environmental indicators and their role in environmental balance and eco-toxicology
- CO2 Understand the concept of pesticides, IPM, Occupational Health Hazards and their Control
- CO3 Understand the concept, principle and significance of biodiversity.
- CO4 Understand Wildlife of India according to ecological zones.
- CO5 Demonstrate knowledge of Conservation of Biodiversity, Wildlife in Rajasthan and Biospheres reserves

### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES:

Course Outcome	Program Outcome						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	3	1	0	0	2
CO2	3	0	3	1	0	0	2
CO3	3	0	3	1	0	0	2
CO4	3	0	3	1	0	0	2
CO5	3	0	3	1	0	0	2

3 = Highly Related, 2 = Medium, 1 = Low

#### Suggested Readings :

- Wild life management - Hossetti
- V.B. Saharia wildlife in India
- S.K. Tiwari wildlife in central India
- R.K. Tondon Biodiversity Taxonomy & Ecology
- P.C. Kotwal Biodiversity and conservation

#### MZO017C: Laboratory Exercises of Environmental Biology

Credits-4

1. To Mark important sanctuaries and national parks of Rajasthan on map, and write details of any three.
2. To estimate any environmental toxicants (biochemical/ GC/TLC).
3. To determine chloride concentration in the given water sample.
4. To estimate the total hardness of given water sample.
5. To determine the acidity of water.
6. To determine the alkalinity of water.
7. To estimate total dissolved solid in water sample.
8. To determine the dissolved oxygen in given water sample.
9. To determine the BOD of given water sample.
10. To determine the free CO<sub>2</sub> of given water sample.
11. To estimate salinity, phosphates, sulphates, silicates and nitrates in water samples.
12. To separate and identify soil arthropods using Berlese funnel.
13. To Determine organic matter in soil sample.
14. To Determinate Carbonates & bicarbonates in soil sample.
15. To Determine moisture content and water holding capacity of soil sample.
16. To study the physical and chemical characteristics of soil.
17. To study the physico-chemical properties of water.
18. Assessment of density, frequency and abundance of plants/ animals in a community using various techniques i.e. transect, quadrat etc.
19. Decomposition of various organic matters and nutrient release mechanisms/role of arthropods and other micro- and macro-fauna in decomposition.
20. Understanding ecosystem succession by studying various stages of vegetation/community assemblage development.
21. Application of molecular techniques in ecological study.

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22. Study of Insect diversity in soil.
  23. Identification of aquatic organisms of different trophic levels and construction of food chain and food web.
  24. Principles of GIS, GPS and RS technology.
  25. Interpretation (visual and automated) of remote sensing information for landscape differentiation.
  26. FIELD STUDY-A study tour of at least five days duration (need not be at a stretch) to observe the ecology and behaviour of animals should be undertaken. The places of visit include inter tidal region, fresh water bodies, lakes, rivers, hill streams, wetlands, mangroves, forests grasslands, drinking water treatment plants, and sewage treatment plants.
- A report of the field study is to be included in the practical record to be submitted at the time of Examination

#### SEMESTER IV

MZO021B	Project/ Dissertation	16
MZO022A	SEMINAR	2
MZO029A	Review Report/Scientific Writing	3
	Total credits	21

#### MZO021B: Project/ Dissertation

Credit(s):16

The students should carry out a project/dissertation work for at least 16 weeks in a National Lab/Private industry/reputed lab/institute. Dissertation will be based upon research and actual bench work. It will begin from the end of III semester and will continue through the IV semester. Dissertation report will be submitted and evaluated at the end of IV semester and students should defend their work in front of a selected committee in their last semester.




#### MZO 022A: Seminar

Credit(s): 2

#### MZO029A: Review Report/Scientific Writing

Credit(s): 3

Student will compile the review of literature (at least a ten-year data) on any topic related to the importance of Zoology and its applied fields. The review matter will be supported by the publication in indexed Journal of National/International repute and/or submission of manuscript.



**JECRC<sup>TM</sup>**  
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**School of Sciences**

**Department of Zoology**

**Course Structure and Syllabi**

**B. Sc. Pass Course (Zoology)**  
**(Session 2022-2025)**

*Gp*

*Shirajimisha*

*2022*

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## DEPARTMENT OF ZOOLOGY

The curriculum and syllabus for B.Sc. Program conforms to outcome based teaching learning process. In general, several outcomes have been identified and the curriculum and syllabus have been planned in such a way that each of the courses meets one or more of these outcomes. These relate to the skills, understanding and behaviors that students acquire as they progress through the program. Further each course in the program brings out clear instructional objectives which are mapped to the student outcomes.

The student outcomes are:

1. An ability to apply profound understanding of Chemistry, Zoology and Botany
2. An ability to design and perform experiments, as well as to analyze and interpret data
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, and sustainability
4. An ability to function on multidisciplinary teams
5. An ability to identify, formulate, and solve scientific problems
6. An understanding of professional and ethical responsibility
7. An ability to communicate effectively
8. The broad education necessary to understand the impact of scientific solutions in global, economic, environmental, and societal context
9. A recognition of the need for, and an ability to engage in life-long learning
10. A knowledge of contemporary issues
11. An ability to use the techniques, skills, and modern scientific tools that provide the learning base for future careers in disciplines such as health sciences, agriculture, environmental management, the emerging biotechnologies, publishing, teaching, research and consultancy.

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**JECRC UNIVERSITY**  
**SCHOOL OF SCIENCE**  
**SESSION 2022-2023**  
**B Sc. (Pass course)**

Details of Scheme for B Sc. (Pass course) with various Courses and their credits with contact hours are given below:

**Semester-I**

S.No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Subject A (Zoology)	BSZ001A	4	-	2	4		1	5	Core
2	Subject B (Course 1)		4	-	2	4		1	5	Core
3	Subject C (Course 1)		4	-	2	4		1	5	Core
4	Web Development		2	-		2			2	Fundamental
5	Web Development Lab				2			1	1	Fundamental
6	Environment Studies		3		2*	3		1	4	Fundamental
7	Communication Skills		2	0	0	2	0	0	2	Foundation
8	Communication Skills Lab		0	0	2	0	0	1	1	Foundation
9	Culture Education I		2	-		2			2	Foundation
			21		12	21		6	27	

\*Field/ Project Work and Report

*for*

*Shivajinikae*

*Sumax*


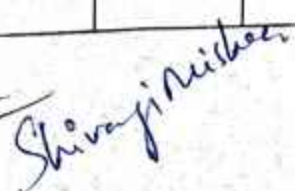
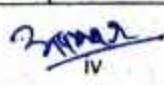

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### Semester II

S. No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Subject A (Zoology)	BSZ003 A	4	-	2	4		1	5	Core
2	Subject B (Course 2)		4	-	2	4		1	5	Core
3	Subject C (Course 2)		4	-	2	4		1	5	Core
4	Project Management Lab			-	2			1	1	Fundamental
5	Professional Skills		2	0	0	2	0	0	2	Foundation
6	Professional Skills Lab		0	0	2	0	0	1	1	Foundation
7	Culture Education-2		2	0	0	2	0	0	2	Foundation
			16		10	16		5	21	

### Semester III

S. No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Subject A (Zoology)	BSZ005 A	4	-	2	4		1	5	Core
2	Subject B (Course3)		4	-	2	4		1	5	Core
3	Subject C (Course3)		4	-	2	4		1	5	Core
4	Advanced Spread Sheet Lab			-	2			1	1	Fundamental
5	Life Skills1 (Personality Development)		1	0	2	1	0	1	2	Foundation
6	Value Education and Ethics-1		1	0	0	1	0	0	1	Foundation
7	Open Elective- I		3		0	3		0	3	Interdisciplinary
			17		10	17		5	22	



**Semester IV**

S.No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Subject A (Zoology)	BSZ007A	4	-	2	4		1	5	Core
2	Subject B (Course4)		4	-	2	4		1	5	Core
3	Subject C (Course 4)		4	-	2	4		1	5	Core
4	Python programming		2	-		2			2	Fundamen tal
5	Python programming Lab				2			1	1	Fundamen tal
6	Life Skills-2 (Aptitude)		1	0-	2	1	0	1	2	Foundatio n
7	Value Education and Ethics-2		1	0	0	1	0	0	1	Foundatio n
			16		10	16		5	21	

**Semester V**

S.No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Subject A (Zoology)	BSZ009A	4	-	2	4		1	5	Core
2	Subject B(Course5)		4	-	2	4		1	5	Core
3	Subject C(Course5)		4	-	2	4		1	5	Core
4	Project	BSZ011A			12			6	6	Discipline Specific
			12		18	12		9	21	

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### Semester VI

S. No	Subject	Code	Lecture (Hr.)	Tutorials (Hr.)	Practical (Hr.)	Credits			Total Credits	Paper Category
						L	T	P		
1	Subject A (Zoology)	BSZ012 A	4	-	2	4		1	5	Core
2	Subject B (Course 6)		4	-	2	4		1	5	Core
3	Subject C (Course 6)		4		2	4		1	5	Core
4	Open Elective- II		3			3			3	Interdisciplinary
5	Open Elective – III		3			3			3	Interdisciplinary
			18		6	18		2	21	

### Total Credits

Credits	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total
	27	21	22	21	21	21	133

*For Shrivastava*

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**JECRC UNIVERSITY****School of Science****Department of Zoology****B.Sc. Pass Course****Academic session 2022-23**

Semester –I		Credits
Course Code	Title of Course	
BSZ001A	Animal Diversity (Non Chordates) and Evolution	4
BSZ002A	Non Chordates & Evolution Lab	1
	Total	5
Semester –II		
BSZ003A	Cell Biology and Genetics	4
BSZ004A	Cell Biology and Genetics Lab	1
	Total	5
Semester –III		
BSZ005A	Biology of Chordates and Economic Zoology	4
BSZ006A	Chordates and Economic Zoology Lab	1
	Total	5
Semester –IV		
BSZ007A	Developmental Biology and Immunology	4
BSZ008A	Developmental Biology and Immunology Lab	1
	Total	5
Semester –V		
BSZ009A	Ecology, Ethology and Biostatistics	4
BSZ010A	Ecology, Ethology and Biostatistics Lab	1
BSZ011A	Project (Discipline Specific)	6
	Total	5
Semester –VI		
BSZ012A	Animal Physiology and Biochemistry	4
BSZ013A	Physiology and Biochemistry of Animals Lab	1
	Total	5
	Total Credits	30

*For*  
*Shirajmishra* *2022*  
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**JECRC UNIVERSITY**  
**SCHOOL OF SCIENCE**  
**DEPARTMENT OF ZOOLOGY**  
**B.Sc. Pass Course**

**Program Educational Objective (PEO's):**

A graduate of the B.Sc. (Pass course) Program should:

**PEO- I**

The student will recognize and be able to apply basic ethical principles to basic and applied biological/biomedical practice and will understand the role of chemical/biological/biomedical science, scientists, and practitioners in society.

**PEO- II**

The student will be able to facilitate their acquisition of basic and specialist science skills that instill qualities of self-confidence and self-reliance, so that the products of the degree Programs can play active and informed roles in personal, community, national and international development strategies.

**PEO- III**

Students will be able to make valuable contributions to contemporary chemical/biological issues of national and international interest.

**PEO- IV**

Students will be provided with a modern, high-quality foundation education that prepares them for excellence, leadership roles along diverse career paths with encouragement to professional ethics and active participation needed for a successful career.

**Program Outcome (PO's)**

A graduate of the B.Sc. (Pass course) Program will demonstrate:

**PO1 Core competency:** The graduates are expected to know the fundamental concepts of Science and other subjects. These fundamental concepts would reflect the latest understanding of the subject and in allied subject areas. Students will learn to investigate, experiment, relate information and draw logical conclusions based on scientific reasoning.

**PO2 Disciplinary knowledge and skill:** To learn and apply the knowledge in understanding research and addressing practical problems and to apply various scientific methods to address different questions by formulating the hypothesis, data collection and critically analyze the data. The student will be inquisitive about processes and phenomena happening during experiments in laboratories and seeks answers through the research path..

**PO3 Skilled communicator:** Communicate effectively on various scientific issues with the with society at large, They are expected to read and understand documents with in-depth analyses and logical arguments. Graduates are expected to be well-versed in speaking and communicating their idea.

**PO4 Critical thinker and problem solver:** Critical thinking and analytical reasoning and the scientific knowledge will help to develop scientific temper that will be more beneficial for the society. The student will be able to draw logical conclusions based on a group of observations, facts and rules.



**PO5 Team player:** The course curriculum has been designed to provide opportunity to act as team player by contributing in laboratory, field based work, project and industry.

**PO6 Moral and ethical awareness:** Graduates are expected to be responsible citizen of India and be aware of moral and ethical baseline of the country and the world.. Emphasis be given on academic and research ethics, including fair Benefit Sharing, Plagiarism, Scientific Misconduct and so on.

**PO7 Skilled project manager:** Graduates are expected to be familiar with decision making process and basic managerial skills to become a better leader by acquiring knowledge about project management, writing, planning, study of ethical standards and rules and regulations pertaining to scientific project operation.

**PO8 Digitally literate:** The student will acquire knowledge in understanding and carrying out data analysis, use of library search tools, and use of software and related computational work. Students will acquire digital skills and integrate the fundamental concepts with modern tools.

**PO9 Environment and sustainability:** Apply the knowledge of basic science and allied fields to protect environment and to prevent environmental degradation as science graduate, to stay firm on the value systems, of their culture, including their own for a healthy socio cultural environment.

**PO10 Lifelong learner:** Graduates will acquire the ability to engage independent and self-learning as well as to successfully pursue their career objectives in advanced education and in professional courses, through the use of advanced ICT technique and other available techniques/books/journals for personal academic growth as well as for increasing employability.

### **Program Specific Outcomes (PSO's)**

In pursuit of the general objective of producing these self-reliant young biological scientists and contributing to scientific knowledge, the following are the **Program Specific Outcomes** of the B.Sc. (Pass course) degree Programme:

**PSO1.** Understand the nature and basic concepts of cell biology, Biochemistry, Taxonomy and ecology and analyze the relationships among animals, plants and microbes. **(Scientific Knowledge)**

**PSO2.** Perform procedures as per laboratory standards in the areas of Biochemistry, ethology, Biostatistics, Taxonomy, Economic Zoology and Ecology and Understand the applications of biological sciences in Apiculture, Aquaculture, Pisciculture, Agriculture and Medicine. **(Professional Skills)**

**PSO 3:** To train academically sound future researchers and intellectuals in the area of general biology, with emphasis in areas on the cutting edge of modern biology, e.g., Molecular biology, Biochemistry, physiology, Genetics, Cytology and Environmental Conservation. **(Successful Career and Entrepreneurship)**

### **Course Learning Objective:**

- To study individual organisms and populations, as well as their relationships to each other and the environment, with the core foundation of evolution and ecology.

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- To comprehend the genetics, anatomy, physiology and behavior along with other specialized fields of interest
- To comprehend the basic phylogenetic relationships of the major groups of vertebrates
- To comprehend and analyze the adaptive changes that have occurred in invertebrates & vertebrates
- To comprehend and analyze the changes in homologous structures which accompanied the invasion of terrestrial habitats by vertebrates
- To recognize, describe, and point out the external and internal features that characterize the major groups of modern day vertebrate & invertebrates
- To recognize and describe the basic habit, habitat & behavior of chordates
- To gain an in-depth knowledge and practical skills in various aspects of animal biology.
- To Enhance collaborative learning and communication skills through practical sessions, team work, group discussions, assignments and projects.






**JECRC UNIVERSITY  
SCHOOL OF SCIENCE  
DEPARTMENT OF ZOOLOGY  
B.Sc. Pass course**

**SEMESTER-I**

**BSZ001A: Animal Diversity (Non-Chordates) and Evolution      Credit(s)-4**

**Unit I**

**Animal Diversity (Non chordates)**

**Taxonomy and classification:** General principles of taxonomy - Binomial nomenclature, Trinomial nomenclature, Rules of nomenclature, Concept of Five kingdom, Basis of Classification: symmetry, coelom, segmentation and embryogeny.

**Unit II**

Salient features and Outline Classification upto class in Non-Chordates (Protozoa to Coelenterata)

Phylum Protozoa: Type study-*Paramecium*,

Phylum Porifera Type study- *Sycon*

Phylum Coelenterata, Type study – *Obelia*

Reproduction in Protozoans

Evolution of canal system in sponges

**Unit III**

Salient features and Outline Classification upto class in Non-Chordates (Platyhelminthes to Annelida)

Phylum Platyhelminthes, Type study- *Fasciola*

**Onychophora:** Peripatus (salient features) and as connecting link

Phylum Annelida: Type study- *Neries*

Parasitic adaptations in Platyhelminthes

**Unit IV**

Salient features and Outline Classification upto class in Non-Chordates (Arthropoda to Echinodermata)

Phylum Arthropoda, Type study- Prawn

Phylum Mollusca, Type study - *Pila*

Phylum Echinodermata Type study- *Asterias*

Metamorphosis in insects

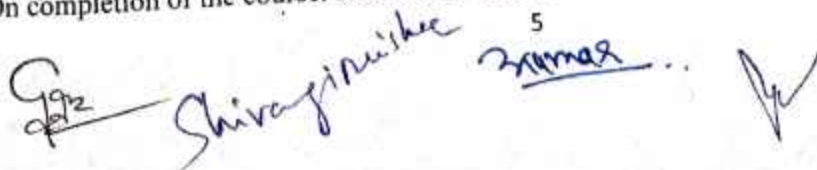
Water vascular system of star fish

**Unit V**

**Evolution:** Lamarckism, Darwinism, Natural Selection, Modes of speciation, Isolation and Isolating mechanisms, Variations: Heritable variations and their role in evolution, Adaptations, Mimicry, Fossils

**Course Outcomes (COs) of the course "Animal Diversity (Non Chordates) & Evolution":**

On completion of the course, students are able to:

The bottom of the page features several handwritten signatures and initials. On the left, there is a signature that appears to be 'Shivaji Mishra'. In the center, there is a signature that looks like 'Zuma' with a small '5' written above it. To the right of this, there are more initials and a signature that is partially visible.



- CO1 Understand general taxonomic rules on animal classification, the principles and methods of taxonomy, the Levels of structural organization and the Basis of Classification -coelom, symmetry, segmentation and its types.
- CO2 Critically analyse the organization, complexity and characteristic features of non-chordates making them familiarize with the morphology and anatomy of representatives of various animal phyla like Protozoa, Porifera, Coelenterata, using examples and Understand the concept of canal system in Porifera
- CO3 Write down the classification and characteristics of Phylum Platyhelminthes, Aschelminthes Onychophora, Annelida and understand about the Parasitic adaptations in Platyhelminthes
- CO4 Write down the classification and characteristics of Phylum Arthropoda, Mollusca and Echinodermata and Understand Metamorphosis in insects, Water vascular system of star fish
- CO5 Understand the process of evolution, Lamarckism, Neo-Lamarckism, Darwinism, Neo-Darwinism, Natural selection, Speciation, Isolation, Variation, Adaptations, Mimicry

**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome										Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	H	M		L							H	M	M
CO2	H	M		L							H	M	M
CO3	H	M		L							H	M	M
CO4	H	M		L							H	L	L
CO5	H	M		L							H	L	L

H = Highly Related; M = Medium L = Low

**Recommended readings:**

- Barnes, R.D. (2006). Invertebrate Zoology, VII Edition, Cengage Learning, India.
- Pechenik, J. A. (2015). Biology of the Invertebrates. VII Edition, McGraw-Hill Education
- R.L.Kotpal :Modern text book of biology – Invertebrate –(Rastogi Publication, Meerut).
- Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing.
- Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007). Evolution. Cold Spring, Harbour Laboratory Press.
- Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers



### BSZ002A: Non-Chordates and Evolution Lab Credit(s) -1

1. Study the working of optical microscope- compound & dissecting and methods of preparation of permanent slides-single staining and double staining.
2. To prepare permanent slides of - Hydra, Obelia colony, sponge-fibre/spicules/gemmules
3. To identify and study the characteristics of whole mount of *Euglena*, *Amoeba*, *Paramecium*, Binary fission and Conjugation in *Paramecium*, *Elphidium*, *Vorticella*, *Planaria w.m.*
4. Study of animals through museum specimens in the laboratory with details on their classification, biogeography and diagnostic features of *Euplectella*, *Vellela*, *Alcyonium*, *Metridium*, *Gorgonia*, *Physalia*, *Penatulla*, *Aurelia*, any Ctenophore
5. To identify and study the characteristics of: *Heteronereis*, *Aphrodite*, *Arenicola*, *Limulus*, *Scorpion*, *Centipede*, *Millipede*, *Lepas*, *Squilla*, *Eupagurus*, *Crab*, *Mantis*, *Peripatus*.
6. To identify and study the characteristics of: *Chiton*, *Loligo*, *Nautilus*, *Pentaceros*, *Echinus*, *Ophiothrix*, *Antedon*.
7. Examination of water samples collected from different places to observe diversity in Protista
8. Study of adult *Fasciola hepatica*, *Taenia solium*, *Ascaris lumbricoides* and their life stages (Slides/microphotographs)
9. Comparison of two species of birds belonging to same genus (Interspecific difference) and same family but dissimilar genera.
10. Study of adaptive radiations in feet of birds and mouth parts of insects.
11. Study of homology and analogy from suitable specimens (like wings of birds and insects, forelimbs of bat and rabbit), Serial homology in appendages of *Palaemon*.
12. Collection of five species (preferably invertebrates, insects) belonging to a clade. A project work on their generic identification, description and illustration with a note on their locality.
13. Submit a Project Report on field study of the social behaviour of any insect (bees/termites/ants/wasps) or behavioural pattern of earthworm in nature or life cycles of parasites or pathogens.

**Note:** Classification to be followed from "Barnes, R.D. (2006). Invertebrate Zoology, VII Edition, Cengage Learning, India"

Study of live animals should be done without painning them, prefer studies of species which are easy to culture. Digital media can be used to study various characters of animal species. Use of animals for dissection is subject to the conditions that these are not banned under the Wild life (Protection) Act, 1972.

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## SEMESTER II

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4	-	1	5

### BSZ003A: Cell Biology and Genetics

Credit(s)-4

#### Unit I

##### Introduction to cell: Prokaryotic & Eukaryotic

Structure & functions of- cell membrane, mitochondria, Endoplasmic reticulum, ribosome, golgi complex, lysosomes, centrioles, cilia & flagella

Nucleic acids- structure, polymorphism. DNA, RNA- Types of RNA (mRNA, rRNA, tRNA).

#### Unit II

Central Dogma

**DNA Replication** : Experiments of Messelson and Stahl; Mechanism of replication, Enzymology of DNA replication (Enzymes and Proteins associated with DNA replication), Synthesis of RNA : (Transcription in Prokaryote and Eukaryotes), RNA processing.

#### Unit III

Genetic Code – Essential features, Wobble hypothesis.

Protein synthesis – Translation in Prokaryotes and Eukaryotes.

Regulation of gene expression: Inducible system; Lac operon, Repressible system; Tryptophan.

#### Unit IV

**Heredity**: Mendel and his work, Laws of Inheritance, Monohybrid Cross, Dihybrid Cross Multiple allelism

Sex- linked Inheritance

**Gene**– Concept, types and functions of gene.

#### Unit V

Gene interaction (Intragenic and Intergenic interaction)

Cytoplasmic inheritance in animals

Mutations, Eugenics, Genetic counseling, Euthenics, Euphenics

### Course Outcomes (COs) of the course “Cell Biology and Genetics”

On completion of the course, students are able to:

CO1 Understand about the structure and function of different cell organelles, genetic material (Nucleic acids) and various types of RNA

CO2 Understand about process of DNA replication, Transcription & RNA processing,

CO3 Understand about Genetic Code, Translation & gene regulation.

CO4 Understand the concept of gene, Mendelism & Multiple allelism, & Sex- linked Inheritance

CO5 Understand the concept of gene interaction, Cytoplasmic inheritance in animals and the terms like Mutations, Eugenics, Genetic counseling, Euthenics, Euphenics



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF  
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome										Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
CO1	H	M		L							H	L	L
CO2	H	M		L							H	L	L
CO3	H	M		L							H	M	M
CO4	H	M		L							H	L	L
CO5	H	M		L							H	L	M

H = Highly Related; M = Medium L = Low

**Suggested books**

- De Roberties, E.D.P. and De Roberties, E.M.F.: Cell and Molecular Biology, B.I. Publications Pvt. Ltd. Lippincott Williams and Wilkins.
- Rastogi, S.C. Cell biology, New age international (P) Ltd, Publishers.
- Lodish, H, Matsudaira, P. and Darnell, J. Molecular cell biology, W.H. Freeman and company.
- Rastogi V.B.: Genetics, Rastogi Publications, Meerut.
- Freifelder, D. Essential of Molecular biology, Narosa Publishing House.
- Gardner : Genetics

**BSZ004A: Cell Biology and Genetics Lab Credit(s): 1**

1. To study the permanent slides and prepare slides of mitotic stages from onion root tip.
2. To study the permanent slides of meiotic cell division.
3. To isolate RNA from Yeast.
4. To Extract DNA from onion.
5. To study and prepare slide of giant chromosome in salivary glands of Chironomous larva.
6. To prepare slide and study Barr body for identification of Gender in Human.
7. To identify male and female *Drosophila*.
8. To prepare culture and study the life-cycle of *Drosophila*.
9. To identify wild and mutant forms of *Drosophila*.
10. To study the permanent prepared slides: Sex comb, Salivary gland chromosomes.
11. To do exercises related to the Human pedigree chart.
12. To do genetics exercises related to monohybrid cross, dihybrid cross, multiple allelism, sex-linked inheritance, genetic interaction

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### SEMESTER-III

L	T	P	C
4	-	1	5

#### BSZ005A: Biology of Chordates and Economic Zoology

CREDIT(S): 4

##### Unit I

**Protochordata:** Classification upto order, General characters

Ascidia: retrogressive metamorphosis, salient features of Amphioxus.

**Agnatha:** Classification upto order, General characters,

Salient features: Petromyzon, Ammocoet larva.

**Gnathostomata:** Classification upto order, General characters,

##### Unit II

General characters and outline classification of Pisces, Amphibia, Reptilia, Aves and Mammals upto order

Comparative anatomy of Integumentary, digestive and Respiratory system of frog, varanus, pigeon and rabbit.

##### Unit III

Salient features: Dipnoi (Lung fishes), Migration in fishes & birds, Adaptive radiation in Amphibian & mammals, Neoteny, Parental care in amphibians. Flight adaptation and Perching mechanism; Structure and types of feathers, hair and its development

##### Unit IV

Economic importance of Protozoa, Coral and coral reefs, parasitic adaptations in helminthes. General introduction about vermiculture, Apiculture, Sericulture, lac culture, Pearl culture, stored grain pests.

##### Unit V

General introduction about Venom industry (Poisonous and non-poisonous snakes), Pisciculture, prawn culture.

General introduction about poultry, dairy industry and wool industry, Wildlife tourism

#### Course Outcomes (COs) of the course "Biology of Chordates & Economic Zoology"

On completion of the course, students are able to:

- CO1 Understand and study the classification of Protochordata, Agnatha & Gnathostomata and general characters of Ascidia, Amphioxus & Petromyzon
- CO2 Understand the classification of Pisces, Amphibia, Reptilia, Aves and Mammals and comparative account of Integumentary, digestive and circulatory system
- CO3 Understand General Topics like migration in fishes Adaptive radiation in Amphibian & mammals, Neoteny, Parental care in amphibians. Flight adaptation and Perching mechanism; Structure and types of feathers, hair and its development
- CO4 Understand and study the economical importance of Protozoa, Coral and coral reefs, parasitic adaptations in helminthes and a basic idea of vermiculture, Apiculture, Sericulture, lac culture, Pearl culture.
- CO5 Understand general topics like Venom industry (Poisonous and non-poisonous snakes), Pisciculture, prawn culture, poultry, dairy industry, wool industry and Wildlife tourism



**MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcome	Program Outcome										Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
CO1	H	M		L							H	L	L
CO2	H	M		L							H	L	L
CO3	H	M		L							H	L	L
CO4	H	M		L							H	L	L
CO5	H	M		L							H	L	L

H = Highly Related; M = Medium L = Low

**Suggested books**

- R.L.Kotpal : Modern text book of biology –Vertebrate –(Rastogi Publication, Meerut).
- Young, J.Z. : Life of Vertebrate.(E L B S) 1983.Oxford.
- Dalela, R.C. : A text book of Chordate Zoology, (Jai Prakash Nath publications, Meerut.).
- Park, K. (2007). Preventive and Social Medicine. XVI Edition. B.B Publishers.
- Newman, H.H. : The phylum Chordate, (Satish Book Enterprise, Agra).
- Jordon, E.L. : Vertebrate Zoology, ( S.Chand and Co., New Delhi.).
- Arora, D. R and Arora, B. (2001). Medical Parasitology. II Edition. CBS Publications and Distributors.
- Kumar and Corton. Pathological Basis of Diseases.
- Atwal, A.S. (1986). Agricultural Pests of India and South East Asia, Kalyani Publishers.
- Dennis, H. (2009). Agricultural Entomology. Timber Press (OR).
- Hafez, E. S. E. (1962). Reproduction in Farm Animals. Lea & Fabiger Publisher
- Dunham R.A. (2004). Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications, U.K.
- Pedigo, L.P. (2002). Entomology and Pest Management, Prentice Hall.

**BSZ006A: Chordates and Economic Zoology Lab Credits :1**

1. To identify and study the characteristics of: *Balanoglossus*, *Amphioxus*, *Petromyzon*, *Hippocampus*, *Torpedo*, *Acipenser*, *Amia*, *Clarias*, *Exocoetus*, *Echeneis*, *Protopterus*.
2. To identify and study the characteristics of: *Ichthyophis*, *Proteus*, *Ambystoma*, *Axolotl*, *Alytes*, *Hyla*, fresh water Tortoise; *Sphenodon*; *Phrynosoma*, *Draco*; *Chameleon*; *Viper*/ *Hydrophis*

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3. To identify and study the characteristics of: *Archaeopteryx* Parrot, *Ornithorhynchus*, *Tachyglossus*, *Macropus*, Bat, Loris
4. To Study the life cycle of endoparasites through permanent slides/photomicrographs / specimens.
5. To Study the life cycles of earthworm, silk-moth, honey bee.
6. To prepare permanent slides of - Herdmania spicules, Striped muscle fibers
7. To Study arthropod vectors associated with human diseases: *Pediculus*, *Culex*, *Anopheles*
8. To study the identifying feature and economic importance of common food pest – locust, beetle, *Callosobruchus chinensis* ( pulse beetle), *Sitophilus oryzae* (rice weevil) and *Tribolium castaneum* (red flour beetle)
9. To prepare a list of all vertebrates found in and around your locality /A Visit to poultry farm / animal breeding centre/ wool industry and submission of visit report
10. To prepare and maintain freshwater aquarium or study of economic important fishes species through photomicrographs/ specimens
11. To make a chart explaining types of wools found in the world.
12. To study the Key for Identification of poisonous and non-poisonous snakes. An "animal album" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose
13. To study anatomy of any edible fresh water fish.

#### SEMESTER-IV

L	T	P	C
4	-	1	5

#### **BSZ007A: Developmental Biology and Immunology**

**Credit(s): 4**

##### **Unit I**

Animal development: Gametogenesis (Spermatogenesis and oogenesis - vitellogenesis), fertilization, cleavage and morulation, blastulation, gastrulation, fate map, morphogenetic movement, Significance of cleavage and gastrulation.

##### **Unit II**

Elementary idea about embryonic induction: primary organizer and competence.  
Extra-embryonic membranes in chick, their development and functions  
Placentation in Mammals

##### **Unit III**

Brief idea of: Parthenogenesis, Regeneration, Cloning of animals, transgenesis  
Stem cells: types and their applications  
Teratology  
Aging: the biology of senescence

##### **Unit IV**

Immunology -Overview of immune system; types of immunity



Mechanism of humoral immunity. Immunity regulating cells: Macrophages, lymphocytes (B & T types), Plasma cells and memory cells.  
Antigens: Types and Properties of antigens

#### Unit V

Antibodies: Basic structure, classes and function, Antigen-Antibody interaction: precipitation reaction, agglutination reaction, neutralization reaction, complement and lytic reaction and phagocytosis. Brief idea of vaccines.

#### Course Outcomes (COs) of the course "Developmental Biology and Immunology"

On completion of the course, students are able to:

- CO1 Understand the process of: Gametogenesis, Fertilization and early development.
- CO2 Understand the concept of embryonic induction: primary organizer and competence, extra-embryonic membranes and placentation
- CO3 Understand the concept of parthenogenesis, regeneration, cloning, transgenesis, stem cell, teratology and ageing
- CO4 Understand the concept of Immunology, Mechanism of immunity, Immunity regulating cells, Antigens
- CO5 Understand the basic structure, classes and function of Antibodies, Antigen-Antibody interaction

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome										Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO3
CO1	H	M		L							H	L	L
CO2	H	M		L							H	L	L
CO3	H	M		L							H	L	L
CO4	H	M		L							H	M	L
CO5	H	M		L							H	L	L

H = Highly Related; M = Medium L = Low

#### Suggested Books

- Gilbert, S.F. (2006) 8th edn. Developmental Biology, Sinauer Associates, Inc.
- Rastogi, V.B.: Development Biology
- Kindt, T. J., Goldsby, R. A., Osborne, B. A., Kuby, J. (2006). VI Edition. Immunology. W.H. Freeman and Company.
- Delves, P. J., Martin, S. J., Burton, D. R., Roitt, I.M. (2006). XI edition. Roitt's Essential Immunology, Blackwell Publishing

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**BSZ008A: Developmental Biology and Immunology Lab**      **Credit(s): 1**

1. To study developmental stages of frog: - egg, cleavage, blastula, gastrula, neurula (neural plate, neural fold, neural tube).
2. To study developmental stages of frog: - tadpole larva, metamorphic stages of tadpole.
3. To Study developmental stages of chick - 18h, 24h, 33h.
4. To Study developmental stages of chick - 48h, 72h, 96h of incubation.
5. To make a window in shell of egg to study developmental stages of chick embryo.
6. To identify different blood groups and Rh factor in human blood samples.
7. To study the Rh compatibility conditions.
8. To study the differential count of W.B.Cs.
9. To study the antibiotic resistance in bacterial culture.
10. To study the effect of disinfectants/antiseptic on microorganism.
11. To study cell permeability in mammalian RBC.
12. To study about Vaccines/Vaccination programs.
13. To study about Immunity regulating cells.

**SEMESTER-V**

L	T	P	C
4	-	1	5

**BSZ009A: Ecology, Ethology and Biostatistics**

**Credit(s): 4**

**Unit I**

**Ecology**

Ecosystem – definition, types, Structure: Abiotic & Biotic

Basic concepts of ecology.

**Population Ecology:** Density and methods of its measurement, natality, mortality, age and ratio distribution, population structure, biotic potential, dispersal and dispersion of population, species distribution, population interactions and propagation, reproductive strategies.

**Unit II**

**Community Ecology:** Characteristics of natural communities structure, composition, stratification, host-parasite interactions.

**Ecological Succession:** Types and patterns of succession, concept of climax (mono-, di-, polyclimax), ecotone and edge effect, niche.

**Habitat Adaptations:** Deep sea and Desert, behavioral adaptations

**Unit III**

**Ethology**

**Concepts of Ethology-** Motivation, Fixed Action Patterns (FAP), Sign Stimulus; Innate Releasing Mechanism (IRM); Action Specific Energy (ASE); Learning; Imprinting.

**Methods of Studying Behaviour:** Studies in Laboratory- Neuroanatomical, Neurophysiological and Neurochemical techniques.

Brief account on Pheromones, Biological Clocks, Orientation.

#### Unit IV

##### Biostatistics

**Introduction:** Definition, Functions, scope and application of biostatistics.

**Frequency distribution:** Collection and tabulation of data, Graphical presentation of frequency distribution- Bar diagram, Histogram, Frequency Polygon, smooth frequency curve, ogives, Pie charts.

#### Unit V

**Measures of Central Value:** Average, Mean, Mode, Median. Mean and Standard Deviation.

**Statistical Inference:** student's 't' test, Chi square test.

#### Course Outcomes (COs) of the course "Ecology, Ethology and Biostatistics"

On completion of the course, students are able to:

CO1 Understand the basic concepts of ecosystem, ecology & Population Ecology.

CO2 Understand the Characteristics of Community; Ecological Succession and habitat adaptation.

CO3 Understand the concepts of Ethology, Methods of Studying Behavior and a Brief idea about Pheromones, Biological Clocks, Orientation.

CO4 Understand the Functions, scope and application of biostatistics, Data Classification and Graphical presentation of frequency distribution.

CO5 Understand the measures of central tendency and dispersion like Computation of arithmetic mean, mode and median, Standard Deviation, Standard error of mean and student's 't' test, Chi square test.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome										Program Specific Outcome		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3
CO1	H	M		L					H		M	L	L
CO2	H	M		L					H		M	L	L
CO3	H	M		L							M	L	L
CO4	H	M		L							H	M	L
CO5	H	M		L							H	M	L

H = Highly Related; M = Medium L = Low

#### Suggested Books

- Odum, E.P.: Fundamental of Ecology, W.B. Saunders, New Delhi.
- Verma, P.S. and Agarwal, U.K.: Environmental Biology, S. Chand and co., New Delhi.

- Gupta, P.K.: Environmental Biology, Rastogi Publication, Meerut.
- Manning, A.: An introduction to Behaviour, Edward Arnold, London.
- Mathur, R.: Animal Behaviour, Rastogi Publications, Meerut.
- Bailey: Biostatistics
- Gupta, S.P.: Biostatistics.

### BSZ010A: Ecology, Ethology and Biostatistics Lab Credit(s): 1

1. To determine the alkalinity of given water sample.
2. To determine the acidity of given water sample.
3. To determine the free carbon dioxide of given water sample.
4. To determine the dissolved oxygen of given water sample.
5. To determine the moisture content and water holding capacity of given soil sample.
6. To determine the carbonate and bicarbonate content in given soil sample.
7. To prepare culture of Paramecium and study its behavior (Thigmotrophism, thermotrophism, chemotrophism).
8. To study behavior of different zoo-planktons.
9. To study food preference/ phototactic response in *Tribolium*.
10. To study antennal grooming in Cockroach.
11. To prepare a list of all animals found in and around your locality/Institute or A visit to a zoo/ national park / wildlife sanctuary and study their behavior.
12. To do exercises on Bar diagram, Histogram, Frequency Polygon, smooth frequency curve, ogives, Pie charts.
13. To do exercises on Mean, Mode & Median. Standard deviation

### BSZ011A: Project (Discipline Specific)

Credit(s): 6

### SEMESTER-VI

L	T	P	C
4	-	1	5

### BSZ012A: Animal Physiology and Biochemistry

Credit(s): 4

#### Unit I

#### Animal Physiology

**Physiology of Digestion:** Mechanism of digestion, absorption and elimination.

**Physiology of Respiration:** Mechanism of breathing: exchange of gases, transport of oxygen & carbon dioxide in blood, regulation of respiration.

#### Unit II

**Physiology of Circulation:** Composition and function of blood, mechanism of blood clotting, heartbeat, cardiac cycle, homeostasis.

**Physiology of nerve impulse and Reflex Action:** Functional architecture of a neuron, origin and propagation of nerve impulse, synaptic transmission, reflex action.

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### Unit III

**Physiology of muscle contraction:** Functional architecture of skeletal muscles, chemical and biophysical events during contraction and relaxation of muscle fibre, Cori's cycle

**Physiology of Excretion:** Nitrogenous excretory products, role of liver in formation of these end products, Functional architecture of a nephron, mechanism and regulation of urine formation.

### Unit IV

**Physiology of endocrine glands: Classification of hormones:** Regulation of their secretion; Mode of hormone action. Types of Endocrine glands, their secretion, functions and mechanism of action, disorders related to hypo and hyper secretion – pituitary, adrenal, thyroid, islet of langerhan's, gonads (testes & Ovary), Placental hormones

### Unit V

#### Biochemistry

Structure, function and significance of Carbohydrates, Proteins and Lipids.

Metabolism of Carbohydrate (glycolysis, kreb's cycle, oxidative phosphorylation and ETS)

Protein (Deamination, transamination and decarboxylation), Lipids (beta-oxidation)

#### Course Outcomes (COs) of the course "Animal Physiology and Biochemistry"

On completion of the course, students are able to:

CO1 Understand the Physiology of Digestion & Respiration.

CO2 Understand the Physiology of Circulation & nerve impulse and Reflex Action.

CO3 Understand the Physiology of muscle contraction & Excretion

CO4 Understand the Physiology & Types of Endocrine glands, Classification of hormones.

CO5 Understand the Structure, function, significance and Metabolism of Carbohydrates, Proteins and Lipid.

#### MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcome	Program Outcome										Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	H	M		L							H	L	M
CO2	H	M		L							H	L	M
CO3	H	M		L							H	L	M
CO4	H	M		L							H	L	M
CO5	H	M		L							H	H	M

H = Highly Related; M = Medium L = Low

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**Suggested books**

- Berry, A.K.; A Textbook of Animal Physiology; Emkay Publisher, Delhi
- Chatterjee, M.N and Shinde, R.; Text Book of Medical Physiology; Jaypee brothers.
- Animal physiology and biochemistry, Dr. K.V. Sastry; rastogi publications, Meerut, India.
- Leninger, A.D. Principles of Biochemistry, CBS Publishers and Distributors, Shahdra, Delhi.
- Jain, J.L. Fundamentals of Biochemistry, S.Chand publishers New Delhi.

**BSZ013A: Physiology and Biochemistry of Animals Lab**

**Credit(s): 1**

1. To study histological structure of major endocrine glands of mammals.
2. To enumerate the red blood cells in given blood sample.
3. To enumerate the white blood cells in given blood sample.
4. To estimate the hemoglobin content in given blood sample.
5. To estimate haematocrit values in given blood sample.
6. To study the enzymatic activity (catalases) in microorganisms/Liver.
7. To study the salivary digestion.
8. To perform the qualitative estimation of carbohydrates in given samples.
9. To perform the qualitative estimation of proteins in given samples.
10. To perform the qualitative estimation of lipids in given samples.
11. To separate different dyes by circular paper chromatography and calculate the  $R_f$
12. To separate different amino acids/ carbohydrates by thin layer chromatography.

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