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**School of Engineering**

**Scheme**

**(Master of Computer Applications)**

**Academic Program**

**Batch 2018-21(Normal Entry) & 2018-20 (Lateral Entry)**

**Total Credits for the Batch 2018-21 Normal Entry = 168 Credits**

1. **Minimum Credits required = 154 Credits**
2. **Total Relaxation = 14 Credits**
3. **No relaxation in Core, Foundation and Skill Enhance Course subjects**
4. **Students must choose at least two subject of type ID in first year and must choose at least one subject of type ID from II and III year.**
5. **Students must choose at least three subjects of type S in II and III year.**
6. **Theory exams duration will be of 03 hours and Practical exams will be of 02 hours.**
7. **Internal Assessment will be of 50 marks and End Term Assessment will be of 50 marks.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **I Semester** | **II Semester** | **III Semester** | **IV Semester** | **V Semester** | **VI Semester** | **Total** | **Min Credits Required** |
| **28** | **28** | **28** | **28** | **28** | **28** | **168** | **154** |

**Subject Description as per Type**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Type 🡫** | **Semester 🡪** | **I Semester** | **II Semester** | **III Semester** | **IV Semester** | **V Semester** | **VI Semester** | **Total** |
| **Foundation (F)** | | **4** | **4** | **2** | **3** | **-** | **-** | **13** |
| **Core (C)** | | **12** | **8** | **13** | **6** | **9** | **28** | **76** |
| **Specialization (S)** | | **-** | **4** | **-** | **8** | **8** | **-** | **20** |
| **Interdisciplinary (ID)** | | **8** | **4** | **3** | **3** | **3** | **-** | **21** |
| **Skill Enhance Courses (SEC)** | | **4** | **8** | **10** | **8** | **8** | **-** | **38** |
| **Total** | | **28** | **28** | **28** | **28** | **28** | **28** | **168** |

**Total Credits for the Batch 2018-20 Lateral Entry = 112 Credits**

1. **Minimum Credits required = 102 Credits**
2. **Total Relaxation = 10 Credits**
3. **No relaxation in Core, Foundation and Skill Enhance Course subjects**
4. **Students must choose at least one subject of type ID from II and III year.**
5. **Students must choose three subject of type S from II and III year.**
6. **Theory exams duration will be of 03 hours and Practical exams will be of 02 hours.**
7. **Internal Assessment will be of 50 marks and End Term Assessment will be of 50 marks.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **III Semester** | **IV Semester** | **V**  **Semester** | **VI Semester** | **Total** | **Min Credits Required** |
| **28** | **28** | **28** | **28** | **112** | **102** |

**Subject Description as per Type**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Type 🡫** | **Semester 🡪** | **III Semester** | **IV Semester** | **V Semester** | **VI Semester** | **Total** |
| **Foundation (F)** | | **2** | **3** | **-** | **-** | **5** |
| **Core (C)** | | **13** | **6** | **9** | **28** | **56** |
| **Specialization (S)** | | **-** | **8** | **8** | **-** | **16** |
| **Interdisciplinary (ID)** | | **3** | **3** | **3** | **-** | **9** |
| **Skill Enhance Courses (SEC)** | | **10** | **8** | **8** | **-** | **26** |
| **Total** | | **28** | **28** | **28** | **28** | **112** |

**Semester – I**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **L**  **(Hr.)** | **T (Hr.)** | **P**  **(Hr.)** | **Credits** | **Type** |
| MCA101A | Programming Fundamentals using C | 3 | 1 | 0 | 4 | CORE |
| MCA102A | Information Technology | 3 | 1 | 0 | 4 | F |
| MCA103A | Introduction to Management Function | 3 | 1 | 0 | 4 | ID |
| MCA104A | Operating Systems | 3 | 1 | 0 | 4 | CORE |
| MCA105A | Information Systems, Analysis, Design & Implementation | 3 | 1 | 0 | 4 | CORE |
| MCA106A | Digital Electronics | 3 | 1 | 0 | 4 | ID |
| MCA107A | Programming fundamental Using C Lab | 0 | 0 | 2 | 2 | SEC |
| MCA108A | Office Automation Tools Lab | 0 | 0 | 2 | 2 | SEC |
|  | **Total** | **18** | **6** | **4** | **28** |  |

* **F- Foundation, S- Specialization, ID- Interdisciplinary, SEC- Skill Enhance Courses**
* **L- Lecture, T- Tutorial, P- Practical**

**Semester – II**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **L**  **(Hr.)** | **T (Hr.)** | **P (Hr.)** | **Credits** | **Type** |
| MCA109A | Mathematical Foundations | 3 | 1 | 0 | 4 | ID |
| MCA110A | Programming in Java | 3 | 1 | 0 | 4 | S |
| MCA111A | Communication Skills | 3 | 1 | 0 | 4 | F |
| MCA112A | Computer Organization & Architecture | 3 | 1 | 0 | 4 | CORE |
| MCA113A | Introduction to DBMS | 3 | 1 | 0 | 4 | CORE |
| MCA114A | Programming in Java Lab | 0 | 0 | 2 | 2 | SEC |
| MCA115A | DBMS Lab | 0 | 0 | 2 | 2 | SEC |
| MCA116A | Unix and Windows Lab | 0 | 0 | 2 | 2 | SEC |
| MCA117A | Communication Skills Lab | 0 | 0 | 2 | 2 | SEC |
|  | **Total** | **15** | **5** | **8** | **28** |  |

* **F- Foundation, S- Specialization, ID- Interdisciplinary, SEC- Skill Enhance Courses**
* **L- Lecture, T- Tutorial, P- Practical**

**Semester – III**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **L**  **(Hr.)** | **T (Hr.)** | **P**  **(Hr.)** | **Credits** | **Type** |
| MCA118A | Advance Database Management Systems | 3 | 0 | 0 | 3 | CORE |
| MCA119A | Programming in C++ | 3 | 0 | 0 | 3 | CORE |
| MCA120A | Computer Networks | 3 | 1 | 0 | 4 | CORE |
| MCA121A | Advance Data Structures and Algorithms | 3 | 0 | 0 | 3 | CORE |
| MCA122A | Statistical Computing | 3 | 0 | 0 | 3 | ID |
| MCA123A | Business Communication Skills | 2 | 0 | 0 | 2 | F |
| MCA124A | Advance Database Management Systems Lab | 0 | 0 | 2 | 2 | SEC |
| MCA125A | Programming in C++ Lab | 0 | 0 | 2 | 2 | SEC |
| MCA126A | Advance Data Structures and Algorithms Lab | 0 | 0 | 2 | 2 | SEC |
| MCA127A | Business Communication Skills Lab | 0 | 0 | 2 | 2 | SEC |
| MCA128A | Minor Project Lab (In C & C++) | 0 | 0 | 2 | 2 | SEC |
|  | **Total** | **17** | **1** | **10** | **28** |  |

* **F- Foundation, S- Specialization, ID- Interdisciplinary, SEC- Skill Enhance Courses**
* **L- Lecture, T- Tutorial, P- Practical**

**Semester – IV**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **L**  **(Hr.)** | **T (Hr.)** | **P (Hr.)** | **Credits** | **Type** |
| MCA129A | Accounting Principles and Practices | 3 | 0 | 0 | 3 | ID |
| MCA130A | Advance Java | 3 | 0 | 0 | 3 | CORE |
| MCA131A | Software Engineering | 3 | 0 | 0 | 3 | F |
| MCA132A | PHP & MYSQL | 3 | 0 | 0 | 3 | CORE |
|  | Elective – I | 2 | 0 | 2 | 4 | S |
|  | Elective – II | 3 | 1 | 0 | 4 | S |
| MCA133A | Advance Java Lab | 0 | 0 | 2 | 2 | SEC |
| MCA134A | PHP & MYSQL Lab | 0 | 0 | 2 | 2 | SEC |
| MCA135A | Software Testing Lab | 0 | 0 | 2 | 2 | SEC |
| MCA136A | Minor Project | 0 | 0 | 2 | 2 | SEC |
|  | **Total** | **17** | **1** | **10** | **28** |  |

* **F- Foundation, S- Specialization, ID- Interdisciplinary, SEC- Skill Enhance Courses**
* **L- Lecture, T- Tutorial, P- Practical**

**Semester – V**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **L**  **(Hr.)** | **T (Hr.)** | **P (Hr.)** | **Credits** | **Type** |
| MCA137A | Management Information System | 3 | 0 | 0 | 3 | ID |
| MCA138A | Information Security & Cyber Law | 3 | 1 | 0 | 4 | CORE |
| MCA139A | Programming in ASP.Net | 3 | 0 | 0 | 3 | CORE |
| MCA140A | Programming in R | 2 | 0 | 0 | 2 | CORE |
|  | Elective – III | 2 | 0 | 2 | 4 | S |
|  | Elective – IV | 3 | 1 | 0 | 4 | S |
| MCA141A | Programming in ASP.Net Lab | 0 | 0 | 2 | 2 | SEC |
| MCA142A | Programming in R Lab | 0 | 0 | 2 | 2 | SEC |
| MCA143A | Minor Project (PHP, ASP.Net, Java) | 0 | 0 | 4 | 4 | SEC |
|  | **Total** | **16** | **2** | **10** | **28** |  |

* **F- Foundation, S- Specialization, ID- Interdisciplinary, SEC- Skill Enhance Courses**
* **L- Lecture, T- Tutorial, P- Practical**

**Semester – VI**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course Code** | **Course Name** | **L**  **(Hr.)** | **P**  **(Hr.)** | **Credits** | **Type** |
| MCA169A | Industrial Training/Project Presentation | 0 | 28 | 28 | CORE |

**List of Courses for Elective – I**

|  |  |
| --- | --- |
| **Course Code** | **Course Name** |
| MCA144A | Programming in Python |
| MCA145A | Android Application Development |
| MCA146A | Web Technologies |

**List of Courses for Elective – II**

|  |  |
| --- | --- |
| **Course Code** | **Course Name** |
| MCA147A | Parallel Computing |
| MCA148A | Advance Computer Architecture |
| MCA149A | Theory of Computation |
| MCA150A | Data warehousing and Data Mining |
| MCA151A | Optimization Techniques |
| MCA152A | NLP and Information Retrieval |
| MCA153A | Object Oriented Analysis & Design |
| MCA154A | Cloud Computing |
| MCA155A | Distributed Computing |
| MCA156A | Introduction to Sales Force |

**Note:**

1. **Students have to select electives as per the given list for Elective – I and Elective – II.**
2. **Minimum Batch size is 20 for any Elective.**

**List of Courses for Elective – III**

|  |  |
| --- | --- |
| **Course Code** | **Course Name** |
| MCA157A | Unix & Shell Programming |
| MCA158A | Programming in C# |
| MCA159A | Professional Java |

**List of Courses for Elective – IV**

|  |  |
| --- | --- |
| **Course Code** | **Course Name** |
| MCA160A | Design & Analysis of Algorithms |
| MCA161A | Mobile Computing |
| MCA162A | Image Processing |
| MCA163A | Soft Computing |
| MCA164A | Compiler Design |
| MCA165A | Big Data Analytics |
| MCA166A | Organization Behavior |
| MCA167A | Artificial Intelligence and Expert System |
| MCA168A | Computer Graphics |

**Note:**

1. **Students have to select electives as per the given list for Elective – III and Elective – IV.**
2. **Minimum Batch size is 20 for any Elective.**

**PROGRAMME EDUCATIONAL OBJECTIVES (PEO’s)**

A master of the Computer Science Program should:

**PEO- I**

To excel in problem solving and programming skills in the various computing fields of IT industries.

**PEO- II**

To develop the ability to plan, analyze, design, code, test, implement & maintain a software product for real time system

**PEO- III**

To promote students capability to set up their own enterprise in various sectors of Computer applications

**PEO- IV**

To experience the students in finding solutions and developing system based applications for real time problems in various domains involving technical, managerial, economical & social constraints

**PEO- V**

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.

**PROGRAMME OBJECTIVES**

Understand and Apply mathematical foundation, computing and domain knowledge for the conceptualization of computing model of problems.

1. Identify, analyze the computing requirements of a problem and Solve them using computing principles.
2. Design and Evaluate a computer based system, components and process to meet the specific needs of applications.
3. Use current techniques and tools necessary for complex computing practices.
4. Use suitable architecture or platform on design and implementation with respect to performance.
5. Develop and integrate effectively system based components into user environment.
6. Understand and commit to Cyber regulations and responsibilities in Professional computing practices.
7. Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.
8. Apply the understanding of management principles with computing knowledge to manage the projects in multidisciplinary environments.
9. Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.
10. Understand societal, environmental, health, legal, ethical issues within local and global contexts and the consequential responsibilities relevant to professional practice.
11. Function effectively in a team environment to accomplish a common goal.
12. Identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.
13. Use knowledge to analyze, interpret the data and synthesis the information to derive valid conclusions using research methods.
14. Expertise in developing application with required domain knowledge.

**PROGRAM OUTCOME (PO’s)**

MCA programme has been designed to prepare graduates for attaining the following program outcomes:

PO1: Engineering knowledge: Apply the knowledge of mathematics, 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.

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.

**Semester I**

**Course Name: Programming Fundamentals using C**

**Course Code: MCA101A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objectives:**

1. To provide exposure to problem solving through programming.
2. To enhance the ability to solve the problem through various constructs of C such as decision control and looping statements.
3. To demonstrate the concept of functions, arrays, strings, pointers, structure and union.
4. To evaluate the concept of file management and pre-processor directives.
5. To explores major concepts of computer science and the process of computer programming, including programming, procedural and data abstraction and program modularity.

**Syllabus**

**Unit I**

**Introduction to Programming and C:** Introduction to Computer Software, Classification of Computer Software, Programming Languages, Generation of Programming Languages

C Programming Language: Introduction, Structure of C Program, Files Used in C Program, Compiling and Executing C Programs, Keywords, Identifiers , Data Types, Variables, Constants, Input/output Statement in C, Operators in C, Type Conversion and Typecasting, Structure of C Program.

**Unit II**

**Decision Control and Looping Statements:** Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, break and continue Statements, goto Statement, Building a Robust C Program, Flow Chart Designing.

**Unit III**

**Array, String & Functions:** Array & String: Declaration of Arrays, Accessing Array Elements, Storing Values in Arrays, Length of an Array, Array Operations, Multidimensional Arrays, Two-Dimensional Arrays, Operations on Two-dimensional Arrays, String Introduction, Suppressing Input, String Operations, String and Character Functions, String Array

Functions: Function Declaration/Function Prototype, Definitions, Function call, Return Statement, Parameter passing, Scope of Variables, Storage classes, Recursive functions

**Unit IV**

**Pointers, Structure & Union:** Computer’s Memory, Introduction to Pointers, Declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic, Null Pointers, Generic Pointers, Passing Arguments, Pointers and Arrays, Pointers and Strings, Array of Pointers, Function Pointers, Array of Function Pointers, Pointers to Pointers

Structure & Union : Structure Declarations, Typedef keyword, initialization, Accessing members, nested structure, Array of Structure, Structure with functions , Self-referential Structures, Union, Structure vs Union

**Unit V**

**Files and Preprocessor Directives:** Introduction to Files, Using Files in C , Writing to files, Read data, EOF, Error handling , Command line Arguments, Functions for Selecting a Record Randomly, Renaming the File, Temporary File

Preprocessor Directives: Introduction, Types, #define, #include, #undef, #line, Pragma Directives, Conditional Directives, The Defined Operator, #error Directive , Predefined Macro Names

**Course Outcomes:**

**On successful completion of this course students will be able to:**

CO1: Students will learn the concept of character set identifiers and keywords, data type, variable names, declaration statements and basic structure of C program.

CO2: Student will classify the File handling, preprocessor directives and predefined macro names.

CO3: Students will apply the concept of Arithmetic operators, relational and logical operators, type, conversion, Standard input and output, formatted output and input.

CO4: Students will contrast C programs based on Flow of Control and program Structures.

CO5: Students will learn the concept of Arrays, Pointers, Structures Union and 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 |
| CO2 |  | H | H | M |  |  |  |  |  | M |  |  |
| CO3 | H |  |  |  |  |  | H | M |  |  |  |  |
| CO4 |  |  |  | H |  |  |  |  |  |  | M |  |
| CO5 |  |  |  |  | H |  |  |  | M |  |  |  |

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

# Text Books

1. Reema Thareja, “Introduction to C Programming”, First Edition, Oxford University press, 2012.

**Reference Books**

1. Yeshwant kanetkar, Let us C, Fifteenth Edition, BPB Publication 2016.
2. Byron S Gottfriend, “Programming with C”, Second Edition, McGraw Hill, 2007.
3. K R Venugopal, S R Prasad, “Mastering in C”, second edition, Tata McGraw Hill, 2007.
4. Herbert Schildt, Turbo C**:** The Complete Reference, Fourth edition, McGraw-Hill, 2017.

**Course Name: Information Technology**

**Course Code: MCA102A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To explain why information systems are so important today for business and management.
2. To evaluate the role of the major types of information systems in a business environment and their relationship to each other.
3. To assess the impact of the Internet and Internet technology on business-electronic commerce and electronic business.
4. To identify the major management challenges to building and using information systems.
5. To learn how to find appropriate solutions to those challenges.

**Syllabus**

**Unit I**

**Information concepts and processing:** Evolution of information processing, data information language and communication. Elements of a computer processing system: Hardware - CPU, storage devices and media, VDU, input-output devices, data communication equipment Software- system software, application software.

**Unit II**

**Programming languages:** Classification, machine code, assembly language, higher level languages, fourth generation languages. Operating systems: Concept as resource manager and coordinator of processor, devices and memory.

**Unit III**

**Priorities, protection and parallelism:** Concept of Priorities, protection and parallelism, Command interpreter, typical commands of DOS/ UNIX/Network, Gul- Windows. Computers and Communication: Single user, multi-user, work station, client server systems, Computer networks, network protocols, LAN, WAN, Internet facilities through WWW, Mosaic, Gopher, html, elements of Java.

**Unit IV**

**Information integrity** definition ensuring integrity Computer security: Perverse software, concepts and components of security, Preventive measures and treatment.

**Unit V**

**Productivity Software:** Commercial Software, Freeware and Public Domain Software, Open-Source Software. Understanding the Need for Security Measures: Overview, Need for Computer Security, Basic security concepts, Threats to users, hacking, hacking methods. Protective Measures: keeping system safe, avoiding Identity Theft; keeping data secure (Limiting Physical access, Firewall), Managing cookies, spyware & other bugs.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Summarize the basic concept of processing of information, system software and application software.

CO2: Identify computer hardware components and describe their function;

CO3: Understand the input, output, storage, programming languages and operating system concepts

CO4: Describe the concepts related to Computer Networking, Computer Security & Productivity Software.

CO5: Describe the concept of commercial software, security, threats and firewall.

**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 |
| CO2 |  | H | H | M |  |  |  |  |  | M |  |  |
| CO3 | H |  |  |  |  |  | H | M |  |  |  |  |
| CO4 |  |  |  | H |  |  |  |  |  |  | M |  |
| CO5 |  |  |  |  |  | M |  |  | M |  |  |  |

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

# Text Books

1. Rajaraman V, "Fundamental of Computers" (2nd edition), Prentice Hall of India, New Delhi. 1996.

**Reference Books**

1. Mohan, P., “Fundamentals of Computers”, Himalaya publishing House, 2010
2. Murthy, C. S., “Fundamentals of Computers”, Himalaya Publishing House, 2010
3. Tiwari, H. N., & Jain, H. C., “Fundamentals of Computer and Information System”, International Book House Pvt. Ltd., 2012
4. Vallabhan, S. V., “Introduction to Computer Applications in Business”, Sultan Chand & Sons, 2009

**Course Name: Introduction to Management Function**

**Course Code: MCA103A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To acquire the knowledge about the important management concepts & their application.
2. To observe the process of management's four functions: planning, organizing, leading, and controlling.
3. To identify and properly use vocabularies within the field of management to articulate one's own position on a specific management issue and communicate effectively with varied audiences.
4. To evaluate leadership styles to anticipate the consequences of each leadership style.
5. To gather and analyze both qualitative and quantitative information to isolate issues and formulate best control methods.

**Syllabus**

**Unit I**

**Management:** Meaning & concept, Management principles (Fayol& Taylor), Management process (in brief), Managerial levels, Roles & skills of a manager, Management Theories (Classical, Neo classical, Behavioral, Systems & Contingency)

**Unit II**

**Planning:** Meaning, Purpose & process, Decision making: Concept &process,Organizing: Process, Depart mentation, Authority & Responsibility relationships,Decentralization. Staffing: Nature & Importance.

**Unit III**

**Staffing:** Concept, nature & importance of staffing. Directing: Motivation: concept & theories (Maslow’s, Herzberg Two factor, McGregor’s theory X & Y) , Leadership: Concepts & styles.

**Unit IV**

**Decision making:** The decision making process. Strategic vs operational decisions. Programmed vs non-programmed decisions. Decision making under conditions of risk and uncertainty. Decision making tools. Controlling: Nature, Importance, significance & Process of control

**Unit V**

**Strategy:** Formulating strategy. The grand strategies of growth, stability, retrenchment and combination. Porter’s competitive strategies. Managing People - Meaning, Need of understanding human behavior in organization, Models of OB, Major concepts in OB (elementary)- Personality, Learning, Perception & Attitude Building.

**Course Outcomes:**

Upon successful completion of this subject students should be able to:

CO1: Comprehend management concepts, principles, process and decisions.

CO2: Understand the basic functions of management and there importance in one’s life.

CO3: Enhance the abilities to be a good leader, Decision making and controlling of the process.

CO4: Get the knowledge about the important management concepts & their application.

CO5: Understand the formulating strategy, human behavior in organization and models of OB.

**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 |  |  | M |  |  |  | M |  |  |  |  | H |
| CO3 |  |  | H |  |  |  |  |  |  |  | M |  |
| CO4 | M |  |  |  |  | M |  |  |  |  |  |  |
| CO5 |  |  |  |  |  |  |  | M |  | H |  |  |

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

**Text Books**

1. Madan, S., “Fundamentals of Computers and Information System”, Scholar Tech Press, 2012.

**Reference Books**

1. Mohan, P., “Fundamentals of Computers”, Himalaya publishing House, 2010
2. Murthy, C. S., “Fundamentals of Computers”, Himalaya Publishing House, 2010
3. Tiwari, H. N., & Jain, H. C., “Fundamentals of Computer and Information System”, International Book House Pvt. Ltd., 2012
4. Dr. C.B Gupta “Management concepts & practices” S.Chand& Sons, 2009.

**Course Name: Operating System**

**Course Code: MCA104A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To understand the structure of modern computers purpose, structure and functions of operating systems illustration of key OS aspects by example.
2. To be able to describe the general architecture of computers describes, contrast and compare differing structures for operating systems.
3. To learn the mechanisms involved in memory management in contemporary OS
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
5. To know the components and management aspects of concurrency management

**Syllabus**

**Unit I**

**Evolution of operating systems**: Types of operating systems. Different views of the operating system, operating system concepts and structure. Processes: The Process concept, systems programmer's view of processes. The operating system services for process management. Scheduling algorithms. Performance evaluation.

**Unit II**

**Memory Management:** Memory management without swapping or paging, swapping, virtual memory, page replacement algorithms, Segmentation, Demand Paging, Page fault trap.

**Unit III**

**Interprocess Communication and synchronization:** The need for intercrosses synchronization, mutual exclusion, semaphores, and hardware sport for mutual exclusion. Critical section and problems, Deadlocks. Conditions, Deadlock detection, recovery, deadlock avoidance- Banker Algorithm.

**Unit IV**

**File Systems:** File systems, directories, file system implementation, security protection mechanisms. Input/output Principles of I/O Hardware: I/O devices, device controllers, direct memory access. Principles of I/O Software: Goals, interrupt handlers, device drivers, device independent I/O software. User space I/O software.

**Unit V**

**Disks:** Disk hardware, Disk scheduling algorithms, Error handling, RAM Disks. Clocks: Clock hardware, memory mapped terminals, I/O software. Case Studies: MS, DOS. MS WINDOWS, LINUX (UNIX) operating system.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Analyze the structure of OS and basic architectural components involved in OS design

CO2: Examine and design the applications to run in parallel either using process or thread models of different OS and understand the concept of memory management.

CO3: Inference the various device and resource management techniques for timesharing and file system principles.

CO4: Extend the concept of Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system.

CO5: Analysis the disk uses with the help of disk scheduling 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 | H |  |  |  |  |  |  |  |  |  | M |  |
| CO2 |  |  | H |  |  |  |  | M |  |  |  |  |
| CO3 |  | M |  | H |  |  |  |  |  |  |  | M |
| CO4 |  |  |  |  |  | H |  |  |  | M |  |  |
| CO5 |  |  | M |  |  |  | H |  |  |  |  |  |

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

**Text Books**

1. Galvin, Peterson, J.L. Abraham Silberschatz. "Operating System Concepts". Addison Wesley Publishing Company. 1989.

**Reference Books**

1. William Stallings, “Operating Systems**:** Internals and Design Principles”
2. Tanenbaum, A.S., "Modem Operating Systems", Prentice Hall of India Pvt. Ltd. 1995.
3. Deitel. H.M .. "An Introduction to Operating Systems". Addison Wesley Publishing Company
4. D. M. Dhamdhere, “Operating Systems**:** A Concept-Based Approach”

**Course Name: Information System Analysis, Design & Implementation**

**Course Code: MCA105A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To provide an understanding and application of system analysis and design processes centered on the systems development life cycle.
2. To extend the core topics include project management and cost-benefit analysis; information systems planning and project identification and selection.
3. To emphasizes interpersonal skill development with clients, users, team members, and others associated with development, operation, and maintenance of systems.
4. To learn the Information system components, Types on information systems, System development life cycles, the systems analyst.
5. To make a study of Systems planning, Object oriented analysis and design.

**Syllabus**

**Unit I**

**Overview of Systems Analysis and Design:** Systems Development Life Cycle. Concept and Models: requirements determination. Logical design. Physical design, test planning implementation planning and performance evaluation; communication, interviewing, presentation skills; group dynamics; risk and feasibility analysis; group-based approaches. JAD, structures walkthroughs, and design and code reviews; prototyping; database design; software quality metrics; application categories software package evaluation and acquisition.

**Unit II**

**Information requirement Analysis:** Process modelling with physical and logical data flow diagrams, data modelling with logical entity relationship diagrams; developing a Proposal: Feasibility study and cost estimation.

**Unit III**

**System Design:** Design of input and control, design of output and control, file design/database design, Process design, user interface design; prototyping; software constructions; documentation.

**Unit IV**

**Application Development Methodologies and CASE tools:** Information engineering, structured systems analysis and design and object oriented methodologies for application development data modeling, process modeling, user interface design and prototyping; use of computer aided software engineering (CASE) tools in the analysis, design and implementation of information systems.

**Unit V**

**Design and Implementation of OO platforms:** Object oriented analysis and design through object modeling technique, object modeling, dynamic modeling and functional modeling, object oriented design and object oriented programming systems for implementation, object oriented data bases.

Managerial Issues in Software Projects: Introduction to software markets; planning of software projects, size and cost estimations; project scheduling; measurement of software quality and productivity; ISO and capability maturity models for organizational growth.

**Course Outcomes (CO)**

**Upon successful completion of this subject, students should be able to:**

CO1: Students are able to describe the concept of Information System Analysis and development life cycle.

CO2: Explain the purpose of Information Requirement Analysis, Data modeling with logical entity relationship diagrams, Feasibility study and cost estimation.

CO3: Understand System Designing & Implementation of object oriented analysis and design.

CO4: Solve Managerial Issues in Software Projects using CASE tools.

CO5: Analysis and design models using object modeling techniques and object oriented 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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  |  | H |  |  |  |  |  |  | H |  |  |
| CO2 |  |  |  |  | M |  |  |  |  |  |  |  |
| CO3 |  | M |  | H |  |  |  | H |  |  |  | M |
| CO4 |  |  |  | M | H |  |  |  |  |  | L |  |
| CO5 |  |  | H |  |  |  | M |  |  |  |  |  |

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

**Text Books**

1. Rajaraman, V, "Analysis and Design of Information Systems". Prentice Hall of India, 1991.

**Reference Books**

1. Haryszkiewycz, LT., "Introduction of Systems Analysis and Design". Prentice Hall of India, 1989.
2. Senn, LA., "Analysis and Design of Information Systems". Tata McGraw Hill Book Company.
3. Whiten, 1.K., Bentley, L.D., Beslow, V.M., ''Systems Analysis and Design Methods". Galgotia Publications Pvt. Ltd. 1994.
4. Alan Dennis, Barbara Haley Wixom, Roberta M. Roth, “Systems Analysis and Design, SixthEdition”, John Wiley and Sons, 2014.

**Course Name: Digital Electronics**

**Course Code: MCA106A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To introduce the concept a comprehensive introduction to digital logic design leading to the ability to understand number system representations.
2. To know binary codes, binary arithmetic and Boolean algebra, its axioms and theorems, and its relevance to digital logic design.
3. To know about synchronous sequential logic and Asynchronous sequential logic.
4. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
5. To prepare students to perform the analysis and design of various digital electronic circuits.

**Syllabus**

**Unit I**

**IC Digital Logic Families** - Characteristics of digital IC’s, Transistor – Transistor Logic family, Standard TTL characteristics, Other TTL series, Open collector TTL, Wired OR/AND connection, Tristate TTL, Emitter-Coupled Logic family, ECL NOR/OR gate.

**Unit II**

**Simplification of Boolean Functions** - Using Karnaugh map and Quine - Mccluskey methods, SOP, POS simplification, NAND and NOR implementations, other two-level implementation (AND-OR-INVERT).

**Unit III**

**Combinational Logic Design**- Design procedure, Adder: Half adder, Full adder, Serial adder, Parallel adder & Carry look-ahead adder, Subtractors : Half subtractor & Fullsubtractor, BCD to Excess-3 code convertor, BCD to 7-segment decoder, Parity generator and checker .

**Unit IV**

**Combinational Logic Design using MSI Circuits** - Application of typical IC‟s like4-bit parallel adder (ex : 7483), Encoders (ex :74148), Multiplexers (ex: 74151, 74153,74157) and their use in realizing boolean functions, Multiplexer trees, Demultiplexer /Decoders (e.g.: 74138, 74154) and their use in realizing a boolean function and demultiplexertrees, 4- it magnitude comparator (ex:7485).

**Unit V**

**Synchronous Sequential Logic**- Analysis of clocked sequential logic, State reduction and assignment, Flip-flop excitation tables, Design procedure, Design of sequential circuits ex : 3-bit up/down counter (mod < 8), 3-bit up/down gray code counter, Serial adder.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Know how digital logic design is used to represent computer systems and recall the use of digital IC’s, Transistor.

CO2: Illustrate the concept of SOP, POS simplification and NAND, NOR implementations.

CO3: Know concepts of Boolean algebra, its theorems, and its relevance to digital logic design.

CO4: Demonstrate the concept of Boolean functions, multiplexer trees and de-multiplexer.

CO5: Understand the concept of sequential logic and design procedures.

**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 |  | M |  |  |  |
| CO2 |  | H |  |  |  |  |  | M |  |  |  | M |
| CO3 |  |  |  |  | H | M |  |  |  |  | M |  |
| CO4 |  |  |  | H |  |  |  | M |  |  |  |  |
| CO5 | H |  |  |  |  |  |  |  |  | M |  |  |

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

**Text Books**

* 1. M.Morris Mano, “Digital Design”, 3rd edition, Pearson Education, Delhi, 2007.

**Reference Books**

1. R. P Jain, Modern Digital Electronics, Second Edition, TMH
2. Donald P Leech, Albert Paul Malvino and GoutamSaha, “Digital Principles and Applications”, Tata McGraw Hill, 2007.
3. L K Maheswari and M M S Anand, “Laboratory Manual for Introductory Electronic Experiments”, New Age, 2010.
4. S Poornachandra Rao and B Sasikala, “Handbook of Experiments in Electronics and Communication Engineering”,Vikas publishers, 2003.

**Course Name: Programming Fundamentals using C Lab**

**Course Code: MCA107A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objective**

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 Sample Programs**

1. Write a program to demonstrate the use of printf Statement to print values of variables of different data types.
2. Write a program to calculate the area of a triangle using Hero’s formula.
3. Write a program to calculate the distance between two points.
4. Write a program to perform addition, Subtraction Division, Integer Division, Multiplication and modulo Division on two Integer numbers.
5. Write a program to subtract two long Integers.
6. Write a program to illustrate the use of Unary prefix increment and decrement operators.
7. Write a program to find the largest of three numbers using Ternary operators.
8. Write a program to show use of Bitwise operators.
9. Write a program to demonstrate the use of Assignment Operators
10. Write a program to Swap 2 numbers using a temporary variable.
11. Write a program to Swap 2 numbers without using a temporary variable.
12. Write a program to convert degrees fahrenheit into Degrees Celsius.
13. Write a program to covert a floating point number into the corresponding integer.
14. Write a program to convert an Integer into the Corresponding floating point number.
15. Write a program to determine whether a person is eligible to vote or not.
16. Write a program to determine the character entered by the user.
17. Write a program to find whether the given number is even or odd.
18. Write a program to find whether the given year is a leap year or not.
19. Write a program to test whether a number entered is positive , negative or equal to zero.
20. Write a program to input three numbers and then find largest of them using && operator.
21. Write a program to calculate the roots of a quadratic equation.
22. Write a program to demonstrate the use of switch statement without a break.
23. Write a program to determine whether an entered character is a vowel or not.
24. Write a program to enter a number from 1 to 7 and display the corresponding day of the week using switch case statement.
25. Write a program that accepts a number from 1 to 10. Print whether the number is even or odd using a switch case construct.
26. Write a program to print the following pattern

\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*

1. Write a program to print the following pattern

A

AB

ABC

ABCD

ABCDE

1. Write a function to swap the value of two variables.
2. Write a program to calculate area of a circle using function.
3. Write a program to print the Fibonacci series using recursion.
4. Write a program to read and display n numbers using an array.
5. Write a program to print the position of the smallest of a number using arrays.
6. Write a program to enter n number of digits. Form a number using these digits.
7. Write a program to transpose a 3X3 matrix.
8. Write a program to read and display a 3X3 matrix.
9. Write a program to enter n number of digits. Form a number using these digits.
10. Write a program to implement linear search.
11. Write a program to implement Binary search.
12. Write a program to print the elements of a 2D array.
13. Write a program to display a string using printf ().
14. Write a program to find the length of a string.
15. Write a program to convert characters of a string into lower case.
16. Write a program to print Hello worlds using pointers.
17. Write a program to calculate area of circle.
18. Write a program to display the sum and average of numbers from m to n.
19. Write a program to calculate area of a Triangle.
20. Write a program using structures to find the largest of three numbers.
21. Write a program to read a file character by character, and display it simultaneously on the screen.
22. Write a program to count the number of characters and number of lines in a file.
23. Write a program to copy one file into another .copy one character at a time.

**Course Name: Office Automation Tools Lab**

**Course Code: MCA108A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objective**

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 Sample Programs**

Elaborate these topics in with the help of following tools ie. open office/MS office.

**1. Introduction**

1.1. Concept of Windows, Icon, Menu

1.2. Desktop

1.3. Creating Folders and Shortcuts

1.4. Finding Files & Folders

1.5. Creating, Copying, Moving and Deleting files

1.6. Windows Explorer

**2. Word Processing Package**

2.1. Typing, Editing, Proofing & reviewing

2.2. Formatting text & Paragraph

2.3. Automatics Formatting and Styles

2.4. Working with Tables

2.5. Graphics and Sound

2.6. Mail Merge

**3. Spreadsheet package**

3.1. Concept of worksheet

3.2. Working & Editing in Workbooks

3.3. Creating Formats & Links

3.4. Protecting and Hiding data

3.5. Built in Functions (Mathematical, Statistical, String & Date)

3.6. Formatting a Worksheet & Creating graphics objects

3.7. Creating Charts (Graphics), Formatting and analyzing data

3.8. Sharing & Importing Data

3.9.Printing

**4. Presentation Package**

4.1. Creating and Editing Slides

4.2.Creating and Editing objects in the slide

4.3. Animation

4.4. Creating and Running Slide Show

4.5. Templates

**5. Internet**

5.1. Concepts

5.2. Working

5.3. Mailing & surfing tools

**Semester II**

**Course Name: Mathematical Foundation**

**Course Code: MCA109A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To know the concept of Mathematical Logics, especially First Order Logic.
2. To develop an understanding of inferring a conclusion from the given premises applying rules of inference in statement calculus and predicate calculus.
3. To introduce proof techniques such as Mathematical Induction and Contradiction. These techniques will come in handy for courses such as Analysis of Algorithms and Automata Theory.
4. To develop an understanding of counting, functions and relations.
5. To be familiar with fundamental notions of statistics, such as sample space, mean and distributions. Understand basic definitions and properties of graphs. To have the knowledge of applications of graphs in the field of computer science.

**Syllabus**

**Unit I**

Mathematical Logic: Notation. Connectives Normal forms. Theory of inference for statement calculus.

**Unit II**

Predicate calculus. Inference theory of the predicate calculus. Relations and ordering.

**Unit III**

Functions. Recursion. Algebraic Structures: Groups. Application of residue arithmetic to computers. Group codes.

**Unit IV**

Graph theory: Definition. Paths, reach ability, connectedness. Matrix representation of graphs. Trees.

**Unit V**

Storage representation and manipulation of graphs: Trees. List structures and graphs. Pert and related techniques.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Develop fluent knowledge, skills and understanding of mathematical methods and concepts

CO2: Acquire, select and apply mathematical techniques to solve problems

CO3: Understand the concepts like Functions, Recursion, and Algebraic Structures & Graph theory.

CO4: Apply the acquired knowledge of predicate calculus and design discrete problems to solve by computers.

CO5: Understand the functions concepts and distinguish different types of functions. Identify and describe various types of relations. Develop the ability to solve the recurrence relations by using various methods.

**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 |  |  | M |  | H |  |  |  |
| CO2 | H |  |  |  |  |  |  |  |  |  |  | M |
| CO3 |  | H |  |  | M |  |  |  |  | M |  |  |
| CO4 |  |  | M |  |  |  |  | H |  |  |  |  |
| CO5 | M |  |  |  |  | M |  |  |  |  | H |  |

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

# Text Books

1. Kolman, B., and Busby. R., "Discrete Mathematical Structures for Computer Science", Prentice Hall. 1987.

**Reference Books**

1. Sahni, S., "Concepts in Discrete Mathematics". Camelot Publisher. U.S.A. 1981.
2. Tremblay, J.P., el. al. "Discrete Mathematical Structures with Applications to Computer Science" McGraw Hill, 1987.
3. Kenneth H Rosen, “Discrete Mathematics and its applications”, 6th Edition, McGraw Hill 2007.
4. J.P. Tremblay, “Discrete Mathematical Structures with Applications to Computer Science”, McGraw Hill

**Course Name: Programming in Java**

**Course Code: MCA110A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objectives:**

1. To understand 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 use variety technologies of Java and work on different platforms.
5. To examine the life cycle of applets and packages.

**Syllabus**

**Unit I**

**Introduction to OOPS:** Paradigms of Programming Languages – Basic concepts of Object Oriented Programming – Differences between Procedure,Oriented Programming and Object Oriented , History of Java features – Java Environment, JDK ,API.

Introduction to Java: Types of java program, Creating and Executing a Java program, Java Tokens: Keywords, Character set, Identifiers, Literals, Separator, Java Virtual Machine (JVM) – Command Line Arguments, Comments in Java program.

**Unit II**

**Control Structures, Arrays, and Vectors:** Elements, Constants, Variables, Data types, Scope of variables, Type casting – Operators: Special operators, Expressions, Evaluation of Expressions.

Decision making and Branching: Simple if statement, if – else statement, nesting if – else, else if Ladder – switch statement – Decision making and looping: While loop, do - While loop for loop, break, loop continue Statement.

Arrays: One Dimensional Array – Creating an array, Array processing, Multidimensional Array, Vectors ArrayList, Advantages of Array List over Array Wrapper classes.

**Unit III**

**Strings, Classes And Interfaces**: Strings: String Array, String Methods, String Buffer Class. Class and objects: Defining a class, Methods, Creating objects, Accessing class members, Constructors, Method overloading, Static members, Nesting of Methods, this keyword – Command line input.

Inheritance introduction and its definition, Final variables and methods, Final classes, Final methods, Abstract methods and classes.

**Unit IV**

**Packages, Applets and Awt Controls**: Packages: Java API Packages System Packages, Naming Conventions, Creating & Accessing a Package, Adding Class to a Package Hiding.

Classes Applets: Introduction, Applet Life Cycle, Creating & Executing an Applet, Applet tags in HTML, Parameter tag aligning the display, Graphics Class: Drawing and filling lines, Rectangles, Polygon, Circles, Arcs, Line Graphs, Drawing Bar charts.

**Unit V**

**Exception Handling And Multi-threading**: Limitations of Error handling – Advantages of Exception Handling Types of Errors – Basics of Exception Handling – try blocks – throwing an exception – catching an exception – finally statement

Multithreading: Creating Threads, Life of a Thread, Defining & Running Thread Methods, and Thread Priority Synchronization.

**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 Multi**-**threading, life of a thread and graphics in java.

CO5: Evaluate the concept of array, string, function, class and object.

**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 |  |  | L |  |  |  | M |  |  |
| CO2 |  | H |  |  |  |  |  |  |  |  |  | M |
| CO3 |  |  | H |  |  |  |  |  |  |  | M |  |
| CO4 |  |  |  |  | M |  |  | H |  |  |  |  |
| CO5 | H |  |  | M |  |  |  |  | M |  |  |  |

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

**Text Books**

1. Programming in Java, Sachin Malhotra, Oxford University, November 2013
2. Java One step ahead, Seth and Juneja, Oxford University, May 2017.

**Reference Books**

1. R. Nageswara Rao, “Core Java**:** An Integrated Approach”, First Edition, DT Editorial Services, 2016.
2. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
3. Herbert Schildt, “The Complete Reference”, Ninth Edition, McGraw Hill, 2014.
4. Cay S. Horstmann,” Core Java”, Ninth Edition, Prentice Hall,2012.

**Course Name: Communication Skills**

**Course Code: MCA111A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To understand the concept and basics of communication and essentials of grammar.
2. To find out the possible barriers to communication and to chalk out the strategies to overcome it.
3. To summarize the better writing skills by briefing the learners to the dynamics of effective writing.
4. To acquire the understanding of effective letter writing and its various formats.
5. To extend the concept of memorandum, notices and e-mails.

**Unit I**

**Essentials of Grammar**

1. Parts of Speech
2. Articles
3. Question Tags
4. Conditional Sentences
5. Modal Verbs

**Unit II**

**Applied Grammar**

1. Tenses
2. Passive Voice
3. Indirect Speech
4. Subject-Verb Agreement (Concord)
5. Linking Words (Conjunctions)
6. Relative Clauses

**Unit III**

**Errors**

1. Common Errors & Misappropriations
2. Jumbled Sentences

**Unit IV**

**Composition**

1. Dialogue Writing
2. Paragraph and Precise Writing
3. Report, its importance and Report Writing

**Unit V**

**Short Stories**

1. How Much Land Does a Man Need?: Leo Tolstoy
2. The Last Leaf: O. Henry

Poems

1. The Character of A Happy Life: Sir Henry Wotton
2. No Men are Foreign: James Kirkup
3. If : Rudyard Kipling

**Course Outcomes (Cos)**

**Upon successful completion of this subject students should be able to:**

CO1: Understand the communication processes and practices in academic and professional contexts.

CO2: Able to understand the concept and basics of communication and essentials of grammar.

CO3: Students are able to work with jumble words and grammar.

CO4: Enhance the knowledge of composition; produce written academic and professional documents.

CO5: Improve writing skills for stories and poems.

**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 |  |  | H |  |  |  |  | M |
| CO2 |  |  | L |  |  |  |  |  |  | M |  |  |
| CO3 |  |  |  |  |  |  | H | M |  |  | M |  |
| CO4 |  |  |  |  | H |  |  | H |  |  |  |  |
| CO5 | H |  |  |  |  | M |  |  |  |  |  | M |

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

**Text Book**

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma &Binod Mishra, PHI Learning Pvt. Ltd.

**Reference Books**

1. English for Engineers: Made Easy, AedaAbidi&Ritu Chaudhary, Cengage Learning, (New Delhi)
2. A Practical Course for Developing Writing Skills in English, J.K. Gangal, PHI Learning Pvt. Ltd., New Delhi.
3. Intermediate Grammar, Usage and Composition, Tickoo, A. E. Subramaniam& P. R.Subramaniam, Orient Longman (New Delhi)
4. The Written Word , Vandana R. Singh, Oxford University Press (New Delhi)R.T.U., Kota Scheme and

**Course Name: Computer Organization &Architecture**

**Course Code: MCA112A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To provides information about digital computer technology and computer system performance.
2. To describes concepts of instruction-set architecture.
3. To clear concepts of central processing unit and describes the structure of arithmetic/logic units.
4. To have a thorough understanding of the basic structure and operation of a digital computer.
5. To discuss in detail the operation of the arithmetic Unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.

**Syllabus**

**Unit I**

**Background And Motivation:** Combinational Digital Circuits, Signals, Logic Operators, and Gates, Boolean Functions and Expressions, Designing Gate Networks, Useful Combinational Parts, Programmable Combinational Parts, Timing and Circuit Considerations

Digital Circuits with Memory: Latches, Flip-Flops, and Registers, Finite-State Machines, Designing Sequential Circuits

**Unit II**

**Computer System Technology & Performance:** From Components to Applications, Computer Systems and Their Parts, Generations of Progress, Processor and Memory Technologies, Peripherals, I/O, and Communications, Software Systems and Applications

Computer Performance: Cost, Performance, and Cost/Performance, Defining Computer Performance, Performance Measurement vs. Modeling Reporting Computer Performance, The Quest for Higher Performance

**Unit III**

**Instruction-Set Architecture**: Instructions and Addressing: Abstract View of Hardware, Instruction Formats, Simple Arithmetic and Logic Instructions, Load and Store Instructions, Jump and Branch Instructions, Addressing Modes.

Procedures and Data: Simple Procedure Calls, Using the Stack for Data Storage, Parameters and Results, Data Types, Arrays and Pointers, Additional Instructions

**Unit IV**

**Arithmetic/Logic Unit:** Number Representation: Positional Number Systems, Digit Sets and Encodings, Number-Radix Conversion, Signed Integers, Fixed-Point Numbers, Floating-Point Numbers.

Adders and Simple ALUs: Simple Adders, Carry Propagation Networks, Counting and Instrumentation, Design of Fast Adders, Logic and Shift Operations.

Multipliers and Dividers: Shift-Add Multiplication, Hardware Multipliers, Programmed Multiplication, Shift-Subtract Division, Hardware Dividers, Programmed Division.

**Unit V**

**Memory System Design:** Main Memory Concepts: Memory Structure and SRAM, DRAM and Refresh Cycles, Hitting the Memory Wall, Pipelined and Interleaved Memory, Nonvolatile Memory, Need for a Memory Hierarchy.

Cache Memory Organization: The Need for a Cache, Direct-Mapped Cache, Set-Associative Cache, Cache and main Memory, improving Cache Performance.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Students are able to understand concept of combination and digital circuits.

CO2: Able to understand Computer systems and Computer Performance.

CO3: To describe Instruction set Architecture, Simple Procedure Calls.

CO4: Able to understand ALU functioning and Architecture, Multipliers and Dividers.

CO5: Enhance the knowledge of Memory system design, cache memory organization and interleaved memory.

**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 |  |  |  |  |  |  |  |  |  |  |  |
| CO2 |  |  | H |  |  | M |  |  |  | M |  |  |
| CO3 |  |  |  |  | H |  |  |  |  |  |  | M |
| CO4 |  | M |  |  |  |  |  | M |  |  |  |  |
| CO5 | M |  |  | H |  |  |  |  |  |  | M |  |

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

**Text Books**

1. M. Mano, Computer System Architecture, 3rd Edition, Prentice Hall of India, 2008.

**Reference Books**

1. W. Stallings, Computer Organization and Architecture- Designing for Performance, 7th Edition, Pearson Education/PHI, Inc., 2008.
2. Nicholas Carter, Schaum’s outline of Computer Architecture, Tata McGraw Hill, 2006,
3. John L. Hennessy and David A Patterson, Computer Architecture A quantitative Approach, Morgan Kaufmann / Elsevier, Fourth Edition, 2007.
4. Carl Hamacher, ZvonkoVranesic and SafwatZaky, “Computer Organization”, Fifth Edition, Tata McGraw-Hill.

**Course Name: Introduction to DBMS**

**Course Code: MCA113A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

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 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 III**

**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 IV**

**Transaction Management:** Transaction Concept, ACID Properties, Transaction State, Implementation of ACID properties, Schedules.

**Unit V**

**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)**

**Upon successful completion of this subject students should be able to:**

CO1: Recall the basic concept of BDBM 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, Norm forms, constraints and integrity

CO5: Able to understand the concept of concurrency control techniques and recovery.

**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 |  |  |  |  | H |
| CO3 |  | M |  |  |  |  |  |  |  | M |  |  |
| CO4 |  |  |  | H | H |  |  |  | M |  |  |  |
|  | H |  |  |  |  |  | M |  |  |  | L |  |

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

**Text Books**

1. 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. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson, 2008.
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: Programming in Java Lab**

**Course Code: MCA114A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objective**

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 Sample Programs**

1. To write a java program to find the area of rectangle
2. To write a java program to find the result of the following expressions
3. (a<<2) + (b>>2)
4. (b>0)
5. (a+b\*100) /10
6. a & b

Assume a=10 and b=5

1. To write a java program to print the individual digits of a 3 digit number.
2. 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”.
3. To write a java program to read an integer and find whether the number is odd or even
4. To write a java program find the biggest of three integers.
5. Write a program to display a simple message.
6. Write a program to add two numbers.
7. Write a program to arithmetic operations.
8. Write a program to area of the circle.
9. Write a program to check odd or even.
10. Write a program to find Greatest among three numbers.
11. Write a program to find greatest number using nested if.
12. Write a program to sum and average of five marks.
13. Write a program to describe functionality of Arithmetic operations using switch.
14. Write a program to write names of 10 natural numbers.
15. Write a program to sum of ‘n’ natural numbers.
16. Write a program to find Factorial of a number.
17. Write a program to sum of ‘n’ numbers.
18. Write a program to sum of two numbers using class and object.
19. Write a program to prepare mark sheet of a student.
20. Write a program to find area of rectangle using constructor.
21. Write a program to find area of room.
22. To write a java program to find the sum of digits of a given number
23. To write a java program to find the first 15 terms of Fibonacci sequence.
24. To write a java program to print the Armstrong numbers.
25. To write a java program to find the largest and smallest number in an array.
26. Write a program to arithmetic operations using static members.
27. Write a program to print greatest value using nesting of methods.
28. To write a java program that creates a string object and initializes it with your name and performs the following operations
29. To find the length of the string object using appropriate String method.
30. 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
31. 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
32. To write a java program to create a StringBuffer object and illustrate how to insert characters at the beginning
33. To write a java program to Create a StringBuffer object and illustrate the operations of the append () and reverse () methods.
34. 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).
35. 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().
36. 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”.
37. Write a java program to create a Player class and inherit three classes Cricket\_Player, Football\_Palyer and Hockey\_Player.
38. Write a program to find area and volume of a room using inheritance .
39. Write a program to describe Method overriding
40. To write a java program to show how a class implements two interfaces.
41. To write a java program to show that the variables in an interface are implicitly static and final and methods are automatically public
42. To write a java program to create a package for Book details giving Book name, Author name, price and year of publishing.
43. 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
44. To write an applet program for creating a simple calculator to perform Addition, subtraction, Multiplication and Division using Button, Label and TextField component.
45. To write a java program to catch more than two exception
46. To write a java program to create our exception subclass that throws exception if the sum of two integers is greater than 99.
47. To write a java program for generating two threads, one for generating even number and one for generating odd number.

**Course Name: Database Management System lab**

**Course Code: MCA115A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objective**

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 Sample Programs**

1. Create and use the following database scheme to answer the given queries.

**EMPLOYEE Scheme**

Field Type NULL KEY DEFAULT

Eno Char(3) NO PRI NIL

Ename Varchar(50) NO NIL

Job\_type Varchar(50) NO NIL

Manager Char(3) Yes FK NIL

Hire\_date Date NO NIL

Dno Integer YES FK NIL

Commission Decimal(10,2) YES NIL

Salary Decimal(7,2) NO NIL

**EMPLOYEE State**

Eno Ename Job\_type Manager Hire\_date Dno Commission Salary

765 Martin Sales\_man 198 1981-04-22 30 1400.00 1250.00

756 Jones Manager 783 1981-04-02 20 0.00 2300.00

752 Ward Sales\_man 769 1981-02-22 30 500.00 1300.00

749 Allan Sales\_man 769 1981-02-20 30 300.00 2000.00

736 Smith Clerk 790 1980-12-17 20 0.00 1000.00

793 Miller Clerk 788 1982-01-23 4 0.00 1300.00

792 Ford Analyst 756 1981-12-03 20 0.00 2600.00

790 James Clerk 769 1981-12-03 30 0.00 950.00

787 Adams Clerk 778 1983-01-12 20 0.00 1150.00

784 Turner Sales\_man 769 1981-09-08 30 0.00 1450.00

783 King President NULL 1981-11-17 10 0.00 2950.00

788 Scott Analyst 756 1982-12-09 20 0.00 2850.00

778 Clark Manager 783 1981-06-09 10 0.00 2900.00

769 Blake Manager 783 1981-05-01 30 0.00 2870.00

**DEPARTMENT Scheme**

Field Type NULL KEY DEFAULT

Dno Integer No PRI NULL

Dname Varchar(50) Yes NULL

Location Varchar(50) Yes New Delhi

**DEPARTMENT State**

Dno Dname Location

10 Accounting New York

20 Research Dallas

30 Sales Chicago

40 Operation Boston

50 Marketing New Delhi

**Query List**

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE\_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than$2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.
8. Query to display Employee Name and Department No. Of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don’t have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission. Sort the data in descending order of Salary and Commission.
12. Query to display Name of all the employees where the third letter of their name is ‘A’.
13. Query to display Name of all employees either have two ‘R’s or have two ‘A’s in their name and are either in Dept No = 30 or their Manger’s Employee No = 7788.
14. Query to display Name, Salary and Commission for all employees whose Commission Amount is greater than their Salary increased by 5%.
15. Query to display the Current Date.
16. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
17. Query to display Name and calculate the number of months between today and the date each employee was hired.
18. Query to display the following for each employee:-

<E-Name> earns < Salary> monthly but wants < 3 \* Current Salary >.

Label the Column as Dream Salary.

1. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with ‘J’, ’A’ and ‘M’.
2. Query to display Name, Hire Date and Day of the week on which the employee started.
3. Query to display Name, Department Name and Department No for all the employees.
4. Query to display Unique Listing of all Jobs that are in Department # 30.
5. Query to display Name, Dept Name of all employees who have an ‘A’ in their name.
6. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
7. Query to display Name and Employee no. Along with their Manger’s Name and the Manager’s employee no; along with the Employees’ Name who do not have a Manager.
8. Query to display Name, Dept No. And Salary of any employee whose department No. And salary matches both the department no. And the salary of any employee who earns a commission.
9. Query to display Name and Salaries represented by asterisks, where each asterisk (\*) signifies $100.
10. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
11. Query to display the number of employees performing the same Job type functions.
12. Query to display the no. Of managers without listing their names.
13. Query to display the Department Name, Location Name, No. Of Employees and the average salary for all employees in that department.
14. Query to display Name and Hire Date for all employees in the same dept. As Blake.
15. Query to display the Employee No. And Name for all employees who earn more than the average salary.

**Course Name: UNIX and Windows Lab**

**Course Code: MCA116A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objective**

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 Sample Programs**

1. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
2. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
3. Write C programs to simulate UNIX commands like ls, grep, etc.
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time. (2 sessions)
5. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time. (2 sessions)
6. Developing Application using Inter Process communication (using shared memory, pipes or message queues)
7. Implement the Producer – Consumer problem using semaphores (using UNIX system calls).
8. Implement some memory management schemes – I
9. Implement some memory management schemes – II
10. Implement any file allocation technique (Linked, Indexed or Contiguous)

**Course Name: Communication Skills Lab**

**Course Code: MCA117A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objective**

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 Sample Programs**

**Phonetics**

1. Phonetic Symbols
2. Transcriptions
3. Word Stress
4. Weak Forms
5. Intonation

**Building Advanced Vocabulary**

1. Word Formation
2. Affixes
3. Words often Mis-spelt and Mis- Pronounced
4. Words often Confused
5. Homonyms and Homophones
6. One Word for Many.
7. Synonyms and Antonyms.

**Semester III**

**Course Name: Advance Database Management System**

**Course Code: MCA118A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 0 | 0 | 3 |

**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+-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 Book**

1. 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. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson, 2008.
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: Programming in C++**

**Course Code: MCA119A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 0 | 0 | 3 |

**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 Specifies, 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 Book**

1. 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. Let Us C: BalaGuruswamy, TATA McGraw Hill.
3. Robert Lafore, “Object-Oriented Programming in C++”, Sams, Fourth Edition 2007
4. BjarneStroustrup, “The C++ Programming Language**:** Special Edition”, Addison-Wesley, Third Edition 2000

**Course Name: Computer Network**

**Course Code: MCA120A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**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 Book**

1. 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. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2014
4. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition, Pearson, 2011

**Course Name: Advance Data Structure and Algorithms**

**Course Code: MCA121A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 0 | 0 | 3 |

**Course Objectives**

1. To describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs).
2. To demonstrate an understanding of external memory and external search and sorting algorithms.
3. To generate the code for binary search tree and graph.
4. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.
5. To describe the basic terminology of graph and tree.

**Syllabus**

**Unit I**

**Introduction to Advance data structure:** Huffman Tree, 2-3 Tree, Stack and it’s operation & applications, Queue and it’s operation and & Application, Priority Queue.

**Unit II**

**External Sorting & Hashing:** Sorting introduction, Types, Internal & External Sorting, k-way Merge, Buffer Handling, optimization. Introduction to Static hashing , Hash tables, Hash Functions ,Types, Secure hash functions , Collision, Resolution Techniques: Open addressing, chaining Dynamic hashing ,Pros and Cons of Hashing, Applications

**Unit III**

**Binary search trees (BST):** Binary Search Trees, Definition, ADT, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching , Introduction to Red –Black and Splay Trees, B-Trees, B-Tree of order m, height  of a B-Tree, insertion, deletion and searching, Comparison of Search Trees

**Unit IV**

**Trees & Heaps:** Basic Terminology, Types of Trees: general, forests, binary, bst, expression, creating a Binary Tree from a General Tree, Traversing a Binary Tree, Applications of Trees**.** Introduction to Binomial Heap and Fibonacci Heap and its operations

**Unit V**

**Graphs**: Introduction, Graph Terminology, Directed Graphs, Bi-connected Components, Representation of Graphs, Graph Traversal Algorithms, Topological Sorting, Minimum Spanning Trees, Shortest Path Algorithms, Applications of Graphs

**Course Outcomes (Cos):**

**Upon successful completion of this subject students should be able to:**

CO1: Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs).

CO2: Demonstrate an understanding of external memory and external search and sorting algorithms.

CO3: Able to generate source code for binary search tree and heap.

CO4: To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

CO5: To understand the basic terminology of graph, graph traversal algorithm, topological sorting and shortest path.

**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 Book**

1. Algorithm Design and Analysis, Oxford University, Harsh Bhasin, October 2015.

**Reference Books**

1. “Data Structures Through C in Depth” by Deepali Srivastava and S K Srivastava.
2. “Problem Solving in Data Structures and Algorithms Using C: The Ultimate Guide to Programming Interviews” by Hemant Jain.
3. “Data Structures and Algorithms Made Easy : Second Edition: Data Structure and Algorithmic Puzzles” by NarasimhaKarumanchi
4. “Data Structures and Program Design In C” by Robert L Kruse and Bruce P Leung

**Course Name: Statistical Computing**

**Course Code: MCA122A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 0 | 0 | 3 |

**Course Objectives**

1. To help in design, data collection plans, analyze data appropriately and interpret and draw conclusions from analyses.
2. To be able to exploit central objective of the undergraduate major in Statistics is to equip students with consequently requisite quantitative skills that they can employ and build on in flexible ways.
3. To learn the concepts and tools for working with data and have experience in analyzing real data.
4. To understand the fundamentals of probability theory, statistical reasoning, inferential methods, statistical modeling and its limitations.
5. To exploratory analysis of data by graphical and other means.

**Syllabus**

**Unit I**

**Basic Statistics:** Definition, Function & Scope of Statistics. Measures of Central Tendency: Arithmetic Mean, Weighted A.M., Median, Mode, Geometric & Harmonic Mean and Their Merits & Demerits. Measures of dispersion. Frequency distributions.

**Unit II**

**Measures of Variation:** Range, The Interquartile Range or Quartile Deviation, Average (Mean), Deviation Standard Deviation, Coefficient of Variation, Skewness, Moments & Kurtosis.

Sampling: Theory of sampling, population and sample Survey methods and estimation Statistical inference, testing of hypothesis.

**Unit III**

**Correlation Analysis:** Introduction, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient.

**Unit IV**

**Regression Analysis:** Difference between Correlation & Regression, Regression Lines, Regression Equations, Regressions Coefficient.

**Unit V**

**Sampling Distribution:** Chi Square (X2) Distribution and Its Properties, Chi - Square Test, Application of Chi -Square Distribution: Chi-Square Test for Population Variance, ChiSquare Test of Goodness of Fit, Independence of Attributes, T- Distribution & Its Properties, Application of T - Distribution to Testing Hypothesis About Population Mean, Difference Between Two Means, Correlation Coefficient, F- Distribution.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Use the computer to conduct a statistical analysis of data, including how to acquire, clean and organize data, analyze data using computationally intensive statistical methods.

CO2: To acquire skills of regression equation and coefficient.

CO3: To test hypothesis and methodology such as sampling, goodness-of-fit testing, analysis of variance and least squares estimation.

CO4: To design data collection plans, analyze data appropriately and apply Chi-Square Testing.

CO5: To simplify Correlation Coefficient with different 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 |  |  |  |  |  |  | M |  |  |  |
| CO2 |  |  | L |  | H |  |  |  |  |  | M |  |
| CO3 |  |  |  |  |  | M |  | H |  |  |  |  |
| CO4 |  | M |  | H |  |  |  |  |  |  |  | M |
| CO5 | H |  |  |  |  |  | L |  |  | M |  |  |

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

**Text Book**

1. Affi, A.A., "Statistical Anal);sis: A Computer Oriented Approach". Academic Press, New York, 1979.

**Reference Books**

1. Hogg. R. v..Et. Al., "Introduction to Mathematical Statistics", American Publishing, New York. 1980.
2. Bailer, A. J. (2010). Statistical Programming in SAS Cary, NC: SAS Institute Inc. Delwiche, L. and Slaughter, S. (2008).
3. The Little SAS Book: A Primer, Fourth Edition. Cary, NC: SAS Institute Inc. SAS Institute Inc. (2011). SAS Inc. 9.3
4. Language Reference: Concepts. Cary, NC: SAS Institute

**Course Name: Business Communication Skills**

**Course Code: MCA123A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 2 | 0 | 0 | 2 |

**Course Objectives**

1. To apply an ability to develop communication theories and be highly skilled in the use of quantitative methods to evaluate them.
2. To apply ability to how people create, transmit, interpret, evaluate and respond to messages to inform, relate to, and influence one another interpersonally, in small groups, in organizations, in public settings and across cultures.
3. To build a firm knowledge of communication so as to facilitate its application for employability skills.
4. To enhance employability skills and facing the corporate world with full confidence.
5. To enhance the report writing and technical writing skills

**Syllabus**

**Unit I**

Basics of Communication

1. Introduction: What is Communication?
2. The Process of Communication : sender, receiver, channel, code, topic, message, context, feedback, ‘noise’
3. Filters & Barriers to Communication
4. Different Types of Communication
5. The importance of communication
6. Verbal and non-verbal communication
7. Comparing general’ communication and business communication

**Unit II**

Composition

1. Resume Writing
2. Job application

**Unit III**

Written Communication

1. Report Writing
2. Definition and characteristics of report,
3. Need of reports
4. Types of reports: Technical Reports, Progress report, ,Event reporting,
5. Newsletters
6. Summer project report
7. Technical proposal writing
8. Definition and characteristics of technical proposal writing,
9. Types of proposal
10. Making a proposal

**Unit IV**

Speaking Skills

1. Seminar Presentation. :
2. Verbs often Required in Presentations
3. Importance of Body Language in Presentations
4. Preparing an Outline of a Presentation Pronunciation
5. Structure of Presentation
6. Ending the Presentation
7. Group Discussion.
8. Definition,
9. Advantages,
10. Qualities Required,
11. General Dos and Don’ts,
12. Body languages,
13. Acting as a moderator
14. Interview:
15. Types of interview,
16. Getting ready for an interview,
17. Interview phases

**Unit V**

1. Written Analysis of Cases/Case study
2. The research paper/the process of research

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Understand communication processes and practices in professional and academic contexts.

CO2: Research and use information for communicative tasks.

CO3: Enhance employability skills and facing the corporate world with full confidence.

CO4: Enhance ability to develop communication theories and be highly skilled.

CO5: Enhance ability to write research papers and thesis.

**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 |  |  |  |  | H |  |  |  | L |  |
| CO2 |  |  | M |  |  |  |  |  |  | H |  |  |
| CO3 |  |  |  |  |  |  |  | H |  |  |  | M |
| CO4 |  |  |  | H |  |  |  |  |  |  |  |  |
| CO5 | H |  |  |  | M |  |  |  | L |  |  |  |

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

**Text Book**

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma and BinodMishra,PHI Learning Pvt. Ltd.(New Delhi)

**Reference Books**

1. English Grammar and Composition, Gurudas Mukherjee, Ane Books Pvt. Ltd.(New Delhi)
2. Current English Grammar and Usage with Composition, R.P. Sinha, Oxford University Press (New Delhi)
3. Effective Technical Communication, M Ashraf Rizvi, Tata McGraw Hill (New Delhi)
4. Business Communication, Meenakshi Raman & Prakash Singh, Oxford University Press (New Delhi)

**Course Name: Advance Database Management System Lab**

**Course Code: MCA124A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objective**

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 Sample Programs**

1. Create a relational database that contains the following tables and insert 10 records into these tables. Solved the Following SQL Queries**:**

student (**sid**, sname, sex, age, year, gpa)   
dept (**dname**, numphds)   
prof (**pname**, dname)   
course (**dname, cno**, cname)   
major (**dname, sid**)   
section (**dname, cno, sectno**, pname)   
enroll (**sid, dname, cno, sectno**, grade)

1. Print the names of professors who work in departments that have fewer than 50 PhD students.
2. Print the names of the students with the lowest GPA.
3. For each Computer Sciences class, print the class number, section number, and the average gpa of the students enrolled in the class.
4. Print the names and section numbers of all classes with more than six students enrolled in them.
5. Print the name(s) and sid(s) of the student(s) enrolled in the most classes.
6. Print the names of departments that have one or more majors who are under 18 years old.
7. Print the names and majors of students who are taking one of the College Geometry courses.
8. For those departments that have no major taking a College Geometry course print the department name and the number of PhD students in the department.
9. Print the names of students who are taking both a Computer Sciences course and a Mathematics course.
10. Print the age difference between the oldest and the youngest Computer sciences major.
11. For each department that has one or more majors with a GPA under 1.0, print the name of the department and the average GPA of its majors.
12. Print the ids, names and GPAs of the students who are currently taking **all** the Civil Engineering courses.
13. Create the 3 structured record data type named as address\_type(street, city, state, pin\_code), person\_type(firstname, lastname, DOB) and business\_type( title, company). Create 2 tables based on person\_type and business\_type. Create one more table which is referred by first two tables. ( Reference type)
14. Write a program to enter a number and find the factorial of the number.
15. Write a code to create a type with an array of number 10.
16. Write a PL/SQL code to take the input from the user for 3 subjects and calculate total marks and percentage.
17. Write a program to create a function for add two numbers and call it by passing the values as an argument.
18. Write a program to enter two number and find greater number using function
19. Write a program to create a PL/SQL function for count the number of records in any existing table.
20. Write a PL/SQL code to create a table using the already created array type and insert 5 records.
21. Write a PL/SQL code to enter two numbers and perform the arithmetic operations. (Addition, Subtraction, Multiplication, Division)
22. Write a PL/SQL code to retrieve the employee name and city from employee database of an employee whose number is input by the user. (Create a Employee table with the field named as emp\_no, employee name, street, city)
23. Write a program to create a table with at least 3 fields and create a procedure for insert data in the existing table. Insert 5 records through this procedure.

**Course Name: Programming in C++ Lab**

**Course Code: MCA125A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objective**

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 Sample Programs**

Following are the list of sample programs. Students have to perform accordingly.

1. Write a program to calculate the distance between two points.
2. Write a program to perform addition, subtraction, multiplication and division on 2 integer numbers.
3. Write a program to swap 2 numbers using a temporary variable.
4. Write a program that displays the size of every data type.
5. Write a program to convert an integer into the corresponding floating point number.
6. Write a program to enter any character. If the entered character is in lower case, convert it into upper case. If it is a lower case character, then convert it into upper case.
7. Write a program to find whether a given year is leap year or not.
8. Write a program to print 20 horizontal asterisks (\*)
9. Write a program to classify a given number as prime or composite.
10. Write a program to sum the series: 1/1+22/2+33/3+….
11. Write a program to print the following pattern:

A

AB

ABC

ABCD

ABCDE

1. Write a program to print the following pattern:

1

121

12321

1234321

1. Write a program using for loop to calculate the average of first n natural numbers.
2. Write a program to enter a decimal number. Calculate and display the binary equivalent of this number.
3. Write a program to display the largest of 10 numbers using ternary operator.
4. Write a program to generate calendar of a month given the start day and the number of days in that month.
5. Write a program to calculate the area of a circle using functions.
6. Write a program to calculate the volume of a cuboid using default arguments.
7. Write a program to add two values of different data types using static polymorphism.
8. Write a program to calculate GCD using recursive function.
9. Write a program to calculate exp (x,y) using recursive functions.
10. Write a program to read and display n random numbers using an array.
11. Write a program to interchange the largest and the smallest number in the array.
12. Write a program to find the second largest number using an array of n numbers.
13. Write a program to merge 2 unsorted arrays.
14. Write a program to implement linear search in any given array.
15. Write a program to transpose a 3\*3 matrix.
16. Write a program to read and display a 2\*2\*2 array.
17. Write a program to concatenate 2 strings.
18. Write a program to compare 2 strings.
19. Write a program to insert a string in the main text.
20. Write a program to sort names of students.
21. Write a program to enter a text that contains multiple lines. Display the n lines of text starting from mth line.
22. Write a program to add 2 integers using pointer.
23. Write a program to add 2 vectors (Arrays).
24. Write a program to copy a given string into a new string. Memory for the new string must be allocated dynamically.
25. Write a program to read, display, add and subtract 2 complex numbers.
26. Write a program to read and display information of a student using structure within a structure.
27. Write a program to read and display information of all the students in the class.
28. Write a program using pointer to structure to initialize the members in the structure.
29. Write a program to illustrate the use of arrays within structure.
30. Write a program to display the name of the colors using enumerated types.
31. Write a program to enter a rational number, simplify and display it.
32. Write a program to demonstrate the concept function overloading in the member functions of a class.
33. Write a program that adds 2 complex numbers. The object must be passed through preference and the result must be passed by value.
34. Write a program to display the list of students according to their marks.
35. Write a program to find mean of 2 numbers belonging to two different classes using friend function.
36. Write a program to add 2 arrays using friend function and operator overloading.
37. Write a program that uses an overloaded constructor to dynamically allocate memory to an array and thus find the largest of its elements.
38. Write a program that uses dynamic constructor to allocate memory to an array. Count the number of even and odd elements.
39. Write a program to overload the increment and decrement operators on the array class.
40. Write a program to find the next date using unary increment operator.
41. Write a program to demonstrate the use of type conversions with distance class.
42. Write a program that uses multi level inheritance to implement classes- note, server and device.
43. Write a program with class bill. The users have the option to pay the bill either by cheque or by cash. Use the inheritance to model this situation.

**Course Name: Advance Data Structure and Algorithm Lab**

**Course Code: MCA126A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objective**

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 Sample Programs**

1. Write a program for performing Push & Pop operations in Stack.
2. Write a program for performing Insertion & Deletion operations in Circular Queue.
3. Write a program for Merge Sort.
4. Write a program for Quick Sort.
5. Write a program to demonstrate any Hash Function.
6. Write a program for creating a Binary Search tree and taking its Preorder, Postorder and Inorder.
7. Write a program for identifying that given binary tree is complete binary tree or not.
8. Write a program to create a maximum priority queue using max heap tree.
9. Write a program to create AVL tree.
10. Write a program for identifying that given graph is complete graph or not.
11. Write a program for Depth First Search algorithm in Graph.
12. Write a program for Breadth First Search algorithm in Graph.
13. Write a program for Topological Sort.
14. Write a program of maintaining a Spanning Tree using Kruskal or Prim’s Algorithm.
15. Write a program for finding Shortest Paths from given graph using Dijkstra’s Algorithm.

**Course Name: Business Communication Skills Lab**

**Course Code: MCA127A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objective**

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 Sample Programs**

* 1. Introduction of Phonetics
  2. Pronunciation Exercise
  3. Describing the Pictures or images and cartoon using MSWord
  4. Developing outline, key expression and situation
  5. Jumbled words/sentences
  6. Group Discussion
  7. Job inter view
  8. Seminar Presentation
  9. Resume Writing Practicing

**Course Name: Minor Project Lab (In C & C++)**

**Course Code: MCA128A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objectives**

The purpose of minor project is to enhance the practical knowledge based on prescribed languages C and C++. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

**Semester IV**

**Course Name: Accounting Principles and Practices**

**Course Code: MCA129A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 0 | 0 | 3 |

**Course Objectives:**

1. To be acquainted with about the important concepts and characteristics of accounting.
2. To study the application of accounting in the general business environment.
3. To prepare the estimate for various business activities such as purchase, sale, production and cash budgets.
4. To provide a comprehensive treatment of accounting principles, technique and practices.
5. To get the students acquainted with fundamental concepts and processes of accounting so that they are able to appreciate the nature of item presented in the annual accounts of an organization.

**Syllabus**

**Unit I**

**Accounting Concept:** Basic of Accounting, Meaning and nature of accounting, Scope of financial accounting, Interrelationship of Accounting with other disciplines, Branches of Accounting, Accounting concepts and convention, Indian Accounting Standards

**Unit II**

**Journal, Ledger and Trial Balance:** Journal: Meaning of Journal, Advantages, and Subdivision. Ledger: Meaning, subdivision, Mechanics of Posting, balancing of Ledger accounts. Trial Balance: Objectives, Defects of trial balance, Errors disclosed by trial balance, preparation and locating errors.

**Unit III**

**Cash Book and Subsidiary books of Accounting:** Kinds of cashbook, Purchase daybook, Sales daybook, Bills receivable book, Bills payable book.

**Unit IV**

**Finance Accounts:** Trading account, Profit & Loss account, Adjustments, Balance Sheet, Forms of balance Sheet, Assets and their classification, liabilities and their classification, uses and limitations.

**Unit V**

**Depreciation:** Causes of Depreciation, Meaning of Depreciation Accounting, Method of Recording depreciation, Methods of Providing Depreciation.

**Course Outcome:**

**Upon successful completion of this subject students should be able to:**

CO1: Get the Knowledge about the important concepts and characteristics of accounting.

CO2: Able to understand the budget preparation and control of a company.

CO3: Be prepared of fiscal policies of the organization.

CO4: Decide about the state of affairs of a particular firm/company.

CO5: Understand the concept of causes of depreciation.

**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 |  |  |  |  |  |  |  |  |  |  |
| CO2 |  |  | H |  |  |  |  |  | M |  |  |  |
| CO3 |  |  |  |  | H |  |  |  |  |  |  | M |
| CO4 | M |  |  |  |  |  | H |  |  |  | L |  |
| CO5 |  | H |  |  |  |  |  | M |  |  |  |  |

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

**Text Book**

1. Maheshwari, S.N. and Maheshwari, S. K., (2009) An Introduction to Accountancy,Eighth Edition, Vikas Publishing House.

**Reference Books**

1. Tulsian, P.C., (2009) Financial Accountancy, 2nd edition, Pearson Education.
2. Essentials of Financial Accountng (based on IFRS), Bhattacharya (PHI,3 rd Ed) 3)
3. Ramachandran Kakani- Financial Accounting for Management( TMH ,3 rd Edition). 4)
4. Dhamija - Financial Accounting for managers: (Prentice Hall, 2 nd Edition).

**Course Name: Advance Java**

**Course Code: MCA130A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 0 | 0 | 3 |

**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**

**Core Java Recap**: Introduction, Java Evolution and history, Classes and Objects, Functions & Interfaces, Inheritance, keywords: Static, Final, Super, Packages, Applets

**Unit II**

**Exception Handling, Multi-threading & Garbage Collection**: 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, Synchronization & Deadlock, Inter-thread Communication Garbage Collection: Introduction, Size, Accessing GC from Java Program

**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, GenericServlet.

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 Book**

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 Programming Language Ken Arnold Pearson
3. The complete reference JAVA2, Herbert schildt. TMH

**Course Name: Software Engineering**

**Course Code: MCA131A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 0 | 0 | 3 |

**Course Objectives**

1. To provides a comprehensive overview of Software Engineering
2. To develop 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 develop 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**

**Software Engineering Introduction:** Motivation, Definition of Software Engineering, Characteristics of Software, Problems Confronted by Software Engineering, The Software Engineering Response, Challenges with the Response, Grand Challenge, Software Engineer

Evolution of Software Engineering: Motivation, History, Evolutionary Trends, Programming to Software Engineering, Hardware-Software: From Coupling to Congress, Advent of High-Level Languages, Advent of the Personal Computer, Global Software Development, Return of Open Source, Milestones in Software Engineering.

**Unit II**

**Planning and Managing Software Development:** Software Development Methodologies: A Method to the Madness, Software Development Life Cycle Algorithm, Process, and Methodology, Different Development Philosophies, People and Processes Software Estimation: Science and Art of Software Estimation, Importance of Estimation in Software Development, Estimating Size, Estimating Effort, Estimating Time, Estimation and Experience, COCOMO

Metrics in Software Development: Need for Measurement, Metrics Go Beyond Mere Measuring, Metrics, Management, and Beyond, Brief Review of Software Metrics, Function point, LOC.

**Unit III**

**Software Making:** Software Architecture: Architectural Views of Software, Views and Definitions of Software Architecture, Need for Architecture in Large-Scale Software Systems, How Architecture Differs from Design, Architectural Patterns, Future of Software Architecture, Languages of Software Development: Incremental Approach to Learn Languages, Programming Languages, Modeling Languages, Specification Languages

Software Development across Workflows and Phases: Dimensionality of Software Development Phases and Workflows in Perspective, Model for Software Development

**Unit IV**

**Testing, Maintaining:** Software Testing, Reliability, and Quality: Some Testing Terms, Some Testing Tenets, Testing Philosophies, Different Types of Testing, Inspections, Walkthroughs, and Reviews, Case Study

**Unit V**

**World Wide Web & ESD:** Software & WWW: Internet and the WWW, Before and After the Web Architecture of Web-Based Software Systems, Software Systems on the Web: Salient Features, Web as a Software Development Medium

Enterprise Software Development: Enterprise Software Development, Differences, Importance of Enterprise Software, Challenges Unique To Enterprise Software Development, Enterprise-Oriented Software Engineering.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Considerate the Basics of Software Engineering & Development and Evolution of Software Engineering.

CO2: Understand the models, Software Matrices and Estimation, Software Development Life Cycle Algorithm, Process, and Methodology.

CO3: Understanding of Software Development across Workflows and Phases, languages & Architecture, Views and Definitions of Software Architecture.

CO4: Summarize Software Testing, strategies and tools, Reliability, and Quality.

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 Outcomes** | **Program 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 Book**

1. Software Engineering Fundamentals, Oxford, Ali Behforooz and Frederick Hudson, October 2012.

**Reference Books**

1. Pressman, R.S., ''Software engineering" A Practitioner's Approach", Third Edition, Jalote, P., "An Integrated Approach to Software Engineering". Narosa 1991.
2. Jalote P., "An Integrated approach to Software Engineering", Narosa,1991.
3. Ghezzi Carlo and Others "Fundamentals of Software Engineering" PHI
4. Fairley R., "Software Engineering Concepts", Tata McGraw Hill, 1997.

**Course Name: PHP & MYSQL**

**Course Code: MCA132A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 0 | 0 | 3 |

**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 justify the database connectivity of PHP with MYSQL.

**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, 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 IV**

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, Un registering and deleting session variable Concept of Cookies.

**Unit V**

Introduction of MySQL**,** Types of tables in MySQL**,** Query in MySQL: Select, Insert, Update, and Delete. Truncate Alias**,** Order By. Database connectivity of PHP with MySQL

**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: Learn to work with database like MYSQL and to be able to connect PHP with MYSQL.

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Outcomes** | **Program Outcomes** | | | | | | | | | | | |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  |  |  | M |  |  |  | M |  |  |  |  |
| CO2 |  | M |  |  |  | M |  |  |  |  | M |  |
| CO3 |  |  |  |  |  |  | M |  |  |  |  |  |
| CO4 |  |  | H |  |  |  |  |  | M |  |  | L |
| CO5 | M |  |  |  |  | L |  |  |  |  |  |  |

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

**Text Book**

1. Core PHP Programming, Leon Atkinson Pearson publishers, 2nd Edition.

**Reference Books**

1. PHP Cookbook by David Sklar and Adam Trachtenberg, O’Reilly Media, Inc., ISBN: 978-1-449-36375-8.
2. The Complete Reference PHP, SteverHolzner McGraw Hill, Edition: 1 ISBN: 9780070223622.
3. 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.
4. “Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP ( 4th Revised Edition ) CD-ROM Included” by Ivan Batross

**Course Name: Advance Java Lab**

**Course Code: MCA133A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**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 Sample Programs**

1. Write a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2-4ac is negative, display a message stating that there are no real solutions?
2. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value of the Fibonacci sequence?
3. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer?
4. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome?
5. Write a Java program that reads a line of integers and then displays each integer and the sum of all integers.
6. To write a java program to show how a class implements two interfaces.
7. To write a java program to show that the variables in an interface are implicitly static and final and methods are automatically public.
8. Write a program to implement multilevel inheritance and method overriding.
9. Write a program to illustrate class member access for packages and also implement interfaces.
10. 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
11. To write an applet program for creating a simple calculator to perform Addition, subtraction, Multiplication and Division using Button, Label and TextField component.
12. Write a program in Java to describe concepts of handling exceptions.
13. Write a program in Java to describe Exception Handling with all keywords
14. Write a program to describe the concept of Collection framework - an ArrayList.
15. Write a program to describe Java Generics using Map.
16. Write a program in Java in AWT to design login form.
17. Write a Java program to draw a rectangle using swing.
18. Write a Java swing program to print a wave form with output.
19. Write a Enable and Disable button in Java swing.
20. Write a java program that connects to a database using JDBC and does add, deletes, modify and retrieve operations.
21. Write a program to update student information using jdbc connection.
22. Write a program to demonstrate dynamic HTML using java servlet.
23. Write a program to create an applet of a moving banner.
24. Develop static pages (using only HTML) of an online Book store.
25. Validate the registration, user login, user profile and payment by credit card pages using Java servlet.
26. Write a program to demonstrate basic servlet.
27. Write a program to demonstrate basic JSP example.
28. Write a program to perform database operations in JSP.
29. Write a program to create session management in JSP.
30. Create a Cookie and add these four user id’s and passwords to this Cookie using servlet.
31. Write a Servlet code to implement the session handling in java.
32. Write a JSP code which does the following job: Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.
33. Develop a simple website using JSP and servlet , session handling , login

**Course Name: PHP & MYSQL Lab**

**Course Code: MCA134A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**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 Sample Programs**

1. WAP to reverse the string without using any predefined function
2. WAP to check the season of the year according to given month using control statement(Switch statement)
3. spring month 3,4,5
4. summer month 6,7,8
5. autumn month 9,10,11
6. winter month 12,1,2
7. WAP to create an array for employee names and associate another array of employee's salary and print these values using for each loop.
8. WAP that will accept an array of integers as input and output an array where for each item in the source array, the new array will perform the following operations:-
   1. for even numbers divide by 2
   2. for odd number multiply by 3
9. WAP to make sure a value has been supplied for a form element. For example, you want to make sure a text box hasn’t been left blank.
10. WAP to know whether an email address a user has provided is valid.
11. WAP in php to show the values in the input fields after the user hits the submit button
12. WAP create a form with one text field and submit button to find string in lower case, uppercase, sub string, position of a string and trimmed string
13. WAP to find whether a given string is subset of another given string or not
14. WAP to find square and square root of a randomly generated number
15. WAP to merge 2 associative array sort that array in :-
    1. ascending order
    2. descending order
    3. in key sorted form
16. WAP to generate captcha code
17. WAP to create session, provide it name and id and display their values and finally delete the session.
18. WAP to in which you want to set a cookie so that your website can recognize subsequent requests from the same web browser.
19. WAP to in which you want to read the value of a cookie that you’ve previously set.
20. WAPin which You want direct access to the body of a request, not just the parsed data that PHP puts in $\_POST for you. For example, you want to handle an XML document that’s been posted as part of a web services request.
21. WAP to shows how to use validate().
22. WAP to Call ob\_start() at the top of your page and ob\_end\_flush() at the bottom. You can then intermix commands that generate output and commands that send headers.
23. WAP to send compressed content to browsers that support automatic decompression.
24. WAP to use the same HTML page to emit a form and then process the data entered into it. In other words, you’re trying to avoid a proliferation of pages that each handle different steps in a transaction.
25. WAP in which you have data that can be easily represented as key/value pairs, want to store it safely, and have very fast lookups based on those keys.
26. WAP in which you want access to a SQL database to store or retrieve information. Without a database, dynamic websites aren’t very dynamic.
27. WAP in which you want to retrieve some data from your database.
28. WAP in which you want a concise way to execute a query and retrieve the data it returns.
29. WAP in which you want to know how many rows a SELECT query returned or you want to know how many rows an INSERT, UPDATE, or DELETE query changed.
30. WAP in which you need to make text or binary data safe for queries.

**Course Name: Software Testing Lab**

**Course Code: MCA135A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**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 Sample Programs**

1. Draw state chart diagram (e.g. ATM system or others).
2. Draw Activity diagram (e.g. Hospital management system or others)
3. Entity relationship diagram and Draw Data flow diagram (e.g. Banking management system or others.
4. Draw use case diagram (e.g. Online shopping or others).
5. Draw sequence diagram (e.g. Airline reservation system or others).
6. Write programs in „C‟ Language and find out the errors in the program after testing.
7. A program written in „C‟ language for Matrix Multiplication fails introspect the causes for its failure and write down the possible reasons for its failure.
8. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
9. Study of any test management tool (e.g. Test Director)
10. Study of any open source-testing tool (e.g. Test Link)
11. Study of any testing tool (e.g. Win runner/LoadRunner)
12. Study of any web testing tool (e.g. Selenium)
13. Write the test cases for any known application (e.g. Banking application)
14. Create a test plan document for any application (e.g. Library Management System)
15. Study of any bug tracking tool (e.g. Bugzilla, bugbit)
16. MS – project Its use in project scheduling

**Course Name: Minor Project**

**Course Code: MCA136A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**Course Objectives**

The purpose of minor project is to enhance the practical knowledge based on prescribed languages which are introduced in this program. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

**Semester V**

**Course Name: Management Information System**

**Course Code: MCA137A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 0 | 0 | 3 |

**Course Objectives**

1. To get the knowledge about the important management concepts & their application, to have an insight of various functional departments in an organization.
2. To discuss the importance of security, privacy, and ethical issues as they relate to information systems.
3. To identify some of the strategies employed to lower costs and improve service.
4. To know about the designing and development of MIS
5. To know about Role of Decision Support System in MIS, Decision Support Models,

**Syllabus**

**Unit I**

**Introduction to Information System:** Why information system, Classification of Information, Key aspects of Management, Definitions, roles and features of MIS, Structure of Management Information System, Benefits of Management Information System, Limitations of Management Information System, Management Support Systems

**Unit II**

**MIS Development:** Overview of design of an information system, The role and tasks of systems analysts, Tools used by system analyst in designing Information system, MIS Requirement Analysis, MIS Requirement Specification, Feasibility Analysis & Report, MIS Development Models, MIS Design & Development Phase

**Unit III**

**Decision Support System in MIS:** Managerial Decision Making, Types of Decisions, Definition and characteristics of DSS, Types of Decision Support Systems, Components of DSS, Role of Decision Support System in MIS, Decision Support Models, Risks of DSS in MIS,

**Unit IV**

**Data warehousing and mining:** Technology of Information Systems, Unified Communication and Networks, Database and Client Server Architecture. Data Warehouse: Architecture to Implementation E-Business Technology, Data Mining Concepts and Applications, Tools and Techniques, Text Mining, Web Mining

**Unit V**

**MIS Security:** MIS Security Risks, Threats & Vulnerability, Assessing Risks. Common MIS Controls (Physical, Electronic, Software, Management Controls), MIS Threats (Natural Disasters, Employee Errors, Computer Crime, Fraud, Abuse, Program Bugs), Information Security and control concepts-Access controls, QA and QC concepts with respect to the processes of various functional areas of management, social and security issues related to MIS, Control, Audit and Security of MIS.

**Course Outcomes (Cos):**

**Upon successful completion of this subject students should be able to:**

CO1: Understand the roles and features of MIS, Structure of Management Information System, and Benefits of Management Information System.

CO2: Know about the designing and development of MIS, MIS Requirement Specification, and Feasibility Analysis & Report.

CO3: To identify MIS Security Risks, Threats & Vulnerability and Assessing Risks.

CO4: To identify Database and Client Server Architecture. Data Warehouse: Architecture to implementation.

CO5: Know about Role of Decision Support System in MIS, Decision Support Models,

**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 Book**

1. Management Information Systems: Waman S Jawadekar, Tata McGraw-Hill

**Reference Books** -

1. Management Information Systems S. Sadagopan, PHI learning PVT Ltd.
2. Management Information Systems, Davis, Tata McGraw-Hill
3. Decision Support and Expert Systems: Management Support Systems, Efraim Turban, Prentice Hall
4. Dr. C.B Gupta “Management concepts & practices” S.Chand& Sons, 2009.

**Course Name: Information Security & Cyber Law**

**Course Code: MCA138A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**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 Book**

# Atul Kahate, Cryptography and Network Security, Mc Graw Hill Education, 3rd Edition.

**Reference Books**

1. William Stallings, ―Cryptography and Network Security, Prentice Hall, New Delhi, 2006.
2. Neal Krawetz, ―Introduction to Network Security‖, Thomson Learning, Boston, 2007.
3. Bruce Schneier, ―Applied Cryptography‖, John Wiley & Sons, New York, 2004.
4. Frontiers of of Electronic Commerce Kalakota and Whinstn Addition Wesley

**Course Name: Programming in ASP.Net**

**Course Code: MCA139A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 0 | 0 | 3 |

**Course Objectives**

1. To introduce the concept of to the .NET framework, .NET Interoperation services and Different projects.
2. To demonstrate Client side programming: HTTP, CGI, Cookies, JavaScript, HTML, XML.
3. To demonstrate Server side programming: Web Forms, ASP.NET Web Services, ADO.NET Data Access.
4. To be able to create Consistent Page Layout with Master Pages.
5. To measure the User Controls, Validating User Input, Understanding Request Validation

**Syllabus**

**Unit I**

**An Introduction to ASP .NET ;-** A Tour of the IDE, The Sample Application, Different Project Types, Creating a New ASP.NET 4 Web Site, Working with Files in Your Web Site, Working with Web Forms,

**Unit II**

**Designing Your Web Pages:-** Problems of HT ML Formatting, An Introduction to CSS, Working with CSS in Visual Web Developer, Working with ASP.NET Server Controls:- Introduction to Server Controls, Ty pes of Controls, The ASP .NET State Engine

**Unit III**

**Creating Consistent Looking Web Sites:-** Consistent Page Layout with Master Pages, Using a Centralized Base Page, Themes, Skins. Navigation: - Understanding Absolute and Relative URL s, Using the Navigation Controls, Programmatic Redirection.

**Unit IV**

**User Controls:** Validating User Input, Understanding Request Validation, Processing Data at the Server, Sending E‑mail from Your Web Site, Reading from Text Files

**Unit V**

**Introducing Databases** ADO .NET Object Model, Using SQL to Work with Database Data, Creating Your Own Tables, Data Controls:- Data-bound Controls, Data Source Controls, Data Source and Data-bound Controls Working Together, Storing Your Connection Strings in web.config, AJAX, LINQ

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Web applications development using ASP.NET framework is the main outcome of this course.

CO2: Demonstrate Client side programming: HTTP, CGI, Cookies, JavaScript, HTML, XML.

CO3: Demonstrate Server side programming: Web Forms, ASP.NET Web Services, ADO.NET Data Access.

CO4: Able to create Consistent Page Layout with Master Pages.

CO5: Measure the User Controls, Validating User Input, Understanding Request Validation

**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 |  |  |  |  |  | M |  |  |
| CO3 | M |  |  |  | M |  | L |  |  |  |  | M |
| CO4 |  |  | L |  |  |  |  | M |  |  |  |  |
| CO5 | H |  |  |  | L |  |  |  | M |  |  |  |

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

**Text Book**

1. ASP.NET 4.5 Web Programming with C# 2012 by Mary Delamater and Anne Boehm, published by Murach, 2013**.**

**Reference Books**

1. Debugging ASP.NET (New Riders) - Jonathon Goodyear, Brian Peek, Brad Fox
2. Designing Microsoft ASP.NET Applications (Microsoft Press) - Jonathon Goodyear, Brian Peek, Brad Fox
3. Microsoft ASP.NET Step by Step (Microsoft Press) - G. Andrew Duthrie
4. Deploying and Managing Microsoft .NET Web Farms (Sams) - Barry Bloom

**Course Name: Programming in R**

**Course Code: MCA140A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 2 | 0 | 0 | 2 |

**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 Outcome** | **Program 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 Book**

1. Statistical Programming in R (Oxford) Srinivasa, Siddesh, Shetty and Sowmya, June 2017.

**Reference Books**

1. Lawrence Leemis. Learning Base R. Lightning Source, 2016
2. VikramDayal.An Introduction to R for Quantitative Economics: Graphing, Simulating and Computing*. Springer, 2015*
3. Matthias Kohl*.*Introduction to statistical data analysis with R*. bookboon.com, London, 2015.*
4. Matthias Kohl*.*Introduction to statistical data analysis with R*. bookboon.com, London, 2015.*

**Course Name: Programming in ASP.Net Lab**

**Course Code: MCA141A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**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 Sample Programs**

1. Write a program to display the following feedback form.
2. The different options for the list box must be ASP-XML, DotNET, JavaPro and UNIX, C, C++. When the Submit Form button is clicked after entering the data, a message as seen in the last line.
3. Write a program to display three images in a line. When any one of the images is clicked, it must be displayed below. On clicking the displayed image it must be cleared.
4. Write a simple ASP.NET program to display the following Web Controls:
5. A button with text “clicks me”. The button control must be in the center of the form.
6. A label with a text hello
7. A checkbox.
8. Write a program to display “Welcome To Radiant” in the form when the “click” button is clicked. The form title must be ASP.NET.
9. Write a program containing the following controls:
10. A ListBox
11. A Button
12. An Image
13. A Label
14. The listbox is used to list items available in a store. When the user clicks on an item in the listbox, its image is displayed in the image control. When the user clicks the button, the cost of the selected item is in the control

**Course Name: Programming in R Lab**

**Course Code: MCA142A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 2 | 2 |

**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 Sample Programs**

Following are the list of sample programs. Students have to perform accordingly.

1. Illustrate addition, multiplication and division between vectors.
2. Enumerate multiplication and division operations between matrices and vectors in R console.
3. Write the command in R console to create a list containing a vector, a matrix and a list. Also give names to the elements in the list and display the list.
4. Write the command in R console to add a new element at the end of the list and display the same.
5. Write the command in R console to delete the fourth element from a list and display the resultant list.
6. Write the command in R console to update the third element of the list and display the resultant list.
7. Write the command in R console to create two lists, each containing 5 elements. Convert the list into vectors and perform addition on the two vectors. Display the resultant vector.
8. Write an R programme to print the values in vectors using the while loop.
9. Write an R programme to print the values in vectors using for loop.
10. Write an R programme to create four vectors namely patientid, age, diabetes and status. Put these four vectors into a Data frame patientdata and print the values using the for loop.
11. Write an R programme to print HELLO 10 times using for loop.
12. Write an R programme to print the Fibonacci series.
13. Write an R programme to print if the given number is ODD/EVEN.
14. Write an R programme to print the first 100 prime numbers.
15. Write an R programme to calculate the factorial of a number.
16. Write an R programme to calculate LCM of 2 numbers.
17. Write an R programme to calculate GCD of 2 numbers.
18. Write a programme to illustrate the use of local and global variable.
19. Write a programme to multiply two numbers using a function with a default value. Assume default value as NULL.
20. Demonstrate the creation of a complex number.
21. Add two complex numbers using the complex functions and test whether the sum of the complex numbers is complex or not.
22. Write a programme to calculate factorial of a number using recursive computation.
23. Write a programme to sum n natural numbers.
24. Write a programme to find nth Fibonacci number using recursive computation.
25. Write a programme to calculate the GCD of two numbers using recursive computation.
26. Write the commands in R console to find mean number of leaves for each day (data frame) using apply function.
27. Write the command in R console to specify the columns that needs to be excluded in the apply function.
28. Write the command in R console to change a value in the duckweed data frame.
29. Write the command in R console to determine the proportion of the total number of leaves counted on each day.
30. Write the command in R console to obtain mean using tapply function by considering a vector having 10 normal and 10 uniform variables. Assume that these vectors have three groups.
31. Calculate the mean of ozone, solar radiation, and wind within each month using lapply for air quality dataframe.
32. Calculate the mean of ozone, solar radiation, and wind within each month using sapply for air quality dataframe.
33. Using R pie chart, demonstrate the percentage conveyance of various ways for travelling to office such as walking, car, bus, cycle and train.
34. Using a chart legend, Show the percentage conveyance of various ways for travelling to office such as walking, car, bus, cycle and train.
35. Using R bar chart, demonstrate the percentage conveyance of various ways for travelling to office such as walking, car, bus, cycle and train.
36. Using box plots demonstrate the relation between the cars speed and the distance taken to stop.
37. Using R histogram, demonstrate the relation between the cars speed and the distance taken to stop.
38. Using R line graphs, demonstrate the relation between the cars speed and the distance taken to stop.
39. Using scatters plots in R, demonstrate the relation between the cars speed and the distance taken to stop.
40. Write the commands in R console to read a CSV file and display the number of rows and columns.

**Course Name: Minor Project (PHP, ASP.Net, Java)**

**Course Code: MCA143A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 0 | 0 | 4 | 4 |

**Course Objectives**

The purpose of minor project is to enhance the practical knowledge based on prescribed languages which are introduced in this program. The students will be able to enhance their analyzing and problem solving skills after implementation of all the given experiments.

**List of Courses for Elective – I**

**Course Name: Programming in Python**

**Course Code: MCA144A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 2 | 0 | 2 | 4 |

**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**

**Basics Of Python Programming:** 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 , Input Operation, Comments , Reserved Words , Indentation , Operators and Expressions, Expressions in Python, Operations on Strings , Concatenation, Multiplication (or String Repetition), Other Data Types, Tuples , Lists , Dictionary, Type Conversion .

**Unit II**

**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.

**Unit III**

**Function:** Function Definition, Function Call , Variable Scope and Lifetime, return statement, Lambda Functions or Anonymous Functions , Documentation Strings, Recursive Functions.

**Unit IV**

**File Handling:** File Path, Types of Files, Opening and Closing Files, Reading and Writing Files, File Positions Renaming and Deleting Files, Directory Methods

**Unit V**

**Classes and Objects**: Classes and Objects, Class Method and self Argument, The \_\_init\_\_() Method, 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, Class Methods, Static Methods.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Outline the basics of python programming, Features, history, data types and variables.

CO2: Understanding of Python especially Decision control, function and modules.

CO3: Understanding of the file handling and Data Structure.

CO4: Be exposed to object oriented concepts in Python programming, decision controls and function.

CO5: Understand the concept of class and object, class methods and Garbage.

**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 Book**

1. Python Programming, Oxford, ReemaThareja, June 2017

**Reference Books**

1. “Programming Python” by Mark Lutz and O’Reilly Media
2. “Python Testing Cookbook” by Greg L Turnquist
3. “Head First Programming” by Paul Barry and David Griffiths
4. “Python Crash Course: A Hands-On, Project-Based Introduction to Programming” by Eric Matthes.

**Course Name: Android Application Development**

**Course Code: MCA145A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 2 | 0 | 2 | 4 |

**Course Objectives:**

1. To understand the Android application architecture, including the roles of the task stack, activities, and services.
2. To build user interfaces with fragments, views, form widgets, text input, lists, tables, and more.
3. To use advanced UI widgets for scrolling, tabbing, and layout control.
4. To store application data on the mobile device, in internal or external storage locations.
5. To support user-specific preferences using the Android Preferences API.

**Unit I**

**Introduction to Android:** Android Versions, Features of Android, Architecture of Android Obtaining the Required Tools: Android Studio, Android SDK, Creating Android Virtual Devices (AVDs), Launching Your First Android Application. Exploring the IDE, Using Code Completion, Debugging Your Application:- Setting Breakpoints

**Unit II**

**Android User Interface**:- Understanding the Components of a Screen: Views and ViewGroups, LinearLayout, RelativeLayout, ScrollView, TableLayout, FrameLayout, Using Basic Views: TextView, Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, Display Long Lists: ListView, Using the Spinner View, Utilizing the Action Bar: Adding Action Items to the Action Bar, Creating the User Interface Programmatically,

**Unit III**

**Activities, Fragments, and Intents**:- Understanding Activities: Applying Styles and Themes to an Activity, Hiding the Activity Title, Displaying a Dialog Window, Displaying a Progress Dialog, Linking Activities Using Intents: Open an Activity, Returning Results from an Intent, Fragments: Life Cycle of a Fragment, Adding Fragments Dynamically, Interactions Between Fragments, Understanding the Intent Object

**Unit IV**

Displaying Pictures and Menus with Views: Using Image Views to Display Pictures: ImageView ,RecyclerView, Using Menus with Views: Creating the Helper Methods, Options Menu, Context Menu

**Unit V**

Saving and Loading User Preferences: Accessing Preferences Using an Activity, Modifying, Programmatically Retrieving and Modifying the Preferences Values , Creating and Using Databases: Creating the DBAdapter Helper Class, Using the Database Programmatically, Consuming Web Services Using HTTP: Accessing Web Services Using the GET Method Consuming JSON Services

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Student can setup Android Environment, Well understanding of Android Architecture.

CO2: Capable to customize IDE, can insert breakpoint and debugging, learn application deployment.

CO3: Learn to create different views of activity and manage layout for different activity.

CO4: Knowledge of Activity life cycle, and fragment. How intent will work for communication.

CO5: Can store Activity data on local device with database helper class, and use of preferences for authentication.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  | L | H |  |  |  | M |  | M |  |  |  |
| CO2 |  | H |  |  | L |  |  | M |  |  |  | L |
| CO3 | H |  |  |  | H | M |  |  | L |  |  |  |
| CO4 |  |  | H | H |  |  | L | M |  |  |  |  |
| CO5 |  | L |  |  |  |  |  |  | H |  | M |  |

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

**Text Book**

1. Beginning Android Programming with Android Studio

**Reference Books**

1. Android Application Development Cookbook.
2. Building Android application with HTML, CSS, and JavaScript 2nd Edition O’Relly’s Publication
3. Android 4.2 App Development Essentials
4. Android Appliation Development for Dummies

**Course Name: Web Technologies**

**Course Code: MCA146A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 2 | 0 | 2 | 4 |

**Course Objective:**

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.

**Unit I**

**Introduction to the Web and HTTP**: History of the Web, Protocols Governing the Web , Creating Websites for Individuals and Web Applications , Writing Web Projects, Identification of Objects ,Target Users , Web Team, Planning and Process Development , Web Architecture , Major Issues in Web Solution ,Development, Web Servers, Web Browsers, Internet Standards , TCP/IP Protocol Suite, IP Addresses.

**Unit II**

**Hypertext Markup Language (HTML)**: History of HTML and W3C, HTML and its Flavors, HTML Basics, Elements, Attributes, and Tags, HTML Elements, HTML Tags, Basic Tags, Headings , Advanced tags, Frames, Images, Meta Tag, Planning of Web Page, Model and Structure for a Website, Designing Web Pages, Multimedia Content (Audio and Video) Frames

**Unit III**

**Cascading Style Sheet (CCS) & XML**: Introduction, Advantages, Adding CSS, External Style Sheets, Embedded Style Sheets, Imported Style Sheets, Inline Style Sheets, Cascading Rule, Browser Compatibility, CSS and Page Layout, Anatomy of a Style Rule, Selectors, Grouping, Type Selectors ,Universal Selectors, Descendant Selectors ,Child Selectors, Attribute Selectors, class Selectors, ID selectors ,XML: Common Use , Role of XML, Basic Structure, Body, Elements, Attributes, Validation, Displaying XML, Namespace

**Unit IV**

**Java Script**: Introduction, Variables, Literals , Operators, Control Structure, Conditional Statement , Arrays, Functions , Predefined Objects, The Location Object, History, Object Hierarchy, Accessing Objects, Event Handling , DOM, JavaScript and XML

**Unit V**

**Servlet and JSP**: Introduction, Definitions , Server-side Java, Advantage over Applet,ServletArchitecture,Servlet Life Cycle,GenericServlet, HttpServlet,FirstServlet,Passing Parameters to Servlets,RetrievingParameters,Cookies

JSP: JSP and HTTP,JSPEngines,JSP and Servlet,JSP Syntax, JSP Components

**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.

**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 | H |  |  |  | M |  | M |  |  |  |
| CO2 |  | H |  |  | L |  |  | M |  |  |  | L |
| CO3 | H |  |  |  | H | M |  |  | L |  |  |  |
| CO4 |  |  | H | H |  |  | L | M |  |  |  |  |
| CO5 |  | L |  |  |  |  |  |  | H |  | M |  |

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

**Text Book**

1. Web Technologies, Oxford University, Uttam Kumar Roy, November 2010

**Reference Books**

1. “Semantic Web Technologies: Trends and Research in Ontology-based Systems” by John Davies and Rudi Studer
2. “Semantic Web Technologies and Legal Scholarly Publishing (Law, Governance and Technology Series)” by Silvio Peroni
3. “Foundations of Semantic Web Technologies” by Pascal Hitzler and Markus Krotzsch
4. “Semantic Web Technologies for Intelligent Engineering Applications” by Stefan Biffl and Marta Sabou

**List of Courses for Elective – II**

**Course Name: Parallel Computing**

**Course Code: MCA147A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objectives:**

1. To identify the scope for parallelism in a program and Routing Mechanisms for Interconnection Networks.
2. To understand the various parallel programming models and the challenges involved in parallel programming.
3. To learn the basics of heterogeneous systems using CUDA and OpenCL.
4. To introduce the foundations of parallel computing, including parallel architectures, parallel programming methods and techniques.
5. To introduce parallel algorithm designs, and parallel performance analysis.

**Syllabus**

**Unit I**

**Introduction to Parallel Computing:** Motivating Parallelism, Scope of Parallel Computing, Organization and Contents of the Text, Parallel Programming Platforms, Implicit Parallelism: Trends in Microprocessor Architectures, Limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks.

**Unit II**

**Principles of Parallel Algorithm Design:** Introduction, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for Containing Interaction Overheads, Parallel Algorithm Models

**Unit III**

**Basic Communication Operations:** One-to-All Broadcast and All-to-One Reduction**,** All-to-All Broadcast and Reduction**,** All-Reduce and Prefix-Sum Operations**,** Scatter and Gather**,** All-to-All Personalized Communication**,** Circular Shift**,** Improving the Speed of Some Communication Operations

**Unit IV**

**Analytical Modeling of Parallel Programs:** Sources of Overhead in Parallel Programs**,** Performance Metrics for Parallel Systems**,** The Effect of Granularity on Performance**,** Scalability of Parallel Systems**,** Minimum Execution Time and Minimum Cost-Optimal Execution Time**,** Asymptotic Analysis of Parallel Programs.

Programming Using the Message-Passing Paradigm: The Building Blocks: Send and Receive Operations, MPI: the Message Passing Interface, Topologies and Embedding

**Unit V**

**Programming Shared Address Space Platform:** Thread Basics**,** The POSIX Thread API**,** Thread Basics: Creation and Termination**,** Synchronization Primitives in Pthreads**,** Controlling Thread and Synchronization Attributes**,** Thread Cancellation**,** Composite Synchronization Constructs

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Able to understand the concept of parallelism and Routing Mechanisms for Interconnection Networks.

CO2: Able to understand the parallel algorithm design techniques.

CO3: To design the Analytical Models of Parallel Programs.

CO4: To understand the concept of thread, POSIX and Pthreads, Thread Cancellation and Composite Synchronization Constructs

CO5: To understand the basic communication operations, message passing interfaces and topologies.

**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 | H |  |  |  | M |  | M |  |  |  |
| CO2 |  | H |  |  | L |  |  | M |  |  |  | L |
| CO3 | H |  |  |  | H | M |  |  | L |  |  |  |
| CO4 |  |  | H | H |  |  | L | M |  |  |  |  |
| CO5 |  | L |  |  |  |  |  |  | H |  | M |  |

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

**Text Book**

1. Introduction to parallel Computing, Oxford University, Petersen and Arbenz, July 2008.

**Reference Books**

1. “Computer Architecture and Parallel Processing” by Kai Hwang
2. “Computer Architecture and Parallel Processing” by Bharat Bhushan Agarwal and Sumit Prakash Tayal.
3. “Parallel Computers – Architecture and Programming” by Rajaraman V
4. “Advanced Computer Architecture for Parallel Processing (Mcgraw Hill Series in Electrical and Computer Engineering)” by Kai Hwang

**Course Name: Advance Computer Architecture**

**Course Code: MCA148A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To describe the operation of modern and high performance computers.
2. To undertake performance comparisons of modern and high performance computers.
3. To improve the performance of applications on modern and high performance computers.
4. To development of software to solve computationally intensive problems.
5. To enhance teamwork and leadership skills through the project.

**Syllabus**

**Unit I**

**Introduction to Advanced Computer Architecture and Parallel Processing:**  Four Decades of Computing, Flynn’s Taxonomy of Computer Architecture, SIMD Architecture, MIMD Architecture, Interconnection Networks

**Unit II**

**Performance Analysis of Multiprocessor Architecture:** Computational Models, an Argument for Parallel Architectures, Interconnection Networks Performance Issues, Scalability of Parallel Architectures

**Unit III**

**Instruction Set and Addressing Modes:** Pipelining, Categories of Instructions: General Instruction Format, General Addressing Modes, Program Control, An Example: the M68000 Addressing Modes, Instruction Set of MIPS Processor, Link to Subroutines, Three Instruction Formats, Three Ways of Branch/Jump Addressing, Three Addressing Modes for Operands, CISC vs. RISC

**Unit IV**

**Memory And I/O Cache Performance** – Reducing cache miss penalty and miss rate – Reducing hit time Main memory and performance – Memory technology. Types of storage devices –Buses – RAID – Reliability, availability and dependability – I/O performance measures designing an I/O system.

**Unit V**

**Multi-Core Architectures** Software and hardware multithreading – SMT and CMP architectures – Design issues –Case studies – Intel Multi-core architecture – SUN CMP architecture – heterogenous multi-core processors – case study: IBM Cell Processor.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Know the fundamental aspects of computer architecture design and analysis

CO2: Understand design, pipelining, instruction set, out-of-order execution, caches (memory hierarchies).

CO4: Understand virtual memory, storage systems, and simulation techniques

CO3: Know about computer performance, instruction set architecture design and implementation.

CO5: Know about Multi-Core Architectures, Software and hardware multithreading

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | H |  |  | M |  |  |  |  | M |  |  |  |
| CO2 |  |  |  | H |  |  |  |  |  | L |  |  |
| CO3 |  |  |  |  |  | M |  |  |  |  |  | M |
| CO4 |  |  |  | M |  |  |  | H |  |  |  |  |
| CO5 | H |  | L |  |  |  | M |  |  |  | M |  |

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

**Text Books:**

1. “Advanced Computer Architecture for Parallel Processing (Mcgraw Hill Series in Electrical and Computer Engineering)” by Kai Hwang
2. “Advanced Computer Architecture for Parallel Processing”, Wiley, Hesham El-Rewini and Mostafa Abd-El-Barr

**Reference Books**

1. David E. Culler, Jaswinder Pal Singh, “Parallel computing architecture :Ahardware/software approach” , Morgan Kaufmann /Elsevier Publishers, 1999.
2. “Computer Architecture and Parallel Processing” by Bharat Bhushan Agarwal and Sumit Prakash Tayal.
3. “Parallel Computers – Architecture and Programming” by Rajaraman V
4. Kai Hwang and Zhi.WeiXu, “Scalable Parallel Computing”, Tata McGraw Hill, NewDelhi, 2003.

**Course Name: Theory of Computation**

**Course Code: MCA149A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective**

1. To introduce the mathematical foundations of computation including automata theory.
2. To understand the concept of formal languages and grammars and the notions of algorithm, decidability, complexity, and computability.
3. To enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.
4. To enhance the ability to understand the concept of Regular Expression Formalism.
5. To be able to describe formation of Turing machine by Grammars.

Syllabus

Unit I

**Introduction**: Basic Concepts, Sets, Relations, Graphs, Languages, Mathematical Induction, Finite State Machines FSM: Concept of Basic Machine, Finite State Machine, Finite Automata,

Deterministic Finite Automata, Non-deterministic Finite Automata, Equivalence of NFA and DFA, NFA with є-Transitions, Equivalence of NFA and NFA with є-Transitions, Equivalence of DFA and NFA with є-Transitions, Finite Automata with Output, Equivalence of Moore and Mealy Machines, FSM Equivalence, DFA Minimization

**Unit II**

**Regular Expression:**  Formalism, Examples of Regular Expressions, Equivalence of Regular Expressions and Finite Automata, DFA to Regular Expression Conversion, Regular Sets and their Closure Properties, Pumping Lemma for Regular Languages, Decision Algorithms for Regular Sets, Applications of Regular Expressions and Finite Automata.

**Unit III**

**Turing Machine:** Elements of a Turing Machine, Turing Machine Formalism, Instantaneous Description, Transition Graph for Turing Machine, Complexity of a Turing   
Machine, Composite and Iterative Turing Machines, Universal Turing Machine, Multi-tape Turing Machine, Multi-stack Turing Machine, Multi-track Turing Machine, Solvable, Semi-solvable, and Unsolvable Problems, Halting Problem Recursively Enumerable and Recursive Languages, Functions, Linear Bounded Automata.

**Unit IV**

**Grammar:** Constituents of Grammar, Formal Definition of Grammar, Grammar Notations, Derivation Process, Derivation Tree, Context-free Languages, Ambiguous Context-free Grammar, Simplification of Context-free Grammar, Normal Forms, Chomsky Hierarchy, Equivalence of Right-linear and Left-linear Grammars ,Equivalence of Regular Grammars and Finite Automata Pumping Lemma for Context-free Languages, Kuroda Normal Form, Dyck Language, Derivation Graph, Applications of Context-free Grammar, Backus–Naur Form

**Unit V**

**Automata:** Elements of a PDM, Pushdown Automata, Finite Automata vs PDAPDA Accepting CFLs, DPDA vs NPDA, Equivalence of CFG and PDA, Closure Properties of CFLs, Additional PDA Examples. Parsing, Bottom-up Parsing, Working of a Bottom-up Parser, Automatic Construction of Bottom-up Parser.

**Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to**

CO1: Students are able to understand basic terms TOC and FSM.

CO2: Enhance the knowledge Regular Expression and its fundamentals.

CO3: Determine formation of Turing machine by Grammars.

CO4: Students will be able to understand the different-2 types of grammars

CO5: Students will be able to describe the PDA, Parsing, Bottom-up Parsing.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | H |  | H |  |  |  |  | H | M |  |  |  |
| CO2 |  |  |  | H |  | H |  |  |  | L |  |  |
| CO3 |  |  |  |  |  |  |  |  |  |  |  | M |
| CO4 |  |  |  | M |  |  |  | H |  |  |  |  |
| CO5 |  | H |  |  |  |  | M |  | H |  | M |  |

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

**Text Book:**

1. Vivek Kulkarni ''Theory of Computation" , Oxford University Press. 2013

**Reference Books:**

1. Peter Linz, “An Introduction to Formal Languages and Automata”, (5e),Jones & Bartlett Learning, 2011.
2. John C Martin, “Introduction to Languages and the Theory of Computation”, (3e), McGraw Hill, 2007.
3. J E Hopcroft, Rajeev Motwani& Jeffrey D Ullman, “Introduction to Automata Theory, Languages and Computation”, (3e), Pearson Education, 2006.
4. K. L. P. Mishra, N. Chandrashekharan, “Theory of Computer Science”, (3e),PHI publications, 2007.

**Course Name: Data Warehousing and Data Mining**

**Course Code: MCA150A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To know the basic concept of data mining, Architecture of a Data Mining System and the Knowledge Discovery Process
2. To provide the fundamental concepts of data warehousing technology.
3. To incorporates a step-by-step approach to designing and building a data warehouse.
4. To provides numerous review questions, multiple choice questions and other exercises at the end of each chapter.
5. To contain a running fabricate case-study to bring out practical aspects of building a data warehouse.

**Syllabus**

**Unit I**

**Introduction to Data mining**: Introduction, Architecture of a Data Mining System, The Knowledge Discovery Process , Integrating Data Mining with Data Warehouse, Related Areas of Data Mining , Data Mining Techniques

**Unit II**

**Data Warehousing**: Introduction to Data Warehousing: Historical Background, Increasing Demand for Strategic Information, Data Warehouse Defined, Data Warehouse Users, Benefits of Data Warehousing, Concerns in Data Warehousing. Features of a Data Warehouse, Data Granularity, the Information Flow Mechanism, Metadata, Two Classes of Data, The Lifecycle of Data, Data Flow from Warehouse to Operational Systems.

**Unit III**

**Architecture, Planning and Project Management**: Architecture, Characteristics of Data Warehouse Architecture, Data Warehouse Architecture Goals, Data Warehouse Architecture, Data Warehouse and Data Mart, Building Data Marts and its issues, Building Data Marts, Other Data Mart Issues.

Planning and Project Management: Project Management Principle, Data Warehouse Readiness Assessment, Data Warehouse Project Team, Planning for the Data Warehouse, Data Warehouse Project Plan, Planning for the Data Warehouse Server, Capacity Planning, Selecting the Operating System, Selecting the Database Software.

**Unit IV**

**Schema & Dimensional Modeling**: Schema: Dimensional Modeling, The Star Schema, The Snowflake Schema, Aggregate Tables, Fact Constellation Schema, The Strengths of Dimensional Modeling, Data Warehouse and the Data Model.

Dimensional Modeling: Characteristics of a Dimension Table, Characteristics of a Fact Table, T Types of Dimension Tables, Keys in the Data Warehouse (Star) Schema, Enhancing the Data Warehouse Performance, Technology Requirements.

**Unit V**

**Testing, Growth, Maintenance & OLAP**: Data Warehouse Design Review, Developing the Data Warehouse Iteratively, Testing, Monitoring the Data Warehouse, Tuning the Data Warehouse. OLAP: Need For OLAP, OLAP and Multidimensional Analysis, OLAP Functions, OLAP Applications, OLAP Models, OLAP Design Considerations, OLAP Tools and Products, Existing OLAP Tools, Data Design, Administration and Performance, OLAP Platforms.

**Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to**

CO1: Describe the fundamental concepts, benefits and problem areas associated with data warehousing.

CO2: Describe the various architectures and main components of a data warehouse.

CO3: Design a data warehouse, and be able to address issues that arise when implementing a data warehouse.

CO4: Understand various schemes and data models.

CO5: Compare and contrast OLAP and data mining as techniques for extracting knowledge from a data warehouse.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | H |  | H |  |  |  |  | H | M |  |  |  |
| CO2 |  |  |  | H |  | H |  |  |  | L |  |  |
| CO3 |  |  |  |  |  |  |  |  |  |  |  | M |
| CO4 |  |  |  | M |  |  |  | H |  |  |  |  |
| CO5 |  | H |  |  |  |  | M |  | H |  | M |  |

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

**Text Books:**

1. VikramPudi, ''Data Mining" , Third Edition, Oxford university Press

**Reference Books :**

1. Jiawei Han and MichelineKamber, “Data Mining- Concepts and Techniques”, (3e), Morgan Kaufmann Publishers, 2011
2. PaulrajPonniah, “Data Warehousing”, (2e), Wiley India Pvt. Ltd., 2010
3. H. Witten and E. Frank, “Data Mining: Practical Machine Learning Tools and Techniques”, Morgan Kaufmann, 2000.
4. M.H.Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education 2006.

**Course Name: Optimization Techniques**

**Course Code: MCA151A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To introduce the fundamental concepts of Optimization Techniques.
2. To make the learners aware of the importance of optimizations in real scenarios.
3. To provide the concepts of various classical and modern methods of for constrained and unconstrained problems in both single and multivariable.
4. To introduce the concept of modeling approach.
5. To introduce the concept of linear programming.

**Syllabus**

**Unit I**

**Nature of Operation Research:** History, Nature of OR, Impact of OR, Application Areas. Overview of modeling approach: Formulating the problem, constructing a mathematical model, Deriving a solution, Testing a model and the solution, establishing control over the solution, Implementation issues.

**Unit II**

**Linear Programming:** Introduction, Graphical solution, Graphical sensitivity analysis, The standard form of linear programming problems, Basic feasible solutions, Simplex algorithm, Artificial variables, Big M and two phase method, Degeneracy, Alternative optima, Unbounded solutions, Infeasible solutions.

**Unit III**

**Dual Problem:** Relation between primal and dual problems, Dual simplex method. Assignment problem: Hungarian method.

**Unit IV**

**Travelling Salesman Problem:** Branch and Bound Technique. Sequencing Problem: 2 machines n jobs, 3 machines n jobs, n machines m job.

**Unit V**

**Pert and CPM:** Arrow network, Time estimates, earliest expected time, latest allowable occurrence time, latest allowable occurrence time and stack, Critical path, Probability of meeting scheduled date of completion of project, Calculation of CPM network, Various floats for activities, Project crashing.

**Course Outcomes (COs):**

CO1: Formulate optimization problems.

CO2: Understand and apply the concept of optimality criteria for various type of optimization problems.

CO3: Solve various constrained and unconstrained problems in single variable as well as multivariable.

CO4: Apply the methods of optimization in real life situation.

CO5: Know about the Calculation of CPM network and Pert.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | H |  | H |  |  |  |  | H | M |  |  |  |
| CO2 |  |  |  | H |  | H |  |  |  | L |  |  |
| CO3 |  |  |  |  |  |  |  |  |  |  |  | M |
| CO4 |  |  |  | M |  |  |  | H |  |  |  |  |
| CO5 |  | H |  |  |  |  | M |  | H |  | M |  |

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

**Text Books:**

1. KantiSwaroop, Gupta P.K. Man Mohan, “Operations Research”, Sultan Chand and Sons.

**References Books:**

1. Kambo, N.S., “Mathematical Programming Techniques”, McGraw Hill
2. Operations Research : Principles and Practice 2nd edition Ravindran Wiley Production.
3. Elementary Number Theory with applications: Thomas Koshy, 2nd Ed., Elsevier.
4. Gillet, B.E., “Introduction to Operation Research: a computer oriented algorithmic approach” Tata McGraw Hill, NY.

**Course Name: NLP and Information Retrieval**

**Course Code: MCA152A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To introduces the fundamental concepts and techniques of natural language processing (NLP).
2. To gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
3. To examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.
4. To understanding semantics and pragmatics of English language for processing ·
5. To be able to write programs in Python to carry out natural language processing

**Syllabus**

**Unit I**

**Introduction to NLP**: What is Natural Language Processing (NLP), Origins of NLP, Language and Knowledge, The Challenges of NLP, Language and Grammar, Processing Indian Languages, NLP Applications, Some Successful Early NLP Systems, Information Retrieval Language Modeling: Various Grammar-based Language Models, Statistical Language Model

**Unit II**

**Word Level Analysis:** Regular Expressions, Finite-State Automata, Morphological Parsing, Spelling Error Detection and Correction, Words and Word Classes, Part-of-Speech Tagging, Syntactic Analysis: Context-Free Grammar, LEEE Contents, Constituency, Parsing, Probabilistic Parsing, Indian Languages

**Unit III**

**Semantic Analysis:** Meaning Representation, Lexical Semantics, Ambiguity, Word Sense Disambiguation. Discourse Processing: Introduction, Cohesion, Reference Resolution, Discourse Coherence and Structure

**Unit IV**

**Natural Language Generation & Machine Translation**: Architectures of NLG Systems, Generation Tasks and Representations, Applications of NLG. Machine Translation: Introduction , Problems in Machine Translation , Characteristics of Indian Languages , Machine Translation Approaches , Direct Machine Translation , Rule-based Machine Translation , Corpus-based Machine Translation , Semantic or Knowledge-based MT systems , Translation involving Indian Languages

**Unit V**

**Information Retrieval**: Basics, Design Features of Information Retrieval systems ,Contents EN, Information Retrieval Models, Classical Information Retrieval Models, Non-classical models of IR , Alternative Models of IR , Evaluation of the IR System

**Course Outcomes (COs):**

**Upon successful completion of this subject students will able**

CO1: The students will get acquainted with natural language processing and learn how to apply basic algorithms in this field.

CO2: They will understand the algorithms of Word level analysis.

CO3: They will understand the algorithms of Semantic analysis.

CO4: They will also grasp basics of knowledge representation Natural languages and machine Translation.

CO5: The students will get acquainted with the methods of information retrievals.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | H |  | H |  |  |  |  | H | M |  |  |  |
| CO2 |  |  |  | H |  | H |  |  |  | L |  |  |
| CO3 |  |  |  |  |  |  |  |  |  |  |  | M |
| CO4 |  |  |  | M |  |  |  | H |  |  |  |  |
| CO5 |  | H |  |  |  |  | M |  | H |  | M |  |

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

**Text Books:**

1. Natural Language Processing and Information, Oxford Universitty, Siddiqui, Tanveer and Tiwary, April 2008.

**Reference Books**

1. “Foundations of Statistical Natural Language Processing” by Chris Manning and HinrichSchuetze.
2. “Natural Language Processing Tools” by Elaine UiDhonnchadha and Elaine U. Dhonnchadha.
3. “Natural Language Processing Using Very Large Corpora” by S Armstrong and Kenneth W Church.
4. “Speech and Language Engineering HRD Edition” by RajmanPallota.

**Course Name: Object Oriented Analysis and Design**

**Course Code: MCA153A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To teach the student the essential and fundamental aspects of object oriented analysis and design, in terms of “how to use” it for the purpose of specifying and developing software.
2. To explore and analyze different analysis and design models, such OO Models, Structured Analysis and Design Models, etc.
3. To understanding the insight and knowledge into analyzing and designing software using different object-oriented modeling techniques.
4. To understanding the fundamental principles through advanced concepts of analysis and design using UML
5. To providing clear instructions and information on the "How-to" dimension for applying the UML models and to the ways to document their products

**Syllabus**

**Unit I**

**Introduction to object oriented systems**: Classes, Objects, Abstraction, Inheritance, Polymorphism, Encapsulation, Message Sending, Association, Aggregation, Iterative development and the Unified Process (UP), UP phases: Inception, Elaboration, Construction and Transition, Object-oriented metrics

**Unit II**

**Introduction to UML:** Use Cases and functional requirements, Identifying and writing Use Cases, Decomposition of use cases, Modeling System Workflows using Activity Diagrams, Modeling a System's Logical Structure using Classes and Class Diagrams, Modeling Interactions using Sequence Diagrams and Communication Diagrams, Timing Diagrams, Interaction Overview Diagrams, Component Diagram, Package diagram, State Machine Diagrams, Deployment Diagrams.

**Unit III**

**Introduction to Patterns:**GoF Patterns, Creational Patterns, Structural Patterns, Behavioral Patterns, Software Architectural patterns, The Observer Pattern, The Template Method Pattern , Factory Patterns: Factory Method and Abstract Factory.

**Unit IV**

**Pattern:** The Singleton Pattern, The Iterator Pattern , The Composite Pattern , The Facade Pattern , The State and Strategy patterns , Command Pattern , The Adapter Pattern , The Proxy Pattern , The Decorator Pattern, The Visitor Pattern , Anti Patterns, Patterns for Assigning Responsibilities: GRASP Patterns

**Unit V**

**Domain modeling:** assigning responsibility using sequence diagrams, mapping design to code, CASE tools, Unit, Cluster, and System-level testing of Object-oriented programs, Aspect- oriented and Service-oriented software.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Explain the object oriented software development process, including object-oriented methodologies and work flows.

CO2: Justify designs based on design principles, patterns, and heuristics

CO3: Know about Domain modeling, System-level testing of Object-oriented programs, Aspect- oriented and Service-oriented software.

CO4: Create use case documents that capture requirements for a software system.

CO5: Create class diagrams that model both the domain model and design model of a software system.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | H |  | M |  |  |  |  |  |  | M |  |  |
| CO2 |  |  |  | H |  | L |  |  |  |  |  | M |
| CO3 |  | H |  |  |  |  |  |  |  |  | M |  |
| CO4 |  |  |  |  |  |  | H | M |  |  |  |  |
| CO5 | M |  |  |  | H |  |  |  | H |  |  | L |

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

**Text Book**

1. Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development, by Craig Larman, Pearson Education. (1998)

**Reference Books:**

1. Design Patterns - Elements of Reusable Object-Oriented Software, Gamma, et. al., Addison-Wesley. (1994)
2. BjarneStroustrup, The C++ Programming Language, Addison-Wesley.
3. Andrei Alexandrescu, Modern C++ Design, Pearson Education India.
4. Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison Wesley.

**Course Name: Cloud Computing**

**Course Code: MCA154A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**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:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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. Cloud Computing by Dr. Kumar Saurabh, Wiley India, 2011.

**Reference Books**

1. Michael Miller, Cloud Computing: Web based applications that change the way you work and collaborate online, Que publishing, August 2009
2. RajkumarBuyya, James Broberg, Andrzej M. Goscinski,”Cloud Computing**:**Principles and Paradigms”, Edition1, Wiley,2011
3. Barrie Sosinsky,”Cloud Computing Bible”,Edition1, Wiley-India, 2010
4. Ronald L. Krutz, Russell Dean Vines,”Cloud Security**:**A Comprehensive Guide to Secure Cloud Computing”, Edition 1 , Wiley- India,2010

**Course Name: Distributed Computing**

**Course Code: MCA155A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To be familiar with the differences among: concurrent, networked, distributed, and mobile.
2. To be familiar with the Resource allocation, Inter Process and remote Communication.
3. To be familiar with the deadlock detection and avoidance techniques in distributed system.
4. To gain the knowledge of concept of shared memory in Distributed environment.
5. To be familiar with the Distributed file system, it’s Implementation and new trends in distributed file systems and their naming.

**Syllabus**

**Unit I**

**Introduction:** 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

**Unit II**

**Inter-process and Remote Communication:** Inter-process Communication: Message Passing, Introduction to Message Passing, Advantages and Features of Message- passing Systems , IPC Message format, Group Communication,

Remote Communication: Introduction to remote communication, Middleware, Remote Procedural Call Basics, RPC Implementation, RPC Communication

**Unit III**

**Synchronization:** Synchronization in distributed systems, Clock synchronization Mutual exclusion , Election algorithms , Atomic transactions , Deadlocks in distributed system , Threads, Thread usage and Implementation of thread packages, processor allocation

**Unit IV**

**Distributed Shared Memory:** Basic concepts of DSM, DSM architecture, Message passing vs shared memory, Types of DSMs, Advantages of DSM, Hardware DSM, On-chip memory DSM, Bus-based multiprocessor, Ring-based multiprocessor, Design Issues in DSM Systems , Granularity, Consistency models, Coherence protocols, Issues in implementing DSM Systems, Thrashing, Responsibility for DSM management, Replication vs migration strategies ,Replacement Strategy ,Heterogeneous and Other DSM Systems

**Unit V**

**File Systems and Naming:** Distributed File system: File service interface, semantics of the file sharing, Distributed file system, Implementation of new trends in distributed file systems

Naming: Features of Good Naming, System Oriented Names, Object, Locating Mechanisms, Name Caches, Naming and Security

**Course Outcomes (COs):**

**Upon successful completion of this subject students will able**

CO1: Describe the architecture and model of distributed computing and communication over network.

CO2: Develop, test and debug RPC based client-server programs in Unix.

CO3: Design and build application programs synchronous distributed systems.

CO4: Improve the performance and reliability of distributed shared memory.

CO5: Design and build newer distributed file systems for any OS.

**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 | 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. Distributed Computing, Oxford University, Mahajan and Shah, June 2013.

**Reference Books**

1. “Distributed Computing South Asian Edition: Principles, Algorithms, and Systems” by Professor Ajay D Kshemkalyani and Professor MukeshSinghal
2. “Distributed and Cloud Computing: From Parallel Processing to the Internet of Things” by Hwang
3. “Distributed Computing: Principles and Applications” by Liu
4. “Distributed Computing” by Sunita Mahajan and Seema Shah

**Course Name: Introduction to Sales Force**

**Course Code: MCA156A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To introduce cloud computing and sales force approaches.
2. To understand the concept and features of CRM, Data Migration Import Wizard and Data Loader.
3. To describe needs of APEX as a Programming Language, Various Statements and Operators.
4. To demonstrate class and visual force.
5. To be able to understand the concept of Trigger Context Variables, Validation and Automation, Components, Client Controller and Server Controller.

**Syllabus**

**Unit I**

**Introduction to Cloud Computing & Sales force:** On premise and Cloud approach, IaaS, PaaS and SaaS, Clouds, Versions, Editions & Environments, Product & Project Development

MVC Pattern and Multitenent Architecture: Configuration, Development, Testing and Admin, along with 15 steps of Salesfroce.com, MVC Diagram, Multi-Tenant Diagram

Starting Designing Applications on Force.com: Basic Vocabulary, Registration, Navigation and Principles, Understanding the Same with Lightning, Relationships, All 6 Types, Validation, Page Layouts and Record Types

**Unit II**

**CRM:** Campaign, Lead, Account, Contact and Opportunity, Campaign, Lead, Account, Contact and Opportunity, Product, Proce Book, Quote, Forecast, Order, Asset, Case, Solution, Activity, Task, Event, Calendar, PaaS features for CRM.

Data Migration Import Wizard and Data Loader: Reports and Dash-Boards, Work flows, Process Builder, Approval Process, Security Profile, Role, Queues, Public Group, OWD, Sharing Rules, Permission Sets.

**Unit III**

**Introduction to Programming:** Need of APEX as a Programming Language, Various Statements and Operators, 9 types of operators and 5 types of statements, System.debug, Comments, Indentation, Naming Conventions, OOP, Business Class , Test Class, Test Methods, Creating object, calling methods, executing a program, Constructor / Method / Operator Over Loading / this, Default , Parameterised .

**Unit IV**

**Class and Visual Force:** Static and non-static members of a class, Class Summary, try catch, Collections list: Set, Map, Exception Handling, Assertions and Annotations: 6 types of Assertions and 3 Annotations, Database Statements: DML , MC inter relation, Database Statements : SOQL / SOSL, Visual Force - Types of Tags: 6 Types, Visual Force -Static / Dynamic Data, Org Sobject $User: {! } $User, Standard Controllers: Save, Save and New, Cancel ,Edit, Delete, Explanation of for each loop / Standard list Controller : Previous, Next, First Last, Custom Controller, VC / MVC Examples: Add numbers, Insert and fetch Record

**Unit V**

**Custom List Controller:** Insert and fetch Records, Schedule Apex: Interface, Batch Apex: 50 K, 50 Million, Triggers: if and its types, Trigger Context Variables, Validation and Automation, Components, Client Controller, Server Controller

**Course Outcomes (COs):**

**Upon successful completion of this subject students will able**

CO1: Introduce cloud computing and sales force approaches.

CO2: Able to understand the concept and features of CRM, Data Migration Import Wizard and Data Loader.

CO3: Describe needs of APEX as a Programming Language, Various Statements and Operators.

CO4: To demonstrate class and visual force.

CO5: Able to understand the concept of Trigger Context Variables, Validation and Automation, Components, Client Controller and Server Controller.

**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 | 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. Wes Nolte ,‎ Jeff Douglas , “Salesforce Handbook” (3e), Lulu.com, 2011.

**Reference Books:**

1. David Taber, “Salesforce.com Secrets of Success: Best Practices for Growth and Profitability”, 1 edition, Prentice Hall, 2009.
2. Tom Wong, Liz Kao & Matt Kaufman “Salesforce for Dummies”,4th Revised edition edition ,John Wiley & Sons, 2010
3. Visual force practices by Michael Floyd, Don Robins, Dan Appleman, et al.
4. **Development with the Force.com Platform,** Jason Ouellette

**List of Courses for Elective – III**

**Course Name: UNIX & Shell Programming**

**Course Code: MCA157A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 2 | 0 | 2 | 4 |

**Course Objective:**

1. To be familiar with the variety operating systems, history and features of UNIX and UNIX environment.
2. To able to work with UNIX file system as organizing, accessing and logging in to systems.
3. To be able to write simple C-Shell scripts using advance UNIX commands.
4. To be able to execute the Operation Modes, kernel mode, user mode.
5. To be able to use compression techniques in UNIX and Managing files.

**Syllabus**

**Unit I**

**UNIX: An Introduction:** Operating System**,** History of UNIX and Features of UNIX System**,** Structure of UNIX System**,** UNIX Environment.

**Unit II**

**UNIX File System:** Introduction to Files, Organization of File Systems, Accessing File Systems, Structure of File Systems, Logging in to Systems, Overview of Commands.

**Unit III**

**Advanced Unix Commands:** Overview**,** File Access Permissions, Input/Output Redirection in Unix, Pipe Operator, Cutting Data from Files, paste: Pasting Data in Files, split: Splitting Files into, Lines or Bytes, Counting Characters, Words, and Lines in File**, s**ort: Sorting Files, head: Displaying Top, diff: Finding Differences between Two Files, Eliminating and Displaying Duplicate Lines, Displaying and Suppressing Unique or Common Content in Two Files, Finding Consumed Time, Showing Content Page-wise, Printing Documents, Cancelling Print Command, Understanding .profile Files, calendar: Getting Reminders, script: Recording Sessions.

**Unit IV**

**File Management and Compression Techniques:** Managing and Compressing Files, Computer Devices, Disk-related Commands, Compressing and Uncompressing Files, Dealing with Files, Important Unix System Files, Shell Variables, Export of Local and Global Shell Variables.

**Unit V**

**System Calls:** Introduction, Operation Modes, kernel mode, user mode, File-related System Calls, Directory Handling System Calls, Process-related System Calls, Interrupted System Call, Standard C library functions, Streams and File Input/ Output Library Functions, Error Handling, Stream Errors, Functions for Dynamic Memory Management, File Locking.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Be familiar with the variety operating systems, history and features of UNIX and UNIX environment.

CO2: Able to work with UNIX file system as organizing, accessing and logging in to systems.

CO3: Be able to write simple C-Shell scripts using advance UNIX commands.

CO4: Able to execute the Operation Modes, kernel mode, user mode.

CO5: Able to use compression techniques in UNIX and Managing files.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  | H |  |  |  |  |  |  |  |  |  |  |
| CO2 |  |  | H |  |  |  |  |  | M |  |  |  |
| CO3 |  |  |  |  | H |  |  |  |  |  |  | M |
| CO4 | M |  |  |  |  |  | H |  |  |  | L |  |
| CO5 |  | H |  |  |  |  |  | M |  |  |  |  |

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

**Text Book**

1. Unix and Shell Programming, Oxford University, Harwani, July 2012.

**Reference Books**

1. “Unix Shell Programming” by Yashavant P Kanetkar.
2. “UNIX and Shell Programming” by Behrouz A Forouzan and Richard F Gilberg
3. “Unix and Shell Programming” by Sumitabha Das
4. “Introduction to Unix and Shell Programming” by M G Venkateshmurthy

**Course Name: Programming in C#**

**Course Code: MCA158A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 2 | 0 | 2 | 4 |

**Course Objective:**

1. To create, compile and run object-oriented C# programs using Visual Studio.
2. To write and understand C# language constructs, syntax and semantics.
3. To develop reusable .NET components via interface realization and standard design patterns.
4. To leverage the major namespaces and classes of the .NET Framework.
5. To access databases using Language Integrated Query (LINQ).

**Syllabus**

**Unit I**

**Introduction To C#:** Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, Boxing and Un- boxing.

**Unit II**

**Object Oriented Aspects Of C#:** Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, Delegates, Events, Errors and Exception, Threading.

**Unit III**

**Application Development On .Net:** Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, Dataset,DataAdapter, updating database using stored procedures, SQL Server with ADO.NET, Handling Exceptions, Validating Controls, Windows Application Configuration.

**Unit IV**

**Web Based Application Development On .Net:** Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, Web.Config, Web Services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.

**Unit V**

**Clr And .Net Framework:** Assemblies, Versoning, Attributes, Reflection, Viewing Meta Data, Type Discovery, Reflection on type, Marshalling, Remoting, Security .

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Create, compile and run object-oriented C# programs using Visual Studio.

CO2: Write and understand C# language constructs, syntax and semantics with object oriented paradigms.

CO3: Develop .NET application development through SDI, MDI and ADO.

CO4: Develop web based applications with the help of .net framework.

CO5: Access databases using CLR and .net framework.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  | H |  |  |  |  |  |  |  |  |  |  |
| CO2 |  |  | H |  |  |  |  |  | M |  |  |  |
| CO3 |  |  |  |  | H |  |  |  |  |  |  | M |
| CO4 | M |  |  |  |  |  | H |  |  |  | L |  |
| CO5 |  | H |  |  |  |  |  | M |  |  |  |  |

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

**Text Book**

1. Programming in C#, Oxford, Harsh Bhasin, March 2014.

**Reference Books**

1. “C# 4.0 The Complete Reference” by Herbert Schildt
2. “Beginning Visual C# 2010” by Karli Watson
3. “Essential C# 4.0” by Mark Michaelis and Eric Lippert
4. “Programming in C#” by Balagurusamy

**Course Name: Professional Java**

**Course Code: MCA159A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 2 | 0 | 2 | 4 |

**Course Objectives:**

1. To provide thorough understanding of each topic through extensive examples along with the program codes and screenshots
2. To be extensive coverage of advanced topics on Java from tools to enterprise Java
3. To provide ample application-based examples, with step-by-step explanations
4. To provide 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**

**Java Naming and Directory Interface:** Naming Concepts, Directory Concepts,Java Naming and Directory Interface, An Example, Specifying JNDI Properties, Name Servers, Using Apache DS, Calculator RMI Application Using JNDI, Naming Operations, Working with Directory.

**Unit II**

**Java Message Service:** Messaging, JMS API, JMS Components, Messaging Models, Programming Model, Installing Open MQ, Writing JMS Application, Writing a P2P Producer, Writing a P2P Synchronous Consumer, Writing a P2P Asynchronous Consumer,Writing a Pub/Sub producer, Writing a Pub/Sub Synchronous Consumer, Running this Example, Writing a Pub/Sub Asynchronous Consumer, Browsing Queue, Using JNDI, Reliability Mechanisms, Transacted Session.

**Unit III**

**Introduction to J2EE:** Overview of J2EE, Introduction to JavaBeans**,** Bean Builder, Advantages of JavaBeans, BDK Introspection, Properties, BeanInfo Interface, Persistence, Customizer, JavaBeans API, EJB, Introduction to Struts Framework.

**Unit IV**

**Java and CORBA:** Introduction, CORBA Architecture, Java IDL, Developing CORBA Applications, Compiling Applications, Running the Application, Using Properties, Stringified Object Reference, Using URL, Using Tie, Persistent Objects, Callback, Using Dynamic Invocation Interface, Using Dynamic Skeleton Interface, Using Out and In out Parameter, RMI-IIOP, IDL to Java Language Mapping.

**Unit V**

**Java Server Faces:** Introduction, First Application, Request Processing Life Cycle, Tracing Phases, Managed Bean, Accessing Managed Bean Programmatically, Basic JSF Tags, Expression Language, AJAX, Event Handling, An Event Handling Example, Page Navigation.

**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:**

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| **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 Book**

1. Advance Java Programming, Oxford, Uttam Kumar Roy, April 2015.

**Reference Books**

1. Advance java programming, Oxford, Uttam Kumar Roy, April 2015.
2. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
3. Java Programming Language Ken Arnold Pearson
4. The complete reference JAVA2, Herbert schildt. TMH

**List of Courses for Electives – IV**

**Course Name: Design & Analysis of Algorithms**

**Course Code: MCA160A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To design effective, efficient, elegant, and readable algorithms for various classes of computing problems
2. To learn good principles of algorithm design;
3. To determine space and time complexities of algorithms by the use various algorithm design techniques like (divide and conquer, backtracking, greedy, etc.)
4. To become familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles;
5. To learn how to apply their theoretical knowledge in practice

**Syllabus**

**Unit I**

Introduction, algorithms specification, time and space complexity, performance analysis, recurrence relations. Divide and Conquer – finding max min.

**Unit II**

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

**Unit III**

Graph algorithms–flow problems, String Matching Algorithms: Naive algorithm, automata and KMP matcher algorithms, Boyer-Moore algorithm

**Unit IV**

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

**Unit V**

NP Completeness: Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems.**.**

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Able to design effective, efficient, elegant, and readable algorithms.

CO2: What are the various methods of calculating complexity?

CO3: Which method is best for different algorithms?

CO4: About computational geometry and lower bound theory etc.

CO5: Able to solve the NP completeness problem.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  |  |  | H |  |  |  |  |  | M |  |  |
| CO2 |  | H |  |  | L |  |  | M |  |  |  |  |
| CO3 |  |  | H |  |  |  |  |  |  |  | M |  |
| CO4 |  |  |  |  |  |  | H |  |  |  |  |  |
| CO5 | H |  |  | L |  |  |  |  | M |  |  |  |

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

**Textbook**

1. Cormen, Leizerson&Rivest, Introduction to algorithms, Prentice-Hall. 2002

**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
4. Horowitz &Sahni, Fundamentals of Computer Algorithms, Galgotia Publication. 1999

**Course Name: Mobile Computing**

**Course Code: MCA161A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To be able to understand the concepts of mobile computing and mobile communication in equal measure2G, 2.5G, 3G, 3G+, and 4G communication systems.
2. To know about mobile satellite communication networks, mobile IP, mobile TCP and digital audio-video broadcasting
3. To be able to understand Mobile systems and devices, mobile operating systems used for application development, mobile databases,
4. To know about Client-server computing agents, application servers.
5. To know about security protocols, mobile Internet, and ad-hoc and sensor networks.

**Syllabus**

**Unit I**

**Mobile Communication and Mobile Devices**: Mobile Computing introduction, Mobile Computing , Mobile Computing Architecture, Mobile Devices, Mobile System, Networks, Data Dissemination, Mobility Management, Security.

Cellular Networks and Frequency Reuse, Mobile Smartphones, Smart Mobiles, and Systems, Handheld Pocket Computers, Smart Systems, Limitations of Mobile Devices, Automotive Systems.

**Unit II**

**GSM and Other 2G Architectures** : GSM—Services and System Architecture, Radio Interfaces of GSM, Protocols of GSM, Localization, Call Handling, Handover, Security, New data Services, General Radio Packet Services.

**Unit III**

**Wireless Medium Access Control, CDMA, 3G and 4G Communication**: Modulation, Multiplexing, Controlling the Medium Access, Spread Spectrum, FHSS, Coding Methods, CDMA,OFDM, High Speed Packet Access (HSPA) 3G Network, Long-term Evolution, WiMaxRel 1.0 IEEE 802.16e, Broadband Wireless Access, 4G Networks, Mobile Satellite Communication Networks.

**Unit IV**

**Mobile IP Network Layer and Mobile Transport Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunnelling and Encapsulation, Route Optimization, DHCP, VoIP, Ipsec. Conventional TCP/IP Transport Layer Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Methods of Mobile TCP-layer Transmission, TCP over 2.5G/3G Mobile Networks.

**Unit V**

**Mobile Ad-hoc and Wireless Sensor Networks**: Introduction to Mobile Ad-hoc Network, Fixed Infrastructure Architecture, MANET Infrastructure Architecture, MANET, Properties, Spectrum; Applications Routing and Routing Algorithms, Security in Ad-hoc Network, Wireless Sensor Networks, Data Dissemination, Sensor Network Applications, Distributed Network and Characteristics, TinyOS.

**Course Outcomes (COs):**

**Upon successful completion of this subject students should be able to:**

CO1: Describe wireless and mobile communications systems and be able to choose an appropriate mobile system from a set of requirements.

CO2: To describe all layers, GSM and Architectures

CO3: To describe Interface a mobile computing system with CDMA, 3G and 4G communications.

CO4: To describe IP Network and layers.

CO5: To describe MANET and wireless sensor networks

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  |  |  | H |  |  |  |  |  | M |  |  |
| CO2 |  | H |  |  | L |  |  | M |  |  |  |  |
| CO3 |  |  | H |  |  |  |  |  |  |  | M |  |
| CO4 |  |  |  |  |  |  | H |  |  |  |  |  |
| CO5 | H |  |  | L |  |  |  |  | M |  |  |  |

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

**Text Book**

1. Mobile Computing, Oxford University, Raj Kamal, December 2011.

**Reference Books**

1. Mobile Communication 2nd edition by Jochen Schiller, Pearson education
2. Mobile Computing by AsokeTalukder, RoopaYavagal (Tata McGraw Hill)
3. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober-  
   “Principles of Mobile Computing”
4. HazysztofWesolowshi- “Mobile Communication Systems”

**Course Name: Image Processing**

**Course Code: MCA162A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To introduce students to the mathematical foundation of Image processing
2. To do detailed study of image processing Operations and Systems.
3. To learn students about Image transforms, Enhancement with algorithms of restoration and Compression.
4. To do detailed study about image segmentation.
5. To learn about Image Compression Model and Compression Algorithm.

Syllabus

Unit I

Introduction to Image Processing : Overview of Image Processing, Nature of Image Processing, Image Processing and Related Fields, Digital Image Representation Types of Images, Digital Image Processing Operations, Fundamental Steps in Image Processing, Image Processing Applications.

Unit II

Digital Imaging Systems and Processing Operations: Overview of Digital Imaging Systems, Physical Aspects of Image Acquisition, Biological Aspects of Image Acquisition, Review of Digital Cameras, Image Display Devices and Device Resolution, Digital Halftone Process, Image Storage and File Formats. Basic Relationships and Distance Metrics, Classification of Image Processing Operations, Logical Operations, Geometrical Operations, Image Interpolation Techniques.

Unit III

Image Enhancement: Image Quality and Need for Image Enhancement, Image Enhancement Operations, Image Enhancement in Spatial Domain , Histogram-based Techniques, Spatial Filtering Concepts, Image Smoothing Spatial Filters, Image Sharpening Spatial Filters, Image Smoothing in Frequency Domain Filtering, Image Sharpening in Frequency Domain, Homomorphic Filtering.

Unit IV

Image Restoration and Compression: Image Restoration : Introduction to Degradation, Types of Image Degradations, Point Spread Function and Modulation Transfer Function, Image Degradation Model, Noise Modelling, Image Restoration in Presence of Noise Only, Periodic Noise, and Band-pass and Band-reject Filtering, Image Restoration Techniques.

Image Compression: Image Compression Model, Compression Algorithm and its Types, Types of Redundancy, Lossless Compression Algorithms, Lossy Compression Algorithms, Image and Video Compression, Wavelet Transform and Multiresolution Analysis.

**Unit V**

**Image Segmentation and Colour Image Processing: Segmentation:** Introduction, Classification of Image Segmentation Algorithms, Detection of Discontinuities, Edge Detection, Hough Transforms and Shape Detection, Corner Detection, Principle of Thresholding , Principle of Region-growing, Active Contour Models, Validation of Segmentation Algorithms.

Colour Image Processing: Colour Image Storage and Processing, Colour Models, Colour Quantization, Pseudocolour Image Processing, Full Colour Processing.

**Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to :**

CO1: Students are able to understand basic terms of Image Processing.

CO2: Students are able to understand Processing operations and its fundamentals.

CO3: Students will be able to describe the effect of transform operation on Digital Image .

CO4: Students will be able to understand the different-2 Image compressing algorithms.

CO5: Students will be able to describe segmentation and Color image processing.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  |  |  | H |  |  |  |  |  | M |  |  |
| CO2 |  | H |  |  | L |  |  | M |  |  |  |  |
| CO3 |  |  | H |  |  |  |  |  |  |  | M |  |
| CO4 |  |  |  |  |  |  | H |  |  |  |  |  |
| CO5 | H |  |  | L |  |  |  |  | M |  |  |  |

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

**Text Book**

1. S. Sridhar , ''Digital Image processing" , Oxford University Press, 2011

**Reference Books**

1. Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing” (3e), Pearson Prentice Hall, 2008.
2. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, (2e), Tata McGraw Hill Publication, 2010.
3. Sonka, Hlavac, Boyle, “Digital Image Processing and Computer Vision”,CENGAGE Learning.
4. “Digital Image Processing” by Rafael C Gonzalez and Richard E Woods.

**Course Name: Soft Computing**

**Course Code: MCA163A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To illustrative description of the inherent principles of soft computing, eliminating heavy mathematical treatment
2. To introduce the concept of swarm intelligent systems
3. To extensive the coverage of neural networks and fuzzy logic concepts
4. To understanding basic concepts and working of generic algorithms.
5. To understand the concept of artificial neural network.

**Syllabus**

**Unit I**

**Introduction to soft computing, Need for soft computing,** Artificial Intelligence, Artificial Neural Networks , Fuzzy Systems, Genetic Algorithm and Evolutionary Programming, Swarm Intelligent Systems, Swarm Intelligent Systems, Comparison among Intelligent Systems

**Unit II**

**Artificial Neural Networks- I:** Introduction to Neural Networks, Biological Inspiration, Comparison between Brain and Computer, Biological Neural Networks to Artificial Neural Networks, Information Processing at the Neurons and Synapses, Classification of ANNs, Neural Network Architecture, Learning/Training, Training and Testing Modes, Activation/Transfer Function, First-generation Neural Networks, McCulloch and Pitts Neuron Model, Learning Rules: Hebbian and Delta, Perceptron Network , Adaline Network , Madaline Network

**Unit III**

**Artificial Neural Networks- II:** Backpropagation Neural Networks, Kohonen Neural Network, Learning Vector Quantization, Hamming Neural Network, Hopfield Neural Network, Bi-directional Associative Memory, ART Network, Boltzman Machine Neural Networks , Radial Basis Function Neural Networks, Support Vector Machines.

**Unit IV**

**Fuzzy Logic**: Fuzzy Logic Introduction, Human Learning Ability, Undecidability,Imprecision, and Uncertainty, Probability Theory vs Possibility Theory, Fuzzy sets and Classical sets, Fuzzy set operations, Fuzzy relations, Fuzzy compositions, Natural Language and Fuzzy Interpretations, Structure of Fuzzy Inference System

**Unit V**

**Genetic Algorithm**: Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications

**Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to :**

CO1: To know about the basics of soft computing techniques and also their use in some real life situations.

CO2: To solve the problems using neural networks techniques.

CO3: To find the solution using different fuzzy logic techniques

CO4: To use the genetic algorithms for different modelling

CO5: To integrate the various soft computing techniques

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  |  |  | H |  |  |  |  |  | M |  |  |
| CO2 |  | H |  |  | L |  |  | M |  |  |  |  |
| CO3 |  |  | H |  |  |  |  |  |  |  | M |  |
| CO4 |  |  |  |  |  |  | H |  |  |  |  |  |
| CO5 | H |  |  | L |  |  |  |  | M |  |  |  |

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

**Text Book**

1. Soft Computing with MATLAB Programming, Oxford University, Padhy and Simon, May 2015.

**Reference Books**

1. “Soft Computing :Fundamentals And Applications” by Pratihar D K
2. “Soft Computing and Intelligent Systems Design: Theory, Tools and Applications” by Karray
3. “Soft Computing Applications and Intelligent Systems” by ShahrulAzman Noah and SitiNorul Huda Sheikh Abdullah
4. “Soft Computing and Its Applications, Volume Two: Fuzzy Reasoning and Fuzzy Control: Volume 2” by Kumar S Ray

**Course Name: Compiler Design**

**Course Code: MCA164A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objectives:**

1. To understand, design and implement a lexical analyzer.
2. To understand, design and implement a parser.
3. To understand, design code generation schemes.
4. To understand optimization of codes and run time environment.
5. To understand various compiler writing tools.

Syllabus

Unit I

Introduction to Compiler: Theory of Computer Languages, Design of a Language, Evolution of Compilers, Stages of Compilation: Lexical Analysis, Syntactic Analysis, Semantic Analysis, Intermediate Code Generation, Code Optimization, Code Generation, Symbol Table Management, Error Management.

**Unit II**

**Lexical Analysis and Syntax Analysis:** Lexical Analysis: Alphabets and Tokens in Computer Languages, Representation of Tokens and Regular Expression, Token Recognition and Finite State Automata, Implementation, Error Recovery.Syntax Analysis: Context-free Grammar and Structure of Language, Parser and its Types, Top down Parser, Bottom-up Parser, Parser Generator Tool (Yacc).

### Unit III

### Run-time Storage Organization Intermediate Code Generation: Need for Intermediate Code, Types of Intermediate Code, Representations of All Language Constructs by Three-address, Grammar Symbols and Attributes, Semantic Analysis, Semantic Routines for Intermediate Code Generation.

**Unit IV**

**Code Optimization:** Need for Optimization, Objectives, Performance factors, Writing Optimized Code at User Level, Construction of Basic Blocks and Processing, Data-flow Analysis Using Flow Graph, Principal Sources of Optimization and Transformations, Alias, Procedural Optimization, Loops in Flow Graphs, Loop Optimization.

**Unit V**

**Code Generations and Compiler Writing Tools**: Issues in Code Generation, Target Machine Architecture, Subsequent Use Information,Register Allocation, Directed Acyclic Graph Representation of Basic Blocks, Code Generation From Intermediate Code, Peephole Optimization, Code Scheduling, Lexical Tools, Syntactic Tools.

**Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to :**

CO1: Learn the design and develop a comprehensive Compiler for a given language or an Introduction.

CO2: Analyze and able to design a compiler development with lexical and syntax analysis.

CO3: Describe all aspects of Run time storage with intermediate Code generation.

CO4: Implement various code optimization techniques.

CO5: Implement various optimization and code generation algorithms for the design of a compiler.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  |  |  | H |  |  |  |  |  | M |  |  |
| CO2 |  | H |  |  | L |  |  | M |  |  |  |  |
| CO3 |  |  | H |  |  |  |  |  |  |  | M |  |
| CO4 |  |  |  |  |  |  | H |  |  |  |  |  |
| CO5 | H |  |  | L |  |  |  |  | M |  |  |  |

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

**Text Book**

1. Compiler Design, Oxford University, Muneeswaran, November 2012.

**Reference Books**

1. “Compilers: Principles, Techniques and Tools” by Alfred V Aho and Ravi Sethi
2. “Engineering a Compiler” by Keith D Cooper and Linda Torczon
3. “Compiler Design in C” by Allen I Holob
4. “Elements of Compiler Design” by Meduna

**Course Name: Big Data Analytics**

**Course Code: MCA165A**

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| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To know the fundamental concepts of big data and analytics.
2. To explore tools and practices for working with big data
3. To learn about stream computing.
4. To know about the research that requires the integration of large amounts of data.
5. To know about clustering and classification.

**Syllabus**

**Unit I**

**Introduction To Big Data:** Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating- The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage – A General Overview of High-Performance Architecture - HDFS – Map Reduce and YARN – Map Reduce Programming Model

**Unit II**

**Clustering and Classification:** Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases -Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons toChoose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree – TheGeneral Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees inR - Naïve Bayes - Bayes‘ Theorem - Naïve Bayes Classifier.

**Unit III**

**Association and Recommendation System:** Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation Approaches.

**Unit IV**

**Graph Memory And Stream Memory:** Using Graph Analytics for Big Data: Graph Analytics - The Graph Model - Representation as Triples - Graphs and Network Organization - Choosing Graph Analytics - Graph Analytics Use Cases - Graph Analytics Algorithms and Solution Approaches - Technical Complexity of Analyzing Graphs- Features of a Graph Analytics Platform - Considerations: Dedicated Appliances for Graph - Introduction to Streams Concepts – Stream Data Model and Architecture -Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elementsin a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

**Unit V**

**Nosql Data Management For Big Data And Visualization:** NoSQL Databases : Schema-less Models‖: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive -Sharding –- Hbase – Analyzing big data with twitter - Big data for E-Commerce Big data for blogs- Review of Basic Data Analytic Methods using R.

**Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to :**

CO1: Identify the difference between structured, semi-structured and unstructured data.

CO2: summarize the challenges of big data and how to deal with the same.

CO3: Explain the significance of NoSQL databases.

CO4: Explain about Hadoop Ecosystem.

CO5: Identify the difference between Pig and Hive.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  | M |  |  |  | M |  |  |  | M |  |  |
| CO2 |  |  |  | M |  |  |  | M |  |  |  |  |
| CO3 |  |  |  |  | M |  |  |  |  |  | M |  |
| CO4 |  |  |  |  |  |  | H |  |  |  |  |  |
| CO5 | H | M |  |  |  | M |  |  | M |  |  |  |

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

**Text Book**

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge

University Press, 2012.

**Reference Book**

1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with
2. Tom White, “Hadoop: The Definitive Guide”, Second Edition, O’Reilly Yahoo Press.
3. Robert D. Schneider, “Hadoop for Dummies”, Wiley.
4. VigneshPrajapati, “Big Data Analytics with R and Hadoop”, Packt Publishing.

**Course Name: Organization Behavior**

**Course Code: MCA166A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objectives:**

1. To discuss the development of the field of organizational behavior and explain the micro and macro approaches
2. To analyze and compare different models used to explain individual behavior related to motivation and rewards
3. To identify the processes used in developing communication and resolving conflicts

To explain group dynamics and demonstrate skills required for working in groups (team building)

1. To discuss the implementation of organizational change.

**Syllabus**

**Unit I**

**Organization behavior:** The Importance of Interpersonal Skills, Management Functions, Management Roles, Management Skills, Effective versus Successful Managerial Activities, Enter Organizational Behavior, Complementing Intuition with Systematic Study, Disciplines That Contribute to the Organizational Behavior Field, Psychology, Social Psychology, Sociology, Anthropology, Challenges and Opportunities for Organizational Behavior

**Unit II**

**Diversity in organization:** Demographic Characteristics of the U.S. Workforce, Levels of Diversity, Discrimination, Biographical Characteristics, Ability: Intellectual Abilities, Physical Abilities 55, The Role of Disabilities, Implementing Diversity Management Strategies, Attracting, Selecting, Developing, and Retaining Diverse Employees, Effective Diversity Programs.

**Unit III**

**Attitudes and job Satisfaction:** What Are the Main Components of Attitudes, Does Behavior Always Follow from Attitudes, What Are the Major Job Attitudes, Job Satisfaction, Measuring Job Satisfaction, How Satisfied Are People in Their Jobs, What Causes Job Satisfaction, The Impact of Satisfied and Dissatisfied Employees on the Workplace

**Unit IV**

**Emotions and Moods:** The Basic Emotions, The Basic Moods: Positive and Negative Affect, The Function of Emotions, Sources of Emotions and Moods, Emotional Labor, Affective Events Theory, Emotional Intelligence, The Case for EI, The Case Against EI, Emotion Regulation, OB Applications of Emotions and Moods.

**Unit V**

**Perception and Decision Making:** Factors That Influence Perception, Making Judgments About Others, Attribution Theory, Common Shortcuts in Judging Others, Specific Applications of Shortcuts in Organizations, The Link Between Perception and Individual Decision Making, Decision Making in Organizations, The Rational Model, Bounded Rationality, and Intuition, Common Biases and Errors in Decision Making, Influences on Decision Making: Individual Differences and Organizational Constraints, Ethics in Decision Making, Three Ethical Decision Criteria, Improving Creativity in Decision Making.

**Course Outcomes (COs):**

**On successful completion of this course, the learner will be able to :**

CO1: To identify the various leadership styles and the role of leaders in a decision making process.

CO2: To explain organizational culture and describe its dimensions and to examine various organizational designs

CO3: Able to understand negative and positive emotions and moods.

CO4: Able to know the concept of Diversity in organization

CO5: Able to understand attitude and job satisfaction.

**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 |  |  |  | M |  |  |
| CO2 |  |  |  | M |  |  |  | M |  |  |  |  |
| CO3 |  |  |  |  | M |  |  |  |  |  | M |  |
| CO4 |  |  |  |  |  |  | H |  |  |  |  |  |
| CO5 | H | M |  |  |  | M |  |  | M |  |  |  |

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

**Text Book**

1. “Organizational Behavior” Stephen P. Robbins —San Diego State University Timothy A. Judge —University of Notre Dame, 15th edition, Pearson.

**Reference Books**

1. McShane, S.L. and Von Glinow, M.A., Organizational Behaviour, New Delhi, Tata McGrawHill Publishing company ltd.
2. P. Jyothi, P. and Venkatesh, D.N., Human Resource Management, New Delhi, Oxford University Press.
3. Denhardt, R.B., Denhardt, J.V., and Aristigueta, M.P. (2009), Managing Human Behaviour in Public and Non-Profit Organizations, Second edition. California, Sage Publications.
4. Pynes, J.E. (2004). Human Resources Management for Public and Nonprofit Organizations, Second Edition. San Francisco, CA: Jossey- Bass Publishers.

**Course Name: Artificial Intelligence and Expert System**

**Course Code: MCA167A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To understand AI methodology and fundamentals; intelligent agents.
2. To understand search algorithms; game playing; supervised and unsupervised learning; decision tree learning.
3. To learn neural networks, nearest neighbor methods, dimensional reduction, clustering.
4. To understand kernel machines, support vector machines; uncertainty and probability theory.
5. To understand probabilistic reasoning in AI.

**Syllabus**

**Unit I**

**History & Knowledge Representation**: Artificial Intelligence: History and Applications, Intelligence, Communication, Learning, Artificial Intelligence, Progress of Artificial Intelligence, Modeling, Simulation, and AI, Intelligent Systems, Comparison of Various Intelligent Systems

Knowledge Representation: Reasoning, Issues, and Acquisition, Propositional Calculus, Predicate Calculus, Rule-based Knowledge Representation, Symbolic Reasoning Under Uncertainty, Basic Knowledge Representation Issues, Knowledge Acquisition

**Unit II**

**Heuristic Search & State Space Search**: Heuristic Search: Search as a Problem-solving Technique, Techniques for Heuristic Search, Admissibility, Monotonicity, Heuristic Classification, Intelligent Agents

State Space Search: Implementation and Applications, Strategies for State Space Search, Implementation of Graph Search, Search Based on Recursion, Production Systems, Natural Language Processing , Applications of Search Techniques in Game Playing and Planning, Predicate Calculus and Planning

**Unit III**

**Artificial Intelligence Problem-solving Languages**: PROLOG , Control Structures used in Rule-Based Systems , Search, Search Strategies Using Search Techniques , Implementation of Search, Construction and Debugging Methods for a Program, LISP, Problem-solving by LISP, Implementation of LISP , Comparison of LISP and PROLOG

**Unit IV**

**Expert & Fuzzy Systems**: Expert Systems : Features ,Characteristics, Architecture, Goals, Basic Activities, Advantages, Stages in the Development of an Expert System, Probability-based Expert Systems, Expert System Tools , Applications

Fuzzy Systems : Foundation of Fuzzy Systems, Fuzzy Relations ,Arithmetic Operations of Fuzzy Numbers, Linguistic Descriptions and their Analytical Forms , De- fuzification Methods, Fuzzy Logic in Control and Decision-making Applications,

**Unit V**

**Swarm Intelligent Systems**: Swarm Intelligent Systems: Background of Ant Intelligent Systems, Importance of the Ant Colony Paradigm, Ant Colony Systems, Biological Ant Colony Systems, Artificial Ant Colony Systems, Development of the Ant Colony System, Applications of Ant Colony Intelligence

**Course Outcomes:**

**On successful completion of this course students will be able to:**

CO1: Knowledge of what constitutes "Artificial" Intelligence and History of Artificial Intelligence.

CO2: Explain Implementations Applications related to Artificial Intelligence.

CO3: Implement Expert system technologies and Fuzzy logic theory.

CO4: Ability to apply Artificial Intelligence with neural network and genetic algorithm.

CO5: Explain the Swarm Artificial Intelligence techniques.

**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 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 |  | M |  |  |  | M |  |  |  | M |  |  |
| CO2 |  |  |  | M |  |  |  | M |  |  |  |  |
| CO3 |  |  |  |  | M |  |  |  |  |  | M |  |
| CO4 |  |  |  |  |  |  | H |  |  |  |  |  |
| CO5 | H | M |  |  |  | M |  |  | M |  |  |  |

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

**Text Book**

1. N. P. Padhy, ''Artificial Intelligence and Intelligent Systems", 1st Edition, Oxford University Press , 2005.

**Reference Books**

1. Stuart Russell and Peter Norvig,“Artificial Intelligence A Modern Approach”, 3‘rd Edition , Pearson Education, 2010.
2. 2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, “Artificial Intelligence”, 3‘rd Edition, TataMcGraw Hill Edition, 2008.
3. SarojKaushik, “Artificial Intelligence”, (1e),Cengage Learning Publications, 2011.
4. Don W. Patterson,“Introduction to Artificial Intelligence and Expert Systems”, PHI Publication,2006.

**Course Name: Computer Graphics**

**Course Code: MCA168A**

|  |  |  |  |
| --- | --- | --- | --- |
| **L (Hr.)** | **T/P (Hr.)** | **Pr (Hr.)** | **Credits** |
| 3 | 1 | 0 | 4 |

**Course Objective:**

1. To provide comprehensive introduction about computer graphics system, design algorithms and two dimensional transformations.
2. To make the students familiar with techniques of clipping, three dimensional graphics and three dimensional transformations.
3. To be prepare students for activities involving in design, development and testing of modeling.
4. To make the students familiar with techniques of rendering, shading and animation.
5. To know about **Modeling Transformations.**

**Syllabus**

**Unit I**

**Computer Graphics Basics and Object Representation**: Historical Development of the Field, Major Issues and Concerns in Computer Graphics, Preliminaries: Basics of Graphics System, CRT Displays, Graphics Pipeline: Stages of Rendering Process, Role of Graphics Libraries.

Categorization of Representation Techniques, Boundary Representation Techniques, Spline Representations, Space-partitioning Representation, Other Representations, Issues in Model Selection.

**Unit II**

**Modelling Transformations, Illumination, Lighting Models, and Intensity Representation**: Basic Transformations, Matrix Representation and Homogeneous Coordinate System, Composition of Transformations, Transformations in 3D ,Simple Lighting Model, Shading Models, Handling the Shadow Effect Intensity Representation.

**Unit III**

**Color Models, Texture Synthesis, 3D Viewing and Clipping**: Physiology of Vision, Color Models, Texture Synthesis, 3D Viewing Transformation, Projection, Window-to-viewport Transformation, Clipping in 2D, 3D clipping.

**Unit IV**

**Hidden Surface Removal and Rendering**: Types of Methods, Application of Coherence, Back Face Elimination, Depth (Z) Buffer Algorithm, A-Buffer Algorithm, Depth Sorting (Painter’s) Algorithm, Warnock’s Algorithm, Octree Methods, Scan Conversion of a Line Segment, DDA Algorithm, Bresenham’s Algorithm, Circle Scan Conversion, Midpoint Algorithm, Fill Area Scan Conversion, Seed Fill Algorithm, Flood Fill Algorithm, Scan Line Polygon Fill Algorithm, Character Rendering, Anti-aliasing, Aliasing and Signal Processing, Pre-filtering or Area Sampling, Gupta–Sproull Algorithm, Super Sampling.

**Unit V**

**Computer Animation , Multimedia and Hypermedia**: Generic Architecture, Input and Output of Graphics System, GPU and Shader Programming, Graphics Software and OpenGL, Traditional Animation Tech, Keyframing, Motion Capture, Physically based Methods and Procedural Techniques. Hypermedia, Multimedia Authoring, Components of Multimedia, Data Compression Standards

**Course Outcomes (COs):**

**On successful completion of this course students will be able to:**

CO1: Students will get the concepts of Graphics display devices, different types of graphics drawing algorithms.

CO2: Students will get the concepts of 2D and 3D Geometrical Transformations

CO3: Students will get the concepts of Color models and clipping.

CO4: Students will get the concepts of Hidden Line/surface elimination techniques

CO5: Student will get the concepts of creating animations and multimedia.

**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 |  |  |  | M |  |  |
| CO2 |  |  |  | M |  |  |  | M |  |  |  |  |
| CO3 |  |  |  |  | M |  |  |  |  |  | M |  |
| CO4 |  |  |  |  |  |  | H |  |  |  |  |  |
| CO5 | H | M |  |  |  | M |  |  | M |  |  |  |

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

**Text Book**

1. Computer Graphics, Oxford University, Bhattacharya, December 2015.

**Reference Books**

1. “Mathematical Elements of Computer Graphics” by Kogin Adams
2. “Computer Graphics” by John F Hughes
3. “Computer Graphics” by Desai and Apurva A
4. “Computer Graphics: A Programming Approach” by Steven Harrington