

## M.C.A

SEM	COURSE CODE	COURSE	COURSE TITLE	HRS/ WEEK	CREDIT	CIA MARKS	SE MARKS	TOTAL MARKS
I	14MCA1C1	Core I	Programming in C	4	4	40	60	100
	14MCA1C2	Core II	Mathematical Foundations	4	4	40	60	100
	14MCA1C3	Core III	Computer Organization and Architecture	4	4	40	60	100
	14MCA1C4	Core IV	Computer Graphics	4	4	40	60	100
	14MCA1C5	Core V	Management Information Systems	4	4	40	60	100
	14MCA1C6P	Core VI	C Programming Lab	4	3	40	60	100
	14MCA1C7P	Core VII	Multimedia Lab	4	3	40	60	100
		Skill Based Course - I	Communication Skills *	2	-	-	-	-
<b>TOTAL</b>				<b>30</b>	<b>26</b>	<b>280</b>	<b>420</b>	<b>700</b>
II	14MCA2C8	Core VIII	Object Oriented Programming with C++	4	4	40	60	100
	14MCA2C9	Core IX	Numerical and Statistical Methods	4	4	40	60	100
	14MCA2C10	Core X	Principles of Operating Systems	4	4	40	60	100
	14MCA2C11	Core XI	Database Systems	4	4	40	60	100
	14MCA2C12	Core XII	Accounting and Financial Management	4	4	40	60	100
	14MCA2C13P	Core XIII	Object Oriented Programming Lab	4	3	40	60	100
	14MCA2C14P	Core XIV	Shell Programming Lab	4	3	40	60	100
	14MCA2S1	Skill Based Course - I	Communication Skills *	2	3	100	-	100
14MCA2PW1		Summer Project Work – I	-	2	40	60	100	
<b>TOTAL</b>				<b>30</b>	<b>31</b>	<b>420</b>	<b>480</b>	<b>900</b>
III	14MCA3C15	Core XV	Programming in Java	4	4	40	60	100
	14MCA3C16	Core XVI	Optimization Techniques	4	4	40	60	100
	14MCA3C17	Core XVII	Computer Networks	4	4	40	60	100
	14MCA3C18	Core XVIII	Data Structures and Algorithms	4	4	40	60	100
	14MCA3CE1	Core Based Elective – I #		4	4	40	60	100
	14MCA3C19P	Core XIX	Java Programming Lab	4	3	40	60	100
	14MCA3C20P	Core XX	RDBMS Lab	4	3	40	60	100
		Skill Based Course – II	Numerical Aptitude *	2	-	-	-	-
14MCA3EC1	Extra Credit Course – 1	Data Mining	-	4***		100	100	
<b>TOTAL</b>				<b>30</b>	<b>26</b>	<b>280</b>	<b>420</b>	<b>700</b>
IV	14MCA4C21	Core XXI	.Net Technology	4	4	40	60	100
	14MCA4C22	Core XXII	Computer Simulation and Modeling	4	4	40	60	100
	14MCA4C23	Core XXIII	Microprocessors, Principles and Applications	4	4	40	60	100
	14MCA4C24	Core XXIV	Artificial Intelligence and Expert Systems	4	4	40	60	100
	14MCA4CE2	Core Based Elective– II #		4	4	40	60	100
	14MCA4C25P	Core XXV	Web Technology Lab	4	3	40	60	100
	14MCA4C26P	Core XXVI	.Net Lab	4	3	40	60	100
	14MCA4S2	Skill Based Course – II	Numerical Aptitude *	2	3	100	-	100
	14MCA4PW2		Summer Project Work – II	-	2	40	60	100
14MCA4EC2	Extra Credit Course – 2	Programming Smart Devices	-	4***		100	100	
<b>TOTAL</b>				<b>30</b>	<b>31</b>	<b>420</b>	<b>480</b>	<b>900</b>
V	14MCA5C27	Core XXVII	Distributed Technology	4	4	40	60	100
	14MCA5C28	Core XXVIII	Principles of Compiler Design	4	4	40	60	100
	14MCA5C29	Core XXIX	Organizational Dynamics	4	4	40	60	100
	14MCA5CE3	Core Based Elective– III #		4	4	40	60	100
	14MCA5CE4	Core Based Elective– IV#		4	4	40	60	100
	14MCA5C30P	Core XXX	Distributed Technology Lab	4	3	40	60	100
	14MCA5C31P	Core XXXI	Mini Project Lab	4	3	40	60	100
	14MCA5S3	Skill Based Course - III	Comprehensive Study **	2	2	100	-	100
14MCA5EC3	Extra Credit Course -III	Cloud Computing	-	4***		100	100	
<b>TOTAL</b>				<b>30</b>	<b>28</b>	<b>380</b>	<b>420</b>	<b>800</b>
VI	14MCA6PW	Industrial Experience and Project Work		30	20	80	120	200
<b>TOTAL</b>				<b>30</b>	<b>20</b>	<b>80</b>	<b>120</b>	<b>200</b>
<b>GRAND TOTAL</b>				<b>180</b>	<b>162</b>	<b>1860</b>	<b>2340</b>	<b>4200</b>

\* Fully Internal – Examination at the end of the year

\*\* Paper fully Internal

\*\*\* Not considered for Grand Total and CGPA

# Core Based Electives

SEMESTER	CORE BASED ELECTIVE
III	Multimedia Systems and Design
	Pattern Recognition
	Digital Image Processing
IV	Software Engineering
	Human Computer Interaction
	Genetic Algorithm
V	Principles of E-Commerce
	Information Security
	Software Project Management
	Parallel Processing
	Grid Computing
Ontology and Semantic Web	

**SEMESTER - I : CORE - I  
PROGRAMMING IN C**

**Course Code : 14MCA1C1**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To develop programming skills using C Language.

**UNIT I**

**12 hours**

**Getting Started:** What is C? Getting Started With C - The First C Program - Compilation and Execution - Receiving Input - C Instructions - Control Instruction in C. **The Decision Control Structure:** The if Statement - The if else Statement - Use of Logical Operators - A Word of Caution - The Conditional Operators.

**UNIT II**

**12 hours**

**The Loop Control Structure:** Loops - The *while* loop - The *for* loop - The Odd Loop - The *break* Statement - The *Continue* Statement - The *do-while* Loop. **The Case Control Structure:** Decisions Using switch - Switch Versus if-else Ladder - The *goto* Keyword.

**Functions and Pointers:** What is Function - Passing Values between Functions - Scope Rule of Functions - #Calling Convention# - One Dicey Issue - Advanced Features of Functions - Adding Functions to the Library.

**UNIT III**

**12 hours**

**Data Types Revisited:** Integers, long and short - Integers, signed and unsigned - Chars, signed and unsigned - Floats and Doubles - A few More Issues - Storage Classes in C. **The C Preprocessor:** Features of C Preprocessor - Macro Expansion - File Inclusion Conditional Compilation - #if and #elseif Directives - Miscellaneous Directives - The Build Process.

**UNIT IV**

**12 hours**

**Arrays:** What are Arrays - More on Arrays - Passing Array Elements to a Function - Pointers and Arrays - Two Dimensional Arrays - Array of Pointers - Three Dimensional Array. **Puppeting On Strings:** What are Strings - More about Strings - Pointer and Strings - Standard Library String Functions - Two Dimensional Array of Characters - #Array of Pointers to Strings #- Limitation of Array of Pointers to Strings.

**UNIT V**

**12 hours**

**Structures:** Why Use Structures - Array of Structures - Additional Features of Structures - Uses of Structures.

**Console Input/Output:** Types of I/O - #Console I/O Functions#

**File Input/Output:** Data Organization - File Operations - Counting Characters, Tabs, Spaces - A File-Copy program- File Opening Modes - String(line) I/O in Files - Text Files and Binary Files - Record I/O Revisited.

#.....# **Self-study portion.**

**Text Books:**

1. Yashavant Kanetkar, *Let Us C*, BPB Publishing Company Limited, Seventh Edition, 2011.

**UNIT I** : Chapter 1, 2

**UNIT II** : Chapter 3, 4

**UNIT III:** Chapter 6, 7

**UNIT IV:** Chapter 8, 9

**UNIT V** : Chapter 10, 11, 12

**Books for Reference:**

1. E. Balagurusamy, *Programming in ANSI C*, Tata McGraw Hill Education Private Ltd., Fifth Edition, 2011.

**SEMESTER - I : CORE – II  
MATHEMATICAL FOUNDATIONS**

**Course Code : 14MCA1C2**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To impart basic features of Logic, Set Theory and ideas of Lattices and Boolean Algebra and to introduce Graph Theory.

**UNIT I** **12 hours**

Mathematical Logic: Introduction – Statements and Notation – Connectives – (AND, OR, NOT) Negation, Conjunction, Disjunction, Conditional and Biconditional – Tautologies, Contradiction, Related Problems – Tautological Implication – Normal Forms.

**UNIT II** **12 hours**

Set Relations and Functions: Basic Concepts of Set Theory – Notations, Inclusion and Equal Sets, Power Set – Operations on Sets – Cartesian Product – Relations – Properties of Relation – Relation Matrix and Graph of a Relation – Partition and Covering of a Set – Equivalence Relation.

**UNIT III** **12 hours**

Introduction to Lattice - Lattices as Partially Ordered Sets – Some Properties of Lattices – Lattices as Algebraic System – Some Special Lattices.

**UNIT IV** **12 hours**

Graph Theory :- Introduction – Path and Circuits – Trees and Fundamental Circuits.

**UNIT V** **12 hours**

Trees, Cut Sets, Matrix Representation. Cutsets and Cut Vertices, Matrix Representation of Graphs.

# ..... # **self-study portion.**

**Text Books:**

1. J.P. Tremblay and R. Manohar, *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw Hill, Reprint, 2006.

**UNIT I:** Chapter 1 [1.1, 1.2 (except 1.2.7, 1.2.10, 1.2.12 – 1.2.15), 1.3 (except 1.3.5 – 1.3.6), 1.4 (1.4.1, 1.4.2, 1.4.3) ]

**UNIT II:** Chapter 2 [2.1 (except 2.1.5 – 2.1.8), 2.3 (except 2.3.6) ]

**UNIT III:** Chapter 4 [4.1 (except 4.1.4) ]

2. Narsingh Deo, *Graph Theory with Applications to Engineering and Computer Sciences*, PHI, Twelfth Reprint, 1997.

**UNIT IV:** Chapter 1 (1.1, 1.2, 1.3, 1.5), Chapter 2 (2.1, 2.2, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9),

**UNIT V:** Chapter 3 (3.1, 3.2, 3.3, 3.5, 3.7 to 3.10), Chapter 4 (4.1 to 4.5),

Chapter 7 (7.1 to 7.4, 7.6, 7.7, 7.8, 7.9)

**Books for Reference:**

1. T.Veerajan, *Discrete Mathematics with Graph Theory and Combinatory*, Tata McGraw Hill Private Limited, 2011.

**SEMESTER - I : CORE - III**  
**COMPUTER ORGANIZATION AND ARCHITECTURE**

**Course Code : 14MCA1C3**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To understand the principles of digital computer logic circuits and their design. To understand the working of a central processing unit architecture of a computer

**UNIT I** **12 hours**

Number Systems – Decimal, Binary, Octal and Hexadecimal Systems – Conversion from one system to another – Binary Addition, Subtraction, Multiplication and Division – Binary Codes – 8421, 2421, Excess-3, Gray, BCD – #Alphanumeric Codes# – Error Detection Codes.

**UNIT II** **12 hours**

Basic Logic Gates – Universal Logic – Boolean Laws and Theorems – Boolean Expressions – Sum of Products – Product of Sums – Simplification of Boolean Expressions – Karnaugh Map Method (up to 4 Variables) – Implementation of Boolean Expressions using Gate Networks.

**UNIT III** **12 hours**

Combinational Circuits – Multiplexers – Demultiplexers – Decoders – Encoders – Arithmetic Building Blocks – Half and Full Adders – Half and Full Subtractors – Parallel adder – 2's Complement Adder – Subtractor – #BCD Adder#.

**UNIT IV** **12 hours**

Sequential Circuits – Flip Flops – RS, Clocked RS, D, JK, T and Master-Slave Flip Flops – Shift Register – Counters – Asynchronous, MOD-n and Synchronous Counters – BCD Counter – Ring Counter.

**UNIT V** **12 hours**

Central Processing Unit: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – #Data Transfer and Manipulation# – Program Control – Reduced Instruction Set Computer – CISC characteristics – RISC Characteristics.

# ..... # **self-study portion.**

**Text Books:**

1. Donald P. Leach, Albert Paul Malvino and Goutam Saha, *Digital Principles and Applications*, Tata McGraw Hill, Sixth Edition, Third Reprint, 2007.  
**UNIT I** : Chapter-5 Section (5.1-5.8)  
**UNIT II** : Chapter-2 Section (2.1-2.2), Chapter-3 Section (3.1, 3.2, 3.5, 3.7)  
**UNIT III**: Chapter-4 Section (4.1-4.3, 4.6), Chapter-6 Section (6.7, 6.8)
2. Thomas C. Bartee, *Digital Computer Fundamentals*, Tata McGraw-Hill, Sixth Edition, Twenty Fifth Reprint, 2006.  
**UNIT III** : Chapter-5 Section (5.1, 5.3, 5.10, 5.11)  
**UNIT IV** : Chapter-4 Section (4.1-4.9)
3. Morris Mano M, *Computer System Architecture*, Prentice Hall of India, Third Edition, 2008.  
**UNIT I**: Chapter-3 Section (3.5-3.6)  
**UNIT V**: Chapter-8 Section (8.2-8.8)

**Books for Reference:**

1. Morris Mano. M, *Digital Logic and Computer Design*, Prentice Hall of India, 2008.

## SEMESTER – I : CORE - IV COMPUTER GRAPHICS

**Course Code : 14MCA1C4**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

### **Objective:**

To present concepts on basic graphical techniques, raster graphics, two dimensional and three dimensional graphics.

### **UNIT I 12 hours**

**Overview of Computer Graphics System:** Video Display Devices – Raster Scan Systems – Random – Scan Systems - Graphics Monitors and Workstations – #Input Devices# – Hardcopy Devices – Graphics Software.

### **UNIT II 12 hours**

**Output Primitives:** Line Drawing Algorithms – Loading the Frame Buffer – Line Function – Circle – Generating Algorithms.

**Attributes of Output Primitives:** Line Attributes – Curve Attributes – Color and Grayscale levels – Area fill Attributes – #Character Attributes# – Bundled Attributes – Inquiry Functions.

### **UNIT III 12 hours**

**2D Geometric Transformations:** Basic Transformation – Matrix Representations – Composite Transformations – Window to View port Co-Ordinate Transformations.

**Clipping:** Point Clipping – Line Clipping – Cohen-Sutherland Line Clipping – Liang Barsky Line Clipping – Polygon Clipping – Sutherland – Hodgman Polygon Clipping – Curve Clipping – Text Clipping.

### **UNIT IV 12 hours**

**Graphical User Interfaces and Interactive Input Methods:** The User Dialogue – Input of Graphical Data – Input Functions – Interactive Picture Construction Techniques.

**Three Dimensional Concepts:** 3D-Display Methods – #Three Dimensional Graphics Packages#

### **UNIT V 12 hours**

**3D Geometric and Modeling Transformations:** Translation – Scaling – Rotation – Other Transformations.

**Visible Surface Detection Methods:** Classification of Visible Surface Detection Algorithm – Backface Detection – #Depth-Buffer Method# – A-Buffer Method – Scan-Line Method – Applications of Computer Graphics.

# ..... # **self-study portion.**

#### **Text Book:**

1. Donald Hearn M. Pauline Baker, Computer Graphics, Second Edition, Prentice Hall of India, New Delhi, 2005.

**UNIT I :** Chapter 2 Sections 2.1 - 2.7

**UNIT II :** Chapter 3 Sections 3.2 – 3.5 , Chapter 4 Sections 4.1 – 4.7

**UNIT III:** Chapter 5 Sections 5.1 – 5.3 , Chapter 6 Sections 6.3,6.6-6.10

**UNIT IV:** Chapter 8 Sections 8.1 – 8.3 , 8.5 , Chapter 9 Sections 9.1 – 9.2

**UNIT V :** Chapter 11 Sections 11.1-11.4, Chapter Sections 13.1-13.5

Chapter 1 Sections 1.1-1.8

#### **Books for Reference:**

1. William M. Newman, Robert F. Sproull, Principles of Interactive Computer Graphics, Second Edition, Tata McGraw Hill, 26th Reprint, 2011.

**SEMESTER - I : CORE - V**  
**MANAGEMENT INFORMATION SYSTEMS**

**Course Code : 14MCA1C5**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective :**

To understand the importance of Information Systems, how it relates to managerial end-users and the vital role of Information Technology in business.

**UNIT I**

**12 hours**

Foundations of Information Systems in Business: Foundation Concepts: Information System in Business. Foundation Concepts: The Components of Information Systems. Competing with Information Technology: Fundamentals of Strategic Advantage-#Using Information Technology#.

**UNIT II**

**12 hours**

E-Business Systems: E-Business Systems-Functional Business Systems. Enterprise Business Systems: Getting All the Geese Lined Up: Managing at the Enterprise Level. Enterprise Resource Planning: The Business Backbone. Supply Chain Management: The Business Network.

**UNIT III**

**12 hours**

Electronic Commerce Systems: Electronic Commerce Fundamentals-E-commerce Applications and Issues.

**UNIT IV**

**12 hours**

Decision Support Systems: #Decision Support in Business#-Artificial Intelligence Technologies in Business.

**UNIT V**

**12 hours**

Developing Business/IT Strategies: Planning Fundamentals-Implementation Challenges. Developing Business/IT Solutions: #Developing Business Systems#-Implementing Business Systems.

# ..... # **self-study portion.**

**Text Book :**

1. James A.O 'Brien and George M Marakas, *Management Information Systems*, Tata McGraw-Hill Publishing Company Limited, Ninth Edition, 2010.

**UNIT I** : Chapters 1 & 2

**UNIT II** : Chapters 7 & 8

**UNIT III** : Chapter 9

**UNIT IV** : Chapter 10

**UNIT V** : Chapters 11 & 12

**Books for Reference:**

1. W.S. Jawadekar, *Management Information Systems*, Tata McGraw Hill Publishing Company Limited, 1998.

**SEMESTER - I : CORE - VI  
C PROGRAMMING LAB**

**Course Code : 14MCA1C6P**  
**Hours/Week : 4**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

- 1a. The basic salary is input through the keyboard. The dearness allowance is 40% of basic salary, and house rent allowance is 20% of basic salary. Write program to calculate the gross salary.
- b. Write program to obtain the sum of the first and last digit of a given number.
  
- 2a. Any integer is input through the keyboard. Write a program to determine whether it is an odd number or even number.
- b. Given the length and breadth of a rectangle, write a program to find whether the area of the rectangle is greater than its perimeter.
  
- 3a. If the ages of three persons are input through the keyboard, write a program to determine the youngest and oldest of the three.
- b. Write program to find the greatest of the three numbers entered through the keyboard using conditional operators.
  
- 4a. Two numbers are entered through the keyboard. Write a program to find the value of one number raised to the power of another.
- b. Write a program to print all prime numbers from 1 to 300.(Using nested loops, break and continue)
  
- 5a. Write a menu driven program which has following options:
  - i. Factorial of a number.
  - ii. Prime or not.
  - iii. Perfect number or not
  - iv. Armstrong number or not.
- b. Write a function to calculate the factorial value of any integer entered through the keyboard.
  
- 6a. A positive integer is entered through the keyboard. Write a function to obtain the prime factors of this number. (For example, prime factors of 24 are 2,2,2 and 3, whereas prime factors of 35 are 5 and 7.)
- b. Write a program using function to swap two numbers using pointers.
  
7. Write down the macro definition for the following:
  - a. To convert an uppercase alphabet to lowercase
  - b. To find arithmetic mean of two numbers
  
- 8a. Write a program to find the largest and smallest numbers from an  $m \times n$  matrices.
- b. Write a program for performing addition and multiplication of two matrices.

- 9a. Write a program to sort a set of names stored in an array in alphabetical order.
  - b. Write a program to delete all vowels from a sentence. Assume that the sentence is not more than 80 characters long.
- 
- 10 a. Write a program to display pay slip for an employee
  - b. Write a program to display any five student's mark details using array of structure.
- 
- 11a. Write a program to count chars, spaces, tabs, and newlines in a file.
  - b. Write a program takes the contents of a file and copies them into another file, character by character.



**SEMESTER - I : CORE - VII  
MULTIMEDIA LAB**

**Course Code : 14MCA1C7P**  
**Hours/Week : 4**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Flash**

**WORKING WITH TOOLS**

- Draw few different shapes using the tools available
- Reshape some of the shapes which you have created. Hint : Using the Arrow tool.
- Design a background for a web page.

**USING TOOLS & CREATING ANIMATIONS**

- Design few figures.
- Reshape the figures for animation. Animate any one of the figure, designed by you.  
Hint: Using the Modify - > & Frame-by-frame animation.

**MORE ON ANIMATIONS**

- Design few shapes using line, circle and rectangle, in different layers. Create animations of these shapes. Hint : Motion tween.
- Draw a shape in 1st keyframe and a different shape in 2nd keyframe. Create an animation. Hint : Shape tween.

**ANIMATION USING LAYER MASK**

- Create a scene (Base of a Sea (under water)). Create few fishes. Animate the fishes (some in-front of the objects, some behind the objects).
- Create a spot light Animation using the layer mask option.

**ANIMATION USING SHAPE HINTS**

- Draw the two shapes given below. Animate the smiley face to the sad face.  
Hint : Use shape hints.

**WORKING WITH BUTTONS.**

- Create a simple animation. Insert two buttons named “Play” & “Stop”. Give action to these two buttons as per their name. (Stop will stop the animation and play will start the animation again)
- Create an animation of text (Welcome to Bharathidasan University), in which the text is shown in the screen gradually. Create a button “Link” and link this button with “www.jmc.edu”.

**Photoshop**

1. Two images layer masking
2. Compose old images to new images
3. Compose New images to old images
4. Wind effect for an image
5. Create a own background using various tools
6. Color management
7. Pattern filling
8. Image slicing (use path tool, marquee tools)

**SEMESTER - II : CORE - VIII**  
**OBJECT ORIENTED PROGRAMMING WITH C++**

**Course Code : 14MCA2C8**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective :**

To impart Object Oriented Programming skills using C++

**UNIT I**

**12 hours**

What is Object Oriented Programming? – C++ Console I/O – C++ Comments – Some Differences between C and C++ – Introducing Function Overloading – Constructor and Destructor Functions – Constructors Take Parameters – Introducing Inheritance – # Object Pointers # – Inline Functions – Automatic inlining.

**UNIT II**

**12 hours**

Assigning Objects – Passing Object to Functions – Returning Object from Functions - An Introduction to Friend Functions – Arrays of Objects – Using Pointers to Objects – Using New & Delete – More about new & delete – References – Passing References to Objects – Returning References – # Independent References and Restrictions #.

**UNIT III**

**12 hours**

Overloading Constructor Functions – Creating and Using a Copy Constructor – Using Default Arguments – Overloading and Ambiguity – # Finding the Address of an Overload Function # – The Basics of Operator Overloading – Overloading Binary Operators –Overloading the Relational and Logical Operators – Overloading a Unary Operator – Using Friend Operator Functions – A Closer Look at the Assignment Operator – Overloading the [ ] Subscript Operator.

**UNIT IV**

**12 hours**

Base Class Access Control – Using Protected Members – Constructors, Destructors and Inheritance – Multiple Inheritance – Virtual Base Classes – Some C++ I/O Basics – Formatted I/O – Using width(), precision() and fill() – Using I/O Manipulators – # Creating your own Inserters – Creating Extractors #.

**UNIT V**

**12 hours**

Creating your own Manipulators – File I/O Basics – Unformatted, Binary I/O – More Unformatted I/O Functions – Random Access – Checking the I/O Status – Customized I/O and Files – # Pointers to Derived Classes # – Introduction to Virtual Functions – More about Virtual Functions – Applying Polymorphism – Templates and Exception Handling

# ..... # **self-study portion.**

**Text Book:**

Herbert Schildt, *Teach Yourself C++*, TMH, Third Edition, Eighteenth Reprint, 2008.

**UNIT I** : Chapters 1 and 2

**UNIT II** : Chapters 3 and 4

**UNIT III**: Chapters 5 and 6

**UNIT IV** : Chapters 7 and 8

**UNIT V** : Chapters 9, 10 and 11

**Books for Reference:**

1. Robert Lafore, *Object - Oriented Programming in Turbo C++*, Galgotia, Reprinted, 2002.
2. E. Balagurusamy, *Object Oriented Programming with C++*, TMH, Fourth Edition, 2<sup>nd</sup> Reprint, 2008.

**SEMESTER - II : CORE - IX**  
**NUMERICAL AND STATISTICAL METHODS**

**Course Code : 14MCA2C9**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To provide the basic concepts used in Numerical and Statistical methods for solving problems.

**UNIT I**

**12 hours**

Error – Types of Errors-Solution of Algebraic and Transcendental Equations-Bisection – False Position – Newton Raphson – Iteration – Simultaneous Linear Algebraic Equations – Gauss Elimination – ill Conditioned Equations – #Gauss-Jordon Method# – Gauss Seidel Methods.

**UNIT II**

**12 hours**

Interpolation – Difference Table – Newton’s Forward and Backward Differences – Lagrange’s Interpolation – Numerical Integration – Trapezoidal and Simpson’s Rule Differential Equations – Euler Method –#Runge#-Kutta Methods.

**UNIT III**

**12 hours**

Sample Space – Events - Probability – Probability Axioms – Addition and Multiplication Law of Probabilities – Conditional Probability – Independent Events – #Baye’s Theorem# – Random Variables (One dimensional only) – Distribution Functions.

**UNIT IV**

**12 hours**

Mathematical Expectations – Moment Generating Functions – Discrete Distributions – Binomial – Poisson – Continuous Distributions – #Normal Distributions#.

**UNIT V**

**12 hours**

Sampling – Types of Sampling – Testing of Hypothesis – Test of Significance of Small Samples – Test Based on Single Mean, Difference of Means – Chi-Square Test – Test of Goodness of Fit.

# ..... # **self-study portion.**

**Text Books:**

1. S. Sastry, *Introductory Methods of Numerical Analysis*, Third Edition, 2008. [UNIT I, II]  
UNIT I: Chapter 1: 1.4 only, Chapter 2: [2.2, 2.4, 2.5], Chapter 6: [6.3.2, 6.3.7, 6.4]  
UNIT II: Chapter 3: [3.3.1, 3.3.2, 3.6, 3.9.1], Chapter 5: [5.4.1, 5.4.2], Chapter 7: [7.4, 7.5]

2. S.C Gupta and V.K Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand and sons, 1999.

**UNIT III, IV & V**

UNIT III : Chapter 3:[3.8.1, 3.8.2, 3.8.3, 3.8.4, 3.8.5, 3.9:3.9.1, 3.10, 3.12],

Chapter 4: 4.2 only, Chapter 5: [5.1, 5.2, 5.3, 5.4:5.4.1, 5.4.2, 5.4.3],

UNIT IV : Chapter 6:[6.1, 6.2, 6.4, 6.5, 6.6], Chapter 7:7.1 only, Chapter 8:[8.4, 8.5],  
Chapter 9:9.2 only.

UNIT V : Chapter 14:[14.1, 14.2, 14.4], Chapter 15:[15.6.2, 15.6.3],  
Chapter 16:[16.3.1, 16.3.2, 16.6.1]

**Books for Reference:**

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, *Numerical Methods for Science and Engineering Computations*, New Age International(P) Limited Publishers, Third Edition, Seventh Reprint, 1999.

**SEMESTER - II : CORE - X**  
**PRINCIPLES OF OPERATING SYSTEMS**

**Course Code : 14MCA2C10**

**Hours/Week : 4**

**Credit : 4**

**Maximum Marks : 100**

**Internal Marks : 40**

**External Marks : 60**

**Objective :**

To present fundamental aspects of various managements in an operating system

**UNIT I**

**12 hours**

Operating Systems Objectives and Functions – Operating System and User / Computer Interface, Operating System as a Resource Manager: Evolution of Operating Systems – #Serial Processing#, Sample Batch Systems, Multi Programmed Batch Systems, Time Sharing Systems.

**UNIT II**

**12 hours**

Process Description, Process Control – Processes and Threads, Concurrency – Principles of Concurrency, Mutual Exclusion – Deadlock Prevention, Deadlock Detection, Deadlock Avoidance. Memory Management – #Memory Management Requirements# – Fixed Partitioning, Placement algorithm, Relocation in a Paging System – Sample Segmentation.

**UNIT III**

**12 hours**

Virtual Memory – Paging – Address Translation in a Paging System, Segmentation – Organization, Address Translation in a Segmentation System – Combined Paging and Segmentation – #Virtual Memory# – Operating System Software – Fetch Policy, Placement Policy and Replacement Policy.

**UNIT IV**

**12 hours**

Scheduling – Types of Scheduling, Scheduling Algorithms, Scheduling Criteria, FIFO, Round Robin, Shortest Process Next, Shortest Remaining Time, Feedback Scheduling – Fairshare Scheduling.

**UNIT V**

**12 hours**

I/O Management and disk scheduling – Organization of the I/O function – the Evaluation of the I/O Function, Logical Structure of the I/O Function, I/O Buffering, Disk I/O - Disk Scheduling Algorithms, Disk Cache. File Management – Files, File Management Systems, Secondary Storage Management – #File Allocation#.

**# ..... # self-study portion.**

**Text Books:**

1. William Stallings, *Operating Systems*, Second Edition, Maxwell McMillan, International Editions, 1997.
2. Charles Crowley, *Operating Systems – A Design Oriented Approach*, IRWIN Publication, 1998.

**UNIT I** : Chapter II : Section 2.1-2.2

**UNIT II** : Chapter III : Section 3.2-3.5 , Chapter IV : Section 4.1-4.3

Chapter V : Section 5.1-5.4 , Chapter VI : Section 6.1-6.3

**UNIT III** : Chapter VII : Section 7.1-7.3

**UNIT IV** : Chapter VIII : Section 8.1-8.3

**UNIT V** : Chapter X : Section 10.2-10.5 , Chapter XI : Section 11.2-11.6

**Books for Reference:**

1. Dental H.M., *An Introduction to Operating Systems*, Addison Wesley Publishing Co., 1998.
2. Saiberschatz A. Peterson J.L., Galvan P. *Operating System Concepts*. Third Edition, Addison Wesley Publishing Co., 1992.

**SEMESTER – II : CORE - XI**  
**DATABASE SYSTEMS**

**Course Code : 14MCA2C11**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To impart knowledge about relational database and distributed database.

**UNIT I**

**12 hours**

Introduction: Database System Applications – Database Systems Versus File Systems – Views of Data – Data Models – Database Languages-Database Users and Administrators. ER Model: Basic Concepts – Constraints-Keys – #ER Diagram# – Weak Entity Sets.

**UNIT II**

**12 hours**

Relational Model: Structure-Relational Algebra-Tuple Relational Calculus- Domain Relational Calculus. Relational Databases: SQL- Basic Structure-Set Operations-Aggregate Functions-Nested Subqueries - Views-Modification of Database-Joined Relations- Data definition language - #Query By Example#.

**UNIT III**

**12 hours**

Relational Database Design: Pitfalls in Relational Database Design. Functional Dependencies: Basic Definitions- Trivial and Nontrivial Dependencies-Closure of a set of Dependencies – Non-loss Decomposition - First, Second and Third Normal Forms-Boyce/Codd Normal Form- Multivalued Dependencies and Fourth Normal Form-#Join Dependencies#.

**UNIT IV**

**12 hours**

Transactions: Concepts – State – Concurrent Executions - Serializability- Testing for Serializability. Concurrency Control: Lock-Based Protocols-Timestamp Based Protocols- Validation Based Protocols. Recovery System: Failure Classification-Storage Structure-Recovery and Atomicity-Log Based Recovery.

**UNIT V**

**12 hours**

Database System Architectures: Centralized and C/S Architectures-Server System Architectures-Distributed Systems. Distributed Database: Homogeneous and Heterogeneous Database-Distributed Data Storage-Distributed Transactions-Commit Protocols – Concurrency Control in Distributed Database - #Heterogeneous Distributed System#.

..... # self-study portion.

**Text Books:**

1. Abraham Silberschatz, Henry F. Korth, S. Suderson, *Database System Concepts*, McGraw-Hill International Edition, Fourth Edition, 2002.

**UNIT I** : Chapter 1 (1.1 to 1.6) Chapter 2 (2.1 to 2.3, 2.5, 2.6)

**UNIT II** : Chapter 3 (3.1, 3.2, 3.6, 3.7) Chapter 4 (4.1 to 4.4, 4.6, 4.7, 4.9, 4.10, 4.11)  
Chapter 5 (5.1)

**UNIT III** : Chapter 7(7.2)

**UNIT IV** : Chapter 15 (15.1, 15.2, 15.4, 15.5, 15.9) Chapter 16 (16.1 to 16.3)  
Chapter 17(17.1 to 17.4)

**UNIT V** : Chapter 18(18.1, 18.2, 18.4) Chapter 19 (19.1 to 19.5, 19.8)

2. C.J Date, *An Introduction to Database System*, Seventh Edition Pearson Education Asia, 1999

**UNIT III:** Chapter (10.2 to 10.4) Chapter (11.2, 11.3, 11.5), Chapter (12.2, 12.3)

**Reference Books:**

1. Ramez Elmasri, Shamkant B.Navathe, *Fundamentals of Data Base Systems*, Addison Wesley, Third Edition, 2000.
2. Thomas Connolly and Carolyn Begg, *Database System*, Fourth Edition, Pearson Education, 2009.

**SEMESTER - II : CORE - XII**  
**ACCOUNTING AND FINANCIAL MANAGEMENT**

**Course Code : 14MCA2C12**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective :**

To present the whole range of book keeping & accountancy and to give comprehensive coverage to management accounts.

**UNIT I** **12 hours**

Accounting Principles and Concepts – Double Entry Book Keeping – Income and Expenditure – Accounting Record and System – #Assets and Liabilities#

**UNIT II** **12 hours**

Journal – Ledger – #Trial Balance# – Trading, Manufacturing and Profit and Loss Account – Balance Sheet

**UNIT III** **12 hours**

Analysis and Interpretation of Financial Statements with Ratios

**UNIT IV** **12 hours**

Cost Accounting – Methods and Techniques of Cost Accounting – Classifications of Cost – Material Cost – Labour Cost – Overhead – Fixed and Variable Cost – Cost-Volume – Profit Analysis – #Marginal Costing and Decision Making#

**UNIT V** **12 hours**

Budgeting and Budgetary Control – Types of Budgets – Preparation of Various Functional Budgets – Preparations of Cash Budgets – Flexible Budgets – Advantages of Budgeting and Budgetary Control.

# ..... # **self-study portion.**

**Text Books:**

1. K.L. Nagarajan, N. Vinayakam, P.L. Mani, *Principles of Accountancy*, EURASIA Publishing House (PVT) Ltd., Revised Edition, 2002.  
**UNIT I** : Chapter-1  
**UNIT II** : Chapter-2, 4, 6
2. S.N. Maheswari, *Principles of Management Accounting*, Sultan Chand & Sons, 2001.  
**UNIT III** : Section-B Chapter-1, 2  
**UNIT IV** : Section-C Chapter-4  
**UNIT V** : Section-C Chapter-1

**Books for Reference:**

1. M.C. Shukla, T.S. Grewal, *Advanced Accounts*, S.Chand & Company Pvt., Ltd, Eleventh Edition, Reprinted, 1988.
2. M.Y. Khan and P.K. Jain, *Financial Management: Text, Problems and Cases*, Tata McGraw Hill, Fourth Edition, 2007.

**SEMESTER - II : CORE - XIII**  
**OBJECT ORIENTED PROGRAMMING LAB**

**Course Code : 14MCA2C13P**  
**Hours/Week : 4**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

1. Programs using classes and objects
2. Constructors & Destructors
3. Function Overloading
4. Operator Overloading
5. Single & Multi-dimensional arrays
6. Arrays of objects, Passing objects and Arrays as function arguments
7. String manipulation using pointers
8. Inheritance
9. Dynamic Polymorphism – Virtual Functions
10. Formatted I/O and File operations

**SEMESTER - II : CORE - XIV  
SHELL PROGRAMMING LAB**

**Course Code : 14MCA2C14P**  
**Hours/Week : 4**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

- 1). Write a Shell program, which accepts the name of a file from the standard input and performs the following tests on it:
  - (i) File existence
  - (ii) File readable
  - (iii) File writeable
  - (iv) Both readable and writeable
  
- 2). Write a Shell program using 3 arguments to take the pattern as well as input and output file names. If the pattern is found display "Pattern found", else display "Error message". Also check if right number of arguments is entered.
  
- 3). Write a Shell program, which accepts the name of the file from the standard input and then performs the following tests on it:
  - (i) Enter the 5 names in a file
  - (ii) Sort the names in existing file
  - (iii) List unsorted and sorted file
  - (iv) Quit
  
- 4). Write a menu driven Shell program to copy, edit, rename, and delete a file.
  
- 5). Write a menu driven Shell program to perform the following tasks
  - (i) Enter the sentence in file
  - (ii) Search a given whole word in an existing file
  - (iii) Quit
  
- 6(a). Write a Shell program to prepare the electricity bill based on the following rules.

For first 100 units	-	Rs. 1.00 / unit
For next 100 units	-	Rs. 2.00 / unit
Above 200 units	-	Rs. 3.00 / unit
  
- 6(b). Write a Shell program to prepare the electricity bill based on the following conditions. (Illustrates bc utility)

For first 100 units	-	Rs. 0.75 / unit
For next 100 units	-	Rs. 1.50 / unit
Above 200 units	-	Rs. 3.00 / unit



7). Write a Shell script to sum up the following series.

$$\frac{1}{1!} + \frac{2}{2!} + \frac{3}{3!} + \dots$$

8(a). Write a Shell script to display the result “PASS” or “FAIL” using the information given below:

Student Name, Student Register Number, Mark1, Mark2, Mark3, Mark4.  
The minimum pass for each subject is 50.

8(b). Write a Shell script to display the result of a student in neat format using the information given below:

Student Name, Student Register Number, Mark1, Mark2, Mark3, Mark4.  
The minimum pass for each subject is 50.

9). Write a menu driven Shell script for converting all the capital letters in a file to small case letters and vice versa.

10). Write a Shell script for a file contains records with each record containing name of city, name of state and name of country. How would you sort this file with country as the primary sort key and state as the secondary sort key.

11). Merge the contents of three given files, sort them and display the sorted output on the screen page by page.

Display the list of last 20 files present in the current directory. Also store this list in a file name `-profile`.

12). Enhance the `cp` command to copy files. Display the necessary error message if error occurs.

13). Write a Shell script to check the user is eligible for vote or not. (One must attain 18 years for voting. Ignore month differences.)

14). Write a Shell script to do the following on the files of the current directory based on file extensions.

- Move all the C language files in to the subdirectory `-C` (under the root directory of the current user)
- Move all the Shell scripts in to the subdirectory `-shell`
- Move all the Text files in to the subdirectory `-text`
- Move all the Java files in to the subdirectory `-java`

15). Write a Shell script to check whether a given string is Palindrome or not. (Palindrome: The given string and its reverse are same).

**SEMESTER - I & II : SKILL BASED COURSE-I  
COMMUNICATION SKILLS**

**Course Code : 14MCA2S1**  
**Hours/Week : 2 + 2**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 100**

**Course Fully Internal; Examination at the end of Semester II**

**Objective :**

To Empower the students with sufficient ability, usage of vocabulary and styles of usage of English language.

**UNIT I**

**Listening Comprehension**

- Global as well as local comprehension based on the listening to audio cassettes; A communicative interaction is to be set up in the class room.
- Testing accuracy of comprehension by asking ‘yes’ or ‘no’ questions.
- Meaning of words the students find difficult, is to be given.
- Pronunciation and intonation of words and sentences

**Materials used:**

1). Sweet and Salty – A Folk Tale, 2) The Magic Vessels – A Folk Tale, 3) The Crows and Serpent – A Karadi Tale, 4) The Monkey and Crocodile – A Karadi Tale, 5) Keep up your English – Cassette 3, 8) Tiger’s Eye – Cassette 1, 9) Tiger’s Eye- Cassette 2, 10) Tiger’s Eye- Cassette 3.

**UNIT II**

**Video Viewing:**

- Introducing students to foreign accent
- Interaction based on certain important aspects of the clipping used
- Discussion of the theme and moral aspects in an interactive way

**Materials used:**

1) The King and I, 2) Beethoven’s 2<sup>nd</sup> 3) Titanic, 4) The Sound of Music, 5) Mrs. Doubtfire

**UNIT III**

**Grammar and Reading Comprehension:**

Test book used: “Strengthen Your English” (Second Edition) by Bhaskaran and Horsburgh

- Rules on usage are to be explained clearly
- Examples apart from the ones in the text are to be given
- Students are made to answer the exercise following the rules on usage
- The Comprehension questions following the reading passage are to be answered
- To improve the usage of rules pertaining to the topic, a guided composition exercise is to be done.

## UNIT IV

### Speech Practice and Presentation Skills:

- ✓ Speech Preparation: Writing out the speech / Presentation materials with coherence and cohesion

### Delivery and speech presentation:

- ✓ Installing confidence and getting ride of stage fear by asking students speak in front of the class
- ✓ Adhering to the policy of “ Fluency first and accuracy gradually”
- ✓ Building up learner confidence through encouragement and appreciation.

## UNIT V

### Interview Skills:

- (a) Preparation
  - Introducing yourself
    - Traits employers look for in applicants
    - Self Inventory (Experience – Skills - Qualities)
    - Your USP
    - CV and Letter of Application
    - First Impression
- (b) Presentation
  - First Impression
  - Role of Body Language
  - Answering questions
  - Certain Do's and Don'ts
- (c ) Post Presentation
  - Mock Interview and Assessment
  - Guest Lecturers by HR personnel.

## UNIT VI

### Group Dynamics / Discussion:

- Interaction and communication in Group Discussion
- Organisation principles in Group Discussion
- Do's and Don'ts of Group discussion
- Practical Sessions in Group Discussion

### Books for Reference

1. Larry L. Barker, Communication, 3<sup>rd</sup> Edition, Prentice Hall, London, 1984.
2. Mohan, Krishna and Meera Banerji, Developing Communication Skills, Delhi - Macmillan, 1990.
3. Stanton, Nicky, Mastering Communication, Hampshire: Pal grave, 1982.
4. H.M. Prasad, Group Discussion and Interview, Tata McGraw Hill Publishing Company Limited, New Delhi, 2001.
5. Edgar Thorpe and Showick Thorpe, Winning at Interviews, Pearson Education, New Delhi, 2004.
6. Hemant Goswami, How to be successful in Interviews and get a job, Chandika Press Ltd, Chandigarh, 2001.
7. G. Ravindran, S.P. Benjamin Ilango, L. Arockiam, “Success Thru Soft Skills”, IFCOT Publications, 2008.

**SEMESTER – II**  
**SUMMER PROJECT WORK – I**

**Course Code : 14MCA2PW1**  
**Hours/Week : -**  
**Credit : 2**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Students carry out a Project Work during Summer Vacation at the end of Semester II**

**System Study: 10 days**

**Project Development: 3 weeks    18 days x 5 hours per day = 90 hours**

**Report Preparation: 5 days**

**SEMESTER – III : CORE - XV  
PROGRAMMING IN JAVA**

**Course Code : 14MCA3C15**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective :**

To Impart sound knowledge in Object Oriented Programming skills in JAVA

**UNIT I**

**12 hours**

An overview of Java – Java Buzzwords- Data Types, Variables and Arrays - Operators – Control Statements- Introducing Classes: Class Fundamentals – Declaring Objects – Introducing Methods – Constructors – The **this** keyword – Garbage Collection – Overloading Methods – Call by value, Call by reference – #Recursion# – Understanding static – final – Nested and Inner classes.

**UNIT II**

**12 hours**

Inheritance: Inheritance Basics – Using super – Method overriding –Dynamic Method Dispatch- Using Abstract Classes - Final with Inheritance- Object class. Packages and Interfaces: Declaring Packages – #Access Protection# – Importing Packages – Defining, Implementing, Applying Interfaces - Exception Handling: Exception Types – try, catch – throw – throws – finally –multiple catch and nested try statements- Creating User-defined Exception classes.

**UNIT III**

**12 hours**

Multithreaded Programming: The Java Thread Model – Creating a Thread –Creating Multiple Threads-Thread Priorities- Synchronization – #Inter-thread communication. String Handling# –The Collection Interfaces and Collection Classes: List,Set,Map,Enumeration and Iterator interfaces-ArrayList, LinkedList, Vector, Stack,Properties,HashTable, StringTokenizer, and Date classes.

**UNIT IV**

**12 hours**

Files and IO Streams: File – The Byte Streams: InputStream, Output Stream, FileInputStream,FileOutputStream, PipedInputStream and PrintStream – The Character Streams: Reader, Writer. FileReader and FileWriter – Serialization. Networking- Networking classes and interfaces: InetAddress class -#TCP/IP Client and Server sockets#–Datagrams – URL and URLConnection classes.

**UNIT V**

**12 hours**

Introduction to Applet class- Applet Architecture- The HTML APPLET tag – Passing parameters to Applets – Event handling: The Delegation Event Model, Event Classes, Event Listener Interfaces - Working with Graphics, Color and Font classes - Understanding Layout managers- Swing Component classes: JApplet, JFrame and JDialog - Text Fields, Buttons, Combo boxes, List ,Tabbed and Scroll Panes.Understanding Layout managers.

# ..... # **self-study portion.**

**Text Book:**

1. Herbert Schildt, *The Complete Reference Java 2*, Fifth Edition, TMH Education Pvt. Ltd., 2009.

**UNIT I** : Chapter 1 to 7

**UNIT II** : Chapter 8 to 10

**UNIT III** : Chapter 11,13, and 15, 16

**UNIT IV** : Chapter 17 and 18

**UNIT V** : Chapter 19 to 22, and 26

**Books for Reference:**

1. Herbert Schildt with Joe O' Neil, *Java – Programmer's Reference*, TMH, 2000.

**SEMESTER - III : CORE - XVI  
OPTIMIZATION TECHNIQUES**

**Course Code : 14MCA3C16**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To understand the basic concepts of operations research and to impart the knowledge on various operations research techniques and their applications.

**UNIT I**

**12 hours**

Operations Research – Nature and Features of O.R.- Definitions of O.R. - Applications of O.R. - Linear Programming Problem - Mathematical Formulation of the Problem - Graphical Solution Method – Simplex Method – The Computational Procedure - Use of Artificial Variables - Big-M Method - # Two-Phase Method #.

**UNIT II**

**12 hours**

Transportation Problem – # Linear Programming Formulation of the Transportation Problem # - Finding an Initial BFS – North-West Corner Rule – Matrix Minima Method – Vogel's Approximation Method – Test for Optimality - Assignment Problem – Mathematical Formulation of the problem - Hungarian Assignment Method.

**UNIT III**

**12 hours**

Network Scheduling by PERT / CPM – Network: Basic Components – Logical Sequencing – Rules for Network Construction – Concurrent Activities – Critical Path Analysis – Probability Considerations in PERT – # Distinction between PERT and CPM #.

**UNIT IV**

**12 hours**

Inventory Control – Types of Inventories – Reasons for Carrying Inventories – The Inventory Decisions – Objectives of Scientific Inventory Control – Costs Associated with Inventories – # Factors Affecting Inventory Control # – An Inventory Control Problem – The Concept of EOQ – Deterministic Inventory Problems with No Shortages – Deterministic Inventory Problems with Shortages.

**UNIT V**

**12 hours**

Queueing Theory - Queueing System – Elements of a Queueing System – Operating Characteristics of a Queueing System – Classification of Queueing Models – Definition of Transient and Steady States – (M/M/1):(∞ /FIFO) - (M/M/1):(N/FIFO) - (M/M/C):(∞ /FIFO) - # (M/M/C):(N/FIFO) #.

Note : Stress to be on solving numerical problems only.

# ..... # **self-study portion**

**Text Book:**

1. Kanti Swarup, P.K. Gupta and Man Mohan, *Operations Research*, Sultan Chand & Sons. Educational Publishers, New Delhi, Reprint 2008.

**UNIT I:** Chapters 1 (Sec. 1:1, 1:3, 1:10), 2 (Sec. 2:1, 2:2, 2:3), 3 (Sec. 3:1, 3:2) 4 (Sec. 4:1, 4:3, 4:4)

**UNIT II:** Chapters 10 (Sec. 10:1, 10:2, 10:9, 10:10), 11 (11:1, 11:2)

**UNIT III:** Chapter 25 (Sec. 25:1 – 25:8)

**UNIT IV:** Chapter 19 (Sec. 19:1 – 19:11)

**UNIT V:** Chapter 21 (Sec. 21:1 – 21:4, 21:7 - 21:9)

**Books for Reference :**

1. Hamdy A. Taha, *Operations Research : An Introduction*, PHI, New Delhi, 8<sup>th</sup> Edition, 2008.
2. A. Ravindran, Don T. Phillips, James J. Solberg, *Operations Research Principles and Practice*, John Wiley & Sons, Second Edition, Third Reprint 2007.

**SEMESTER - III : CORE - XVII  
COMPUTER NETWORKS**

**Course Code : 14MCA3C17**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To provide an overall knowledge in computer communication networks concepts and its implementation details in the Internet

**UNIT I**

**12 hours**

Introduction – Uses of Computer Networks – Network Hardware: LAN-MAN-WAN – Networks Software: Protocol Hierarchies – Reference models: OSI - TCP/IP.  
The Physical Layer: Guided Transmission Media - The Public Switched Telephone Network: Structure of the Telephone System – #Switching#

**UNIT II**

**12 hours**

The Data Link Layer: Design Issues –Error Detection and Correction – Elementary Data Link Protocol – Sliding Window Protocol – HDLC.  
The Medium Access Control Sub Layer: Multiple Access Protocol: CSMA Protocol – Collision Free Protocol – Data Link Layer Switching: Repeaters, Hub, Bridges, Switches, Router, and Gateways - #Bluetooth#.

**UNIT III**

**12 hours**

The Network Layer: Design Issues – Routing Algorithms: Optimality Principle – Shortest path – Distance Vector – Link State – Hierarchical – Broadcasting – #Congestion Control algorithms# – The network layer in internet: IP protocol – IP address.

**UNIT IV**

**12 hours**

The Transport Layer: The Transport Service: Service provided to the Upper Layer – Transport Service Primitives – Berkeley Sockets - Elements of Transport Protocols – The Internet Transport Protocol: UDP: Introduction – #RPC# - TCP: Service Model – TCP Segment Header. The Application Layer: DNS – E-Mail: Architecture and Services – Message Formats.

**UNIT V**

**12 hours**

Network Security: Cryptography: introduction – Substitution and Transposition Cipher – Symmetric-key Algorithm: DES – Public-key Algorithms: RSA – Digital Signature: Symmetric and Public key Signature – #Communication Security#: Firewalls – VPN. Authentication Protocol: Authentication based on shared key – Diffie-Hellman key Exchange.

# ..... # self-study portion.

**Text Book:**

1. Andrew S. Tanenbaum, *Computer Networks*, PHI, Fourth Edition, 2003.

**UNIT I:** Chapter 1 (1.1, 1.2(1.2.1 to 1.2.3), 1.3(1.3.1), 1.4(1.4.1, 1.4.2)

Chapter 2 (2.2, 2.5(2.5.1, 2.5.5)

**UNIT II:** Chapter 3(3.1, 3.2, 3.3, 3.4, 3.6.1), Chapter 4(4.2.2, 4.2.3, 4.6, 4.7.5)

**UNIT III:** Chapter 5 (5.1, 5.2(5.2.1, 5.2.2, 5.2.4, 5.2.5, 5.2.6, 5.2.7), 5.3, 5.6(5.6.1, 5.6.2)

**UNIT IV:** Chapter 6 (6.1(6.1.1 to 6.1.3), 6.2, 6.4.1, 6.4.2, 6.5.2, 6.5.4.

Chapter 7 (7.1, 7.2.1, 7.2.3)

**UNIT V:** Chapter 8 (8.1.1, 8.1.2, 8.1.3, 8.2.1, 8.3.1, 8.4.1, 8.4.2, 8.6.2, 8.6.3, 8.7.1, 8.7.2)

**Books for Reference:**

1. William Stallings, *Data and Computer Communication*, PHI, Eighth Edition, 2009

2. Behrouz A. Forouzan, *Data Communications and Networking*, Third Edition, Tata McGraw Hill, 2003.

**SEMESTER - III: CORE - XVIII**  
**DATA STRUCTURES AND ALGORITHMS**

**Course Code : 14MCA3C18**  
**Hours : 4**  
**Credits : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To give a detailed knowledge on Data structures and to give an exposure in the development of algorithms related to data structures.

**UNIT I** **12 hours**

**Lists, Stacks and Queues:** Abstract Data Types (ADTs) - The Stack ADT - #The Queue ADT#

**UNIT II** **12 hours**

**Trees:** Preliminaries - Binary Trees - The Search Tree ADT (Binary Search Trees) - AVL Trees - #Splay Trees# - Tree Traversals - B-Trees.

**UNIT III** **12 hours**

**Sorting:** Preliminaries - Insertion Sort - A Lower Bound for Simple Sorting Algorithms – Shellsort – Heapsort – Mergesort – Quicksort - Sorting Large Structures - A General Lower Bound for Sorting - Bucket Sort - External Sorting.

**UNIT IV** **12 hours**

**Graph Algorithms:** Definitions - Topological Sort - Shortest Path Algorithms - Network Flow Problems - Minimum Spanning Tree - Applications of Depth First Search - #Introduction to NP-Completeness#.

**UNIT V** **12 hours**

**Algorithm Design Techniques:** Greedy Algorithms - Divide and Conquer - Dynamic Programming - Randomized Algorithms - #Backtracking Algorithms#.

# ..... # self-study portion.

**Text Book:**

1. Mark Allen Weiss, “*Data Structures an Algorithm Analysis in C*”, Pearson publishing Company Limited, Second Edition, Reprint, Eleventh Impression 2009.

**UNIT I** : Chapter 3 Section 3.1 , 3.3 , 3.4

**UNIT II** : Chapter 4 Section 4.1 – 4.7

**UNIT III** : Chapter 7 Section 7.1 – 7.11

**UNIT IV** : Chapter 9 Section 9.1 – 9.7

**UNIT V** : Chapter 10 Section 10.1 – 10.5

**Books for Reference:**

1. Seymour Lipschutz, *Data Structures*, Schaum’s Outlines, Tata McGraw Hill Publishing Company Limited, Fourth Reprint, 2006.



**SEMESTER - III : CORE BASED ELECTIVE-I  
MULTIMEDIA SYSTEMS AND DESIGN**

**Course Code : 14MCA3CE1**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To provide a sound knowledge in various concepts of Multimedia and its applications.

**UNIT I** **12 hours**

Introduction – Definition – Multimedia Hardware – #Multimedia Software# – Multimedia Networking – Multimedia Applications – Multimedia Environments – Multimedia Computer Components – Multimedia Standards – Multimedia PC.

**UNIT II** **12 hours**

Multimedia Information Systems : Limitations in workstation Operating Systems .  
Middleware System services Architecture: Goals of Multimedia System Services – Multimedia System Services Architecture Text : Elements of Text – Using Text in Multimedia Applications – Graphics : Element of Graphics – #Images and color# – Graphics file and Application formats – Obtaining Images for Multimedia use – Using Graphics on multimedia applications.

**UNIT III** **12 hours**

Digital Audio Representation and Processing : Uses of Audio in Computer applications – Digital Representations of sound – Transmission of Digital Sound – Digital Audio Signal Processing, Video Technology : Raster Scanning Principles – Sensors for TV Cameras – Color fundamentals – Color Video – Digital Video and Image Compression: Evaluating Compression System – Video Compression techniques – #JPEG Image compression standard# – MPEG motion Video compression standard.

**UNIT IV** **12 hours**

Multimedia Communications Systems : Applications Network Services – Network Protocols. Multimedia Conferencing : Teleconferencing systems – Requirements for Multimedia Communications – #Multimedia Conferencing Architectures#.

**UNIT V** **12 hours**

Multimedia and Internet : Internet – Client/Server technology – Communications protocol – Internet addressing – Internet functions – HTML and Web Authoring. Multimedia Development Team: Team approach – Assembling multimedia Production Team – Multimedia Development Process: Multimedia Project – Structured Multimedia Development – #Casting multimedia Project#.

# ..... # **self-study portion.**

**Text Books:**

1. Tay Vaughan , *Multimedia Making it Work*, Tata McGraw Hill Edition , Fourth Edition, 2000.  
**UNIT I** : Chapter 1, 2, 4, 5,14
2. John F. Koegel Buferd, *Multimedia Systems*, Addison Wesley Longman. 3<sup>rd</sup> Edition, 2000.  
**UNIT II** : Chapter 1, 2, 3  
**UNIT III** : Chapter 4, 5, 6  
**UNIT IV** : Chapter 13, 15
3. David Hillman, *Multimedia Technology and Applications*, Galgotia Publications Pvt., Ltd., 1998.  
**UNIT V** : Chapter 10, 11, 12

**Books for Reference:**

1. Fred T.Hofstetter, *Multimedia Literacy*, McGraw Hill, 1995.

**SEMESTER – III : CORE BASED ELECTIVE-I  
PATTERN RECOGNITION**

**Course Code : 14MCA3CE1**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To study the various concepts and methods of pattern recognition using statistical decision making, Non-parametric decision making, clustering and processing of waveforms and images techniques.

**UNIT I**

**12 hours**

Introduction: Applications of pattern recognition, statistical decision theory, image processing and analysis. Probability: Introduction, probability of events, random variables, Joint distributions and densities, moments of random variables, #estimation of parameters from samples#, minimum risk estimators.

**UNIT II**

**12 hours**

Statistical Decision Making: Introduction, Baye's Theorem, multiple features, conditionally independent features, decision boundaries, unequal costs of error, estimation of error rates, the leaving-one—#out technique#. Characteristic curves, estimating the composition of populations.

**UNIT III**

**12 hours**

Nonparametric Decision Making: Introduction, histograms, Kernel and window estimators, nearest neighbor classification techniques, adaptive decision boundaries, adaptive discriminate Functions, minimum squared error discriminate functions, choosing a decision making technique.

**UNIT IV**

**12 hours**

Clustering: Introduction, hierarchical clustering, partitional clustering, Artificial Neural Networks: Introduction, nets without hidden layers. nets with hidden layers, the back Propagation algorithms, Hopfield nets, an application.

**UNIT V**

**12 hours**

Processing of Waveforms and Images: Introduction, gray level sealing transformations, equalization, geometric image and interpolation, Smoothing, transformations, edge detection, Laplacian and sharpening operators, line detection and template matching, logarithmic gray level sealing, the statistical significance of image features.

# ..... # **self-study portion.**

**Text Book:**

1. Earl Gose, Richard Hohnsonburg and Steve Joust, Pattern Recognition and Image Analysis, Prentice-Hall of India, 2003.

**UNIT I** : Chapter 1, 2  
**UNIT II** : Chapter 3  
**UNIT III** : Chapter 4  
**UNIT IV** : Chapter 5, 6  
**UNIT V** : Chapter 7

**Books For Reference:**

1. Richard O.Duda , Peter E.Hart and David G.Stork, Pattern Classification, Second Edition, John Wiley, 2000.

**SEMESTER - III : CORE BASED ELECTIVE-I  
DIGITAL IMAGE PROCESSING**

**Course Code : 14MCA3CE1**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To study the various concepts, methods and algorithms of digital image processing with image transformation, image enhancement, image restoration, image compression techniques.

**UNIT I**

**12 hours**

Continuous And Discrete Images And Systems :Light, Luminance, Brightness and Contrast, Eye, The Monochrome Vision Model, Image Processing Problems and Applications, Vision Camera, Digital Processing System, #2-D Sampling Theory#, Aliasing, Image Quantization, Lloyd Max Quantizer, Dither, Color Images, Linear Systems And Shift Invariance, Fourier Transform, ZTransform, Matrix Theory Results, Block Matrices and Kronecker Products.

**UNIT II**

**12 hours**

Image Transforms : 2-D orthogonal and Unitary transforms, 1-D and 2-D DFT, Cosine, Sine, Walsh, Hadamard, Haar, Slant, Karhunen-loeve, #Singular value Decomposition transforms#.

**UNIT III**

**12 hours**

Image Enhancement : Point operations - contrast stretching, clipping and thresholding density slicing, Histogram equalization, modification and specification, spatial operations - spatial averaging, low pass, high pass, band pass filtering, direction smoothing, medium filtering, generalized cepstrum and homomorphic filtering, edge enhancement using 2-D IIR and FIR filters, color image enhancement.

**UNIT IV**

**12 hours**

Image Restoration :Image observation models, sources of degradation, inverse and Wiener filtering, geometric mean filter, non linear filters, smoothing splines and interpolation, constrained least squares restoration.

**UNIT V**

**12 hours**

Image Data Compression And Image Reconstruction From Projections: Image data rates, pixel coding, predictive techniques transform coding and vector DPCM, Block truncation coding, wavelet transform coding of images, color image coding. Random transform, back projection operator, inverse random transform, #back projection algorithm#, fan beam and algebraic restoration techniques.

# ..... # **self-study portion.**

**Text Books:**

1. Anil K. Jain, *Fundamentals of Digital Image Processing*, PHI, 1995.
2. Sid Ahmed M.A., *Image Processing*, McGraw Hill Inc, 1995.
3. Gonzalez R. and Wintz P., *Digital Image Processing*, Addison Wesley, Second Edition, 1987.
4. William. K. Pratt, *Digital Image Processing*, Wiley Interscience, Second Edition, 1991.

**UNIT I** Chapter 3 : Sections 3.2, 3.5, 3.11, Chapter 1 : Sections 1.1

Chapter 4 : Sections 4.2, 4.5, 4.6, Chapter 5 : Sections 5.2 (Book-1)

**UNIT II** Chapter 3 : Sections 3.2, Chapter 5 : Sections 5.2, 5.4-5.11, 5.13

**UNIT III** Chapter 7: Sections 7.2-7.5, 7.8, Chapter 8 : Sections 8.4

**UNIT IV** Chapter 8 : Sections 8.2, 8.3, 8.5, 8.7, 8.8

**UNIT V** Chapter 11 : Sections 11.1-11.4, 11.6 , Chapter 10 : Sections 10.2, 10.3, 10.5, 10.10, 10.11.

**Books for Reference :**

1. S.Jayaraman, S.Esakkirajan , T.Veerakumar, *Digital Image Processing*, McGraw Hill, Twelfth Reprint, 2014.

**SEMESTER – III : CORE XIX**  
**JAVA PROGRAMMING LAB**

**Course Code : 14MCA3C19P**  
**Hours/Week : 4**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

- 1) Write Java Applications for the following:
  - (i) Mark List Preparation (if else)
  - (ii) Reverse and Sum of individual digits of a given number (while, do..while and for loops)
  - (iii) Arranging numbers in Ascending and Descending order (1D-Array)
  - (iv) Matrix Manipulation (Two Dimensional Arrays with switch statement)
  
- 2) Classes and Objects
  - (i) Write a Java program for finding the area and perimeter of a Rectangle (class)
  - (ii) Write a Java program for preparing neat Telephone bill. (Use suitable fields and conditions)
  
- 3) Inheritance
  - (i) Define a class Stack and implement the PUSH and POP operations and enhance the Stack class by automatically extending the size when the stack pointer reaches the maximum value.
  - (ii) Write a Program for Library Information System (Parameterized Constructor)
  
- 4) Interfaces and Packages
  - i) Define an interface named as Area and three implementing classes namely Circle, Rectangle and Triangle. Display the area of the circle, area of the rectangle and area of the triangle by invoking area() method through interface reference.
  - ii) Program to implement multiple inheritance.
  - iii) Prepare an EB-Bill using the package concept.
  
- 5) Exception Handling
  - a) Write a Java Program to handle the following Exceptions
    - i) DivideByZeroException
    - ii) ArrayIndexOutOfBoundsException
    - iii) NumberFormatException
    - iv) NullPointerException
  - b) Program using user-defined Exception class
  
- 6) String and Utility classes
  - i) Write a Program to test the methods in String and StringBuffer classes.
  - ii) Write a Program for arranging the given names in Alphabetical order.
  - iii) Menu driven program using Vector class
  - iv) Menu driven program using LinkedList
  
- 7) Multi Threaded Programs
  - a) Thread Class b) Runnable Interface c) Inter-thread communication

- 8) Files, I/O Streams and Networking
  - i) Program for displaying contents of a given file, Copying contents between files and updating an existing file.
  - ii) Program using ServerSocket and Socket classes.
  - iii) Program using DatagramSocket and DatagramPacket classes
  
- 9) Applets
  - i) Applet program for displaying geometrical object on a window.
  - ii) Applet program for parameter passing (use HTML<param> tag)
  
- 10) Swing
  - i) Bio-Data preparation using Swing classes and interfaces
  - ii) Simple Calculator using Swing classes and interfaces

**SEMESTER – III : CORE - XX**  
**RDBMS LAB**

**Course Code : 14MCA3C20P**  
**Hours/Week : 4**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

1. SQL - Data Definition Language
  - Table Creation with Constraints
  - Table Alteration (Add Column, Modify size and data type, Drop Column)
  - Drop Table
  
2. SQL - Data Manipulation Language
  - Data Insertion
  - Data Updation
  - Data Deletion
  - Ordering Tuples
  - Tuple Variable
  - Pattern Matching
  - Build-in Function
  - Set Operations
  - Join Operations
  - Nested Subqueries
  - Views
  
3. PL/SQL Procedure
  - 3.1 Reverse the string.
  - 3.2 Delete any record and count it.
  - 3.3 Student Mark Sheet Preparation
  - 3.4 Pay Roll preparation.
  - 3.5 Excess record stored in separate files.
  - 3.5 Split a table in to two tables.
  - 3.6 Joining two tables in to one table.
  - 3.7 Find factorial number using recursive function.
  - 3.8 Find Fibonacci series using recursive function.
  
4. SQL Forms
  - Student Mark System
  - Pay Roll Preparation
  - Income Tax Calculation
  - Train Reservation System

**SEMESTER - III : EXTRA CREDIT COURSE - 1  
DATA MINING**

**Course Code : 14MCA3EC1**  
**Hours/Week : -**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : -**  
**External Marks : 100**

**Objective :**

To impart knowledge related to the various concepts, methods and algorithms of data mining with data warehousing, data preprocessing, data mining algorithms with temporal and spatial data mining techniques.

**UNIT I**

Introduction: Data mining-motivation, importance-DM Functionalities, Basic Data Mining Tasks, DM Vs KDD, DM Metrics, DM Applications, Social implications.

**UNIT II**

Data Warehousing: Difference between Operational Database and Data warehouse- Multidimensional Data Model: From tables to data Cubes, Schemas, Measures-DW Architecture: Steps for design and construction of DW, 3-tier DW Architecture-DW Implementation: Efficient computation of DATA Cubes, #Efficient Processing of OLAP queries#, Metadata repository.

**UNIT III**

Data Preprocessing: Data Mining Primitives, Languages: Data cleaning, Data Integration and Transformation, Data Reduction. Discretization and concept Hierarchy Generation. Task-relevant data, Background Knowledge, Presentation and Visualization of Discovered Patterns. Data Mining Query Language-#other languages for data mining#.

**UNIT IV**

Data Mining Algorithms: Association Rule Mining: MBA Analysis, The Apriori Algorithm, Improving the efficiency of Apriori. Mining Multidimensional Association rules from RDBMS and DXV. Classification and Predication: Decision Tree, Bayesian Classification back propagation, Cluster Analysis: Partitioning Methods, Hierarchical Method, Grid-based methods, Outlier Analysis.

**UNIT V**

Web, Temporal And Spatial Data Mining: Web content Mining, Web Structure Mining, Web usage mining. Spatial Mining: Spatial DM primitives, Generalization and Specialization, Spatial rules, spatial classification and clustering algorithms. Temporal Mining: Modeling Temporal Events, Times series, Pattern Detection, #Sequences#.

# ..... # **self-study portion.**

**Text Books:**

1. Jiawei Han & Micheline Kamber, *Data Mining: Concepts and Techniques*, Harcourt India Private Limited, First Indian Reprint, 2001.
2. Margaret H. Dunham, *Data Mining: Introductory and Advanced Topics*, Pearson Education, First Indian Reprint, 2003.
3. Arun K. Pujari, *Data Mining Techniques*, University Press (India) Limited, First Edition, 2001.
4. Efreem O. Mallach, *Decision Support and Data Warehouse Systems*, McGraw-Hill, International Edition, 2000.

**UNIT I** : Chapter I : Sections 1.1,1.4,1.7

**UNIT II** : Chapter III : Sections 3.1.1, 3.2.1, 3.2.2, 3.2.4, 3.3.1, 3.3.2, 3.4.1, 3.3.4, 3.4.3

**UNIT III** : Chapter II : Sections 2.3, 2.4, 2.6

**UNIT IV** : Chapter VI : Sections 6.3.1, 6.4.2, 7.1, 7.4.2, 7.5.3, 7.7, 7.11

**UNIT V** : Chapter VIII: Sections 8.3, 8.5, 9.2, 9.11, 9.4

**Books for Reference:**

1. IBM, *An Introduction to Building the Data Warehouse*, Prentice Hall of India, 2005.

**SEMESTER - IV : CORE - XXI  
.NET TECHNOLOGY**

**Course Code : 14MCA4C21**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective :**

To understand the concepts of .NET technology

**UNIT I**

**12 hours**

Introduction : Integrated Development Environment - IDE Components - Setting Environment Options - Building a Console application -#Variable-Variable as Objects# - Constants-Arrays.

**UNIT II**

**12 hours**

Programming Fundamentals : Flow Control Statement-Writing & using procedures - Argument-Built-in Functions -The Textbox control -The List box, Checked List Box and Combo Box Controls-#The Scrollbar or Track bar controls#.

**UNIT III**

**12 hours**

Working With Forms : Appearance of Forms - Loading or showing Forms - Dynamic Forms -Designing Menus - Common Dialog controls - Rich Text box Control –List view, Tree view, or Image List Controls - Handling Strings or characters - Handling Dates or Times - Manipulating Folders or Files -#Accessing Files#.

**UNIT IV**

**12 hours**

ADO .NET : The Basic Data - Access Classes-storing Data in datasets - Update Operations -Working with Typed Datasets - Data Binding - Designing Data Driven Interfaces.

**UNIT V**

**12 hours**

Building Web Applications : Understanding HTML or DHTML- working with HTML - Cascading Style Sheets - #Server Side Technologies# – Controls - ASP.NET Objects - Understanding Web Services.

# ..... # **self-study portion.**

**Text Book:**

1. Evangelos Petroustos , *Mastering Microsoft Visual Basic*, Wiley India Edition, 2008.

**UNIT I** : Chapter 1, 2  
**UNIT II** : Chapter 3.6  
**UNIT III** : Chapter 7, 8, 9, 13, 15  
**UNIT IV** : Chapter 22, 23  
**UNIT VI** : Chapter 25, 27.

**Book for Reference:**

1. C.Muthu Visual Basic.NET, Vijay Nicole Imprints Private Limited, 2007.  
2. Steven Holzer, Visual Basic.Net Programming Black Book, Dream Tech Press, 2007.



**SEMESTER - IV : CORE - XXII**  
**COMPUTER SIMULATION AND MODELING**

**Course Code : 14MCA4C22**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective :**

To impart knowledge in real time modeling process and the simulation of any system using the real time mode.

**UNIT I**

**12 hours**

Introduction to Simulation: When Simulation is the Appropriate Tool- When Simulation is not Appropriate- Advantages and Disadvantages of Simulation- Areas of Application- Systems and System Environment- Components of a System- Discrete and Continuous Systems- Model of a System- Types of Models- Discrete-Event System Simulation – #Steps in a simulation study#. Simulation Examples: Simulation of Queuing Systems, Simulation of Inventory Systems.

**UNIT II**

**12 hours**

Simulation Software: History of Simulation Software- Selection of Simulation Software- Simulation in JAVA, Simulation in GPSS, Simulation in SSF- #Simulation software# – Experimentation and Statistical and analysis tools .

**UNIT III**

**12 hours**

Statistical Models in Simulation: Review of Terminology and Concepts- Useful Statistical Models- Discrete Distributions- Continuous Distributions- #Poisson process. Queuing models# - Characteristics of queuing systems.

**UNIT IV**

**12 hours**

Random-Number Generation: Properties of Random Numbers-Generation of Pseudo-Random Numbers-Techniques for Generating Random Numbers-Linear congruential Method-Random number streams -Tests for random numbers-Frequency tests - Test for Autocorrelation. Random-Variate Generation: Inverse Transform Technique-Exponential Distribution-Uniform Distribution- #Weibull Distribution#.

**UNIT V**

**12 hours**

Input Modeling: Data Collection - Identifying the Distribution with Data- parameter estimation- goodness of fit tests. Verification and Validation of Simulation Models: Model Building, Verification, and Validation- Verification of Simulation Models-Calibration and Validation of Models.

**# ..... # self-study portion.**

**Text Book:**

1. Jerry Banks, John S. Carson, II Barry L. Nelson., *Discrete-Event System Simulation*, Fourth Edition, PHI Edition, 2009.

**UNIT I** : Chapter 1 Sections (1.1-1.11), Chapter 2 Sections (2.1, 2.2)

**UNIT II** : Chapter 4 Sections (4.1, 4.2, 4.4-4.7)

**UNIT III** : Chapter 5 Sections (5.1-5.5), Chapter 6 Sections (6.1)

**UNIT IV** : Chapter 7 Sections (7.1, 7.2, 7.3.1, 7.3.3, 7.4), Chapter 8 Sections (8.1.1-8.1.3)

**UNIT V** : Chapter 9 Sections (9.1-9.4), Chapter 10 Sections (10.1-10.3)

**Book for Reference:**

1. E. Winsberg, Science in the age of computer simulation, Chicago: University Press, 2010.

**SEMESTER – IV : CORE - XXIII**  
**MICROPROCESSORS, PRINCIPLES AND APPLICATIONS**

**Course Code : 14MCA4C23**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To understand the architecture and working principles of Microprocessors. To write simple assembly language programs and provide knowledge of various real time Microprocessor Applications.

**UNIT I** **12 hours**

Intel 8085 Architecture – Pin Configuration – Instruction Formats – Addressing Modes – Instruction Set – Data Transfer Instructions – Arithmetic Instructions – Logical Instructions – Branch Instructions- Shift and Rotate Instructions – #I/O instructions#– Simple Programs.

**UNIT II** **12 hours**

Intel 8086 Architecture – Internal Operation – Pin Configuration – Minimum & Maximum Modes - Machine Language Instructions – #Addressing Modes# – Instruction Formats – Instruction Execution Timing – The 8088.

**UNIT III** **12 hours**

Instruction Set of 8086 Microprocessor – Assembler Instruction Format – Data Transfer Instructions – Arithmetic Instructions – Branch Instructions – Loop Instructions – Flag Manipulation Instructions – Logical Instructions – Shift and Rotate Instructions – String Instructions – REP Prefix

**UNIT IV** **12 hours**

Assembly Language Programs – Addition, Subtraction, Multiplication and Division – Multibyte Addition and Subtraction – Complements – Shifting – Masking – Sum of a Series – Block Data Transfer – Finding the Smallest and the Biggest Number in an Array – Arranging a Series of Numbers in Descending and Ascending Order – Length of a String – Number of Occurrences of a Character in a String – Comparison of Two Strings

**UNIT V** **12 hours**

Microprocessor Applications – Address Space Partitioning – Memory and I/O Interfacing – I/O Ports – Programmable Peripheral Interface – Delay Subroutines – Seven Segment Displays – Frequency Measurement – Temperature Measurement – #Water Level Indicator & Controller# – Traffic Lights Control.

# ..... # **self-study portion.**

**Text Books:**

1. Badri Ram, Fundamentals of Microprocessors and Microcomputers, Fifth Revised and Enlarged Edition, Dhanpat Rai Publications, 2003.  
**UNIT I** : Chapter-3 Section (3.1) Chapter-4 Section (4.2, 4.3, 4.6) Chapter-6 Section (6.3-6.18)  
**UNIT IV** : Chapter-3 Section (3.4)  
**UNIT V** : Chapter-7 Section (7.2, 7.3, 7.7.1) Chapter-9 Section (9.2, 9.3, 9.5.1, 9.6.1, 9.6.4, 9.8)
2. Yu Cheng Liu and Glenn A. Gibson, Microcomputer Systems–The 8086/8088 Family–Architecture Programming and Design, Prentice Hall of India, Second Edition, 1990.  
**UNIT II** : Chapter-2 Section (2.1-2.5)  
**UNIT III** : Chapter-3 Section (3.1-3.5) Chapter-5 Section (5.1, 5.2)

**Books for Reference:**

1. Douglas V. Hall, Microprocessors and Interfacing – Programming and Hardware, McGraw Hill International Edition, 2002.

**SEMESTER - IV : CORE - XXIV**  
**ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS**

**Course Code : 14MCA4C24**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective :**

To provide the knowledge of problem solving using AI techniques, knowledge representations, expert system development process and tools.

**UNIT I** **12 hours**

The AI problems – AI techniques – problems, problems space & search – Defining the problem as a state Search – Production systems – problem characteristics – heuristic search techniques – Generate & test – #Hill climbing# – Best first search. Problem reduction – constraint satisfaction – means – ends analysis.

**UNIT II** **12 hours**

Game playing : Mini – max procedure – Adding Alpha – Beta cutoffs – Additional refinements – Searching AND/OR Graphs – Iterative deepening. Using Predicate Logic – Representing simple facts & logic – Representing instance & IS a Relationships – Computable functions & Predicates – Use of the predicate calculus in AI – Resolution – #natural deduction#.

**UNIT III** **12 hours**

Representing knowledge using Rules – Procedural verses declarative knowledge logic programming – forward versus backward reasoning – Resolving within AND/OR Graphs matching – control knowledge – symbolic Reasoning under uncertainty – non – monotonic reasoning – Implementation Issues – Augmenting a problem solver - Implementation of depth first & breadth first search. Statistical reasoning – Bayes's theorem – Certainty factors & Rule based Systems – Bayesian Networks – #Dempstor# – Shafer theory – Fuzzy logic.

**UNIT IV** **12 hours**

Expert Systems – Architectural Components – Explanation facilities – knowledge acquisition.

**UNIT V** **12 hours**

Expert System Development process – Non – formal representation of knowledge – semantic Networks – Frames – Scripts – Production Systems – #Expert Systems tools#.

# ..... # self-study portion.

**Text Books:**

1. Elaine Rich & Kevin Kaigh, *Artificial Intelligence*, Tata McGraw Hill, Second Edition, 1991.  
**UNIT I** : Chapter I : Sections 1.1, 1.3, Chapter II : Sections 2.1-2.3  
Chapter III : Sections 3.1-3.6  
**UNIT II** : Chapter XII: Sections 12.2-12.5, Chapter V : Sections 5.1-5.5  
**UNIT III** : Chapter VI : Sections 6.1-6.5, Chapter VII : Sections 7.1,7.3-7.6
2. David W. Roltson, *Principles of Artificial Intelligence & Expert Systems Development*, McGraw Hill, 1988.  
**UNIT IV** : Chapter I : Sections 1.1, 1.6, Chapter VII : Sections 7.1-7.7  
Chapter IX : Sections 9.1-9.9  
**UNIT V** : Chapter VIII : Sections 8.1-8.8, Chapter IV : Sections 4.1-4.4  
Chapter X : Sections 10.1-10.7

**Books for Reference:**

1. Data W. Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI, 2009.
2. Stuart Russell and Peter Norvig, Artificial Intelligence A Modern Approach, Second Edition, Pearson Education Series, 2003.
3. Keith Darlington, The essence of Expert Systems, Pearson First Impression, 2011.

**SEMESTER - IV : CORE BASED ELECTIVE-II  
SOFTWARE ENGINEERING**

**Course Code : 14MCA4CE2**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To provide knowledge of the various phases of software engineering process.

**UNIT I**

**12 hours**

Introduction – Definitions – Size Factors – Quality and Productivity Factors – Managerial Issues. Planning a Software Project – Defining the Problem – Developing a Solution Strategy – #Planning the Development Process# – Planning an Organizational Structure

**UNIT II**

**12 hours**

Software Cost Estimation – Cost Factors – Cost Estimation Techniques – Staffing-Level Estimation – Estimating Software Maintenance Costs - Software Requirements Definition – Software Requirement Specification – #Formal Specification Techniques#.

**UNIT III**

**12 hours**

Software Design – Fundamental Design Concepts – Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real Time and Distributed System Design – Test Plans – Design Guidelines.

**UNIT IV**

**12 hours**

Implementation Issues – Structured Coding Techniques – Coding Style – Standards and Guidelines – Documentation Guidelines – #Data Abstraction# – Exception Handling – Concurrency Mechanisms.

**UNIT V**

**12 hours**

Verification and Validation Techniques – Quality Assurance – Walkthroughs and Inspections – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification- Software Maintenance – Enhancing maintainability during Development - Managerial Aspects – Configuration Management – #Source Code metrics#

# ..... # **self-study portion.**

**Text Book:**

1. Richard Fairley, *Software Engineering Concepts*, Tata McGraw Hill Publishers, 2008.

**UNIT I** : Chapter I : Section 1.1 – 1.4 , Chapter II : Section 2.1 – 2.4

**UNIT II** : Chapter III : Section 3.1 – 3.4 , Chapter IV : Section 4.1 – 4.2

**UNIT III:** Chapter V : Section 5.1 – 5.7 , 5.9

**UNIT IV:** Chapter VI : Section 6.1 – 6.4 , Chapter VII : Section 7.4 – 7.6 , 7.7

**UNIT V** : Chapter VIII : Section 8.1 – 8.7, Chapter IX : Section 9.1-9.3

**Books for Reference:**

1. Roger S. Pressman, *Software Engineering*, TMH Publications, Sixth Edition, 2005.

**SEMESTER - IV : CORE BASED ELECTIVE-II  
HUMAN COMPUTER INTERACTION**

**Course Code : 14MCA4CE2**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To impart knowledge related to the various concepts, methods of Human Computer Interaction techniques with design basics, design rules and evaluation techniques.

**UNIT I** **12 hours**

**The Interaction:** Introduction – Models of interaction – Frameworks and HCI – Ergonomics – Interaction Styles – #Elements of WIMP interface# – Interactivity – The Context of the interaction - **Paradigm:** Introduction – Paradigms for interaction.

**UNIT II** **12 hours**

**Interaction Design basics:** Introduction – what is design? – User focus – Scenarios – Navigation design – Screen design and layout – Interaction and prototyping - **HCI in the software process:** Introduction – The software lifecycle – Usability engineering – #Interactive design and prototyping# – Design rationale.

**UNIT III** **12 hours**

**Design rules:** Introduction – Principles to support usability – Standards – Guidelines – Golden rules and heuristics – #HCI patterns# – **Implementation Support:** Introduction – Elements of windowing systems – Programming the application – Using toolkits – User interface management systems.

**UNIT IV** **12 hours**

**Evaluation techniques:** What is evaluation – Goals of evaluation – Evaluation through expert analysis – Evaluation through user participation – Choosing an evaluation method - **Universal Design:** Introduction – Universal design principles – Multi-modal interaction – Designing for diversity.

**UNIT V** **12 hours**

**User Support:** Introduction – Requirements of user support – Approaches to user support – Adaptive help system – #Designing user support systems#.

# ..... # **self-study portion.**

**Text Book:**

1. Alan Dix, *Human-Computer Interaction*, Pearson Education, Third Edition, 2004.  
**UNIT I** : Chapter-3 Section (3.1-3.8), Chapter-4 Section (4.1, 4.2)  
**UNIT II** : Chapter-5 Section (5.1, 5.2, 5.4-5.8) Chapter-6 Section (6.1-6.5)  
**UNIT III:**Chapter-7 Section(7.1-7.6) Chapter-8 Section (8.1-8.5)  
**UNIT IV:** Chapter-9 Section (9.1-9.5) Chapter-10 Section (10.1-10.4)  
**UNIT V** : Chapter-11 Section (11.1-11.5)

**Books for Reference:**

1. John M. Carroll, *Human Computer Interaction in the new millennium*, Pearson Education, 2007

**SEMESTER - IV : CORE BASED ELECTIVE-II  
GENETIC ALGORITHM**

**Course Code : 14MCA4CE2**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To impart knowledge related to the various concepts, methods of genetic algorithms with foundations, implementation, and advanced searching techniques.

**UNIT I**

**12 hours**

Introduction: A brief history of evolutionary computation, Elements of Genetic Algorithms, A simple genetic algorithm, Applications of genetic algorithms. Genetic Algorithms in Scientific models : #Evolving computer programs#, data analysis & prediction, evolving neural networks, Modeling interaction between learning & evolution, modeling sexual selection, measuring evolutionary activity.

**UNIT II**

**12 hours**

Theoretical Foundation of genetic algorithm : Schemas & Two-Armed and k-armed problem, royal roads, exact mathematical models of simple genetic algorithms, Statistical-Mechanics Approaches#

**UNIT III**

**12 hours**

Computer Implementation of Genetic Algorithm : Data structures, Reproduction, crossover & mutation, mapping objective functions to fitness form, fitness scaling, coding, a multiparameter, mapped, fixed point coding, discretization and constraints.

**UNIT IV**

**12 hours**

Some applications of genetic algorithms : The risk of genetic algorithms, De Jong & function optimization, #Improvement in basic techniques#, current application of genetic algorithms.

**UNIT V**

**12 hours**

Advanced operators & techniques in genetic search : Dominance, duplicity, & abeyance, inversion & other reordering operators. Other micro operators, Niche & speciation, multiobjective optimization, knowledge based techniques, genetic algorithms & parallel processors.

# ..... # self-study portion.

**Text Book:**

1. David E. Goldberg, Genetic algorithms in Search, Optimization & Machine Learning, Pearson Education, 2006.

**UNIT I** : Chapter 1  
**UNIT II** : Chapter 2  
**UNIT III** : Chapter 3  
**UNIT IV** : Chapter 4  
**UNIT V** : Chapter 5

**Books for Reference:**

1. Melanle Mitchell, An introduction to Genetic Algorithms, Prentice Hall India, 2002.

**SEMESTER – IV : CORE - XXV**  
**WEB TECHNOLOGY LAB**

**Course Code : 14MCA4C25P**  
**Hours/Week : 4**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

1. Write a XML program for job listing in HRML.
2. Write a JavaScript code block, which checks the contents entered in a form's text element.  
If the text entered is in the lower case, convert to upper case.
3. Write a JavaScript code block, which validates a username and password.
  - a) If either the name or password field is not entered display an error message.
  - b) The fields are entered do not match with default values display an error message.
  - c) If the fields entered match, display the welcome message.
4. Write a JavaScript code to display the current date and time in a browser.
5. Write a JSP Program for user authentication.
6. Write a JSP Program for a simple shopping cart.
7. Write a JSP Program to prepare a bio data and store it in database.
8. Write an ASP Program using Response and Request Object.
9. Write an ASP Program using AdRotator Component.
10. Write an ASP program using database connectivity for student's record.

**SEMESTER – IV : CORE - XXVI  
.NET LAB**

**Course Code : 14MCA4C26P**  
**Hours/Week : 4**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

1. Placing Textboxes dealing with its properties.
2. Making use of placeholders, literals and controls.
3. Making use of list box, check box and radio button controls.
4. Setting up and using Adrotator control.
5. Making use required field validator and compare validator controls.
6. Using range validator, regular expression validator and validation summary.
7. Database connectivity through connected approach.
8. Data view with the help of grid view control.
9. Formatting data with a help of data list control.
10. Develop a project to update and delete few records using Disconnected Access.
11. Develop a project to view the records using GridView, DetailsView, FormView Controls.
12. Designing a ASP.Net client for web service.



**SEMESTER - III& IV : SKILL BASED COURSE-II  
NUMERICAL APTITUDE**

**Course Code : 14MCA4S2**

**Hours/Week : 2 + 2**

**Credit : 3**

**Maximum Marks : 100**

**Internal Marks : 100**

**Course Fully Internal; Examination at the end of Semester IV**

**Objective:**

To revise and master the basic techniques of arithmetic operations so that these skills will augment to their professional capacity

**UNIT I**

Numbers, HCF, LCM, Decimal Fractions, Simplification, Square Roots, Cube Roots, averages, #Problems in numbers and ages#.

**UNIT II**

Surds, Indices, Percentages, Profit and Loss, Ratio and Proportion, Partnership, Chain Rule, Time and Work, Pipes and Distances.

**UNIT III**

Time and distance, Problems on Trains, Boats and Streams, Alligation, Simple Interest, Compound Interest, Logarithms, #Area#.

**UNIT IV**

Volume and Surface Area, Races and Games of Skill, Calendar, Clocks, Stocks and Shares Permutation and Combination, #Probability#.

**UNIT V**

True discount, Banker's Discount, Height and Distances, Odd man out and Series, Tabulation, Bar graphs, Pie charts, #Line Graphs#.

# ..... # **self-study portion.**

**Text Book:**

1. R.S. Aggarwal, *Quantitative Aptitude for Competitive Examinations*, Seventh Revised Edition, S.Chand and Co. Ltd, 2010.

**UNIT I** Chapter I : Sections 1-8

**UNIT II** Chapter I : Sections 9-16

**UNIT III** Chapter I : Sections 17-24

**UNIT IV** Chapter I : Sections 25-31

**UNIT V** Chapter I : Sections 32-35 , Sections 36-39

**Books for Reference:**

1. Barron's, *Guide for GMAT*, Galgotia Publications, 2005.

**SEMESTER - IV**  
**SUMMER PROJECT WORK – II**

**Course Code : 14MCA4PW2**  
**Hours/Week : -**  
**Credit : 2**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Students carry out a Project Work during Summer Vacation at the end of Semester IV.**

**System study : 10 days**

**Project development : 3 weeks 18days x 5 hours per day = 90 hours**

**Report preparation : 5 days**

## SEMESTER - IV : EXTRA CREDIT COURSE - II PROGRAMMING SMART DEVICES

**Course Code : 14MCA4EC2**

**Hours/Week : -**

**Credit : 4**

**Maximum Marks : 100**

**Internal Marks : -**

**External Marks : 100**

### **Objective:**

To provide concepts to enable the students for creating applications for smart devices using Android

### **UNIT I**

Introduction to Android: History of Android – Versions of Android – Android Architecture – App Architecture – Components – Intents – Manifest – App Package - Activities - Services – Broadcast Receivers – Content Providers – Installing the Android SDK – Installing an Android Platform – Creating an Android Virtual Device – Starting the AVD – Introducing UC – Creating UC – Installing and Running UC – #Preparing UC for Publishing# – Migrating to Eclipse – Developing UC with Eclipse.

### **UNIT II**

User Interface: Customizing the Window – Creating and Displaying Views – Monitoring Click Actions – Resolution Independent Assets – Locking Activity Orientation – Dynamic Orientation Locking – Manually Handling Rotation - Creating Pop-up Menu Actions – Customizing Options Menu – Customizing Back Button – #Emulating the Home Button# – Monitoring TextView Changes – Scrolling TextView Ticker – Animating a View – Creating Drawables as Backgrounds – Creating Custom State Drawables – Applying – Masks to Image – Creating Dialogs that Persist – Implementing Situation – Specific Layouts – Customizing Keyboard Actions – Dismissing Soft Keyboard – Customizing AdapterView Empty View – Customizing ListView Rows – Making ListView Section Headers – Creating Compound Controls.

### **UNIT III**

Interacting with Device Hardware and Media – Interacting Device Location – Mapping Locations – Annotating Maps – Capturing Images and Videos – Making a Custom Camera Overlay – Recording Audio – Adding Speech Recognition – Playing Back Audio/Video – Creating a Tit Monitor – Monitoring Compass Orientation.

### **UNIT IV**

Persisting Data : Marking a Preference Screen – Persisting Simple Data – Reading and Writing Files – #Using Files as Resources# - Managing a Database – Querying a Database – Backing Up Data – Sharing your Database – Sharing your other Data.

### **UNIT V**

Interacting with the Systems: Notifying from the Background – Creating Timed and Periodic Tasks – Scheduling a Periodic Task – Creating Sticky Operations – Running Persistent Background Operations – Launching Other Applications – Launching System Application – other Applications – Interacting with Contacts – Picking Device Media – Saving to the MediaStore Working with Libraries : Creating Java Library JARs – Using Java Library JARs – Creating Android Library Projects – #Using Android Library Projects# – Charting – Practical Push Messaging.

# ..... # **self-study portion**

### **Text Book:**

1. Dave Smith and Jeff Friesen, “Android Recipes: A Problem – Solution Approach”, Rakmo Press Pvt., Ltd, New Delhi, 2011.

### **Web Reference:**

1. <http://developer.android.com/Android Developer's Guides>

**SEMESTER – V : CORE - XXVII  
DISTRIBUTED TECHNOLOGY**

**Course Code : 14MCA5C27**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To impart the basic concepts of Distributed Components(DCOM) and the methods of developing Distributed Applications using RMI,CORBA, Servlet, JSP and EJB with the support of JavaScript and XML.

**UNIT I** **12 hours**

Distributed Component Architecture : Introduction- Methods of Distribution-Multi-tier Architecture-Component Concepts- Distributed Component Model : Evolution of DCOM, OLE, ActiveX, Microsoft DCOM, Error Handling in COM, COM interfaces- Marshalling.

**UNIT II** **12 hours**

Java RMI : Introduction – Architecture of RMI – The RMI Package- Creation of RMI applications- Advantages and Disadvantages of RMI. CORBA : Object Management Architecture-#CORBA Architecture#-OMG CORBA IDL-CORBA Object Life Cycle-CORBA Services: Object Location Service, Messaging Service, Security Service, Transaction Service and Persistency Services.

**UNIT III** **12 hours**

Servlets : Introduction – Advantages of Servlets – The Servlet Life Cycle – Servlet API – Handling HTTP GET Requests-#Handling HTTP POST Requests# –Cookies – Session Tracking – Multi-tier Applications using Database Connectivity- Servlet Chainig.

**UNIT IV** **12 hours**

Introduction to Scripting Languages- JavaScript Elements: Identifiers, Expressions, Keywords, Operators, Statements and Functions – Objects in JavaScript: Window, Document, Forms Objects- Other Objects: Date, Math and String Objects. HTML <form> tag and elements. Java Server Pages: Introduction-Advantages- Components of JSP: Directives, Declaratives, Scriptlets, Expressions, Standard Actions and Custom Tags – JSP Sessions-JSP Implicit Objects.

**UNIT V** **12 hours**

Enterprise Java Beans : Introduction to JavaBeans – Properties – EJB Architecture- Types of Enterprise Beans: Session Bean, Entity Bean and Message Driven Beans – #Life Cycle of Beans# – Callback Methods-Steps for developing Enterprise Beans-Creation of Deployment Descriptor.

# ..... # **self-study portion**

**Text books:**

1. G. Sudha Sadasivam, Distributed Component Architecture, Wiley India Pvt. Ltd, 2008.  
**UNIT I** : Chapter 1 – 1.1, 1.3, 1.5 & 1.6, Chapter 6 - 6.1to 6.5, 6.8, 6.9 and 6.11  
**UNIT II**: Chapter 2 – 2.1 to 2.5, Chapter10 – 10.1  
**UNIT V**: Chapter 8- 8.1 to 8.5
2. N.P. Gopalan and J. Akilandeswari, Web Technology, PHI Learning Pvt. Ltd., 2011.  
**UNIT III** : Chapter 5 Section 2-4 , Chapter 10 Section 1,2, 4 -12  
**UNIT IV** : Chapter 11 : Section 1, 2, 4, 7, 8

**Books for Reference:**

1. Jim Keogh , J2EE – The complete Reference, Tata McGraw Hill Edition, 2002.
2. Richard Monson Haefel, Enterprise Java Beans, O ‘Reilly Fourth Edition, 2004.

**SEMESTER - V : CORE - XXVIII**  
**PRINCIPLES OF COMPILER DESIGN**

**Course Code : 14MCA5C28**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To understand the various phases of a compiler and to develop skills in designing a compiler.

**UNIT I** **12 hours**

Compiler - Phases of Compiler – Lexical Analysis – Role of Lexical analyzer – Finite Automata – #Regular Expression# – From a Regular expression to an NFA , NFA to DFA – Design of Lexical Analyzer.

**UNIT II** **12 hours**

Syntax Analyzer – CFG – Role of the Parser – CFG – Top Down Parsing – Recursive descent parsing, predictive Parsers – Bottom up Parsing – Shift reduce, operator precedence parsers.

**UNIT III** **12 hours**

Syntax directed definition :- Construction of Syntax trees – Intermediate code generation – Intermediate Languages – Syntax trees, post fix form, Three address code – Boolean expressions.

**UNIT IV** **12 hours**

Symbol table – contents of Symbol table – #Data Structures for Symbol table# – Runtime storage Administration – Implementation of Stack allocation scheme – Storage allocation in Fortran.

**UNIT V** **12 hours**

Code Optimization and code generation – principles sources of optimization – loop optimization – Dag Representation of Basic blocks.

Code generation – problems in code generation – #a simple code generator# – Register allocation and Assignment – Peephole optimization.

**# ..... # self-study portion.**

**Text Books:**

1. Alfred V.Aho, Ravi Sethi, Jeffrey D.Ullman, Compilers Principles, Techniques and Tools, Narosa Publishing House, New Delhi, 2004.  
Chapter 1 : (1.1,1.3), Chapter 3: (3.1,3.6,3.7,3.9), Chapter 4: (4.1,4.2,4.4 – 4.6),  
Chapter 5: (5.1, 5.2), Chapter 7: (7.5), Chapter 8: (8.1,8.4)
2. V.Aho and Jeffrey D.Ullman, Principles of Compiler Design, Narosa Publishing House, New Delhi, 1998.

Chapter 9: (9.1,9.2), Chapter 10: (10.1,10.2,10.3),

Chapter 12: (12.1,12.2,12.3), Chapter 15: (15.2,15.4,15.5,15.7)

**UNIT I** : Chapter 1 Sections 1.1, 1.3,1.6, Chapter 2 Sections 2.6, Chapter 3 Section 3.1, 3.6-3.8

**UNIT II** : Chapter 4 Sections 4.1 – 4.5 , Chapter 5 Sections 5.7

**UNIT III** : Chapter 5 Sections 5.2 , Chapter 8 Sections 8.1,8.4,8.6

**UNIT IV** : Chapter 7 Sections 7.3,7.6 , Chapter 9 Sections 9.3

**UNIT V** : Chapter 12 Sections 12.1-12.3 ,Chapter 15 Sections 15.2,15.4-15.7

**Book for Reference:**

1. Santara Chattopadhyay, Compiler design, PHI, New Delhi, 2009.

**SEMESTER - V : CORE - XXVIX  
ORGANIZATIONAL DYNAMICS**

**Course Code : 14MCA5C29**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To impart knowledge about fundamentals of organization behavior, Motivation, Individual and Interpersonal Behavior, Change, Stress and Counseling

**UNIT I 12 hours**

Fundamentals of Organization Behavior: – Understanding Organization Behavior – Fundamental Concepts – Contingency Approach – Limitation of Organization Behavior – An Organization Behavior System – Model of Organization Behavior. Managing Communications: communications Fundamentals – #Upward and Downward Communication# – Other Form of Communication – Informal Communication

**UNIT II 12 hours**

Social Systems and Organizational Culture: Understanding a Social System – Social Culture – Role – Status – Organizational Culture – Motivation: Model – Motivational Drives – Human Needs – Behavior Modification – #Goal Setting. Appraising: Organizational Behavior and performance Appraisal# – Economic Incentive Systems

**UNIT III 12 hours**

Leadership – The Nature of Leadership – Behavior Approaches to Leadership Style – Contingency approaches to Leadership Style – Individual and Interpersonal Behavior: Nature of Employee Attitudes – Effects of Employee Attitudes – Studying Job Satisfaction. Interpersonal Behavior: Conflict in Organizations – #Power and Politics#.

**UNIT IV 12 hours**

Organizations and Individuals: Rights to Privacy – Discipline – QWL –Individual Responsibilities. Informal and Formal Groups: Group Dynamics – #Nature of Informal Group# – Formal Group. Team and Team Building: Organizational Context for Teams – Teamwork – Team Building

**UNIT V 12 hours**

Change and its Effects: Change at Work- Resistance to Change – Implementing Change Successfully – Understanding Organization Development. Stress and counseling: Employee Stress – #Employee Counseling – Type of counseling#.

**# ..... # self-study portion.**

**Text Book:**

1. John W Newstrom, “Organizational Behavior: Human Behavior at Work”, 12<sup>th</sup> Edition, Tata McGraw Hill Education Private Limited, 2007.

**UNIT I** : Chapter 1, 2, 3  
**UNIT II** : Chapter 4, 5, 6  
**UNIT III** : Chapter 7, 9, 11  
**UNIT IV** : Chapter 10, 12, 13  
**UNIT V** : Chapter 14, 15

**Books for Reference:**

1. Organizational Behavior, 12<sup>th</sup> Edition, Tata McGraw Hill Education Private Limited, 2011.
2. Stephen P. Robbins, *Organizational Behavior*, 13<sup>th</sup> Edition, PHI Pvt. Ltd, New Delhi, 2010.

**SEMESTER – V : CORE BASED ELECTIVE III  
PRINCIPLES OF E-COMMERCE**

**Course Code : 14MCA5CE3**

**Hours/Week : 4**

**Credit : 4**

**Maximum Marks : 100**

**Internal Marks : 40**

**External Marks : 60**

**Objective:**

To acquire the knowledge in Electronic Commerce, Electronic Payment systems, Security systems, Online Advertising and Marketing.

**UNIT I**

**12 hours**

Electronic Commerce Framework – Electronic Commerce and Media Convergence – The Anatomy of E-Commerce Applications – Electronic Commerce Consumer Applications – Electronic Commerce Organization Applications. The Network Infrastructure for Electronic Commerce : Components of the I-way – Network Access Equipment – #Global information Distribution Networks#.

**UNIT II**

**12 hours**

The Internet as a Network Infrastructure : The Internet Terminology – NSFNET Architecture and components – #National Research and Education Network# – Internet Governance – An overview of Internet Applications. The Business of Internet Commercialization : Telco/Cable/On-Line companies – #National Independent ISPs# – Regional Level ISPs – Local-level ISPs – Internet Connectivity options.

**UNIT III**

**12 hours**

Electronic Commerce and the World Wide Web : Architectural Framework for Electronic Commerce – World Wide Web as the Architecture – Technology behind the Web – Security and the Web. Consumer-Oriented Electronic Commerce : Consumer-oriented applications – mercantile process model – mercantile models from the consumers perspective.

**UNIT IV**

**12 hours**

Electronic Payment Systems : Types of Electronic Payment Systems – Digital Token based Electronic Payment Systems – #Credit Card-Based Electronic Payment Systems# – Risk and Electronic Payment Systems – Designing Electronic Payment Systems. Inter Organizational Commerce and EDI : Electronic Data Interchange – EDI Applications in Business – EDI: Legal, Security and privacy issues.

**UNIT V**

**12 hours**

Advertising and the Marketing on the Internet : The New Age of Information Search and Retrieval – Electronic Commerce Catalogs – Information filtering – Consumer-Data Interface – Emerging Tools. On Demand Education and Digital Copyrights : Computer-based Education and Training – Technological Components of Education on Demand. Software Agents: Characteristics and Properties of Agents – #The technology behind Software Agents – Applets#, Browsers, and Software Agents.

**# ..... # self-study portion.**

**Text Book:**

1. Ravi Kalakota and Andrew Whinston, *Frontiers of Electronic Commerce*, Addison Wesley, 2000.

**UNIT I** Chapter I : Section : 1.1 - 1.5, Chapter II : Section : 2.2 – 2.5

**UNIT II** Chapter III : Section : 3.1 – 3.7, Chapter IV : Section : 4.1 -4.4, 4.7

**UNIT III** Chapter VI : Section : 6.1 - 6.5, Chapter VII : Section : 7.1, 7.3

**UNIT IV** Chapter VIII : Section : 8.1 – 8.6, Chapter IX : Section : 9.1-9.3

**UNIT V** Chapter XIII : Section : 1.3 - 1.7, Chapter XIV : Section 14.3-14.5, Chapter XV :Section :15.1-15.3, Chapter XVI : Section 16.2-16.3,16.6

**Books for Reference:**

1. Damil Minoli & emma milothi mele commerceTechnology Handbook, Tata McGraw Hill, 1999.
2. K.Bajaj & D.Naj, E-Commerce, Tata McGraw Hill, 1999.

**SEMESTER – V : CORE BASED ELECTIVE-III  
INFORMATION SECURITY**

**Course Code : 14MCA5CE3**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To impart knowledge related to the various concepts, methods of Information Security using cryptography basics, program security, database security, and security in networks.

**UNIT I** **12 hours**

Information Security Fundamentals Protecting Valuables – Characteristics of Computer Intrusion – Attacks – The Meaning of Computer Science – #Computer Criminals# – Methods of Defense – What’s Next in Security

**UNIT II** **12 hours**

Cryptography Basics: Terminology and Background – Substitution Ciphers – Transpositions – Making Good encryption Algorithms – The Data Encryption Standard – The AES – Public key encryption – #The Uses of Encryption#

**UNIT III** **12 hours**

Program Security: Secure Programs – Non-malicious Program Errors – Virus and Other Malicious Code – Targeted Malicious code – #Control against program threats#

**UNIT IV** **12 hours**

Database Security: Introduction to Database – Security Requirements – Reliability and Integrity – Sensitive Data – Inference – Multilevel Databases – Proposal for Multilevel Security

**UNIT V** **12 hours**

Security in Networks: Network concepts – Threats in Networks – Network Security Controls – Firewalls – Intrusion Detection System – #Secure E-mail#

# ..... # self-study portion.

**Text Book:**

1. P. Pfleeger, Shari Lawrence Pfleeger, *Security in Computing*, Charles PH PTR, Third Edition, 2002.

**UNIT I** : Chapter 1 Sections 1.1 – 1.6

**UNIT II** : Chapter 2 Sections 2.1 – 2.9

**UNIT III** : Chapter 3 Sections 3.1 – 3.5

**UNIT IV** : Chapter 4 Sections 6.1 – 6.7

**UNIT V** : Chapter 5 Sections 7.1 – 7.6

**Books for Reference:**

1. Stallings, *Cryptography and Network Security*, 2006.
2. Kauffman, Perlman, Speciner, *Network Security*, PHI, 2011.
3. Conkin et al., *Principles of Computer Security*, Dreamtech Publications, 2002.



**SEMESTER – V : CORE BASED ELECTIVE-III  
SOFTWARE PROJECT MANAGEMENT**

**Course Code : 14MCA5CE3**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To impart knowledge related to the various concepts, methods of Software Project Management using management process framework, management disciplines, and risk management techniques.

**UNIT I** **12 hours**

Software Management Renaissance: Conventional Software Management – Evolution of Software Economics – Improving Software Economics - #The Old Way and the New#

**UNIT II** **12 hours**

A Software Management Project Management Process Framework: Life-Cycle Phases – Artifacts of the Process – #Model-Based Software Architectures# – Work Flows of the Process – Check Points of the Process.

**UNIT III** **12 hours**

Software Management Disciplines: Iterative Process Planning – Project Organizations and Responsibilities – #Process Automation#

**UNIT IV** **12 hours**

Software Management Disciplines: Project Control and Process Instrumentation – Tailoring the Process.

**UNIT V** **12 hours**

Risk Management: Introduction – Risk – Categories of risk – A framework for dealing with risk – Risk Identification – Risk assessment – #Risk planning# – Risk management – Evaluating risks to schedule - Applying the PERT technique – Monte Carlo – Critical chain concepts

# ..... # **self-study portion.**

**Text Books:**

1. Walker Royce, *Software Project Management*, Pearson Education, 2012.

**UNIT I** Chapters 1, 2, 3, 4.

**UNIT II** Chapters 5, 6, 7, 8, 9

**UNIT III** Chapters 10, 11, 12

**UNIT IV** Chapters 13, 14

**UNIT V** Web Reference

**Books for Reference:**

1. Bob Hughes and Mike Cotterell, *Software Project Management*, Third Edition, 2005.
2. Joel Henry, *Software Project Management*, Pearson Education, 2009.
3. Roger S. Pressman, *Software Engineering*, TMH Publications, Sixth Edition, 2005.

**SEMESTER – V : CORE BASED ELECTIVE-IV  
PARALLEL PROCESSING**

**Course Code : 14MCA5CE4**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To study the Parallel computer Architecture, theories of parallel computing, interconnection networks and applications of cost effective computer systems.

**UNIT I**

**12 hours**

Introduction to Parallel Processing – Evolution of Computer Systems – Parallelism in Uniprocessor Systems – Parallel Computer Structures – #Architectural Classification Schemes# – Parallel Processing Applications.

**UNIT II**

**12 hours**

Memory and Input-Output Subsystems – #Hierarchical Memory Structure# – Virtual Memory System – Memory Allocation and Management – Cache Memories and Management – Input-Output Subsystems.

**UNIT III**

**12 hours**

Principles of Pipelining and Vector Processing – Pipelining : An Overlapped Parallelism – Instruction and Arithmetic Pipelines – Principles of Designing Pipelined Processors – Vector Processing Requirements.

**UNIT IV**

**12 hours**

Vectorization and Optimization methods – Parallel Languages for Vector Processing – Design of Vectorizing Compiler – Optimization of Vector Functions – SIMD Array Processors – SIMD Interconnection Networks – #Associative Array Processing#.

**UNIT V**

**12 hours**

Multiprocessors Architecture and Programming – Functional Structures – Interconnection Networks - Parallel Memory Organizations – Multiprocessor Operating Systems – Language Features to Exploit Parallelism – Multiprocessor Scheduling Strategies.

# ..... # **self-study portion.**

**Text Book:**

1. Kai Hwang and Faye A. Briggs, Computer Architecture and Parallel Processing, McGraw Hill International Edition, 1985.

[Chapters : 1, 2, 3, 4.5.1 – 4.5.3, 5.1, 5.2, 5.4, 6.3, 7.1, 7.2.1, 7.2.2, 7.2.3, 7.3.1, 7.3.3, 7.4, 7.5.1, 8.3]

**UNIT I** Chapter 1 Section 1.1 – 1.5

**UNIT II** Chapter 2 Sections 2.1 – 2.5

**UNIT III** Chapter 3 Sections 3.1 – 3.4

**UNIT IV** Chapter 4 Sections 4.5, Chapter 5 Sections 5.1, 5.2, 5.4

**UNIT V** Chapter 7 7.1 – 7.4, 7.5-7.5.1, Chapter 8 Sections 8.3

**Books for Reference:**

1. Richard Kain, *Advanced Computer Architecture*, PHI, 1999.
2. V. Rajaraman and C. Siva Ram Murthy, *Parallel Computers, Architecture and Programming*, PHI, 2000.

**SEMESTER – V : CORE BASED ELECTIVE-IV  
GRID COMPUTING**

**Course Code : 14MCA5CE4**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To impart knowledge related to the various concepts, methods of Grid computing with grid benefits, components, and standards supporting grid computing techniques.

**UNIT I** **12 hours**  
Introduction: Grid Computing & Key Issues – #Applications# – Other Approaches – Grid Computing Standards – Pragmatic Course of Investigation.

**UNIT II** **12 hours**  
Grid Benefits & Status of Technology: Motivations – History of Computing, Communications and Grid Computing – Grid Computing Prime Time – #Suppliers and Vendors# – Economic Value – Challenges.

**UNIT III** **12 hours**  
Components of Grid Computing Systems and Architectures: Basic Constituent Elements-A Functional View – A Physical View – Service View.

**UNIT IV** **12 hours**  
Grid Computing Standards-OGSI: Standardization – Architectural Constructs – Practical View – OGSA/OGSI Service Elements and Layered Model – #More Detailed View#.

**UNIT V** **12 hours**  
Standards Supporting Grid Computing-OGSA: Functionality Requirements – OGSA Service Taxonomy – Service Relationships – OGSA Services – #Security Considerations#.

# ..... # self-study portion.

**Text Book:**

1. Daniel Minoli, *A Networking Approach to Grid Computing*, Wiley Publication, 2004.

**UNIT I** Chapter I : Section 1.1 – 1.2 , 1.4 – 1.6

**UNIT II** Chapter II : Section 2.1 – 2.6

**UNIT III** Chapter III : Section 3.1 – 3.4

**UNIT IV** Chapter IV: Section 4.1 – 4.6

**UNIT V** Chapter V : Section 5.1 – 5.6

**Books for Reference:**

1. Ahmar Abbas, *Grid Computing – A Practical Guide to Technology and Applications*, Charles River Media Publication, 2004.

**SEMESTER – V : CORE BASED ELECTIVE-IV  
ONTOLOGY AND SEMANTIC WEB**

**Course Code : 14MCA5CE4**  
**Hours/Week : 4**  
**Credit : 4**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Objective:**

To impart knowledge related to the various concepts, methods of Ontology and Semantic Web using ontological engineering, tools, ontology languages with case study.

**UNIT I**

**12 hours**

Introduction to the Syntactic web and Semantic Web – Evolution of the Web – The visual and syntactic web – Levels of Semantics – Taxonomies - Logics for Semantic Web – The semantic web architecture and technologies – #Applications of the Semantic Web#

**UNIT II**

**12 hours**

Ontological Engineering: What are Ontologies – Methods and methodologies for building ontologies – Ontology Development process and Life cycle – Methods for Ontology Learning – Ontology Evolution – #Versioning# – Ontology Languages

**UNIT III**

**12 hours**

Editing tools for ontology creation – Protégé – OntoEdit – DOE – IsaViz – Ontolingua Altova Semantic Works – OilEd – WebODE – pOWL – Swoop.

**UNIT IV**

**12 hours**

The Key Semantic Web Ontology Languages – Semantic Reasoning – Logical Implications and Descriptions – #Technical Interpretations of classes and predicates#.

**UNIT V**

**12 hours**

Case Study: Resource Discovery In a Building – Reasoning about Knowledge Base and Ontologies – Semantic search Engines Based on Data Integration Systems.

# ..... # **self-study portion.**

**Text Book:**

1. Jorge Cardoso, *Semantic Web Services – Theory, Tools and Applications*, Information Science Reference, 2007.

**Books for Reference:**

1. Christopher Walton, *Agency and the Semantic Web*, Oxford University Press, 2007.
2. AF Salam and Jason R Stevens, *Semantic Web Technologies and e-Business*, Idea Group Publications, 2007.

**SEMESTER - IV : CORE XXX**  
**DISTRIBUTED TECHNOLOGY LAB**

**Course Code : 14MCA5C30P**  
**Hours/Week : 4**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

1. a) Use Statement Interface to perform creation, insertion, update and deletion of records in MS-Access database  
b) Use Prepared Statement Interface to perform creation, insertion, update and deletion of records in MS-Access database
2. a) Simple Java application using TCP mechanism  
b) Simple Java application using UDP mechanism
3. Simple RMI application for  
a) Downloading and Uploading files on the server by using multiple clients  
b) Inserting and deleting records in any database from the multiple clients
4. Simple Server side Applications  
a) By extending GenericServlet class  
b) By extending HttpServlet class
5. a) Session Tracking in Java Servlets using
  - i) Hidden Form Fields
  - ii) HttpSession class
  - iii) Cookies  
b) Database manipulation using Servlet program.
6. a) JSP code for checking number of times a particular page is visited  
b) JSP code for using request and response objects
7. Simple J2EE application using
  - a) Stateless Session Bean
  - b) Stateful Session Bean
8. Simple J2EE application using Entity Beans
  - a) Container Managed Persistence(CMP)
  - b) Bean Managed Persistence(BMP)

**SEMESTER - IV : CORE - XXXI  
MINI PROJECT LAB**

**Course Code : 14MCA5C31P**  
**Hours/Week : 4**  
**Credit : 3**

**Maximum Marks : 100**  
**Internal Marks : 40**  
**External Marks : 60**

**Students carry out a Mini Project during their practical hours.**

**SEMESTER - V : SKILL BASED COURSE-III  
COMPREHENSIVE STUDY**

**Course Code : 14MCA5S3**  
**Hours/Week : 2**  
**Credit : 2**

**Maximum Marks : 100**  
**Internal Marks : 100**  
**Course Fully Internal**

**Objective:**

To consolidate the understanding of the basics through frequent tests and interaction. Emphasis is on the concepts and fundamentals and the orientation is towards placement.

**UNIT I :** C Debugging – Object Oriented Programming

**UNIT II:** Operating Systems

**UNIT III :** Data Structures – Algorithms

**UNIT IV :** Database Concepts – Software Engineering

**UNIT V :** Distributed Technologies - Networking

**Books for Reference:**

1. Robert Lafore, “ Object Oriented programming in Microsoft C++”, Galgotia Publications, New Delhi, 2000.
2. Andrew S. Tanenbaum, “ Modern Operating Systems”, Prentice Hall of India Private Ltd, New Delhi, 1997.
3. Ellis Horowitz and Sartaj Sahni, “Fundamentals of Computer Algorithms”, Galgotia Publications, New Delhi, 1985.
4. Roger S. Pressman, “Software Engineering”, McGraw Hill, International, 6<sup>th</sup> Edition, New York, 2008.
5. Andrew S. Tanenbaum, “Computer Networks”, Prentice Hall of India, New Delhi, 1999.

**SEMESTER - V : EXTRA CREDIT COURSE - III  
CLOUD COMPUTING**

**Course Code : 14MCA5EC3**

**Hours/Week : -**

**Credit : 4\***

**Maximum Marks : 100\***

**Internal Marks : -**

**External Marks : 100\***

**Objective:**

To impart knowledge related to the various concepts, methods of Cloud Computing techniques with motivation, design, security and disaster recovery techniques.

**UNIT I**

**Cloud Computing:** The cloud – Cloud Application Architecture – The value of cloud computing – Cloud Infrastructure Models – An overview of Amazon Web Services. **Amazon Cloud Computing:** Amazon S3 – #Amazon EC2#.

**UNIT II**

**Moving into the Cloud:** Software Licenses – The Shift to Cloud Cost Model – Service Levels for Cloud Applications – Security – Disaster Recovery.

**UNIT III**

**Getting Ready for the Cloud:** Web Application Design – Machine Image Design – Privacy Design – #Database Management#.

**UNIT IV**

**Security:** Data Security – Network Security – Host Security – Compromise Response.

**UNIT V**

**Disaster Recovery:** Disaster Recovery Planning – Disasters in the Cloud – Disaster Management. **Scaling A Cloud Infrastructure:** Capacity Planning – #Cloud Scale#.

# ..... # **self-study portion**

**Text Book:**

1. George Reese, *Cloud Application Architectures*, O'Reilly Publication, First Edition, April 2009.

**Books for Reference:**

1. Michael Miller, *Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online*, Que Publication, First Print, August 2008.



**SEMESTER – VI**  
**INDUSTRIAL EXPERIENCE AND PROJECT WORK**

**Course Code : 14MCA6PW**  
**Hours/Week : 30**  
**Credit : 20**

**Maximum Marks : 200**  
**Internal Marks : 80**  
**External Marks : 120**

**Students carry out a Project in Software Development Companies throughout the Semester.**