

## SEMESTER-III

**Course Code: MCA 021A**

**Course Name: Advance Database Management System**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	1		4

**Objective:** Knowledge of DBMS, both in terms of use and implementation/design Experience with SQL Experience working as part of team Experience with analysis and design of (Database) software. A variety of topics will be covered that are important for modern databases (see below) in order to prepare the students for real life applications of databases.

### **Unit-I**

#### **Physical Database Design**

Overview of Physical Storage Media, Magnetic Disks, RAID, Tertiary Storage , Storage Access, File Organization, Organization of Records in Files, Data-Dictionary Storage, Storage Structures for Object-Oriented Databases, Basic Concepts, Ordered Indices , B<sup>+</sup>-Tree Index Files, B-Tree Index Files, Static Hashing, Dynamic Hashing , Comparison of Ordered Indexing and Hashing , Index Definition in SQL, Multiple-Key Access

### **Unit-II**

#### **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-III**

#### **Internet Databases**

World Wide Web, User Interfaces and Tools, Web Interfaces to Databases, Web Fundamentals, Servlets and JSP, Building Large Web Applications

#### **XML Databases**

Structure of XML Data, XML Document Schema, Querying and Transformation, Application Program Interfaces to XML, Storage of XML Data, XML Applications

## **Unit-IV**

### **Transaction Management**

Transaction Concept, ACID Properties, Transaction State, Concurrent Executions, Schedules, Serializability, Conflicting Instructions, Conflict Serializability, View Serializability, Testing for Serializability, Test for Conflict Serializability, Test for View Serializability, Recoverable Schedules, Cascading Rollbacks, Cascadeless Schedules, Concurrency Control, Recovery Subsystems.

## **Unit-V**

### **Parallel and Distributed Databases**

Database System Architectures: Centralized and Client-Server Architectures, Server System Architectures, Parallel Systems, Distributed Systems, Parallel Databases: I/O Parallelism, Inter and Intra Query Parallelism, Inter and Intra operation Parallelism, Distributed Database Concepts, Distributed Data Storage

### **Mobile Databases**

Mobile Databases: Location and Handoff Management, Effect of Mobility on Data Management, Location Dependent Data Distribution, Mobile Transaction Models

### **Multimedia Databases**

Multidimensional Data Structures, Image Databases, Text/Document Databases, Video Databases, Audio Databases, Multimedia Database Design.

### **Text Books:**

1. A.Silberschatz, H. Korth and S. Sudarshan, *Database System Concepts*, 5th Edition, McGraw Hill.
2. R.Elmasri, S.B. Navathe, *Fundamentals of Database Systems*, 6<sup>th</sup> edition, Pearson Education, 2010.

### **After successfully completing this subject, students will be able to:**

1. Understand practical implications of distributed databases.
2. Understand the fundamentals of Object Oriented databases
3. Gain about the fundamentals of xml databases
4. Understand the practical implications about the fundamentals of mobile databases

# MCA Syllabus at JECRC University

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**Course Code: MCA022A**

**Course Name: Programming in C++-II**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	1		4

**Objective:** To teach students how to program using the C++ Programming Language and prepare students with the necessary programming background to proceed with C++ object-oriented programming, to prepare object-oriented design for small/medium scale problems to demonstrate the differences between traditional imperative design and object-oriented design to explain class structures as fundamental, modular building blocks.

## **Unit-I**

C++ Overview, C++ Characteristics, Object-Oriented Terminology, Polymorphism, Object-Oriented Paradigm, Abstract Data Types, I/O Services, Standard Template Library, Standards Compliance, Functions and Variables.

## **Unit-II**

Functions: Declaration and Definition, Variables: Definition, Declaration, and Scope, Variables: Dynamic Creation and Derived Data, Arrays and Strings in C++, Qualifiers, Classes in C++, Defining Classes in C++, Classes and Encapsulation, Member Functions, Instantiating and Using Classes,

## **Unit-III**

Working with I/O Streams: Predefined console streams, hierarchy of console stream classes, unformatted I/O operations, formatted console I/O operations, manipulators, custom/user-defined manipulators, stream operator with user-defined classes.

Working with File Streams: Introduction, Hierarchy of file stream classes, opening and closing of files, testing for errors, file pointers and their descriptors /manipulators, sequential access to a file, object retrieval, random access to a file.

## **Unit-IV**

Generic Programming with Templates: Introduction, function templates revisited, overloaded function templates, user defined template arguments. Class templates, inheritance of class template, class template containership, class template with overloaded operators.

Exception Handling: Introduction, Error handling, exception handling model, Exception handling constructs, List of pre-defined exceptions, catch all handler, Exceptions in constructors and destructors, Handling uncaught exceptions, Exceptions in overloaded operators and functions.

## **Unit-V**

Introduction to VC++ -Windows basic concepts, window API, DEF files, creating windows, message, x-windows, Mouse and keyboard. Designing and creating menus, pop-up menus.

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Bitmaps and dialogues; windows animation; Font basics; window controls; Font display; static controls, edit controls, list boxes, psychic windows. Introduction to resources, user defined resources.

### **Text Books**

1. Let Us C: BalaGuruswamy, TATA McGraw Hill.
2. Programming with C, C++: YashwantKanitkar

### **At the end of this subject, students should be able to:**

1. Apply fundamental principles of problem solving in software engineering.
2. Apply basic & advance programming principles using C++ language.
3. Apply basic C++ program structure in software development.

# MCA Syllabus at JECRC University

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**Course Code: MCA023A**

**Course: Advance Computer Networks**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	1		4

**Objectives:** To describe how networks impact our daily lives. To identify the key components of any data network. Describe the characteristics of network architectures: fault tolerance, scalability, quality of service and security. Rules and processes that govern network communications. Tools and commands for constructing and maintaining networks.

## **UNIT –I Introduction**

Introduction to Networks: Types, Protocols Standards, Switching, Guided and Unguided Media, Protocol Layering: OSI Model, TCP/IP Protocol Suite, ATM Networks.

## **UNIT –II Networking Protocols**

Protocol Architecture: Transmission Control Protocol, User Datagram Protocol, Internet Protocol, Next Generation IP – Ipv6, IPv4 v/s IPv6, ICMPv6, Stream Control Transmission Protocol.

## **UNIT –III High Speed Networks**

Frame Relay – Packet Switching Networks, Frame Relay Networks, Asynchronous Transfer Mode – ATM Protocol Architecture, ATM Logical Connections, ATM Cells, ATM Service Categories, ATM Adaptation Layer (AAL), SONET/SDH – Architecture, Sonet Layers, Sonet Frames, ISDN, B-ISDN

## **UNIT –IV Wired & Wireless LAN's**

Wired LAN's Ethernet – IEEE Standards, Standard Ethernet, Changes in the standard, Fast Ethernet, Gigabit Ethernet, 10GB Ethernet, IEEE 802.11, BLUETOOTH, Connecting Devices, Backbone Networks, Virtual LAN's.

## **UNIT - V**

Routing Algorithms – Distance Vector, Link State, RIP, OSPF, Flow Control and Congestion Control, Cellular Telephony, Mobile IP, Satellite Network, Wi-Max

### **Text/ Reference Books:**

1. Data Communication and Networking, by Behrouz A. Forouzan, Fifth Edition
2. High Speed Networks and Internets: Performance and Quality of service by William Stallings Pearson Education India.

### **At the end of this subject, students should be able to:**

1. Deal with complex issues in computer networks both systematically and creatively
2. Advanced knowledge and understanding of Computer networks and their application;

# MCA Syllabus at JECRC University

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**Course Code: MCA024A**

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

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	1		4

**Objectives:** To acquaint the students with the basics of a design language .UML is introduced as a modeling language which helps the students to provide a complete understanding of how to Architect and design a S/W System.

## **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 , 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 , AntiPatterns, Patterns for Assigning Responsibilities: GRASP Patterns

## **Unit-IV**

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.

## **Text Books:**

1. Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development, by Craig Larman, Pearson Education. (1998)
2. Design Patterns - Elements of Reusable Object-Oriented Software, Gamma, et. al., Addison-Wesley. (1994)

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

1. Explain the object oriented software development process, including object-oriented methodologies and work flows.
2. Justify designs based on design principles, patterns, and heuristics
3. Know about Domain modeling, System-level testing of Object-oriented programs, Aspect- oriented and Service-oriented software.

# MCA Syllabus at JECRC University

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**Course Code: MCA025A**

**Course Name: Statistical Computing**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	1		4

## **Objectives:**

Statistical computing help to design data collection plans, analyze data appropriately and interpret and draw conclusions from analyses. The 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.

Major objectives are to learn concepts and tools for working with data and have experience in analyzing real data, understand the fundamentals of probability theory, statistical reasoning, inferential methods, statistical modeling and its limitations, and have skill in description, interpretation and exploratory analysis of data by graphical and other means.

## **Unit-I**

Basic Statistics: Measures of central tendencies. Measures of dispersion. Frequency distributions. Moments. Correlation coefficient. Regression.

## **Unit-II**

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

## **Unit-III**

Computing frequency charts. Regression analysis.

## **Unit-IV**

Time series and forecasting.

## **Unit-V**

Statistical Quality control methods: Factor analysis. Tests of significance X test and F test Applications.

## **Text/Reference Books**

1. Affi, A.A., "Statistical Analysis: A Computer Oriented Approach". Academic Press, New York, 1979. Hogg, R. v..Et. Al., "Introduction to Mathematical Statistics", American Publishing, New York. 1980.

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

1. 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.
2. To express statistical ideas and computations



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3. To learn about different data technologies and tools.
4. To acquire skills in basic numeracy, graphics, modern computationally intensive methods, and simulation.
5. To test hypothesis and methodology such as sampling, goodness-of-fit testing, analysis of variance, and least squares estimation.
6. To acquire the skills and knowledge to take better decision in given circumstances.
7. To design data collection plans, analyze data appropriately and interpret and draw conclusions from those analyses.

# MCA Syllabus at JECRC University

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**Course Code: BMC116A**

**Course Name: Business Communication Skills**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
0	0	2	2

## **Objective:**

- To apply an ability to develop communication theories and be highly skilled in the use of quantitative methods to evaluate them.
- 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.
- To build a firm knowledge of communication so as to facilitate its application for employability skills.
- To enhance employability skills and facing the corporate world with full confidence.

## **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
  - i. Definition and characteristics of report,
  - ii. Need of reports
  - iii. Types of reports: Technical Reports, Progress report, ,Event reporting,
  - iv. Newsletters
  - v. Summer project report
2. Technical proposal writing
  - i. Definition and characteristics of technical proposal writing,
  - ii. Types of proposal
  - iii. Making a proposal

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## Unit IV Speaking Skills

1. Seminar Presentation. :
  - i. Verbs often Required in Presentations
  - ii. Importance of Body Language in Presentations
  - iii. Preparing an Outline of a Presentation Pronunciation
  - iv. Structure of Presentation
  - v. Ending the Presentation
2. Group Discussion.
  - i. Definition,
  - ii. Advantages,
  - iii. Qualities Required,
  - iv. General Dos and Don'ts,
  - v. Body languages,
  - vi. Acting as a moderator
3. Interview:
  - i. Types of interview,
  - ii. Getting ready for an interview,
  - iii. Interview phases

## Unit V

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

## Suggested Readings

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma and BinodMishra, PHI Learning Pvt. Ltd.(New Delhi)
2. English Grammar and Composition, Gurudas Mukherjee, Ane Books Pvt. Ltd.(New Delhi)
3. Current English Grammar and Usage with Composition, R.P. Sinha, Oxford University Press (New Delhi)
4. Effective Technical Communication, M Ashraf Rizvi, Tata McGraw Hill (New Delhi)
5. Business Communication, Meenakshi Raman & Prakash Singh, Oxford University Press (New Delhi)
6. Professional Communication, ArunaKoneru, Tata McGraw Hills, New Delhi.
7. “Communicative English for Engineers and Professionals”, by Nitin Bhatnagar&MamtaBhatnagar, Pearson (New Delhi).
8. “The Ace of Soft Skills”, by Gopalswamy Ramesh &Mahadevan Ramesh, Pearson (New Delhi)

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

1. Understand communication processes and practices in professional and academic contexts.
2. Research and use information for communicative tasks.

## MCA Syllabus at JECRC University

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**Course Code: MCA 026A**

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

L (Hr.)	T/P (Hr.)	Pr (Hr.)	C
0	0	2	2

**Objective:** An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs .An ability to function effectively on teams to accomplish a common goal.

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

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### 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.
19. 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'.

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20. Query to display Name, Hire Date and Day of the week on which the employee started.
21. Query to display Name, Department Name and Department No for all the employees.
22. Query to display Unique Listing of all Jobs that are in Department # 30.
23. Query to display Name, Dept Name of all employees who have an 'A' in their name.
24. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
25. 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.
26. 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.
27. Query to display Name and Salaries represented by asterisks, where each asterisk (\*) signifies \$100.
28. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
29. Query to display the number of employees performing the same Job type functions.
30. Query to display the no. Of managers without listing their names.
31. Query to display the Department Name, Location Name, No. Of Employees and the average salary for all employees in that department.
32. Query to display Name and Hire Date for all employees in the same dept. As Blake.
33. Query to display the Employee No. And Name for all employees who earn more than the average salary.

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

1. Use the knowledge in Database creation, management.
2. Have Knowledge of Back-end and can implement this in project work.
3. Having knowledge of different databases enable them in selection of efficient database.
4. Include these queries in implementation of a project.

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**Course Code: MCA 027A**

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

L (Hr.)	T/P (Hr.)	Pr (Hr.)	C
0	0	2	2

**Objective:** To understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code and to write small/medium scale C++ programs with simple graphical user interface.

1. Write a function using variables as arguments to swap the values of a pair of integers.
2. An election is contested by five candidates. The candidates are numbered 1 to 5 & voting is done by marking the candidate number on the ballot paper. Write a program to read the ballot & count the votes cast for each candidate using an array, variable count. In case, a number read is outside the range 1 to 5, the ballot should be considered as a 'spoilt ballot' and the program should also count the number of spoilt ballot.
3. Write a program to read a matrix of size m\*n from the keyboard and display the same on the screen.
4. Define a class to represent a bank account including the following members: - Data members
  - a. Name of the depositors
  - b. Account number
  - c. Type of account
  - d. Balance amount in the account Member function
    - To assign initial values
    - To deposit an amount
    - To withdraw an amount after checking the balance
    - To display the name and balance.
5. Modify the class and the program of practical 4 for handling 10 customers.
6. Create 2 classes OM and DB which store the value of distance. DM store distances in meters and cm and DB in feet and inches. Write a program that can read values for the class objects and add 1 object OM with another object of DB. Use a friend function to carry out the addition operation the object that stores the results may be a DM object or a DB object, depending upon the units in which the results are required. The display should be in the format of feet and inches or meters and cms depending on the object on display.
7. A book shop maintains the inventory of books that are being sold at the shop the list includes details such as author, title and publisher and stock position. Whenever a customer wants the book, the sales person inputs the title and author and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed, if it is, then the system displays the book details and requests for the number of copies required. If the requested are available, the total cost of the required copies is displayed; otherwise the message "Required copies not in stock" is displayed. Design a system using a class called books with suitable member functions and constructors. Use new operator in constructor to allocate memory space required.

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8. Define a class string that could work as a user defined string type include constructors that will enable us to create an .un-initialized string. String s1; ./ string with length 0 And also to initialize an object with string constant at the time of creation like String s2("well done"); . Include a function that adds two strings to make a third string.
9. Create a class float that contains 2 float data member. Over load all the 4 arithmetic operators so that do operate on the objects of float.
10. Create a class MAT of size m\*o. Define all possible matrix operation for MAT type objects.
11. Create a base class called shape use this class to store two double type values that could be used to compute the area of fig. Derive the specific class called TRIANGLE and RECTANGLE from the data shape. Add to base class, a member function get - data ( ) to initialize base class data members and another member and another member function display – area( ) to compute and display the area of the fig. Make display – area ( ) as a virtual function and redefine function in the derived classes to suit their requirements,Using these 3 classes design a program that will accept dimension of RECTANGLE orTRIANGLE interactivity and display the area.Remember the 2 values given as input will be treated as length of 2 sides in the case ofrectangle and as base and height in the case of triangles and used as follows:

$$\text{Area of rectangle} = x*y$$

$$\text{Area of triangle} = 1/2 *x*y$$

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

1. Apply basic & advance programming principles using C++ language.
2. Apply basic C++ program structure in software development.

**Course Code: MCA028A**

**Course Name: Object Oriented Analysis & Design Lab**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
0	0	2	2

**Objective:** To acquaint the students with the basics of a design language .UML is introduced as a modeling language which help the students to provide a complete understanding of how to Architect and design a S/W System.



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1. Introduction: OOAD and UML
2. What is Object Oriented Architectural Design?
3. What is Visual Modelling?
4. What is Unified Modeling Language (UML)?
5. UML Concepts
6. UML Diagrams:-Class Diagram. Object Diagrams. Interaction Diagrams Sequence Diagrams Collaboration Diagrams Behavioral Modeling Use case Diagrams Activity Diagrams Advanced Behavioral Modeling, State Chart Diagrams Architectural Modeling Component Diagrams Deployment Diagrams
7. UML Softwares Visio, StarUML, DiaArgoUMLUmbrello White Star UML BOUML

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

1. Implement the object oriented software development process, including object-oriented methodologies and work flows.
2. Designs based on design principles, patterns, and heuristics.
3. Implement Domain modeling, System-level testing of Object-oriented programs.
4. To design different UML diagrams through various tools available.

**Course Code: MCA 029A**

**Course Name: Seminar-III**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

**A seminar will be on any technical topic.**

**Course Code: BMC117A**

**Course Name: Business Communication Skills Lab**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
0	0	2	2

**Objective:**

- To learn the art of public speaking and facing interviews.

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- To build up the learners confidence in oral and interpersonal communication by reinforcing the basics of pronunciation specially focusing on interviews / corporate meetings / international business travels.
- To know the techniques of seminars and paper presentation.
- To explain the importance of oral communication to business.

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

### **Suggested Readings and Packages**

1. Advanced Manual for Communication Laboratories and Technical Report Writing, D.Sudha Rani, Pearson, (New Delhi)
2. A Course in Phonetics and Spoken English, J. Sethi& P.V. Dhamija, PHI Learning Pvt.Ltd. (New Delhi)
3. English Language Laboratories: A Comprehensive Manual, NiraKonar, PHI Learning Pvt .Ltd. (New Delhi)
4. Communication Skills for Engineers and Scientists, Sangeeta Sharma and Binod Mishra, PHI Learning Pvt. Ltd.(New Delhi).
5. Oxford English Learning Package.(With CDs: Headway Series)

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

1. Understand communication processes and practices in professional and academic contexts.
2. Develop Reading, Listening and Speaking Skills.

## **SEMESTER -IV**

**Course Code: MCA030A**

**Course Name: Computer Graphics & Multimedia**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	1		4

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**Objective:** To be able to define the process of designing “multi-media” from concept to execution. To be able to utilize skills, technology, and formal concepts to effectively and creatively solve a wide range of graphic design problems which are solved in the context of various multimedia environments.

## Unit-I

Computer Graphics: A Survey of Computer graphics, Overview of Graphics System: Video Display Devices, Raster-Scan Systems, Input Devices, Hard-Copy Devices, Graphics Software, and Introduction to OpenGL. Graphics Output Primitives: Point and Lines, Algorithms for line, circle & ellipse generation, Filled-Area Primitives. Attributes of Graphics Primitives: Point, line, curve attributes, fill area attributes, fill methods for areas with irregular boundaries, Antialiasing.

Geometric Transformations (both 2-D & 3-D): Basic Geometric Transformations, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Inverse Transformations.

## Unit-II

Two Dimensional Viewing: Viewing pipeline, Clipping Window, Normalization & Viewport coordinate Transformations, Clipping Algorithms: Point clipping, Line clipping and Polygon clipping. Three Dimensional Viewing: 3-dimensional Viewing Concepts, Viewing pipeline, Projection Transformations (Orthogonal, Oblique parallel, Perspective).

Three Dimensional Object Representations: Curved Surfaces, Quadratic Surfaces, Spline Representations, Bezier Spline Curves and Surfaces, B-Spline Curves and Surfaces, Visible Surface Detection Methods: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer method.

**Unit-III** Illumination Models: Basic Illumination Models, Displaying light Intensities, Halftone Patterns and Dithering techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading), Ray-Tracing Methods (Basic Ray-Tracing Algorithm, Ray-Surface Intersection Calculations). Computer Animation, Hierarchical Modeling (introductory idea only).

## Unit-IV

Multimedia Fundamentals: Introduction, Multimedia & Hypermedia, WWW, Multimedia software tools, Multimedia Authoring and Tools, Graphics and Image Data Representation, Color Models in images & video, Fundamental Concepts in Video, Basics of digital Audio.

## Unit V

Multimedia Data Compression: Lossless Compression Algorithms (Basics of Information Theory, Run length coding, variable length coding, lossless image compression), Lossy Compression Algorithms (distortion measure, quantization, Discrete Cosine transform), Basic

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Image Compression standard-JPEG, Basic Video Compression standard-MPEG (MPEG-1&2).

### Text Books:

1. Donald **Hearn** & M. Pauline **Baker**, “Computer Graphics with OpenGL”, Third Edition, 2004, Pearson Education, Inc. New Delhi.
2. Ze-NianLiand Mark S. **Drew**, “Fundamentals of Multimedia”, First Edition, 2004, PHI Learning Pvt. Ltd., New Delhi.

### Upon completion of the subject, students will be able to:

1. Demonstrate an understanding of contemporary graphics hardware
2. Differentiate multimedia and non-multimedia
3. Differentiate text, image, video & audio
4. Understand Multimedia Data Compression along with Compression Algorithms and Basic Image Compression standard

**Course Code: MCA031A**

**Course Name: Programming in C#**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	1		4

### Unit-I

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**The .NET Framework:** Understand the motivation behind the .NET platform, Common Language Infrastructure (CLI). Know the role of the Common Type System (CTS), the Common Language Specification (CLS) and the Common Language Runtime (CLR), Understand the assembly, metadata, namespace, type distinction, Contrast single-file and multi-file assemblies, Know the role of the Common Intermediate Language (CIL), Platform independent .NET(Mono / Portable .NET distributions).

## Unit-II

**Evolution of C# Language:** Language Fundamentals, Reference and value Types, primitive types the Nullable and enum types, Classes and objects, Defining classes Creating objects, Using static members, Garbage Collector, Overloading Methods, Various Constructors. Encapsulating data, access modifiers, properties, indexers arrays and read only fields. Handling errors and throwing exceptions The Root object class. Inheritance and polymorphism specialization, abstract classes, nesting of classes. String and Date Time classes

## UNIT - III

**Event handling paradigm:** Delegates and events. Anonymous delegates and lambda expression FUNC and Action delegates.

**Generics Collections:** Interfaces, overriding interface implementation. Explicit interface implementation. Collection, IEnumerable, IEnumerator, IList, IComparer and their Generic equivalent. Working with generic List, Stack, Dictionary and Queue.

## UNIT - IV

**Programming Window Forms Applications:** The notifies - subscribers paradigm for handling events. .NET framework for handling GUI events. Introduction to WPF and building an WPF application

## UNIT - V

Introducing LINQ:A quick introduction. LINQ and C#. Defining and executing a Query. Implicitly typed local variables. Anonymous Types, Extension Methods and Lambda Expressions. Putting LINQ to work. LINQ to SQL Fundamentals of ADO.NET Updating retrieving and deleting data using LINQ to SQL.

## Text Books

1. Jesse Liberty and Donald Xie , “Programming C# 3.0”, O’REILLY.
2. Paul J. Deitel, Harvey Deitel, “C# 2008 for Programmers”, Pearson, 3rd Ed., 2010.
3. Joseph Albahari and Ben Albhari, “C# 3.0/4.0 in NUTSHELL”, O’REILLY.
4. Stephen C. Perry, Atul Kahate, Stephen Walther, Joseph Mayo, “Essential of .net and Related Technologies with a focus on C#, XML, ASP.net and ADO.net”, Pearson, 2nd Ed. 2009.
5. Jon Skeet, “C# in Depth ”, O’REILLY

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

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1. Design, document, code and test small C# console and GUI applications.
2. Design, document, code and unit test class libraries as part of a larger project.

**Course Code: MCA032A**

**Course Name: Compiler Design**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

# MCA Syllabus at JECRC University

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**Objective:** This course aims to teach students the principals involved in compiler design. It will cover all the basic components of a compiler but not the advanced material on optimizations and machine code generation.

## UNIT-I

Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools - Lexical Analysis -Role of Lexical Analyzer – Input Buffering – Specification of Tokens.

## UNIT-II SYNTAX ANALYSIS

Role of the parser –Writing Grammars –Context-Free Grammars – Top Down parsing - Recursive Descent Parsing - Predictive Parsing – Bottom-up parsing - Shift Reduce Parsing – Operator Precedent Parsing - LR Parsers - SLR Parser - Canonical LR Parser - LALR Parser.

## UNIT-III INTERMEDIATE CODE GENERATION

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.

## UNIT-IV CODE GENERATION

Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next-use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.

## UNIT-V CODE OPTIMIZATION AND RUN TIME ENVIRONMENTS

Introduction– Principal Sources of Optimization – Optimization of basic Blocks – Introduction to Global Data Flow Analysis – Runtime Environments – Source Language issues – Storage Organization – Storage Allocation strategies – Access to non-local names – Parameter Passing.

**By the end of the subject, students should be able to:**

1. Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyzer
2. Parser and its types i.e. Top-down and Bottom-up parsers.
3. Syntax directed translation, synthesized and inherited attributes.
4. Techniques for code optimization.
5. Different techniques of symbol table organization.
6. Code generation and its limitations.

**Course Code: MCA033A**

**Course Name: Software Project Management**

L (Hr.)	T/P (Hr.)	Pr (Hr.)	C
3	0		3

## Unit- I

# MCA Syllabus at JECRC University

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## INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT

Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – Stepwise Project Planning.

### Unit- II

#### PROJECT EVALUATION

Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

### Unit- III

#### SELECTION OF APROPRIATE PROJECT APPROACH

Software Process and Process Models, Waterfall Model, Spiral model, Prototype model,, Incremental Delivery, RAD model, Selecting most appropriate model.

### Unit- IV

#### PROJECT PLANNING &ACTIVITY PLANNING

Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

### Unit- V

#### MANAGING PEOPLE AND ORGANIZING TEAMS , SOFTWARE QUALITY

Introduction – Understanding Behavior – Organizational Behavior: A Background –Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation– The Old man – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety, Software quality, Process Capability models. Product and Process Metrics.

### Text Book

1. Bob Hughes, Mikecoterell, “Software Project Management”, Third Edition/ Fifth Edition, TataMcGraw Hill, 2004.

### Upon completion of the subject, students will be able to:

1. Appreciate the importance of software project management;
2. Apply project management techniques for information systems development;
3. Apply the management skills to monitor and control a software project;

**Course Code: MCA034A**

**Course Name: UNIX Lab**

L (Hr.)	T/P (Hr.)	Pr (Hr.)	C
0	0	2	2



## MCA Syllabus at JECRC University

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**Objective:** To provide appropriate knowledge required to administer computer systems and networks. To know about the working of various network protocols. To help learn practical aspects of various system configurations in UNIX variants. Use of a shell script in various applications. A representative list is given in what follows: Write a shell script that presents a multiple choice question, gets the user's answer, and reports back whether it is right or wrong. Finally it shall display the score.

1. Write shell script which simulates the important DOS commands with various switches.
2. Write a shell script that receives a file name and informs whether it exists or not. If it exists, then it shall give the details of its access permission, its size etc.
3. Write a shell script that accepts a matrix and finds and prints the row and column totals Modify the calendar so that it knows about weekend: On Friday, tomorrow include Saturday, Sunday and Monday, Modify calendar to handle leap years. Calendar should know about our college holidays. How would you arrange it.
4. Write a shell script which will accept input and then check if the input is a directory file and is readable and writeable. If so then all ordinary files under the directory should be listed out one by one and for each ordinary file that is writeable, the user should be asked if the file is to be deleted or not. If yes, then the deletion should be done else next files processed. At the end of execution of the script, should display the following messages:
  - i. Ordinary files deleted from the directory.
  - ii. Ordinary files remaining in the directory.
5. Write a shell script that accepts the name of a text file and finds
  - i. No. of sentences ii. No. of words iii. No. of words having more than five characters. iv. No. of words that start with a vowel. v. No. of articles in the text file.
  - ii. Write a program using proper system calls to exchange data between you program and a specified file.
  - iii. Write a Program that passes some amount of data from the client to the server using message Queues files
  - iv. Write a program that enables you to run two or more shells on a single terminal.

**After completing this course students should be able to:**

1. Describe and use the UNIX operating system
2. Describe and use the fundamental UNIX system tools and utilities
3. Describe and write shell scripts in order to perform basic shell programming

**Course Code: MCA035A**

**Course Name: Computer Graphics & Multimedia Lab**

L (Hr.)	T/P (Hr.)	Pr (Hr.)	C
0	0	2	2

**Objective:** An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs and an ability to function effectively on teams to accomplish a common goal.

Topics

1. Introduction to OpenGL Programming.
2. Implementing line drawing algorithms.
3. Implementing circle drawing algorithms.
4. Implementing ellipse drawing algorithms.
5. Implementing Line Clipping Algorithms.
6. Implementing Polygon Clipping Algorithms.
7. Implementing 2-d Transformations.
8. Implementing 3-d Transformations.
9. Implementing scan fill, boundary fill algorithms.
10. Implementing seed fill, flood fill algorithm.
11. Writing program on B-Splines, Bezier Curves
12. Writing program on Mandelbrot set & Julia set.
13. Writing program on Sierpinski gasket, Koch curve.
14. Writing program on Fractal trees & forest.
15. Writing program on wire frame model & terrain generation.
16. Implementing Ray tracing algorithm.
17. Writing program on Animation & Morphing techniques.

**Upon completion of the subject, students will be able to:**

1. Implement different graphical transformations and transitions of various shapes & patterns.
2. Implement Animation & Morphing techniques.

**Course Code: MCA036A**

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

L	T/P	Pr	C
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## MCA Syllabus at JECRC University

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(Hr.)	(Hr.)	(Hr.)	
0	0	2	2

1. Write a Program in C# to Check whether a number is Palindrome or not.
2. Write a Program in C# to demonstrate Command line arguments processing.
3. Write a Program in C# to find the roots of Quadratic Equation.
4. Write a Program in C# to demonstrate boxing and unBoxing.
5. Write a Program in C# to implement Stack operations.
6. Write a program to demonstrate Operator overloading.
7. Write a Program in C# to find the second largest element in a single dimensional array.
8. Write a Program in C# to multiply two matrices using Rectangular arrays.
9. Find the sum of all the elements present in a jagged array of 3 inner arrays.
10. Write a program to reverse a given string using C#.
11. Using Try, Catch and Finally blocks write a program in C# to demonstrate error handling.
12. Design a simple calculator using Switch Statement in C#.
13. Demonstrate Use of Virtual and override key words in C# with a simple program
14. Implement linked lists in C# using the existing collections name space.
15. Write a program to demonstrate abstract class and abstract methods in C#.
16. Write a program in C# to build a class which implements an interface which already exists.
17. Write a program to illustrate the use of different properties in C#.
18. Demonstrate arrays of interface types with a C# program.
19. Program to display the addition, subtraction, multiplication and division of two number using console applications.
20. Program to display the first 10 natural numbers and their sum using console application.

### After completing this course students should be able to:

1. Write programs that use fundamental C# programming tools
2. Use advanced OOP tools when designing C# program

**Course Code: MCA037A**

**Course Name: Professional Skills-I**

L (Hr.)	T/P (Hr.)	Pr (Hr.)	C
4	0	0	4

## SEMESTER –V

**Course Code: MCA038A**

# MCA Syllabus at JECRC University

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**Course Name: Advance Java Programming**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	1		4

**Objective:** An ability to communicate effectively with a range of audiences. An ability to analyze the local and global impact of computing on individuals, organizations and society. Recognition of the need for and an ability to engage in continuing professional development.

## **Unit I Core JAVA**

Java Programming Language, Data Types and Operations, Structured Programming, Selection Statements, Loops, Methods, Method, Arrays, Object-Oriented Programming: Classes and Objects, Constructors, Implementing & Designing Classes, Use of Keywords: static, final, this, Class Abstraction and Encapsulation. Strings and Text I/O, Inheritance and Polymorphism, use of super keyword, Overriding vs. Overloading,

## **Unit II**

Java Programming Object: The Cosmic Superclass, Abstract Classes and Interfaces, Packages, Applet As Java Applications Applets specific methods & Related HTML references Creating an Applet Displaying it using Web Browser with appletviewer.exe Advantages and Disadvantages of Applet Vs Applications

## **Unit III**

Multithreading concepts, Thread Life cycle, creating multithreaded application, Thread priorities

Thread synchronization Abstract Windows Toolkit Components and Graphics Containers, Frames and Panels Layout Managers Border layout, Flow layout Grid layout, Card layout AWT all components.

## **Unit IV**

Event delegation Model Event source and handler Event categories, Listeners, Anonymous classes Swing Libraries Model view Controller design pattern Different layout, menus dialog boxes, text input Java Input Output Java IO package Byte/Character Stream Buffered reader / writer File reader / writer Print writer File Sequential / Random.

## **Unit V**

JDBC Java database connectivity, Types of JDBC drivers Writing first JDBC applications Types of statement objects (Statement, PreparedStatement and CallableStatement) Types of resultset, ResultSetMetadata Inserting and updating records JDBC and AWT Connection pooling RMI Introduction & Architecture of RMI Java rmi classes and interfaces Writing simple RMI application Parameter passing in remote methods (marshalling and unmarshalling) Introduction to CORBA Java Beans :Java Beans introduction, design pattern

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Writing simple bean Beans persistence and introspection EJB Architecture Container classes, Interfaces EJB types- Session, Entity, Message Driven.

### **Text Books:**

1. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. Java Programming John P. Flynt Thomson 2nd
3. Java Programming Language Ken Arnold Pearson
4. The complete reference JAVA2, Herbert schildt. TMH

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

1. Understand the principles of programming, in particular the role of abstractions in representing and manipulating data and processes, and how a particular programming language can be used to express such abstractions in a form that can be executed on a machine  
Understand the key principles of the Object Oriented Programming paradigm including Encapsulation, Polymorphism and Inheritance
2. Design, write and test programs written in Java, employing Graphical User Interface, in response to a set of user requirements
3. Write Java applications for handling collections of data using container objects provided by the Java 2 Collections Framework, in particular Array and Array List

**Course Code: MCA039A**

**Course Name: Operations Research**

## MCA Syllabus at JECRC University

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L (Hr.)	T/P (Hr.)	Pr (Hr.)	C
3	0		3

**Objective:** Students will get an introduction to use quantities methods and techniques for effective decisions making; Students will get introduction about model formulation and applications that are used in solving business decision problems.

### UNIT-I

Introduction: Definition and scope of operations research (OR), OR model, solving the OR model, art of modeling, phases of OR study. Linear Programming: Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.

### UNIT-II

Transportation Problems: Types of transportation problems, mathematical models , transportation algorithms, Assignment: Allocation and assignment problems and models, processing of job through machines

### UNIT-III

Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem. Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

### UNIT-IV

Theory of Games: Rectangular games, Minimax theorem, graphical solution of  $2 \times n$  or  $m \times 2$  games, game with mixed strategies, reduction to linear programming model. Quality Systems: Elements of Queuing model, generalized poisson queuing model, single server models.

### UNIT-V

Inventory Control: Models of inventory, operation of inventory system, quantity discount. Replacement: Replacement models: Equipments that deteriorate with time, equipments that fail with time

### Text Books:

1. Wayne L. Winston, "Operations Research" Thomson Learning, 2003.
2. Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education, 2003.
3. R. Panneer Seevam, "Operations Research" PHI Learning, 2008.
4. V.K.Khanna, "Total Quality Management" New Age International, 2008.

### Learning Outcomes:

## MCA Syllabus at JECRC University

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1. After completion of this syllabus student will be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
2. After completion of this syllabus student will be able to build and solve Transportation Models and Assignment Models.

# MCA Syllabus at JECRC University

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

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

**Objective:-**To make students Develop dynamic web applications, create and consume web services appropriate data sources and data bindings in ASP.NET web applications

## **Unit-I**

An overview of .NET including the Common Language Interface, the Common Type System, the Common Language Runtime, and .NET Framework and class libraries. Language and platform neutrality.

## **Unit-II**

An introduction to Web Forms and a comparison to familiar models such as Windows Forms. The ASP.NET execution model. Server-side controls, events, state-management, configuration, authentication and authorization, navigation, master pages, themes and skins, static and dynamic components, data access and data binding including the use of ADO.NET, security.

## **Unit-III**

Introduction to creation of web services using ASP.NET and consuming web services in both Windows Forms and Web apps.

## **Unit-IV**

Server-side and client-side code-behind.

## **Unit-V**

Current topics such as AJAX, LINQ, MVC, HTML5, and CSS3.

## **Text Book**

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

## **Learning Outcomes:**

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

**Course Code: MCA041A**



**Course Name: Software Testing and Quality Assurance**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	0	0	3

**Objective:**

1. To apply the testing strategies and methodologies in their projects
2. To understand test management strategies and tools for testing
3. A keen awareness on the open problems in software testing and maintenance

**UNIT-I TESTING BASICS**

Testing as an engineering activity – Role of process in software quality – Testing as a process – Basic definitions – Software testing principles – The tester’s role in a software development organization – Origins of defects – Defect classes – The defect repository and test design – Defect examples – Developer / Tester support for developing a defect repository.

**UNIT-II TEST CASE DESIGN**

Introduction to testing design strategies – The smarter tester – Test case design strategies – Using black box approach to test case design – Random testing – Equivalence class partitioning – Boundary value analysis – Other black box test design approaches – Black box testing and COTS – Using white box approach to test design – Test adequacy criteria – Coverage and control flow graphs –Covering code logic – Paths – Their role in white box based test design –Additional white box test design approaches – Evaluating test adequacy criteria.

**UNIT-III LEVELS OF TESTING**

The need for levels of testing – Unit test – Unit test planning – Designing the unit tests – The class as a testable unit – The test harness – Running the unit tests and recording results – Integration tests – Designing integration tests – Integration test planning – System test – The different types – Regression testing – Alpha,beta and acceptance tests.

**UNIT-IV TEST MANAGEMENT**

Basic concepts – Testing, debugging goals, policies – Test planning – Test plan components – Test plan attachments – Locating test items – Reporting test results – The role of three groups in test planning and policy development – Process and the engineering disciplines – Introducing the test specialist – Skills needed by a test specialist – Building a testing group.

**CONTROLLING AND MONITORING**

Defining terms – Measurements and milestones for controlling and monitoring – Status meetings – Reports and control issues – Criteria for test completion – SCM – Types of reviews – Developing a review program – Components of review plans – Reporting review results.

**UNIT-V SOFTWARE QUALITY ASSURANCE**

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Quality Concepts , Quality , Quality Control , Quality Assurance , Cost of Quality , The Quality Movement ,Software Quality Assurance , Background Issues , SQA Activities ,Software Reviews , Cost Impact of Software Defects , Defect Amplification and Removal , Formal Technical Reviews , The Review Meeting , Review Reporting and Record Keeping , Review Guidelines , Formal Approaches to SQA , Statistical Software Quality Assurance , Software Reliability , Measures of Reliability and Availability, Software Safety , Mistake-Proofing for Software , The ISO 9000 Quality Standards , The ISO Approach to Quality Assurance Systems The ISO 9001 Standard ,The SQA Plan ,

### **Text Books**

1. SrinivasanDesikan, Gopaldaswamy Ramesh, “*Software Testing: Principles and Practices*”, Pearson 2012
2. Aditya P. Mathur, “*Foundations of Software Testing*”, Pearson, 2008

### **References:**

1. Paul Ammann, Jeff Offutt, “*Introduction to Software Testing*”, Cambridge University Press, 2008
2. Paul C. Jorgensen, “*Software Testing: A Craftsman's Approach*”, Auerbach Publications, 2008

### **Upon completion of this subject, the student will be able to:**

1. The students learn testing and how apply the testing strategies and methodologies in their projects
2. Use concepts of test management strategies and tools for testing
3. A keen awareness on the open problems in software testing and maintenance.

**Course Code: MCA042A**

## MCA Syllabus at JECRC University

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**Course Name: Programming in JAVA Lab**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
0	0	2	2

**Objective:** This module aims to introduce the students to some concepts of advanced programming and practice on reusing components. It focuses on Graphical User Interface (GUI), multithreading, networking, and database manipulation. A selected programming language is used such as Java. By completing this module, the students should be able to write sophisticated Java applications.

### Topics

1. Introduction, Compiling & executing a java program.
2. Program with data types & variables.
3. Program with decision control structures: if, nested if etc.
4. Program with loop control structures: do, while, for etc.
5. Program with classes and objects.
6. Implementing data abstraction & data hiding.
7. Implementing inheritance.
8. Implementing and polymorphism.
9. Implementing packages.
10. Implementing generics.
11. Program with modern features of java.
12. Implementing interfaces and inner classes
13. Implementing wrapper classes
14. Implementing generics.
15. Implementing cloning.
16. Implementing Reflections
17. Working with files.
18. Assignments on Java concepts such as Interfaces, Packages, Exception Handling, Applet, multithreading, Abstract Windows Toolkit, Java Input Output, Networking, JDBC, RMI ,Java Beans can be included.

**After completion of Lab Course students will be able to:**

1. Design, write and test programs written in Java

**Course Code: MCA043A**

# MCA Syllabus at JECRC University

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## Course Name: Programming in ASP.Net Lab

L (Hr.)	T/P (Hr.)	Pr (Hr.)	C
0	0	2	2

**Objective:** An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs and an ability to function effectively on teams to accomplish a common goal.

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:
  - i. A button with text “clicks me”. The button control must be in the center of the form.
  - ii. A label with a text hello
  - iii. A checkbox.
5. Write a program to display “Welcome To Radiant” in the form when the “click” button is clicked. The form title must be ASP.NET.
6. Write a program containing the following controls:
  - i. A ListBox
  - ii. A Button
  - iii. An Image
  - iv. A Label
7. 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

**After completion of Lab Course students will be able to:**

1. Design, write and test programs written in ASP.NET
2. Develop Web applications with ASP.NET framework

**Course Code: MCA044A**

## MCA Syllabus at JECRC University

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**Course Name: Professional Skills -II**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	0	0	3

**Course Code: MCA045A**

**Course Name: Minor Project**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>		<b>Pr (Hr.)</b>	<b>C</b>
	0		4	4

**Course Code: MCA046A**

## MCA Syllabus at JECRC University

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**Course Name: Software Testing Lab**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>		<b>Pr (Hr.)</b>	<b>C</b>
	0		2	2

**Objective:** To make student accustom with various automated tools used for Software Design and Development, Testing, Project Management etc.

1. Use of diagramming tools for system analysis Preparing Data Flow Diagrams & Entity Relationship Diagrams.
2. Use of Tools To design User Interfaces Report generation (Using VB /Oracle Developer)
3. MS – project Its use in project scheduling
4. Use of any Automated Testing Tools like Selenium/Load Runner/Win Runner etc.
5. Win Runner
  - a. Record Context Sensitive
  - b. Record Analog
  - c. Database check point
  - d. Bit map Check Point
  - e. Synchronization point
6. S/W Configuration Management Tools
  - a. Source Code Control System (SCCS)
  - b. Make in UNIX Note: Student has to check there own developed software through win runner.
7. Use of Test Management tools: Open Source tools like; TET( Test Environment Toolkit), Test manager.
8. Use of Functional Testing Tool: Selenium/Watir/Solex/Webrecorder.
9. Use of Load Testing Tools: Jmeter/FunkLoad.
10. Use of Test Management Tools: HP Quality Centre/QA Complete/Automated Test Designer ( ATD).
11. Use of any tools: Apache JMeter, LoadRunner, WebLOAD, Appvance, NeoLoad, /LoadUI/WAPT/Loadster/LoadImpact/Rational Performance Tester/Testing Anywhe

## Domain-I

**Course Code: MCA047A**

**Course Name: Cloud Computing**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	1		4

**Objectives:** Get a clear understanding of Cloud Computing fundamentals and its importance to various organizations. Master the concepts of IaaS, PaaS, SaaS, Public and Private clouds. Get hands-on experience in Cloud Programming.

### Unit-I

Cloud Computing Fundamental: Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications.

### Unit-II

Cloud Applications: Technologies and the processes required when deploying web services; deploying a web service from inside and outside a cloud architecture, advantages and disadvantages

### Unit-III

Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics : Cloud Computing infrastructures available for implementing cloud based services.

### Unit-IV

Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat) Application Development: Service creation environments to develop cloud based applications. Development environments for service development; Amazon, Azure, Google App.

### Unit V

Best Practice Cloud IT Model : Analysis of Case Studies when deciding to adopt cloud computing architecture. How to decide if the cloud is right for your requirements. Cloud based service, applications and development platform deployment so as to improve the total cost of ownership (TCO)

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### **Text Books:**

1. GautamShroff, Enterprise Cloud Computing Technology Architecture Applications
2. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach

### **At the end of course student will be able to:**

1. Understand the systems, protocols and mechanisms to support cloud computing
2. Develop applications for cloud computing
3. Understand the hardware necessary for cloud computing
4. Design and implement a novel cloud computing application.



# MCA Syllabus at JECRC University

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**Course Code: MCA048A**

**Course Name: Distributed Systems**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0		4

**Objective:** The student will be able to know the following

1. Understanding the major tools and techniques that allow programmers to effectively program the parts of the code that require substantial communication and synchronization; Studying the core ideas behind modern coordination paradigms and concurrent data structures;
2. Introduce a variety of methodologies and approaches for reasoning about concurrent programs;
3. Realizing not only the basic principles but also the best practice engineering techniques of concurrent computing;

## **UNIT I**

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Issues in Distributed Operating Systems, Resource sharing and the Web Challenges. System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection. Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non-token based algorithms, performance metric for distributed mutual exclusion algorithms.

## **UNIT II**

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement Problem-Interactive consistency Problem, Applications of Agreement algorithms.

## **UNIT III**

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study. Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control

## **UNIT IV**

Distributed Transactions: Introduction, Flat and nested distributed transactions, Atomic commit protocols, concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Distributed shared memory – Design and Implementation issues, consistency models, CORBA Case Study: CORBA RMI, CORBA services.

## **UNIT V**

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File service components, design issues, interfaces, implementation techniques, Sun Network File System – architecture and implementation, other distributed file systems – AFS, CODA. Name services – SNS name service model.

### **Learning Outcomes**

1. The students will be able to know the following.
2. Identifying techniques to formally prove correctness of multiprocessor programs;
3. Presenting techniques to formally study the progress properties of concurrent algorithms;
4. Analyzing the performance of multiprocessor algorithms;
5. Identifying limitations and impossibility results which express where the effort should not be put in solving a task;

### **Text Books**

1. "Advanced Concepts in Operating Systems", by MukeshSinghal&Niranjan G Shivaratri, Tata McGraw Hill(2001).
2. "Distributed System: Concepts and Design", by Coulouris, Dollimore, Kindberg , Pearson Education (2006)

# MCA Syllabus at JECRC University

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**Course Code: MCA049A**

**Course Name: Mobile Computing**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

## **Unit-I**

Overview of Mobile Computing and its applications; Radio Communication; Mobile Computing Architecture; Mobile System Networks; Data Dissemination; Mobility Management; Introduction to Cellular network: components, Architecture, Call set-up, Frequency Reuse and Co-channel cell, Cell Design, Interference, Channel assignment, Hand Off;

## **Unit-II**

Cellular Network Standards; Digital cellular communication; Multiple Access Techniques: FDMA, TDMA, CDMA; GSM: System Architecture, Mobile services & features, Protocols, Radio interface, Handover, GSM Channels, Localization and calling, User validation; General Packet Radio Service;

## **Unit-III**

Introduction to CDMA based systems; Spread spectrum in CDMA systems; coding methods in CDMA; IS-95;

## **Unit-IV**

Wireless LAN: Wireless LAN (WiFi) Architecture and protocol layers; WAP Architecture; Bluetooth Architecture: Layers, Security in Bluetooth;  
Mobile Ad-hoc and Sensor Networks: Introduction, MANET, Routing in MANET's Wireless Sensor Networks, Applications;

## **Unit-V**

Mobile Devices: Mobile Agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems; Mobile IP: Architecture, Packet delivery and Hand over Management, Location Management, Registration, Tunnelling and Encapsulation, Route optimization, DHCP. Mobile Transport Layer: Conventional TCP/IP transport protocols, Indirect TCP, Snooping TCP, Mobile TCP

## **Text Books:**

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2004.
2. Raj Kamal, "Mobile Computing", Oxford Higher Education, 2008.

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**Upon completion of the subject, students will be able to:**

1. Understands the process to be followed in the software development life cycle
2. Find practical solutions to the problems
3. Solve specific problems alone or in teams
4. Manage a project from beginning to end
5. Work independently as well as in teams
6. Define, formulate and analyse a problem

# MCA Syllabus at JECRC University

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**Course Code: MCA050A**

**Course Name: Human Computer Interaction**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

**OBJECTIVE:-**At the end of the course, the student should be able to:

1. know what the user-centered design cycle is and how to practice this approach to design your own website or other interactive software systems
2. critique existing website and other interactive software using guidelines from human factor theories
3. analyze one after another the main features of a GUI: the use of colors, organization and layout of content, filling the interface with useful and relevant information, and communication techniques; and to critique designs in order to provide better solutions

## **Unit-I**

Introduction The human, The computer, The interaction, Paradigms, Usability of Interactive Systems, Guidelines, Principles, and Theories

## **Unit-II**

Design Process- Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design, User support

## **Unit-III**

Models and Theories0 Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models, Task analysis, Dialogue notations and design, Models of the system, Modeling rich interaction

## **Unit-IV**

Interaction Styles- Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation

## **Unit-V**

Design Issues- Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search, Information Visualization Module6: Outside the Box- Group ware, Ubiquitous computing and augmented realities, Hypertext, multimedia, and the world wide web

## **Text Books:**

1. "Human Computer Interaction" by Alan Dix, Janet Finlay , ISBN :9788131717035, Pearson Education (2004)

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2. “Designing the User Interface - Strategies for Effective Human Computer Interaction”, by Ben Shneiderman ISBN : 9788131732557, Pearson Education (2010).
3. Usability Engineering: Scenario-Based Development of Human-Computer Interaction , by Rosson, M. and Carroll, J. (2002)

**Upon completion of the subject, students will be able to:**

1. Explain the human components functions regarding interaction with computer
2. Explain Computer components functions regarding interaction with human
3. Demonstrate Understanding of Interaction between the human and computer components.
4. Use Paradigms, implement Interaction design basics, Use HCI in the software process
5. Apply Design rules, Produce Implementation supports, Use Evaluation techniques

# MCA Syllabus at JECRC University

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**Course Code: MCA051A**

**Course Name: Artificial Intelligence & Expert Systems**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0		4

**Objectives:** An ability to communicate effectively with a range of audiences. An ability to analyze the local and global impact of computing on individuals, organizations and society. Recognition of the need for and an ability to engage in continuing professional development.

## **Unit-I**

Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques-search knowledge, abstraction. Problem solving, State space search: Production systems. Search space control: Depth first, breadth first search, heuristic search - Hill climbing, best first search, branch and bound. Minimax search: Alpha-Beta cut offs.

## **Unit-II**

Knowledge Representation Predicate Logic: Skolemizing queries, Unification. Modus ponens. Resolution, dependency directed backtracking. Rule Based Systems: Forward reasoning: Conflict resolution. Backward reasoning: Use of no backtrack. Structured Knowledge Representations: Semantic Net: slots, exceptions and defaults Frames.

## **Unit-III**

Handling uncertainty, Probabilistic reasoning. Use of certainty factors, Fuzzy logic.

## **Unit IV**

Learning: Concept of learning, learning automation, genetic algorithm, learning by induction, neural netsback propagation.

## **Unit V**

Expert Systems: Need and justification for expert systems.Knowledge acquisition. Case studies: MYCIN, RI.

## **Text Books**

1. Nilsson, N.J., "Principles of AP", Narosa Publishing House, 1990.
2. Patterson, D. W., "Introduction to AI and Expert Systems", Prentice Hall of India, 1992.
3. Peter Jackson, "Introduction to Expert Systems", Addison Wesley Publishing Company, M.A., 1992.

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**After completing this course students should be able to:**

1. Understand the history, development and various applications of artificial intelligence
2. Learn the knowledge representation and reasoning techniques in rule-based systems, case-based systems, and model-based systems
3. Appreciate how uncertainty is being tackled in the knowledge representation and reasoning process
4. Master the skills and techniques in machine learning, such as decision tree induction, artificial neural networks, and genetic algorithm;
5. Apply and integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of ExpertSystems.



# MCA Syllabus at JECRC University

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**Course Code: MCA052A**

**Course Name: Theory of Computation**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

## **UNIT I**

Introduction to formal proof – Additional forms of proof – Inductive proofs – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

## **UNIT II**

**REGULAR EXPRESSIONS AND LANGUAGES** Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

## **UNIT III**

**CONTEXT-FREE GRAMMARS AND LANGUAGES** Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG – Deterministic Pushdown Automata.

## **UNIT IV**

**PROPERTIES OF CONTEXT-FREE LANGUAGES** Normal forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

## **UNIT V**

**UNDECIDABILITY** A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem – The classes P and NP.

### **Text Books:**

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.
2. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.

### **At successful completion of the course, students should able to:**

1. Have a good knowledge of formal computation and its relationship to languages.
2. Classify languages and their constructs.
3. Understand the basic concepts of complexity theory.
4. Prove the basic results of the Theory of Computation.

# MCA Syllabus at JECRC University

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**Course Code: MCA057A**

**Course Name: Data Mining & Warehousing**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

**Objective:** To be able to understand the concepts, strategies, and methodologies related to the design and construction of data mining able to comprehend several data preprocessing methods to able to utilize data warehouses and OLAP for data mining and knowledge discovery activities.

## **Unit-I**

Introduction of data warehousing- The evolution of Data warehousing (The Historical Context), the data warehousing- a brief History, need of data warehouse, characteristics of data warehouse, Data marts. Introduction of Data mining: evolution of database technology, definition, Relational data bases, Data warehouse, transactional databases, Advanced database applications and advanced database system, Functionalities of Data mining, classification of Data mining.

## **Unit-II**

Data warehouse and OLAP technology for Data mining: Data warehouse, Operational database system, Data warehouse architecture, data warehouse schemas with examples. Data Warehouse Implementation: Efficient computation of Data cubes, indexing OLAP Data, Development of Database technology: Discovery Driven Exploration of Data cube, From Online Analytical Processing to Online Analytical Mining.

## **Unit-III**

Data Preparation: Pre-process data cleaning, data integration, data transformation, data reduction Data mining primitives: Task Relevant Data, The Kind of Knowledge to be mined, back ground Knowledge: Concept Hierarchies, Architecture of Data mining System.

## **Unit-IV**

Concept Description: Characterization and comparison .Data generalization and Summarization based Characterization, Analysis of attribute Relevance, and Methods of attribute Relevance Analysis. Mining Association rules in large Databases: Market Basket Analysis, Basic concept of Association rule mining, Association rule mining: A road Map.

## **Unit-V**

Apriori Algorithm: Finding Frequent Item sets using Candidate Generation, Multidimensional Association rule, mining multidimensional association rule using static Discretization of Quantitative attributes, mining Quantitative association rules, Mining Distance Based Association Rules. Application of Data warehouse and Data mining in government: National Data warehouse, other areas for data warehouse and data mining. Case studies: Data warehouse in ministry of commerce, Data warehouses in World Bank.

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### **Text Book:**

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining. Pearson (2005), India.
2. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann, 3rd edition

### **After completing this course students should be able to:**

1. Do Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment
2. Have a good knowledge of the fundamental concepts that provide the foundation of data mining
3. Describe different techniques of Data Mining

## Domain-II

**Course Code: MCA053A**

**Course Name: Information security & E- Governance**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

**Objectives:** Support in implementation of security monitoring and evaluation mechanisms to ensure compliance to security policies, procedures • Good practices and standards in information security Approach for managing information security Identification of information security risk categories in the organization

### Unit-I

Introduction: Definition, Security as a concept, functions and subject area. Security domains, problems associated with computer system security – A Scenario. Reasons and argets for attack. Forms of attack and remedies. Security Concepts Security concepts, goals, and services. Role of Cryptography In Information Security. Cryptanalysis.

### Unit-II

Authentication System Key management.

CryptographicAuthentication.AuthenticationSystems: Kerberos, Public Key Infrastructure.

Remote Authentication dial in user services, Human Authentication, Proxies of humans.Security Process Management and Standards

### Unit-III

E-GOVERNANCE Basics of E-Governance; why E-Governance; Issues in E-Governance Applications and Digital Divide. Evolution of EGovernance and its scope and content. Present Global trends of growth in E-Governance. E-Governance Models Models of Digital Governance:

- Broadcasting Model
- Critical Flow Model
- Comparative Analysis Model
- Interactive Service Model
- E-Governance maturity model
- Mobilisation and Lobbying model

Towards good governance through E-governance

### Unit-IV

E-Governance Infrastructure, Stages in Evaluation and Strategies for Success

E-Readiness Data System Infrastructural preparedness Legal Infrastructural preparedness Human Infrastructural preparedness Institutional Infrastructural preparedness Technological Infrastructural preparedness Leadership and Strategic Planning

## MCA Syllabus at JECRC University

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### **Unit V**

#### Case Studies

Challenges In E-Governance Comparative Study of India & any other developing country in terms of implementation of E-Governance; National E-Governance Plan Of Indian Government; Various Agencies Involved and websites In Indian EGovernance; E-Governance Products and Services in India; Case Study-Indian passport portal/ Indian Railways/ Online filing of Income Tax.

#### **Text Books:**

1. Stuart Jacobs 'Engineering Information Security' IEEE Press Series on Information and Communication Network Security, IEEE Press,2011.
2. C.S.R. Prabhu ,E-Governance: Concepts And Case Studies, PHI ,2011.

#### **Upon completion of this subject, the student will be able to:**

1. Define Information security, Threats & Countermeasures of Information Security
2. Use of cryptography in Information Security
3. Understand the basic concepts of E-Governance
4. Critically analyse the different models of E-Governance & use of technology to facilitate effective governance in India

# MCA Syllabus at JECRC University

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**Course Code: MCA054A**

**Course Name: Advance Computer Architecture**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

## **UNIT-I**

INSTRUCTION LEVEL PARALLELISM ILP – Concepts and challenges – Hardware and software approaches – Dynamic scheduling – Speculation - Compiler techniques for exposing ILP – Branch prediction.

## **UNIT-II**

MULTIPLE ISSUE PROCESSORS VLIW & EPIC – Advanced compiler support – Hardware support for exposing parallelism– Hardware versus software speculation mechanisms – IA 64 and Itanium processors –Limits on ILP.

## **UNIT-III**

MULTIPROCESSORS AND THREAD LEVEL PARALLELISM Symmetric and distributed shared memory architectures – Performance issues –Synchronization – Models of memory consistency – Introduction to Multithreading.

## **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.

### **Text Books:**

1. Kai Hwang and Zhi.Wei Xu, “Scalable Parallel Computing”, Tata McGraw Hill, NewDelhi, 2003.
2. David E. Culler, Jaswinder Pal Singh, “Parallel computing architecture :Ahardware/software approach” , Morgan Kaufmann /Elsevier Publishers, 1999.

### **Upon completion of the subject, students will be able to**

1. Know the fundamental aspects of computer architecture design and analysis
2. Understand design, pipelining, superscalar, out-of-order execution, caches (memory hierarchies), virtual memory, storage systems, and simulation techniques
3. Know about computer performance, instruction set architecture design and implementation

# MCA Syllabus at JECRC University

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**Course Code: MCA055A**

**Course Name: High Speed Network**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

**Objectives:** Students will get an introduction about ATM and Frame relay. Students will be provided with an up-to-date survey of developments in High Speed Networks. Enable the students to know techniques involved to support real-time traffic and congestion control. Students will be provided with different levels of quality of service (Q.S) to different applications.

## **Unit-I**

The Motivation for Internetworking; Need for Speed and Quality of Service; History of Networking and Internet; Advanced TCP/IP and ATM Networks; Internet Services; Internet Architecture; Interconnection through IP Routers; Standards; TCP Services; TCP format and connection management; Encapsulation in IP; UDP Services, Format and Encapsulation in IP; IP Services; Header format and addressing; Fragmentation and reassembly; IPv4 Vs. IPv6.

## **Unit-II**

Congestion Control and Quality of Service: Data traffic; Network performance; Effects of Congestion; Congestion Control; Congestion control in TCP and Frame Relay; Link-Level Flow and Error Control; TCP flow control.

## **Unit-III**

Quality of Service: Flow Characteristics, Flow Classes; Techniques to improve QoS; Traffic Engineering; Integrated Services; Differentiated Services; QoS in Frame Relay and ATM; Protocols for QoS Support: Resource Reservation-RSVP; Multiprotocol Label Switching; Real-Time Transport Protocol.

## **Unit-IV**

High Speed Networks: Packet Switching Networks; Frame Relay Networks; Asynchronous Transfer Mode (ATM); ATM protocol Architecture; ATM logical connections; ATM cells; ATM Service categories; ATM Adaptation Layer.

## **Unit-V**

Optical Networks: SONET networks; SONET architecture; High-Speed LANs: The Emergence of High-Speed LANs; Fast Ethernet; Gigabit Ethernet; Wireless LANs: IEEE 802.11, Bluetooth; Connecting LANs: Devices, Backbone networks, Virtual LANs; Wireless WANs: Cellular Telephony; Generations; Cellular Technologies in different generations.

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### **Text Books:**

1. William Stallings, “High-Speed Networks and Internets, Performance and Quality of Service”, Pearson Education;
2. Douglas E. Comer, “Internetworking with TCP/IP Volume – I, Principles, Protocols, and Architectures”, Fourth Edition, Pearson Education.

### **By the end of the subject, students should be able to:**

1. Describe and interpret the basics of high speed networking technologies.
2. Define the various high-speed networking technologies and their design issues.
3. Apply the concept learnt in this course to optimize and troubleshoot high-speed network.
4. Demonstrate the knowledge of network planning and optimization



# MCA Syllabus at JECRC University

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**Course Code: MCA056A**

**Course Name: Enterprise Resource Planning**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

## **UNIT-I**

### **ERP AND TECHNOLOGY**

Introduction – Related Technologies – Business Intelligence – E-Commerce and E-Business – Business Process Reengineering – Data Warehousing – Data Mining –OLAP – Product life Cycle management – SCM – CRM

## **UNIT-II**

ERP Implementation Challenges – Strategies – Life Cycle – Pre-implementation Tasks – Requirements Definition – Methodologies – Package selection – Project Teams –Process Definitions – Vendors and Consultants – Data Migration – Project management– Post Implementation Activities.

## **UNIT-III**

ERP IN ACTION & BUSINESS MODULES Operation and Maintenance – Performance – Maximizing the ERP System – Business Modules – Finance – Manufacturing – Human Resources – Plant maintenance –Materials Management – Quality management – Marketing Sales, Distribution and service.

## **UNIT-IV**

ERP MARKET Marketplace – Dynamics – SAP AG – Oracle – PeopleSoft – JD Edwards – QAD Inc –SSA Global – Lawson Software – Epicor – Intutive.

## **UNIT-V**

Enterprise Application Integration – ERP and E-Business – ERP II – Total quality management – Future Directions – Trends in ERP.

### **Text Books:**

1. Alexis Leon, “ERP DEMYSTIFIED”, Tata McGraw Hill, Second Edition, 2008.
2. Mary Sumner, “Enterprise Resource Planning”, Pearson Education, 2007.

### **Upon completion of the subject, students will be able to:**

1. Examine systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components;
2. Understand production planning in an ERP system, and systematically develop plans for an enterprise;
3. Use methods to determine the correct purchasing quantity and right time to buy an item, and apply these methods to material management;

**Course Code: MCA057A**

**Course Name: Data Mining & Warehousing**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

**Objective:** To be able to understand the concepts, strategies, and methodologies related to the design and construction of data mining able to comprehend several data preprocessing methods to able to utilize data warehouses and OLAP for data mining and knowledge discovery activities. To be able to determine an appropriate mining strategy for given large dataset and to be able to obtain knowledge of current data mining applications.

## **Unit-I**

Data Warehousing: Introduction, Definition, Multidimensional data transformation, OLAP operations, Ware house schema, Ware house Server, Other features.

## **Unit-II**

Data Mining: Introduction, Definition, KDD vs. DM, DBMS vs. DM, DM Techniques, Issues and Challenges in DM, DM Applications. Association Rules: A Prior Algorithm, Partition, Pincer search, Incremental, Border, FP-tree growth algorithms, Generalized association rule.

## **Unit-III**

Classification: Parametric and non-parametric technology: Bayesian classification, two class and generalized class classification, classification error, Decision boundary, Discriminate functions, Non-parametric methods for classification.

## **Unit-IV**

Clustering: Hierarchical and non-hierarchical techniques, K-MEDOID Algorithm, Partitioning, Clara, Clarans. Advanced Hierarchical algorithms Decision Trees: Decision tree induction, Tree pruning, Extracting classification rules from decision trees, Decision tree construction algorithms, Decision tree construction with presorting.

## **Unit-V**

Other Techniques for Data mining: Introduction, Learning, Neural Networks, Data mining using neural networks, Genetic algorithms. Web Mining: Web mining, Text mining, Content mining, Web structure mining.

## **Text Books:**

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining. Pearson (2005), India.
2. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann, 3rd edition

## MCA Syllabus at JECRC University

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**After completing this course students should be able to:**

1. Do Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment
2. Have a good knowledge of the fundamental concepts that provide the foundation of data mining
3. Describe different techniques of Data Mining

# MCA Syllabus at JECRC University

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**Course Code: MCA058A**

**Course Name: Wireless Adhoc Network**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0	0	4

**Objectives:** To demonstrate the knowledge and ability to:

1. Covers fundamental principles of ADHOC Networks.
2. To develop a comprehensive understanding of AdHoc network protocols .
3. To understand current and emerging trends in Wireless Networks.

## **Unit-I**

Introduction– Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

## **Unit-II**

AD-HOC NETWORK ROUTING & TCP: Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link.

## **Unit-III**

WSN ROUTING, LOCALIZATION: Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization.

## **Unit-IV**

Basic probability, randomized rounding; max-cut, max-sat by randomized rounding;

## **Unit-V**

MESH NETWORKS :Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks

## **Text Books:**

1. C.SivaRamMurthyandB.Smanoj,“AdHocWirelessNetworksarchitecturesandProtocols”,PearsonEducation, 2004.
2. FengZhaoandLeonidasGuibas,“WirelessSensorNetworks”,MorganKaufmanPublishers, 2004.
3. C.K.Toth,“AdHocMobileWirelessNetworks”,PearsonEducation,2002.
4. ThomasKragandSebastinBuettrich,“WirelessMeshNetworking”,O’ReillyPublisher,2007.

## **After completing this course students should be able to:**

1. This will help the student to design his own wireless network
2. Students will be able to evaluate the existing network and improve its quality of service

# MCA Syllabus at JECRC University

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**Course Code: MCA051A**

**Course Name: Artificial Intelligence & Expert Systems**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
4	0		4

**Objectives:** An ability to communicate effectively with a range of audiences. An ability to analyze the local and global impact of computing on individuals, organizations and society. Recognition of the need for and an ability to engage in continuing professional development.

## **Unit-I**

Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques-search knowledge, abstraction. Problem solving, State space search: Production systems. Search space control: Depth first, breadth first search, heuristic search - Hill climbing, best first search, branch and bound. Minimax search: Alpha-Beta cut offs.

## **Unit-II**

Knowledge Representation Predicate Logic: Skolemizing queries, Unification. Modus ponens. Resolution, dependency directed backtracking. Rule Based Systems: Forward reasoning: Conflict resolution. Backward reasoning: Use of no backtrack. Structured Knowledge Representations: Semantic Net: slots, exceptions and defaults Frames.

## **Unit-III**

Handling uncertainty, Probabilistic reasoning. Use of certainty factors, Fuzzy logic.

## **Unit-IV**

Learning: Concept of learning, learning automation, genetic algorithm, learning by induction, neural netsback propagation.

## **Unit-V**

Expert Systems: Need and justification for expert systems.Knowledge acquisition. Case studies: MYCIN, RI.

## **Text Books**

1. Nilsson, N.J., "Principles of AP", Narosa Publishing House, 1990.
2. Patterson, D. W., "Introduction to AI and Expert Systems", Prentice Hall of India, 1992.
3. Peter Jackson, "Introduction to Expert Systems", Addison Wesley Publishing Company, M.A., 1992.

## MCA Syllabus at JECRC University

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**After completing this course students should be able to:**

1. Understand the history, development and various applications of artificial intelligence
2. Learn the knowledge representation and reasoning techniques in rule-based systems, case-based systems, and model-based systems
3. Appreciate how uncertainty is being tackled in the knowledge representation and reasoning process
4. Master the skills and techniques in machine learning, such as decision tree induction, artificial neural networks, and genetic algorithm;
5. Apply and integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of ExpertSystems.

# MCA Syllabus at JECRC University

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## List of Open Electives

**Course Code: MCA062A**

**Course Name: Microsoft Windows Application Development**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	0		3

### **Unit - I**

Introduction to Object oriented Programming, Working with C#, Creating Your First C# Program, Dissection the First C# Program You created, Quick Overview of the Visual C# Edition IDE ,Declaring Variables and Assigning Values Duration ,Branching with the if Decision Statement and the Conditional Operator , Operators Expressions and Statements , For Iterations, Creating Arrays of Values, Creating and Calling Simple Overloaded ,Helper Methods, While Iterations and Reading Data from a Text File, Working with Strings , Working with Date Time, Understanding and Creating Classes , Working with Classes and Inheritance in the Net Framework Class.

### **Unit - II**

Understanding Namespaces and Adding References to Assemblies, understanding Scope and utilizing Accessibility Modifiers , Enumerations and the switch Decision Statement , Gracefully Handling Exceptions, Working with Collections , Filtering and Managing Data in Collections using LINQ , Concluding Thoughts , Understanding Event Driven Programming , Getting Started with the Grid App Template, Introduction to XAML, Familiarizing Ourselves with the Grid Template , Modifying the Grid App Template with Branding Element , Data Binding and the Sample Data .

### **Unit - III**

Understanding How Data Binding Works At Design Time, Data Binding to the Recipe Data Source , Understanding Change Notification , Working with JSON Data, Working With Async Methods in the Windows Runtime , Working with the Grid View , Modifying Data Templates , Hands on (Creating your first Windows 8 application), Implementing Type Converters , Responding To Device Orientation Changes , Accommodating the Snapped State , Enabling Semantic Zooming , Implementing the Search Contract , Implementing an App Bar and Flyout , Enabling Your App to Take Photos , Lifetime Management Saving and Restoring State Adding a Settings Command and Settings Flyout , Saving User Preferences .

### **Unit - IV**

Implementing User Preferences, Enabling Secondary Tiles , Incorporating Push Notifications , Incorporating Scheduled Toasts , Detecting Trial Versions , Simulating App Purchases , Simulating Product Purchases , Working with Databases (SQLite), Working with APIs (REST with XML/JSON) , Where to Go From Here, Writing your First Windows Phone App

## MCA Syllabus at JECRC University

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, Basics of Layout and Events , Styling the App, Localizing the App , Understanding Compilation and Deployment , Overview of the Windows Phone Emulator .

### **Unit - V**

Overview of the data-bound App and Pivot App Project Templates , Setting up the SoundBoard App , Improving the View Model and Sample Data ,Styling Tiles in the LongListSelector , Binding to Real Data at Runtime , Playing a Sound when a ListItem is Selected , Working with the Application Bar , Recording an Audio Wav File , Working with Databases , Working with APIs (REST with XML/JSON) , Animating the Reel Grid with a Storyboard , Working with the Geolocator and Geoposition Classes, Navigating and Passing Data to the SearchResults Page , Understanding Async and Awaitable Tasks ,Working with the Lock Screen to Display an Image, Creating a Background Agent for Scheduled Tasks



# MCA Syllabus at JECRC University

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**Course Code: MCA063A**

**Course Name: Android Application Development**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	0	0	3

## **Unit – I**

Introduction: About Android, Smartphone future, Preparing the environment: Installing SDK, Crating Android Emulator, Installing Eclipse, Installing Android Development Tools, Choosing which Android version to use, Android Architecture: Android Stack, Android applications structure, Creating a project, Working with the Android Manifest.xml, Using the log system, Activities.

## **Unit - II**

UI architecture: Application context , Intents, Activity life cycle , Supporting multiple screen sizes, User Interface widgets: Text controls, Button controls, Toggle buttons , Images, Notification and Toast: Parameters on Intents , Pending intents , Status bar notifications, Toast notifications

## **Unit - III**

Menus: Localization , Options menu , Context menu, Dialogs: Alert dialog, Custom dialog, Dialog as Activity, Lists: Using string arrays, Creating lists, Custom Lists

## **Unit - IV**

Location and Maps: Google maps, Using GPS to find current location, Working with data storage: Shared preferences, Preferences activity , Files access , SQLite database, Animation: View animation, Drawable animation

## **Unit - V**

Contents providers: Content provider introduction, Query providers, Network Communication: Web Services, HTTP client, XML and JASON, Services: Service life cycle, foreground service, Publishing App: Preparing for publishing, Signing and preparing the graphics, Publishing to the Android Market.

## **Text Books**

1. Android application development for dummies, Donn Felker with Joshua Dobbs, Wiley Publication.

# MCA Syllabus at JECRC University

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**Course Code: MCA064A**

**Course Name: iOS Application Development**

<b>L (Hr.)</b>	<b>T/P (Hr.)</b>	<b>Pr (Hr.)</b>	<b>C</b>
3	0	0	3

## **Unit - I**

Introduction: The Mobile App Paradigm, Introduction to Xcode, Main characteristics of mobile apps, Differences between mobile apps and desktop apps, How iOS is tailored to a mobile platform, iOS main components and services, Model view-controller design paradigm: The Mobile App Paradigm.

## **Unit - II**

Introduction to objective C: Coordinate Space, Obj-C vs. C++ vs. C# ,Objects , Dynamic Typing and Binding , Classes , Foundation Basics: collections, enumeration , Memory Management Basics, Protocols. View Hierarchy, Transparency, Memory Management, Coordinate Space, Custom Views: Creating a subclass of UIView, Drawing with Core Graphics.

## **Unit - III**

Controllers: View Controller Initialization, View Life Cycle, Controllers of Controllers. Handling Gestures: Recognizing and Handling Gestures: pinch, pan, zoom, swipe, and tap Content Display:UIImageView, UIWebView, UIScrollView, UITableView and UITableViewController.

## **Unit - IV**

Persistence Storage: Property Lists and their limitations , Archiving Objects ,Storing on the filesystem , SQLite ,Core Data Framework ,Using @property to access information,Xcode Generated Code for @property access ,Querying data ,Displaying Core Data data in Table Views ,Fetch Request , CoreDataTableViewController

## **Unit – V**

Blocks and Multi-threading: What is a block ,Block Syntax , Context and Scope ,Memory Management in Blocks ,Declaring variables to hold blocks , Shorthand in block definitions,Usages of Blocks,Grand Central Dispatch API ,Creating and Releasing Queues ,Putting blocks in queues ,Getting the current or main queue , Advance Service:Textual content: UITextView , Keyboard control , Alerts & Timers ,Core Media: audio, still photos and video, Core Motion: accelerometer and gyro in apps , Uploading to the App store

## **Text Books**

1. Beginning iOS 5 Application Development by Wei-Meng Lee, Wrox publication