

# ST. XAVIER'S COLLEGE(AUTONOMOUS)

Palayamkottai - 627 002

(Recognized as "College with Potential for Excellence" by UGC)

(Re-accredited with "A" Grade with a CGPA of 3.50)



## SYLLABUS

*Preserve this copy of the syllabus until you complete the course, as it is an important document of your present course of study.*

Name \_\_\_\_\_

**MASTER OF COMPUTER APPLICATIONS**  
**(w.e.f. 2018 - 2019)**

## Programme Specific Outcomes

1. Adapt and utilize principles of mathematics and computing techniques to solve real world problems.
2. Apply modern tools and techniques to design and develop web and mobile applications.
3. Explore the knowledge acquired from Data Mining, Internet of Things and Cloud Computing and Big Data through research.
4. Analyze and apply the knowledge of Organizational Structure and Human resource management, Management Information Systems and ERP and Mobile Commerce and develop entrepreneurship skills.

## List of ECC/Value added courses

### Self Study Papers:

Course Code	Title of the Paper
18PCAS01	Current Trends in Computers
18PCAS02	Web User Interface Design
18PCAS03	Cyber Security
18PCAS04	Internet of Things
18PCAS05	Mobile Commerce

### ECC/Value Added Papers: (for MCA and Others)

Course Code	Title of the Paper	Duration	Fees (Rs.)
18PCAEC01	Aptitude and Reasoning Skills	30 hours	
18PCAEC02	Communication and Presentation Skills	30 hours	
18PCAEC03	Scripting Languages and AJAX	30 hours	
18PCAEC04	Free and Open Source Software Development	30 hours	
18PCAEC05	IT Infrastructure Management	30 hours	

### MCA - Course Pattern

Semester	Theory Hrs(Credits)	Practical Hrs(Credits)	Elective Hrs(Credits)	Project (Credits)	Total Hours(Credits)
<b>I</b>	4(4)	5(2)	4(4)		
	4(4)	5(2)			
	4(4)				
	4(4)				
	<b>16(16)</b>	<b>10(4)</b>	<b>4(4)</b>		<b>30(24)</b>
<b>II</b>	4(4)	5(2)	4(4)		
	4(4)	5(2)			
	4(4)				
	4(4)				
	<b>16(16)</b>	<b>10(4)</b>	<b>4(4)</b>		<b>30(24)</b>
<b>III</b>	4(4)	5(2)	4(4)		
	4(4)	5(2)			
	4(4)				
	4(4)				
	<b>16(16)</b>	<b>10(4)</b>	<b>4(4)</b>		<b>30(24)</b>
<b>IV</b>	4(4)	5(2)	4(4)		
	4(4)	5(2)			
	4(4)				
	4(4)				
	<b>16(16)</b>	<b>10(4)</b>	<b>4(4)</b>		<b>30(24)</b>
<b>V</b>	4(4)	5(2)	4(4)	(4)	
	4(4)	5(2)			
	4(4)				
	4(4)				
	<b>16(16)</b>	<b>10(4)</b>	<b>4(4)</b>	<b>(4)</b>	<b>30(28)</b>
<b>VI</b>				(16)	
					<b>0(16)</b>
				<b>STAND</b>	<b>0(1)</b>
	<b>80(80)</b>	<b>50(20)</b>	<b>20(20)</b>	<b>(20)</b>	<b>150(141)</b>

### COMPUTER APPLICATIONS (MCA) - Course Pattern

Sem.	Status	Course Code	Title of the Paper	Hours	Credits
<b>I</b>	Core	18PCA11	Mathematical Foundations of Computer Science	4	4
	Core	18PCA12	Programming in C	4	4
	Core	18PCA13	Computer Organization and Architecture	4	4
	Core	18PCA14	Windows and Linux	4	4
	Core	18PCAL15	<b>Practical:</b> Programming in C	5	2
	Core	18PCAL16	<b>Practical:</b> Windows and Linux	5	2
	Elective-I	18PCAE11	Computer Fundamentals and Visual Basic / Computer Crime and Ethics / Microprocessor	4	4
			<b>Sub-Total</b>	<b>30</b>	<b>24</b>
<b>II</b>	Core	18PCA21	Object Oriented Programming with C++	4	4
	Core	18PCA22	Operating Systems	4	4
	Core	18PCA23	Data Structures and Algorithms	4	4
	Core	18PCA24	Database Systems	4	4
	Core	18PCAL25	<b>Practical:</b> C++ and Data Structures	5	2
	Core	18PCAL26	<b>Practical:</b> Oracle and Visual Basic	5	2
	Elective-II	18PCAE21	Numerical and Statistical Methods / Human Machine Interaction / Distributed Operating Systems	4	4
			<b>Sub-Total</b>	<b>30</b>	<b>24</b>
<b>III</b>	Core	18PCA31	Data Communication and Computer Networks	4	4
	Core	18PCA32	Programming in Java	4	4
	Core	18PCA33	Optimization Techniques	4	4
	Core	18PCA34	Computer Graphics and Multimedia	4	4
	Core	18PCAL35	<b>Practical:</b> Programming in Java	5	2
	Core	18PCAL36	<b>Practical:</b> Graphics and Multimedia	5	2
	Elective-III	18PCAE31	Organizational Structure and Human resource management / Management Information Systems and ERP	4	4

			<b>Sub-Total</b>	<b>30</b>	<b>24</b>
<b>IV</b>	Core	18PCA41	Programming in C# and ASP.NET	4	4
	Core	18PCA42	Cloud Computing and Big Data	4	4
	Core	18PCA43	Web Technologies	4	4
	Core	18PCA44	Object Oriented Software Engineering	4	4
	Core	18PCAL45	<b>Practical:</b> Programming in C# and ASP.NET	5	2
	Core	18PCAL46	<b>Practical:</b> Web Technologies	5	2
	Elective-IV	18PCAE41	Accounting and Financial Management / E-Commerce	4	4
			<b>Sub-Total</b>	<b>30</b>	<b>24</b>
<b>V</b>	Core	18PCA51	Android Application Development	4	4
	Core	18PCA52	Data Mining	4	4
	Core	18PCA53	J2EE and J2ME	4	4
	Core	18PCA54	Software Testing	4	4
	Core	18PCAL55	<b>Practical:</b> Android Application Development	5	2
	Core	18PCAL56	<b>Practical:</b> J2EE and J2ME	5	2
	Elective-V	18PCAE51	Mobile Computing / Digital Image Processing / Compiler Design	4	4
	Mini. Project – II	18PCAR51		2	4
			<b>Sub-Total</b>	<b>30</b>	<b>28</b>
<b>VI</b>	Core	18PCA61	Project Work and Viva Voce		16
			<b>Sub-Total</b>		<b>16</b>
	STAND				1
			<b>Grand Total</b>	<b>150</b>	<b>141</b>

# MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

(Sub. Code : 18PCA11)

<b>SEMESTER : I</b>	<b>CORE</b>	<b>HOURS:4</b>	<b>CREDITS : 4</b>
---------------------	-------------	----------------	--------------------

## UNIT I MATHEMATICAL LOGIC

Statement and Notations – Connectives – Negation – Conjunction – Disjunction – Conditional and Biconditional statement - Statement formulae and truth tables — Well Formed Formulae – Tautologies – Equivalences of Formula – Duality Law.

**Predicate Calculus:** Predicates – Statements functions – variables – quantifiers – predicate formulae – Free and Bound variables.

## UNIT II SET THEORY

**Basic concepts of set theory:** Notation – Inclusion of equality of sets – Power set – Operation on sets – Venn diagrams

**Relations and ordering:** Cartesian products - Relations – Properties of Binary relation in a set – Relation matrix and graph – Equivalence relations – Composition of binary relations.

**Functions:** Definition and Introduction – Composition of functions – Inverse function.

## UNIT III GROUPS

Definition and examples – Subgroups – Homomorphism – Cosets – Normal subgroups.

## UNIT IV GRAPH THEORY

Basic terminology: Different types of graphs – Directed and undirected, Simple, Pseudo, Complete, Regular, Bipartite. Incidence and degree, Pendant and Isolated vertex and Null graph. Isomorphism, Sub graphs, Walk, Path and Circuit, Connected and disconnected graphs and components, operations on graphs. Matrix representation of graphs – Incidence and Adjacency matrices.

## UNIT V LANGUAGES, GRAMMARS, MACHINES

Introduction – alphabet, words, languages – regular expressions, regular languages – Finite State Automata – Finite State Machines - Godel numbers – Grammars.

## **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
2. Use effectively algebraic techniques to analyse basic discrete structures
3. Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.
4. Use finite-state machines to model computer operations

## **TEXT BOOKS**

1. J.P Trembley, R. Manohar, “Discrete Mathematical structures with applications to Computer Science”, Tata McGrawHill publications, 2017.**(For Units I-IV)**
2. Seymour Lipschutz, Marc Lipson, “Discrete Mathematics”, Revised 3<sup>rd</sup> Edition, Schaum’s outline series, Tata McGraw Hill publications, 2017.**(For Unit V)**

**Note: Excluding algorithms and theorems.**

## **REFERENCE BOOK**

1. S. Santha, “Discrete Mathematics with combinatory and graph theory”, Third Edition, Cengage Publications, 2015.

# PROGRAMMING IN C

(Sub. Code: 18PCA12)

<b>SEMESTER : I</b>	<b>CORE</b>	<b>HOURS:4</b>	<b>CREDITS : 4</b>
---------------------	-------------	----------------	--------------------

## UNIT I BASICS OF C AND DECISION STATEMENTS

Introduction – Overview of C – Variables and Data types – Operators and Expressions – Managing Input and Output Operations, Decision Making and Branching - Decision Making and Looping.

## UNIT II ARRAY, STRING FUNCTIONS

Introduction – One Dimensional Array – Two Dimensional Array- Array – Declaring and Initializing String – String Handling Function.

## UNIT III FUNCTIONS

Functions – Definition of Function – Function calls – Declaration – Category of Functions – Call by Value and Reference – Recursion Passing arrays to functions – Passing Strings to Functions.

## UNIT IV POINTERS, STRUCTURES AND UNIONS

Understanding Pointers – Pointers and Arrays – Pointers and Character Strings – Pointers and Structures – Structures and Unions: Declaration – Initialization – Arrays of Structures – Structures and Functions – Unions - Size of Structures – Bit fields.

## UNIT V FILE, DYNAMIC MEMORY ALLOCATION

Introduction – Defining and Opening a file – Closing a File – Input/output Operations on Files – Error Handling during I/O Operations – Command Line Arguments – Applications of Command Line Arguments, Dynamic Memory Allocation Function.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to understand the

1. Basics of C language programming.
2. Methods of implementing decision making, branching and looping.
3. Usage of arrays and functions in the coding.
4. Ideas about pointers
5. Various storage components like structures and unions.
6. Concepts of files and its operations.

**TEXT BOOK**

E. Balagurusamy, “Programming in ANSI C”, Seventh Edition, Tata McGraw Hill, 2017.

**REFERENCE BOOKS**

1. Byron Gottfried, “Programming with C”, Third Edition, Mc Graw Hill Education, 2017.
2. Herbert Schildt, “The Complete Reference - C”, Fourth Edition, McGraw Hill Education, 2017.
3. Yashavant Kanetkar, “Let us C”, Fifteenth Edition, BPB Publications, 2016.

# COMPUTER ORGANIZATION AND ARCHITECTURE

(Sub. Code : 18PCA13)

<b>SEMESTER : I</b>	<b>CORE</b>	<b>HOURS:4</b>	<b>CREDITS : 4</b>
---------------------	-------------	----------------	--------------------

## **UNIT I DIGITAL COMPONENTS, REGISTERS AND MICRO OPERATIONS**

Digital Components – Decoders – Multiplexers – Registers – Shift Registers – Binary Counters – Memory Units – Register Transfer Language – Bus and Memory Transfer – Arithmetic Micro Operations – Logic Micro Operations – Shift Micro Operations – Arithmetic Logic Shift Unit.

## **UNIT II COMPUTER ORGANIZATION AND DESIGN OF ACCUMULATOR LOGIC**

Basic Computer Organization and Design – Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory Reference Instructions – Input-Output and Interrupt – Design of Basic Computer – Design of Accumulator Logic.

## **UNIT III CENTRAL PROCESSING UNIT, PIPELINE AND VECTOR PROCESSING**

Central Processing Unit – General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer and Manipulation – Program Control.

Pipeline and Vector Processing – Parallel Processing – Pipelining – Instruction Pipeline – RISC Pipeline – Vector Processing – Array Processors.

## **UNIT IV INPUT-OUTPUT ORGANIZATION**

Input-Output Organization– Peripheral Devices – Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer – Priority Interrupt – Direct Memory Access – Input-Output Processor – Serial Communication.

## **UNIT V MEMORY ORGANIZATION**

Memory Organization – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory – Memory Management Hardware.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Describe the digital components, registers and micro operations
2. Interpret the computer organization and design of accumulator logic
3. Examine the CPU, pipeline and vector processing
4. Describe the input-output organization and direct memory access
5. Illustrate the different types of memory

**TEXT BOOK**

M. Morris Mano, “Computer System Architecture”, Third Edition, Pearson Education, Fourteenth Reprint, 2016.

**REFERENCE BOOKS**

1. William Stallings, “Computer Organization and Architecture: Designing for Performance”, Tenth Edition, Pearson Education, 2015.
2. Linda Null, Julia Lobur, “The Essentials of Computer Organization and Architecture”, Fourth Edition, Viva Publishers, 2015
3. Ikvinderpal Singh, Baljinder Singh, “Computer Organization and Architecture”, First Edition, Khanna Publishers, 2014.
4. Dr. M. Usha, T.S. Srikanth, “Computer System Architecture and Organization”, First Edition, Wiley Publications, 2012.
5. John L. Hennessy , David A. Patterson, “Computer Architecture, Fifth Edition: A Quantitative Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.

## WINDOWS AND LINUX

(Sub. Code : 18PCA14)

<b>SEMESTER : I</b>	<b>CORE</b>	<b>HOURS:4</b>	<b>CREDITS : 4</b>
---------------------	-------------	----------------	--------------------

### **UNIT I INTRODUCTION, WINDOWS DESKTOP, WORKING WITH FOLDERS AND FILES**

**Exploring Windows 7:** Log On to Windows 7 - Explore the Desktop - Work with Windows - Use Windows Help and Support – Turn Off Personal Computers - **Customize the Windows:** Start Menu, Customize the Taskbar - Personalize the Desktop - Set a Screen Saver - Add Gadgets - **Managing Folders and Files:** Navigate to Folders with Windows Explorer - Work with Folders and Files - Copy Data on Storage Media - Renaming files and folders - Deleting files and folders - Views.

### **UNITII INTRODUCTION, SHELL PROGRAMMING**

**Introduction:** Introduction to Linux – History of Linux and Unix – Linux Overview – Linux Software **Getting Started:** Accessing Linux System – GNOME and KDE Desktops – Desktop operations **The Shell:** Command Line – History – File Expansion – I/O Redirection – Pipes – Jobs – Process **Shell Scripts and Programming:** Shell Variables – Shell Scripts – Environment variables – Control Structures.

### **UNIT III FILE STRUCTURE, LINUX SOFTWARE**

**Linux files, Directories, and Archives:** Files and Structure – Listing, Displaying and Printing – managing directories – File and Directory operations – Archiving and Compressing files – **Office and Database Applications:** KOffice – GNOME Office – Database systems – Editors – **Mail and News clients:** Mail Clients – Usenet News – **Web, FTP, Java Clients:** Web Clients – Java for Linux – FTP Clients.

### **UNIT IV SECURITY, FIREWALLS**

**Security Enhanced Linux:** System administration – Terminology – Management operations – Management tools – Policy methods – Policy rules – **IPsec and VPN:** IPsec Protocols – Modes – tools – Configuring connections – Configuring IPsec – Virtual Private

Network – **Secure Shell and Kerberos:** Open SSH – Kerberos – **Firewalls:** IP tables – Packet filtering – Network Address Translation – IP table scripts – IP masquerading.

## **UNIT V INTERNET, NETWORK SERVICES**

**FTP Servers:** FTP – Anonymous FTP – Using FTP – Secure FTP – Professional FTP –

**Web Servers:** Apache web server – Configuration and Directives – Virtual Hosting – Server side Includes – **Proxy Servers:** Configuring Client Browsers – squid.conf – security – caches – Logs – **Mail Servers:** MTA – MX Records – Postfix – Sendmail – POP and IMAP server – Spam.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Provide knowledge about Linux operating system and shell programming.
2. Give detailed exposure in Linux Security, Network services and System administration.

### **TEXT BOOKS**

1. Steve Johnson, “Microsoft Windows 7 Illustrated Complete”, Course Technology, 2010. ( for Unit-I)
2. Richard Petersen, “The Complete Reference Linux”, Sixth Edition, Tata McGrawHill,Seventh Reprint 2010. (for Unit II – Unit V)

### **REFERENCE BOOKS**

1. Evi Nimeth, Garth Snyder and Trent R Hein, ”Linux Administration Hand Book”, Pearson Education.
2. W. Richard Stevens, “Advanced Programming in the Unix Environment”, Addison Wesley Publication Ltd., 2004.
3. Mark G. Sobell,”A Practical Guide to Fedora and Red Hat Enterprise Linux”,Pearson Education,2010.
4. Microsoft Windows 7 Product Guide, Microsoft Publishers.

## PRACTICALS – PROGRAMMING IN C

(Sub.Code:18PCAI25)

<b>SEMESTER : I</b>	<b>CORE</b>	<b>HOURS : 5</b>	<b>CREDITS : 2</b>
---------------------	-------------	------------------	--------------------

1. Program to check for Armstrong number.
2. Program to find prime numbers between a given range.
3. Program to find sum of digits.
4. Program to evaluate the given series.
5. Program to solve quadratic equation.
6. Program to convert decimal to binary, octal and hexadecimal and vice versa.
7. Program to print Fibonacci series.
8. Program to check for Palindrome number.
9. Program to print the Pyramid.
10. Program to sort male and female students separately.
11. Program to find NCR.
12. Program to perform matrix operations.
13. Program for manipulation without string functions.
14. Program using functions.
15. Program using recursion.
16. Program using Structure.
17. Program using Union.
18. Program using files.
19. Program using pointers.
20. Program using command line arguments.

## **PRACTICALS – WINDOWS AND LINUX**

**(Sub. Code: 18PCAL16)**

<b>SEMESTER : I</b>	<b>CORE</b>	<b>HOURS : 5</b>	<b>CREDITS : 2</b>
---------------------	-------------	------------------	--------------------

### **MS-DOS AND WINDOWS**

1. MS-DOS internal commands.
2. MS-DOS external commands.
3. MS-DOS batch programming.
4. Personalizing Windows 7 Desktop.
5. Examining system properties in Windows 7.
6. Working with Files and Folders in Windows 7.
7. Managing Windows Gadgets.

### **UNIX AND LINUX**

1. Basic commands in Unix & Linux
2. Shell programming with control structures.
3. Using Linux commands within Shell scripts.
4. Programs using gawk
5. Linux command implementation programs.
6. Working with different Linux Desktops.
7. Managing Files and Folders under Linux.
8. Working with Linux file and directory permissions.

## COMPUTER FUNDAMENTALS AND VISUAL BASIC

(Sub. Code. : 18PCAE11)

**SEMESTER : I**

**ELECTIVE I : 1.1**

**HOURS : 4**

**CREDITS : 4**

### **UNIT I INTRODUCTION TO COMPUTERS**

Five Generations of Modern Computers - Classification of Digital Computer Systems - Anatomy of a Digital Computer - Computer Architecture - The Number System Central Processing Unit (CPU) and Memory - Secondary (Auxiliary) - Storage Devices - Input Devices - Output Devices - Introduction to Computer Software - Introduction to Software Development - Programming Languages - Operating Systems - General Software Features and Trends.

### **UNIT II VISUAL BASIC OVERVIEW**

Creating A Project In Visual Basic - The Parts Of A Visual Basic Project - Project Scope - Using The Visual Basic Application Wizard - Visual Basic Programming Conventions - Best Coding Practices In Visual Basic - The Visual Basic Development Environment - Overview Of The Integrated Development Environment - Selecting IDE Colors, Fonts, And Font Sizes - Setting A Start-up Form Or Procedure - Using Visual Basic Predefined Forms, Menus, And Projects - Customizing Menus And Toolbars - Adding And Removing Forms, Modules, And Class Modules.

### **UNIT III DATA TYPES, CONTROL STRUCTURES**

The Visual Basic Language - Declaring Constants - Declaring Variables - Selecting Variable Types - Converting Between Data Types - Setting Variable Scope - Verifying Data Types - Declaring Arrays And Dynamic Arrays - Declaring Subroutines - Declaring Functions - Preserving - Variables\_ Values Between Calls To Their Procedures - Handling Strings Converting Strings To Numbers And Back Again - Handling Operators And Operator Precedence - Using If & Else Statements - Using Select Case Making Selections With Switch() And Choose() - Looping - Handling Dates And Times - Handling Financial Data .

### **UNIT IV VISUAL BASIC CONTROLS**

Visual Basic Menus - Text Boxes And Rich Text Boxes - Command Buttons, Checkboxes, And Option Buttons - List Boxes And Combo Boxes - Scroll Bars And Sliders

- Picture Boxes And Image Controls - Windows Common Dialogs - Working With Flex Grid Control - The Frame, Label, Shape, And Line Controls – File Controls.

#### **UNIT V USING DAO AND ADO**

Databases: Using DAO And ADO - Creating And Managing Databases With The Visual Data Manager - Adding A Data Control To A Program - Opening A Database With An ADO Data Control - Working With Database Objects In Code – DAO - A Full-Scale DAO Example – ADO - A Full-Scale ADO Example.

#### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Get clear idea about the fundamentals of computer.
2. Good understanding of the basic concepts of Visual Basic.
3. Have a good understanding of the Visual Basic language structure and language syntax
4. Effectively develop applications with a graphical user interface using controls in Visual Basic.
5. Have the capability of connecting visual basic with databases.

#### **TEXT BOOKS**

1. Alexis Leon and Mathew Leon,“Fundamentals of Information Technology”, Vikas Publishing, Second Edition, 1999 (Unit I).
2. Steven Holzner,“Visual Basic 6 Programming Black Book”, First Edition, Dreamtech Press, 2000.

#### **REFERENCE BOOKS**

1. Peter Norton,“Introduction to Computers”,Fifth Edition, TataMcGraw Hill.
2. Evangelos Petroutsos,“Mastering Visual Basic”, First Edition,BPB Publications.

## **COMPUTER CRIME AND ETHICS**

**(Sub. Code. : 18PCAE11)**

**SEMESTER : I**

**ELECTIVE I : 1.2**

**HOURS : 4**

**CREDITS : 4**

### **UNIT I TECHNICAL WRITING**

Introduction to Technical Writing –Objective of Technical Writing –Audience Recognition and Involvement –Preparation of Resume – Techniques of Writing effective E-mail – Writing User Manuals –Writing Technical Reports and Summaries.

### **UNIT II INTRODUCTION TO COMPUTER ETHICS**

Introduction to Computer Ethics – Policy vacuum – Moral and Legal issues – Computer Ethics – Professional Ethics –Characteristics of professions – Conflicting Responsibilities –Code of Ethics and professions conduct –Philosophical Ethics –Ethical Relativism – Utilitarianism –Rights – Individual and Social Policy Ethics.

### **UNIT III ETHICS ONLINE**

Ethic Online – Hacking and Hacker Ethics – Computer Crime – Netiquette –Privacy – Computers and Privacy issue –Proposals for better Privacy Protection –Property Rights in Computer Software – Current Legal Protection – Software Piracy –The Moral Question.

### **UNIT IV SOCIAL IMPLICATION AND SOCIAL VALUE**

Accountability – Buying and Selling Software – Accountability issues –Social Implication and Social Value – Technology and Social Change –Democratic values in the internet – Freedom of Speech –Future issues.

### **UNIT V THE RIGHTS AND RESPONSIBILITIES OF ENGINEERS**

The Rights and Responsibilities of Engineers – Professional Responsibilities –Ethics and Rights –Ethics in Research and Experimentation.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Getknowledge about general technical writing skills.
2. Applydiverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
3. Identify and analyze in online ethics and Privacy Protection.
4. Identify the social implication and social values.
5. Think about the rights and responsibilities of engineers.

**TEXT BOOKS**

1. Gerson , S.J and Gerson S.M., “Technical Writing Process and Product”, Fifth Edition,PearsonEducation Asia, 2007. (Unit – I)
2. Johnson D.G.,“Computer Ethics”, Third Edition , Pearson Education Asia, 2001. (Unit II - V)

**REFERENCE BOOKS**

1. Fleddermman. C. B, “Engineering Ethics”, Second Edition, Pearson Education, 2004.
2. Martin M.W, SchinZinger. R., “Ethics in Engineering”, Third Edition, Tata McGraw Hill,1996.

## **MICROPROCESSOR**

(Sub. Code : 18PCAE11 )

**SEMESTER : I**

**ELECTIVE II : 2.3 HOURS : 4**

**CREDITS : 4**

### **UNIT I INTRODUCTION AND ADDRESSING MODES**

Microprocessor Architecture – Introduction – Intel 8085 – Instruction Cycle – Timing Diagram – Instruction Set of Intel 8085 – Introduction – Instruction and Data Formats – Addressing Modes – Status Flags – Symbols and Abbreviations – Intel 8085 Instructions.

### **UNIT II MODULAR AND STRUCTURED PROGRAMMING**

Programming of Microprocessors – Assembly Language – High level Language – Area of Applications of Various Languages – Stack – Subroutines – System Software – Some Important Commands – Modular Programming – Structured Programming - Top-Down Design, Bottom-Up Design – MACRO.

### **UNIT III INTEL 8086 INSTRUCTIONS AND REGISTERS**

Intel 8086 – Classification of 8086 Instructions – Binary Address of 8086 Registers – Description of 8086 Registers – Assembler Directives – Assembler Directives for Intel 8086.

### **UNIT IV MEMORY AND I/O INTERFACING**

Peripheral Devices and Their Interfacing – Address Space Partitioning – Memory and I/O Interfacing – Data Transfer Schemes – Interrupts of 8085 – Interfacing Devices and I/O Devices – I/O Ports – Programmable DMA Controller – Programmable Interrupt Controller (PIC) – Programmable Communication Interface.

### **UNIT V PENTIUM AND MULTICORE PROCESSORS**

Intel's 32-Bit and 64-Bit Microprocessors – Intel 80386 – Intel 80486 - Intel's Pentium Processor – Pentium MMX – Pentium II – Pentium III – Pentium 4 – IA-64 – Itanium - Multicore Processors – Other Microprocessors – AMD – Sun Microprocessors – MIPS Microprocessors – PowerPC Microprocessors – DEC's Alpha Microprocessors –

National Semiconductor Microprocessors – ARM Microprocessor – MOTOROLA Microprocessors.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Analyse, specify, design, write and test assembly language programs of moderate complexity.
2. Describe the classifications of 8086 instructions and use of 8086 registers.
3. Understand the interfacing of peripheral devices.
4. Characterise the Intel’s 32-Bit and 64-Bit Microprocessors.
5. Describe the features of Multicore Processors and PowerPC Microprocessors.

**TEXT BOOK**

B.Ram, “Fundamentals of Microprocessor and Microcomputers”, Sixth Edition, Dhanpat Raj Publications.

**REFERENCE BOOKS**

1. Ramesh Goankar, “Microprocessor Architecture, Programming and Applications with the 8085”, Fifth Edition, Penram International Publishing Private Limited, 2012.
2. Yu-Cheng Liu, Glenn A. Gibson, “Microcomputer Systems, The 8086/8088 family Architecture, Programming and Design”, Fourth Edition, PHI, 2015.
3. Aditya. P, Mathur, “Introduction to Microprocessors”, Tata McGraw Hill, Fourth Edition, 2010.
4. Gilmore, “Microprocessors Principles and Applications”, Second Edition, Tata McGraw Hill, 2014.

## **OBJECT ORIENTED PROGRAMMING WITH C++**

**(Sub. Code: 18PCA21)**

<b>SEMESTER : II</b>	<b>CORE</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
----------------------	-------------	------------------	--------------------

### **UNIT I OOPS CONCEPT**

Principles of Object Oriented Programming – Software Crisis – Software Evolution – Procedure Oriented Programming – Object Oriented Programming Paradigm – Basic Concepts and Benefits of OOP – Object Oriented Language – Application of OOP – Beginning with C++ - Structure of C++ - Application of C++ - Tokens – Keywords – Expression – Control Structures – Operators on C++ - Manipulators.

### **UNIT II FUNCTIONS, CLASS, MEMBER FUNCTIONS**

Function in C++ : Function Prototyping – Call by Value and Reference – Inline Functions - Default const Arguments – Function Overloading – Classes and Objects – Member Functions – Nesting of Member Functions – Private Member Functions - Memory Allocation of Object – Array with in a Class – Static Data Members – Static Member Functions - Array of Objects - Objects as Function Arguments – Pointer to Member.

### **UNIT III CONSTRUCTORS, OPERATOR OVERLOADING**

Constructors, Parameterized Constructors – Multiple Constructor – Constructor with Default Parameters – Copy and Dynamic Constructors – Destructors – Operator Overloading – Overloading Unary and Binary Operators - Operator Overloading using Friend Function.

### **UNIT IV INHERITANCE, VIRTUAL FUNCTIONS**

Inheritance – Defining Derived Classes – Single Inheritance – Multiple Inheritance – Hybrid Inheritance - Virtual Base Classes – Abstract Classes - Construction in Derived Classes – Nesting of Classes – this Pointer – Friend and Virtual Functions – Pure Virtual Function.

### **UNIT V FILES, EXCEPTION HANDLING, TEMPLATES**

Streams Formatted and Unformatted I/O, File I/O Operation –Reading and Writing Functions – Random Access - Command Line Arguments – Exception Handling: Try – Catch – Re-throwing –Templates – Class Templates – Class Templates – Function Templates.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to know

1. Object Oriented Programming Concepts in detail.
2. Benefits of implementing OOPs concepts in programming
3. Concepts of constructors and destructors
4. Concepts of Overloading methods.
5. Ideas about Inheritance.
6. Ideas about exception handling and implementation of files concept.

### **TEXT BOOK**

E. Balagurusamy, “Object Oriented Programming with C++”, Fourth Edition, Tata McGraw Hill, 2016.

### **REFERENCE BOOKS**

1. D. Ravichandran, “Programming with C++”, Third Edition, McGraw Hill Education, 2017.
2. Herbert Schildt, “The Complete Reference– C++”, Fourth Edition, McGraw Hill Education, 2017.
3. Mike McGrath, “C++ Programming in Easy Steps”, Fifth Edition, BPB Publications, 2017.
4. Robert Lafore, “Object Oriented Programming with C++”, Fourth Edition, Galgotia Publications, 2013.

## **OPERATING SYSTEMS**

**(Sub. Code: 18PCA22)**

<b>SEMESTER : II</b>	<b>CORE</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
----------------------	-------------	------------------	--------------------

### **UNIT I INTRODUCTION, PROCESSES**

Introduction to Operating system – Computer System Organization – Computer System Architecture – Operating System Operations – Process Management – Memory Management – Storage Management – Protection and Security – Open Source Operating Systems. Operating System Structures : Operating System Services – User and Operating System Interface – Operating System Structure.

Processes: Process Concept – Process Scheduling – Operations on Processes – Interprocess Communication – Communication in Client-Server Systems.

### **UNIT II THREADS, SCHEDULING AND DEADLOCKS**

Threads : Overview – Multithreading Models – Threading Issues – CPU Scheduling : Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiprocessor Scheduling – Real Time Scheduling – Deadlocks : Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

### **UNIT III SYNCHRONIZATION**

Process Synchronization : Background – The Critical Section Problem – Peterson's Solution – Synchronization Hardware – Semaphores – Classical Problems of Synchronization – Monitors – Alternative Approaches.

### **UNIT IV MEMORY MANAGEMENT**

Main Memory : Background – Swapping – Contiguous Memory Allocation – Segmentation – Paging – Structure of the Page Table – Virtual Memory: Background – Demand Paging – Copy-on-Write – Page Replacement – Allocation of Frames – Thrashing.

## **UNIT V STORAGE MANAGEMENT AND DISTRIBUTED SYSTEMS**

Mass-Storage Structure : Overview – Disk Structure – Disk Attachment – Disk Scheduling – Disk Management – Swap-Space Management – RAID Structure – File-System Implementation : File-System Structure – File-System Implementation – Directory Implementation – Allocation Methods – Distributed Systems : Advantages of distributed systems – Types of Network-based Operating Systems – Network Structure – Communication structure.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Describe the operating system operations, structures and processes.
2. Examine threads, CPU scheduling algorithms and deadlocks.
3. Demonstrate critical section problem, semaphores and monitors.
4. Analyze main memory and virtual memory.
5. Classify Disk scheduling, RAID structure, distributed systems and network-based operating systems.

### **TEXT BOOK**

Silberschatz, Galvin and Gagne, “Operating System Concepts”, Ninth Edition, John Wiley and Sons Inc. Publications, 2012.

### **REFERENCE BOOKS**

1. Mukesh Singhal, Niranjana Shivaratri, “Advanced Concepts in Operating Systems”, First Edition, Mc Graw Hill Education, 2017.
2. Andrew S. Tanenbaum, Herbert Bos, “Modern Operating Systems”, Fourth Edition, Prentice Hall Publications, 2015.
3. William Stallings, “Operating Systems: Internals and Design Principles”, Eighth Edition, Prentice Hall Publications, 2014.

## **DATA STRUCTURES AND ALGORITHMS**

(Sub. Code : 18PCA23)

<b>SEMESTER : II</b>	<b>CORE</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
----------------------	-------------	------------------	--------------------

### **UNIT I INTRODUCTION**

Introduction to Data Structures – Performance analysis – Space Complexity – Time Complexity – Asymptotic notations – Performance measurement.

### **UNIT II LINEAR LISTS AND ARRAYS**

Linear Lists – Array representation – The Linear List data structures – Array representation – Vector representation – Linear list linked representation – Arrays & Matrices – Special matrices – Sparse matrices .

### **UNIT III STACKS AND QUEUES**

Stacks – Array representation – Linked representation – Applications – Queues – Array representation – Linked representation – Applications.

### **UNIT IV TREES AND GRAPHS**

Trees – Binary and other trees – Properties and operations – Binary tree traversal – the ADT binary tree – The ADT winner tree and loser tree applications – Indexed binary search tree and its applications – AVL trees – Red Black trees – B trees – Graphs – Representation – Graph search methods.

### **UNIT V DYNAMIC PROGRAMMING**

Divide and Conquer - Sorting techniques - Greedy method – Knapsack problem – Dynamic programming- Backtracking – Branch and Bound method.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to get

1. Basic knowledge about data structures.

2. An exposure in the development of algorithms and analyze the efficiency and limitations of algorithms.
3. Knowledge about stacks and queues.
4. Detailed concept about trees and graphs.
5. Basic knowledge about dynamic programming.

### **TEXT BOOK**

Sartaj Sahni, “**Data structures algorithms and applications in C++**” Second edition, Universities Press, 2011.

### **REFERENCE BOOKS:**

1. Adam Drozdek, “**Data Structures and Algorithms in C++**”, Cengage Learning, 2012
2. Michael T. Goodrich, Roberto Tamassia, David M. Mount, “**Data Structures and Algorithms in C++**”, 2nd Edition, John Wiley & Sons, Incorporated, 2011
3. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, “**Fundamentals of computer Algorithms**”, Second Edition, Universities Press, 2009.

## **DATABASE SYSTEMS**

**(Sub. Code : 18PCA24)**

**SEMESTER : II**

**CORE**

**HOURS : 4**

**CREDITS : 4**

### **UNIT I INTRODUCTION**

Database-System Applications - Purpose of Database Systems - View of Data - Database Languages - Relational Databases - Database Design - Data Storage and Querying - Transaction Management - Database Architecture - Data Mining and Information Retrieval - Specialty Databases - Database Users and Administrators - Introduction to the Relational Model - Structure of Relational Databases - Database Schema - Keys - Schema Diagrams - Relational Query Languages - Relational Operations.

### **UNIT II SQL**

Introduction to SQL - Overview of the SQL Query Language - SQL Data Definition - Basic Structure of SQL - Queries - Additional Basic Operations - Set Operations - Null Values - Aggregate Functions – Intermediate SQL - Join Expressions - Views - Transactions - Integrity Constraints - SQL Data Types and Schemas.

### **UNIT III RELATIONAL DATABASE DESIGN & ER MODEL**

Database Design and the E-R Model - Overview of the Design Process - The Entity-Relationship Model - Constraints - Removing Redundant Attributes in Entity Sets - Entity-Relationship Diagrams – Relational Database Design - Features of Good Relational Designs - Atomic Domains and First Normal - Form Decomposition Using Functional Dependencies.

### **UNIT IV DATA STORAGE, INDEXING & HASHING**

Storage and File Structure - Overview of Physical Storage Media - Magnetic Disk and Flash Storage - RAID - Tertiary Storage - File Organization - Organization of Records in Files - Data-Dictionary Storage – Indexing and Hashing - Basic Concepts - Ordered Indices - B+-Tree Index Files - B+-Tree Extensions – Static Hashing - Dynamic Hashing - Comparison of Ordered Indexing and - Hashing - Bitmap Indices - Index Definition in SQL.

## **UNITV CONCURRENCY CONTROL, RECOVERY SYSTEM**

Concurrency Control - Lock-Based Protocols - Deadlock Handling - Multiple Granularity - Timestamp-Based - Protocols - Validation-Based Protocols - Multiversion Schemes – Recovery System - Failure Classification - Storage - Recovery and Atomicity - Recovery Algorithm - Buffer Management - Failure with Loss of Non-volatile Storage.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Understand the basic concepts of the database and data models.
2. Obtain the knowledge of query evaluation to monitor the performance of the DBMS.
3. Design a database using ER diagrams and normalize the Relations.
4. Describe about Indexing and Hashing Techniques.
5. Acquire the knowledge about Concurrency control and Recovery System.

### **TEXT BOOK**

Abraham Silberschatz, Henry F. Korth and S. Sudharssan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2010.

### **REFERENCE BOOKS**

1. C.J Date, A. Kannan, S. Swaminathan, "An introduction to Database Systems", Eighth Edition, Pearson, 2006.
2. Ramez Elamasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson, 2009.
3. Raghu Ramakrishnan, Johannes Gehrke, "Database Management System", FourthEdition, McGraw Hill Higher Education, 2010.
4. Alexis Leon, Mathew Leon, "Database Management System",Vikas Publications.

## PRACTICALS – C++ AND DATASTRUCTURES

(Sub.Code:18PCAL25)

<b>SEMESTER : II</b>	<b>CORE</b>	<b>HOURS : 5</b>	<b>CREDITS : 2</b>
----------------------	-------------	------------------	--------------------

### C++

1. Simple program using class.
2. Program using function overloading.
3. Program using Constructor and destructor.
4. Program using Operator overloading.
5. Program using Inheritance.
6. Program using Virtual functions.
7. Program using files.
8. Program using templates.

### DATA STRUCTURES

1. Program to perform Stack operation.
2. Program to perform Queue Operation.
3. Program to perform Singly Linked List.
4. Program to perform Tree Traversal.
5. Program to perform Merge Sort.
6. Program to implement Divide and Conquer technique.
7. Program to solve Knapsack problem using greedy method.

## PRACTICALS - ORACLE AND VISUAL BASIC

(Sub. Code : 18PCAL26)

<b>SEMESTER : II</b>	<b>CORE</b>	<b>HOURS : 5</b>	<b>CREDITS : 2</b>
----------------------	-------------	------------------	--------------------

1. Working with DDL and DML commands.
2. Working with Constraints.
3. Queries Using Relational, Logical and Special Operators.
4. Queries using Character, Number and Date functions.
5. Queries using Group Functions.
6. Queries using Order By and Group BY Clause.
7. Queries using Joins and Sub Queries.
8. Queries using SET Operators.
9. Creating Views and Sequences.
10. PL/SQL program using Control Structures.
11. PL/SQL program using Cursors.
12. PL/SQL program using Exception Handling.
13. PL/SQL program using Stored Programs.
14. PL/SQL program using Triggers.

### VISUAL BASIC

1. Program using Control Structures.
2. Program using Controls. (Textbox, Listbox, Combobox, Checkbox, Option Button)
3. Program using File Controls.
4. Designing Menus.
5. Design and Develop an VB application with any Back End using DAO object library.
6. Design and Develop an VB application with any Back End using ADO object library.

## NUMERICAL AND STATISTICAL METHODS

(Sub. Code : 18PCAE21 )

<b>SEMESTER : II</b>	<b>ELECTIVE II : 2.1</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
----------------------	--------------------------	------------------	--------------------

### NUMERICAL METHODS:

#### UNIT I APPROXIMATION AND ERRORS IN COMPUTING

Introduction – Significant Digits – Inherent Errors – Numerical Error – Modeling Error – Blunders – Absolute and Relative errors – Conditioning and Stability.

#### UNIT II ROOTS OF NON-LINEAR EQUATIONS AND LINEAR EQUATIONS

Introduction - - Iterative methods – Bisection – False Position – Newton Raphson's – Secant methods – Gauss Elimination method – Gauss Jordan method – Jacobi Iteration method – Gauss Seidal Method.

#### UNIT III INTERPOLATION AND INTEGRATION

Linear Interpolation – Newton's Forward and Backward interpolation methods – Newton's Divided Difference interpolation methods – Lagrange's methods – Trapezoidal rule, Simpson's One Third(1/3) & Three Eighth(3/8) rules – Weddle Rule.

#### DIFFERENTIAL EQUATIONS

Runge-Kutta Fourth order Method – Milne-Simpson Method and Adams Base Forth method – Moulton Method.

#### UNIT IV STATISTICS

##### BASICS

Mean – Median – Mode – Standard Deviation – Variance – Coefficient of variation of frequency distribution

##### CURVE FITTING AND LEAST SQUARES

Fitting of a Straight line and Parabola, Conversion of Data to Linear form.

#### UNIT V

##### CORRELATION AND REGRESSION

Correlation – Correlation Coefficient, Rank Correlation, Regression – Lines and Curves of Regression.

##### DISCRETE AND CONTINUOUS DISTRIBUTIONS:

Binomial, Poisson and Normal distributions – Fitting of these distributions.

(NOTE: ONLY NUMERICAL PROBLEMS AND NO DERIVATIONS)

**COURSEOUTCOMES:**

On successful completion of the course, the learners will be able to

1. Solve large systems of simultaneous linear equations. Use the least-squares method to obtain a function for data analysis.
2. Find solutions of non-linear equations using bisection method, Newton's methods and secant method and implement using a computer.
3. Estimate the solutions of systems of first order ordinary differential equations or higher order ordinary differential equations using various numerical methods and implement using a computer.
4. Construct graphical displays of science/engineering data and interpret the role of such displays in data analysis.
5. Apply basic statistical inference techniques, including confidence intervals, hypothesis testing and analysis of variance, to science/engineering problems.
6. Employ appropriate regression models to determine statistical relationships

**TEXT BOOKS**

1. E. Balagurusamy, "Numerical Methods", Tata McGraw Hill, 2012.
2. S.G. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Ninth Edition, Sultan Chand & Sons, 2014.

**REFERENCE BOOKS**

1. S. Arumugam, Thangapandi Isaac, S. Somasundaram, "Numerical methods", Scitech Publishers, 2015
2. G.W. Sendctor, W.G. Cochrrass, "Statistical Methods", Sixth Edition, East West Press,2013.

## HUMAN MACHINE INTERACTION

(Sub. Code : 18PCAE21)

**SEMESTER : II**

**ELECTIVE II : 2.2**

**HOURS : 4 CREDITS : 4**

### **UNIT I HISTORICAL CONTEXT, HUMAN FACTOR**

Introduction – As we may think – Sketchpad – Invention of the mouse – Xerox star – Birth of HCI – Growth of HCI and GUI – Growth of HCI Research – Time scale of human actions – Human factors – Sensors – Responders – The brain – Language – Human performance.

### **UNIT II INTERACTION ELEMENTS, SCIENTIFIC FOUNDATIONS**

Hard controls and Soft controls – Control-display relationships – Natural versus learned relationship – Mental models and metaphor – Modes – Mobile context – Research – Empirical research – Research methods – Observe and measure – Research questions – Internal and External Validity – Comparative evaluation – Relationships – Research topics.

### **UNIT III DESIGNING HCI EXPERIMENTS**

Methodology – Ethics approval – Experiment design – Independent variables – Dependent variables – Other variables – Task and procedure – Participants – Questionnaire design – Within subjects and between subjects – Order effects, counterbalancing and Latin squares – Group effects and asymmetric skill transfer – Longitudinal studies – Running the experiment.

### **UNIT IV HYPOTHESIS TESTING, MODELING INTERACTION**

Analysis of variance – Chi-square test – Non-parametric tests for ordinal data – Parametric versus non-parametric tests – Descriptive models – Predictive models – A model continuum model.

### **UNIT V WRITING AND PUBLISHING RESEARCH PAPER**

Conference papers, journal papers – Parts of research paper – Preparing the manuscript.

## **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Get a detailed knowledge about Human Computer Interaction
2. Learn design issue, rules and techniques.
3. Know about evaluation techniques and universal design.
4. Gain knowledge about HCI patterns and toolkits.
5. Get an exposure of user support and adaptive help systems.

## **TEXT BOOK**

I. Scott MacKenzie, “**Human-Computer Interaction An Empirical Research Perspective**”, Morgan Kaufmann is an imprint of Elsevier, 2013.

## **REFERENCE BOOKS**

1. K. Meena, R., “**Human-Computer Interaction**”, PHI learning pvt. Ltd., 2014.
2. Julie A. Jacko, “**Human Computer Interaction Handbook**”, CRC Press, 2012

## **DISTRIBUTED OPERATING SYSTEMS**

(Sub. Code: 18PCAE23)

<b>SEMESTER : II</b>	<b>ELECTIVE II : 2.3</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
----------------------	--------------------------	------------------	--------------------

### **UNIT I FUNDAMENTALS, COMPUTER NETWORKS**

Distributed Computing System – Evolution – Distributed Computing Models – Distributed Operating System – Distributed Computing Environment – Computer Networks: Internetworking – ATM Technology.

### **UNIT II MESSAGE PASSING**

Introduction – Desirable features of a Good Message Passing System – Issues in IPC by Message Passing – Synchronization – Buffering – Multidatagram Messages – Encoding and Decoding of Message Data – Process Addressing – Failure Handling – Group Communication.

### **UNIT III REMOTE PROCEDURE CALLS**

Introduction – The RPC Model – Transparency of RPC – Implementing RPC mechanisms – Stub Generation – RPC Messages – Marshaling Arguments and Results – Server management – Parameter-Passing and Call Semantics – Communication Protocols for RPCs – Complicated RPCs – Client-Server Binding – Exception Handling – Security – Some Special Types of RPCs – RPC in Heterogeneous Environments – Lightweight RPC – Optimizations for Better Performance.

### **UNIT IV RESOURCE MANAGEMENT AND SECURITY**

Introduction – Desirable features of a Good Global Scheduling Algorithm – Task Assignment Approach – Load-Balancing Approach – Load-Sharing Approach – Security: Introduction – Potential Attacks to Computer Systems – Access Control – Digital Signatures – Design Principles.

### **UNIT V DISTRIBUTED FILE SYSTEMS**

Introduction – Desirable Features of a Good Distributed File System – File Models – File-Accessing Models – File-Sharing Semantics – File-Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles.

## **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Describe the distributed computing models and ATM Technology.
2. List out the desirable features of a Good Message Passing System.
3. Demonstrate RPC in Heterogeneous Environments.
4. Analyze the resource management and security in Distributed Operating System.
5. Examine the Distributed File Systems.

## **TEXT BOOK**

Pradeep K. Sinha, “Distributed Operating System Concepts and Design”, Prentice Hall of India Pvt. Ltd., 2012.

## **REFERENCE BOOKS**

1. Andrew S. Tanenbaum, Maarten Van Steen, “Distributed Systems: Principles and Paradigms”, Second Edition, Pearson Education Inc., 2016.
2. I. A. Dhotre, “Distributed Operating Systems”, First Edition, Technical Publications, 2016.
3. Shubhra Garg, “Fundamentals of Distributed Operating Systems”, First Edition, S.K.Kataria & Sons Publications, 2013.
4. William Stallings, “Operating Systems: Internals and Design Principles”, Eighth Edition, Prentice Hall Publications, 2014.

# DATA COMMUNICATIONS AND COMPUTER NETWORKS

(Sub. Code : 18PCA31)

**SEMESTER : III**

**CORE**

**HOURS : 4**

**CREDITS : 4**

## **UNIT I INTRODUCTION, BASIC CONCEPTS, REFERENCE MODEL, MEDIA**

**Introduction:** Need for study – Data communication – Networks – Protocols and Standards – **Basic Concepts:** Line Configuration – Topology – Transmission modes – **OSI Reference model:** Model – Functions – TCP/P Protocol Suite – **Transmission Media:** Guided Media – Unguided Media.

## **UNIT II ERRORS, DATA LINK CONTROL, LAN, MAN**

**Error Detection and Correction:** Types of Errors – Detection – VRC – LRC – CRC – Checksum – Error Correction – **Data Link Control:** Line Discipline – Flow Control – Error Control – **LAN:** Project 802 – Ethernet – Token Bus – Token Ring – FDDI – **MAN:** IEEE 802.6 – SMDS.

## **UNIT III PPP, ISDN, X.25, FRAME RELAY**

**PPP:** Transmission States – Layers – LCP – Authentication – NCP – **ISDN:** Services – History – Layers – B-ISDN – Future – **X.25:** Layers – other X.25 protocols – **Frame Relay:** Introduction – Operation – Layers – Congestion control – Leaky Bucket.

## **UNIT IV ATM, NETWORK DEVICES, TRANSPORT LAYER**

**ATM:** Design Goals – Architecture – Layers – Applications – **Network Devices:** Repeaters – Bridges – Routers – Gateways – Other Devices – Routing Algorithms – Distance Vector – Link State – **Transport Layer:** Duties – Connection – OSI Transport Protocol.

## **UNIT V UPPER OSI LAYERS, TCP/IP-PART-I, TCP/IP-PART-II**

**Upper OSI Layers:** Session Layer – Presentation Layer – Application Layer – **TCP/IP Protocol Suite-Part-I:** Overview – Network Layer – Addressing – Sub netting – Transport Layer - **TCP/IP Protocol Suite-Part-II:** C/S Model – BOOTP, DHCP – DNS – Telnet – FTP, TFTP – SMTP – SNMP – HTTP – WWW.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Gain knowledge about Data and Computer communications.
2. Acquire detailed exposure in Network Concepts and Protocols.
3. Obtain knowledge about various Transmission Media.
4. Get an exposure of OSI and TCP/IP layered approach.
5. Know about internet, email and www.

### **TEXT BOOK**

1. Behrouz A. Forouzan, “**Data communications and Networking**”, Tata McGraw-Hill, Second Edition Update, 2008.

### **REFERENCE BOOKS**

1. Andrew S. Tanenbaum, “**Computer Networks**”, PHI, Fifth Edition Illustrated, 2013.
2. William Stallings, “**Data and Computer Communication**”, Pearson Education, Tenth Edition, 2014.

<b>SEMESTER : III</b>	<b>CORE</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
-----------------------	-------------	------------------	--------------------

### **UNIT I INTRODUCTION TO JAVA**

The History and Evolution of Java– Java buzz words – An overview of Java – Data types – Variables– Arrays–Operators – Control Statements –Introducing Classes – A Closer Look at Methods and Classes.

### **UNIT II INHERITANCE, PACKAGE, EXCEPTION HANDLING**

Inheritance – Overriding methods – Abstract classes - Packages and Interfaces – Exception Handling.

### **UNIT III MULTITHREADING, STRING HANDLING**

Multithreaded Programming – Java Thread Model - Synchronization – Messaging – Runnable Interface – Inter-thread Communication – Deadlock – Suspension, Resuming and Stopping threads – Multithreading –The Java Library – String Handling – StringBuffer.

### **UNIT IV APplet, EVENT HANDLING AND NETWORKING**

Applet basics – Architecture – Applet Skeleton – Using status window – HTML applet tags – Passing parameters to applets – Methods available in applets – Event handling: Event classes – Event Listener interfaces – Using the Delegation Event Model – Networking Basics –The Networking Classes and Interfaces – TCP/IP Client Sockets – Datagrams..

### **UNIT V WORKING WITH AWT, JDBC**

Introducing the AWT: Working with Windows, Graphics, and Text – Using AWT Controls, Layout Managers, and Menus –JDBC: Types of drivers – Steps to establish connectivity –Example of connectivity.

## **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Understand the History and Fundamentals of Java.
2. Acquire the knowledge about Inheritance, Package and Exception Handling.
3. Write program using Multithreading.
4. Design the Applet using various Events.
5. Work with AWT controls.
6. Connect Java with a database using JDBC.

## **TEXTBOOKS**

1. Herbert Schildt, "Java The Complete Reference", Ninth Edition, Tata McGrawHill, 2014.
2. Dr. K. Somasundaram, "Programming in Java2", Jaico Publishing house, 2005. (JDBC)

## **REFERENCE BOOKS**

1. Y. Daniel Liang, "Introduction to Java Programming", Seventh Edition, Pearson education, 2010.
2. Dr. C. Muthu, "Programming with Java", Second Edition, Tata McGraw Hill, 2010.
3. C. Thomas Wu, "An Introduction to Object-Oriented Programming with Java", McGraw Hill International Edition, 2010.

### UNIT I INTRODUCTION, LINEAR PROGRAMMING PROBLEM

The Nature and Meaning of OR – Management Applications of OR - Modeling in OR – General methods for solving OR models – Scope of OR .

**Linear Programming Problem:** Formulation of LP problems, Graphical solution of LP problems, General formulation of LPP, Slack and Surplus variables – standard form of LPP - Some important form of LPP – Simplex Method and its special cases.

### UNIT II ARIFICIAL VARIABLE TECHNIQUES AND IPP

**Artificial variable Techniques:** Two Phase method and special cases.

**Integer Programming Problem:** Importance – Definitions – Gromory’s Pure Integer Programming Problem - Mixed Integer Programming Problem.

### UNIT III ASSIGNMENT AND TRANSPORTATION PROBLEMS

**Assignment problem:** Mathematical formulation – Hungarian method – Unbalanced assignment problem – Various types

**Transportation Model:** Mathematical formulation – Matrix form – Methods for finding Initial Basic Feasible solution and Optimal solution – Degeneracy in Transportation problems – Unbalanced Transportation problem.

### UNIT IV SEQUENCING PROBLEMS AND QUEUING MODELS

**Sequencing problems:** Assumptions – Solutions to sequencing problems: Processing n jobs through 2 machines - Processing n jobs through 3 machines – Processing n jobs on m machines.

**Queuing Models:** Queuing system – Transient and Steady States -Kendal’s Notation for representing Queuing models –various models in queuing system – Birth and Death Model.

### UNIT V PERT AND CPM TECHNIQUES

**PERT and CPM techniques:** Basic Steps – Network diagram representation – Rules for Drawing Network diagram – Labeling Fulkerson’s I-J Rule – Time Estimates and Critical Path in Network analysis – Examples on optimum duration and minimum duration cost – PERT.

### COURSE OUTCOMES:

On successful completion of the course, the learners will be able to

1. Get proficiency with tools from optimization, probability, including fundamental applications of those tools in industry and the public sector in contexts involving uncertainty and scarce or expensive resources.
2. Get facility with mathematical and computational modeling of real decision-making problems, including the use of modeling tools and computational tools, as well as analytic skills to evaluate the problems.
3. Get ability to work in a team: specifically to solve larger problems, communicate technical knowledge, partition a problem into smaller tasks, and complete tasks on time.

### **TEXT BOOKS**

S.D. Sharma, “Operations Research”, Tenth Edition, Pearson, 2017.

### **REFERENCE BOOKS**

1. Hamdy Taha, “Operations Research”, Ninth Edition, 2016.
2. V. Sundaresan, K.S. Ganapathy Subramanian, K. Ganesan , “Resource Management Techniques”, Ninth Edition, A.R. Publications, 2015.

(Sub Code: 18PCA34)

**SEMESTER : III**

**CORE**

**HOURS : 4**

**CREDITS : 4**

### **UNIT I INTRODUCTION TO GRAPHICS**

A Survey of Computer Graphics – Computer Graphics Hardware: Video Display Devices – Raster Scan System – Input Devices – Hard Copy Devices – Graphics on the Internet – Attributes of Graphics Primitive: Color and Grayscale – Point Attributes – Line Attributes – Curve Attributes of Graphics – Fill Area Attributes – Character Attributes.

### **UNIT II ATTRIBUTES, ALGORITHMS AND 2D TRANSFORMATIONS**

Implementation Algorithm for Graphics Primitives : Line Drawing Algorithms – Circle Generating Algorithms – Ellipse Generating Algorithm – Basic 2D Geometric Transformation – 2D Translation, Rotation and Scaling – Matrix Representations and Homogeneous Co-Ordinates – Other 2D Transformations.

### **UNIT III 3D TRANSFORMATIONS, PROJECTION AND CLIPPING ALGORITHMS**

Three Dimensional Geometric Transformations – Translation, Rotating and Scaling – Projection Transformations – Orthogonal Projections – Oblique Parallel Projections – Perspective Projections – Clipping Algorithms – 2D Point Clipping – Cohen Sutherland Line Clipping – Liang Barsky Line Clipping – Sutherland-Hodgeman Polygon Clipping – Weiler-Atherton Polygon Clipping – Visible Surface Detection Methods - Depth Buffer Method – Scan Line Method – Area Subdivision Method.

### **UNIT IV MULTIMEDIA BASICS**

Multimedia – Definitions – Multimedia in Business, Schools, Home and Public Places – Using Text in Multimedia – Hypermedia and Hypertext – Digital Audio – MIDI Audio – MIDI vs. Digital Audio – Making Multimedia – Stages of a Multimedia Project.

### **UNIT V MULTIMEDIA FOR THE WEB**

Internet and Multimedia – Text for the web – Images for the web – Sound for the Web – Animation for the Web - Video for the Web – Mobile Multimedia: Mobile Hardware – Connections -3G vs. 4G – Mobile Operating System.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to know about

1. Computer graphics hardware components.
2. Various attributes of graphics primitives.
3. Basic algorithms of graphics primitives.
4. 2 Dimensional and 3 Dimensional transformations.
5. Projection and clipping algorithms.
6. Multimedia concepts and its widespread applications.

#### **TEXT BOOKS**

1. Donald D. Hearn, M. Pauline Baker and Warren Carithers, “Computer Graphics with Open GL”, Fourth Edition, Prentice Hall Publications, 2011.
2. Tay Vaughan, “Multimedia: Making it Work”, Ninth Edition, McGraw Hill Publications, 2014.

#### **REFERENCE BOOKS**

1. Zhigang Xiang, Roy Plastock, “Computer Graphics, Schaum’s Outlines”, Second Edition, McGraw Hill Education, 2015.
2. Rajiv Chopra, “Computer Graphics”, Fourth Edition, S.Chand & Company Pvt. Ltd., 2014.
3. Ranjan Parekh, “Principles of Multimedia”, Second Edition, McGraw Hill Education, 2017.

(Sub. Code : 18PCAL35)

<b>SEMESTER : III</b>	<b>CORE</b>	<b>HOURS : 5</b>	<b>CREDITS : 2</b>
-----------------------	-------------	------------------	--------------------

1. Program using simple java classes.
2. Program using Constructor.
3. Program using Method Overloading.
4. Program using Inheritance. (Single, Multilevel)
5. Program using Interface.
6. Program using Exception Handling.
7. Program using Package.
8. Program using Multithreading.
9. Program using Applet.
10. Program using Graphics.
11. Design a Simple Calculator using Applet.
12. Program using Mouse Handling Events.
13. Program using Key Events.
14. Program to find the IP Address and Host Name.
15. Program for Socket Programming.
16. Program using Datagram.
17. Program using AWT Controls (Text, Button, Checkbox, Radio Button).
18. Program using JDBC (Insert, Update and Delete Records in the Database).

## PRACTICALS – COMPUTER GRAPHICS AND MULTIMEDIA

(Sub.Code:18PCAL36)

SEMESTER : III

CORE

HOURS : 5

CREDITS : 2

### Graphics Programs using C++

1. Line drawing using DDA algorithm.
2. Line drawing using Bresenham's algorithm.
3. Circle drawing using Mid-point circle algorithm.
4. Implementing 2-dimensional translation, rotation and scaling.
5. Implementing 3-dimensional translation, rotation and scaling.
6. Implementing Cohen Sutherland Line clipping algorithm.
7. Creating an animation using viewport.

### Flash

1. Working with basic tools in flash.
2. Working with multiple layers.
3. Working with text.
4. Create shape tweening and motion tweening.
5. Working with guide layers.
6. Working with mask layers.
7. Creating animation in Flash using Frame by Frame animation.
8. Controlling animations using actionscripts.

## **ORGANIZATIONAL STRUCTURE AND HUMAN RESOURCE MANAGEMENT**

**(Sub. Code : 18PCAE31)**

**SEMESTER : III**

**ELECTIVE III : 3.1 HOURS : 4**

**CREDITS : 4**

### **UNIT I ORGANIZATIONAL STRUCTURE**

Organization: Meaning, function, types – Formal and informal structures of organization – Principles of an organization – Tall and flat organization – organizational authority – line and staff organization – Departmentation – Dynamics of organizational structures.

### **UNIT II INDIVIDUAL DIFFERENCES ,GROUP DYNAMICS**

Personality – Types – Traits – Individual Differences – Factors influencing – Individual's behavior and differences -  
Definition and importance of group dynamics – Types of groups, group formation, group cohesiveness, group development – Decision making in groups – conflict management – Principle –central approach to team development – Leadership: Meaning, styles and theories – Quality of an effective leader.

### **UNIT III HUMAN RESOURCES MANAGEMENT**

Concepts, evolution, objectives and function of HR management – HR management as a profession – challenges for the HR executives of today – HR management in India.

### **UNIT IV HUMAN RESOURCES PLANNING**

Human resource planning – Job analysis – Selection – Orientation and Placement – Training and development –Communication : Definition, characteristic, process and barriers.

### **UNIT V HUMAN RESOURCES MOTIVATION**

Motivation: Meaning, process and theories need hierarchy, XY and two factor theories – performance evaluation: meaning, objective and methods.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to know about

1. Organizational structure
2. Group dynamics
3. Personal Management and Human Resource Development
4. Organizational change and development.

### **TEXT BOOKS**

1. L.M. Prasad, "Principles and Practice of Management", Sultan Chand & Sons, 8th Edition, 2012. (Unit-I)
2. J. Jayasankar, "Organisational Behaviour", Margham Publications, 1<sup>st</sup> Edition, 2012. (Unit-II)
3. Dr. C.B. Mamoria & S. V. Gankar, "A Textbook Of Human Resource Management" Published by Himalaya Publishing House, 2010. (Unit-III, IV & V)

### **REFERENCE BOOKS**

1. Dr. K. Aswathappa, "Organizational Behaviour", Himalaya Publishing hall, 12<sup>th</sup> revised Edition, 2017.
2. Dessler, Varkkey, "Human Resource Management", 14<sup>th</sup> Edition, Pearson Education, 2015.

## MANAGEMENT INFORMATION SYSTEMS AND ERP

(Sub. Code: 18PCAE32)

<b>SEMESTER : III</b>	<b>ELECTIVE III : 3.2</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
-----------------------	---------------------------	------------------	--------------------

### UNIT I INTRODUCTION TO INFORMATION SYSTEMS

Introduction to Information Systems –Systems concepts – Components of IS- IS resources activities – Operations supporting systems -- Solving business problems with IS – Developing IS solutions – Trends in technology and applications

### UNIT II INFORMATION SYSTEMS FOR BUSINESS OPERATIONS

Information Systems for Business operations – business IS – Marketing , manufacturing information systems – Human resource information systems – accounting information systems – financial information systems – transaction processing system

Decision Supporting Systems – Management Information Systems – Expert Systems – Executive Information Systems – Artificial Intelligence Systems

### UNIT III MANAGING INFORMATION TECHNOLOGY

Managing information Technology – management information resources and technologies - Global IT management – planning and implementing business change with IT

### UNIT IV ERP

Enterprise Resource Planning - an overview - benefits of ERP – ERP and related technologies - Business processing reengineering – Data warehousing – data mining – online analytical processing – Supply Chain management -Creating Virtual Company

### UNIT V ERP IMPLEMENTATION

ERP Implementation – ERP implementation life cycle-implementation methodology – hidden cost- organizing the implementation - vendors – consultants and users contracts with vendors , consultants and employees project management and monitoring – ERP present and future - Enterprise Integration Applications - ERP and E-Commerce – ERP and Internet

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to know about

1. Importance of Information systems.
2. Information Systems used in Business Operations.
3. Vital role of Information Technology and Managing Information Systems.
4. Evolution implementation and advantages of an ERP systems.
5. Implementing ERP in Organizations, Consultants and Users.

### **TEXT BOOKS**

1. James A O'Brien, "**Management Information Systems for managing IT in the Internet worked Enterprise**", Fourth Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003 (Unit – I, II, III)
2. Alexis Leon, "**ERP Demystified**", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008 (Unit – IV, V)

### **REFERENCE BOOKS**

W.S Jawadekar, "Management Information Systems", Tata McGraw Hill Publishing Company Limited, New Delhi, 2006.

## **PROGRAMMING IN C# AND ASP.NET**

**(Sub. Code: 18PCA41)**

**SEMESTER : IV**

**CORE**

**HOURS : 4**

**CREDITS : 4**

### **UNIT I INTRODUCTION TO C#, METHODS AND INTERFACES**

Introduction to C# – Characteristics of C# – Applications of C# – Simple C# program – Literals, Variables and Data Types – Operators and Expressions – Branching and Looping Statements – Methods in C# – Handling arrays– Classes and Objects – Interfaces: Defining an interface – Implementing an Interface – Explicit interface implementation.

### **UNIT II ASP.NET 4.5 OVERVIEW, WEB FORMS STANDARD CONTROLS**

Exploring new features of ASP.NET 4.5 – ASP.NET Technologies – ASP.NET Life Cycle – Working with Server Controls – Application Structure and State - Web Forms: Standard Controls – Control Class – Web Control Class – Label Control - Button Control – TextBox Control – Literal Control – Placeholder Control – HiddenField Control - FileUpload Control.

### **UNIT III NAVIGATION, VALIDATION CONTROLS AND MASTER PAGES**

Navigation: Treeview and Menu – Using the TreeView Class – TreeView Control – Using the Menu Class – Menu Control – Creating the TreeView Control – Generating TreeView from a Database – Creating Static and Dynamic Menus – Validation controls – Inside Master Pages – Need for Master Pages – Creating, Configuring, Modifying Master Pages – Loading pages dynamically.

### **UNIT IV DATABASE CONTROLS, DYNAMIC DATA CONTROLS**

GridView Control – DataList Control – DetailsView Control – FormView Control – ListView Control – Repeater Control – DataPager Control – Chart Control – SqlDataSource Control – AccessDataSource Control – Building ASP.NET Dynamic Data Applications – Overview of ASP.NET Dynamic Data – Exploring Dynamic Data Controls – Creating a webpage using ASP.NET Dynamic Data.

## **UNIT V CREATING ASP.NET AJAX AND MVC APPLICATIONS**

Developing ASP.NET AJAX Applications – Exploring AJAX – Need for AJAX – AJAX and other Technologies – ASP.NET AJAX Architecture – AJAX Server or Extension Controls – Differentiating between AJAX and NON-AJAX Applications – Using AJAX Server Controls – ASP.NET MVC Framework – Creating an ASP.NET MVC Application – Working with Login Controls.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Develop C# console applications using classes and objects and interfaces.
2. Demonstrate the ASP.NET Server Controls and Web Forms Standard Controls.
3. Apply Navigation Controls and Master Pages in Web Applications.
4. Build ASP.NET Database and Dynamic Data Applications.
5. Create ASP.NET AJAX and MVC Applications.

### **TEXT BOOKS**

1. E. Balagurusamy, “Programming in C#:A Primer”, Fourth Edition, Mc Graw Hill Education, 2016.
2. Kogent Learning Solutions Inc., “ASP.NET 4.5 Black Book”, First Edition, DreamTech Press, 2013.

### **REFERENCE BOOKS**

1. John Sharp, “Microsoft Visual C# Step by Step”, Microsoft Press, PHI, 2016.
2. Adam Freeman, Matthew MacDonald, Mario Szpuszta, “Pro ASP.NET 4.5 in C#”, Fifth Edition, APress, 2014.
3. Imar Spaanjaars, “Beginning ASP.NET 4.5 in C# and VB”, Wiley-India Edition, Wiley Publications, 2012.

## CLOUD COMPUTING AND BIG DATA

(Sub. Code: 18PCA42)

<b>SEMESTER : IV</b>	<b>CORE</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
----------------------	-------------	------------------	--------------------

### UNIT I INTRODUCTION, PROS AND CONS, APPLICATIONS

**Cloud Computing Basics:** Overview – Applications – Intranets and the cloud – First moves in the cloud. **Organization and the cloud computing:** when to use – benefits – limitations – security concerns. **Cloud computing applications:** Google – EMC – Net App – Microsoft – Amazon – Salesforce – IBM.

### UNIT II CLOUD SERVICES, INFRASTRUCTURE, CLOUD ACCESSING

**Cloud computing services:** Cloud Services – Uses of Apps in business – Deleting Data center – Salesforce.com – Thomson Reuters. **Hardware and Infrastructure:** Clients – security – network – services. **Accessing the Cloud:** platforms – web applications – web API's – web business.

### UNIT III STORAGE, STANDARDS, SERVICES

**Cloud Storage:** Overview – providers. **Standards:** Application – client – infrastructure – service. **Software as a service:** Overview – driving forces – company offerings – industries. **Software plus services:** Overview – mobile integration – providers – Microsoft Online.

### UNIT IV APPLICATION DEVELOPMENT, CLOUD SOLUTIONS, MIGRATION

**Developing Application:** Google – Microsoft – Quick Base – cost Iron – Bungee connect – Development. **Local clouds and Thin clients:** virtualization – server solutions – thin clients – case study. **Migration to cloud:** Individual cloud services – Enterprize cloud offerings – Migration – Best practices.

### UNIT V BIG DATA, EXAMPLES, TECHNOLOGY

**Definition and Importance:** Definition of Bigdata – Importance of bigdata – Key Trends – wider variety – expanding universe. **Industry examples:** Database marketers – pioneers of Big data – fraud – risk – Big data and algorithm – health care and medicine – consumer products. **Big Data Technology:** Hadoop – Old vs. New – Data discovery – open source – Analytics and approaches – Technologies.

## **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Describe about cloud organization and applications.
2. Demonstrate Cloud Infrastructure and Cloud Accessing.
3. Examine Cloud Storage, Standards and Services.
4. Understand Cloud-Based Applications, local clouds and thin clients.
5. Describe Big Data Analytics and Approaches.

## **TEXT BOOKS**

1. Anthony . T. Velte, Toby J. Velte, Robert Elsenpeter, “ Cloud Computing A Practical Approach”, McGraw Hill, 2014.
2. Michael Minelli, Michele Chambess, Ambiga Dhiraj, “Big Data, Big Data Analytics”, Wiley, 2014.

## **REFERENCE BOOKS**

1. Michael Miller, “Cloud Computing: Web Based Applications that change the way you work andcollaborate online”, Eighth Impression, Pearson Education, 2013.
2. Thomas Erl, Ricardo Puttini, Zaigham Mahmood, “Cloud Computing: Concepts, Technology &Architecture”, Prentice Hall, 2013.
3. Jules J Berman , “Principles of Big Data”, Morgan Kaufmann, 2013.
4. Faraz Rabbani, Ali Roghani, “Big Data Analytics for beginners”, Create space Independent Publishing Platform, Third Edition, 2014.

## WEB TECHNOLOGIES

(Sub. Code 18PCA43)

<b>SEMESTER : IV</b>	<b>CORE</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
----------------------	-------------	------------------	--------------------

### UNIT I HTML and CSS

Basic – Formatting tags – links- images – frames – lists – tables – forms – Entities – Cascading Stylesheets – Types – Properties: Background, Text, Border, Table, List, Dimension and classification – Anchor Pseudo Class.

### UNIT II XML

Basic – Elements – Attributes – XML Namespace – Cascading Stylesheets - XSLT elements – Xpath, XSL Formatting Objects – Xlinks. Document type Definitions – Internal and External DTD declaration – DTD Elements declaration – DTD Attributes: types and declaration – PCDATA –CDATA – Entities.

### UNIT III BASICS IN PHP

Getting Started with PHP, PHP Syntax and Variables, PHP Control Structure and Functions, Passing information with PHP

### UNIT IV DATA HANDLING IN PHP

PHP String Handling, PHP Arrays, PHP Number Handling, Working with Cookies and Sessions.

### UNIT V PHP AND MySQL

Integrating PHP and MySQL, Performing Database Queries, Web Forms and Database.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Know about the various web development technologies like HTML & CSS, XML and PHP.
2. Get basic knowledge in database programming with mysql.

**TEXT BOOKS**

1. Thomas Powell, “The Complete Reference: HTML AND XHTML”, Fifth Edition, Tata McGraw Hill Publication, 2010. (Unit: I)
2. Heather Williamson, “The Complete Reference in XML”, First Edition, Tata McGraw Hill Publication. (Unit: II)
3. Steven Suehring, Tim Converse and Joyce Park, “PHP6 and MySQL Bible”, Wiley Publishing Inc.,2009. (Unit: III - V)

**REFERENCE BOOKS**

1. Michael K. Glass, Yann Le Sconarnce, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, “Beginning PHP, Apache, MySQL Web Development”, Wiley Publishing Inc.
2. Steven Holzner, “The Complete Reference: PHP”, First Edition, Tata McGraw Hill Publication.

## **SOFTWARE ENGINEERING**

**(Sub. Code : 18PCA44)**

**SEMESTER : IV**

**CORE**

**HOURS : 4**

**CREDITS : 4**

### **UNIT I SOFTWARE ENGINEERING**

The Nature of Software - The Changing Nature of Software – Software Engineering - Defining the Discipline - The Software Process - Software Engineering Practice - Software Development Myths - Software Process Structure - A Generic Process Model - Defining a Framework Activity - Identifying a Task Set - Process Patterns - Process Assessment and Improvement - PROCESS MODELS - Prescriptive Process Models - Specialized Process Models - The Unified Process - Personal and Team Process Models - Process Technology - Product and Process - Agile Development - Agility and the Cost of Change - Extreme Programming - Other Agile Process Models.

### **UNIT II MODELING**

Requirements Engineering - Establishing the Groundwork - Eliciting Requirements - Developing Use Cases - Building the Analysis Model - Negotiating Requirements - Requirements Monitoring - Validating Requirements - Avoiding Common Mistakes - Requirements Modelling: Scenario - Based Methods - Requirements Analysis - Scenario-Based Modelling - UML Models That Supplement the Use Case.

### **UNIT III DESIGN CONCEPTS**

The Design Process - Design Concepts - The Design Model - Architectural Design - Software Architecture - Architectural Styles - Architectural Design - Agility and Architecture – Component Level Design - Designing Class-Based Components - Conducting Component Level Design – Component Level Design for WebApps - Component-Level Design for Mobile Apps - Designing Traditional Components - Component-Based Development - User Interface Design - The Golden Rules - User Interface Analysis and Design - Interface Analysis - Interface Design Steps - WebApp and Mobile Interface Design - Design Evaluation.

## **UNIT IV SOFTWARE TESTING STRATEGIES**

A Strategic Approach to Software Testing - Strategic Issues - Test Strategies for Conventional Software - Test Strategies for Object-Oriented Software Test Strategies for WebApps - Test Strategies for MobileApps - Validation Testing - System Testing - The Art of Debugging - Testing Conventional Applications - Software Testing Fundamentals - Internal and External Views of Testing - White-Box Testing - Basis Path Testing - Control Structure Testing - Black-Box Testing - Model-Based Testing - Testing Documentation and Help Facilities - Testing for Real- Time Systems - Patterns for Software Testing.

## **UNIT V PRODUCT METRICS**

A Framework for Product Metrics - Metrics for the Requirements Model - Metrics for the Design Model - Metrics for Source Code - Metrics for Testing - Metrics for Maintenance - Process and Project Metrics - Software Measurement - Metrics for Software Quality - Integrating Metrics within the Software Process - Metrics for Small Organizations.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Understand the essentials of software engineering and various models of software Engineering.
2. Model software projects into high level design using UML diagrams.
3. Understand and practice the design and development of Software Engineering.
4. Evaluate the system with various testing techniques and strategies.
5. Measure the product and process performance using various metrics.

### **TEXT BOOK**

Roger S. Pressman, “Software Engineering: A Practitioner Approach”, Eighth Edition, McGrawHill, 2015.

### **REFERENCE BOOKS**

1. Ian Sommerville, “Software Engineering”, Tenth Edition, Pearson, 2015.
2. Ali Behforrooz, Frederick J.Hudson, “Software Engineering Fundamentals”, Oxford Indian Reprint, 2012.
3. Jibitesh Mishra, Ashok Mohanty, “Software Engineering”, First Edition, Pearson Education, 2012.



## PRACTICALS : PROGRAMMING IN C# AND ASP.NET

(Sub. Code : 18PCAL45)

<b>SEMESTER : IV</b>	<b>CORE</b>	<b>HOURS : 5</b>	<b>CREDITS : 2</b>
----------------------	-------------	------------------	--------------------

### C#

1. Simple Application using control structures.
2. Simple Application using arrays.
3. Simple Application using classes and objects.
4. Program to create and implement interfaces.

### ASP.NET

5. Design an application using Server Controls.
6. Design a simple web application using web forms standard controls.
7. Design web applications using navigation controls.
8. Design web applications using validation controls.
9. Design a web application using master page.
10. Develop web application to display records using Data GridView Control.
11. Develop web application to add, modify and delete records using Data GridView.
12. Create a webpage using dynamic data controls.
13. Develop an ASP.NET AJAX application using AJAX Server Controls.
14. Create an ASP.NET MVC Application.
15. Design a web application using Login Controls.

## PRACTICALS - WEB TECHNOLOGIES

(Sub. Code: 18PCAL46)

<b>SEMESTER : IV</b>	<b>CORE</b>	<b>HOURS : 5</b>	<b>CREDITS : 2</b>
----------------------	-------------	------------------	--------------------

1. Design a web page in HTML using frames.
2. Design a web page in HTML using tables.
3. Design a web page in HTML using forms.
4. Design a web site using INLINE CSS.
5. Design a web site using INTERNAL CSS.
6. Design a web site with navigation menus with EXTERNAL CSS
7. Design a simple XML document.
8. Design a web page in XML using CSS.
9. Design a web page in XML using XSLT.
10. Design a web page in XML using XPath.
11. Design a web page in XML using XLink.
12. Design a web page in XML using INTERNAL DTD.
13. Design a web page in XML using EXTERNAL DTD.
14. Designing a XML page using Entities
15. Design a web site in PHP using function.
16. Design a web site in PHP using Array function.
17. Design a web site in PHP using forms.
18. Design a web site in PHP using cookies and session.
19. Design a web site in PHP using Form and database ( MySql )
20. Design a web site in PHP using MySql database.

**ACCOUNTING AND FINANCIAL MANAGEMENT**  
**(Sub. Code : 15PCAE41)**  
**SEMESTER-IV                      ELECTIVE IV : 4.1                      HOURS-4**  
**CREDITS-4**

**Objectives:**

- To obtain knowledge about the various practical problems in accounting and financial management

**UNIT I: FINANCIAL ACCOUNTING**

Definition- Accounting process – Accounting concepts and conventions – Branches of accounting – Classification of accounts – Journal and subsidiary books – Ledger – Trail Balance – Preparation of final accounts – Limitations of financial accounting.

**UNIT II: COST ACCOUNTING**

Meaning and definition – Objectives – Advantages and limitations – Difference between financial and cost accounting - Classification of cost – Methods of costing – Marginal costing – Break-Even analysis.

**UNIT III: MANAGEMENT ACCOUNTING**

Meaning and definition – Objectives – Advantages and limitations – Difference between cost and management accounting – Analysis and interpretation of financial statements – Ratio analysis – Uses and limitations of ratio analysis.

**UNIT IV: FINANCIAL MANAGEMENT**

Meaning, nature and scope of financial management – Objectives – Profit Vs Wealth maximization – Financial decisions – investment, financing and dividend decisions.

**UNIT V: WORKING CAPITAL MANAGEMENT**

Introduction – Meaning and definition - Nature – Concepts – Need for working capital – Classification of working capital – Determinants of working capital.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Acquire knowledge about general aspects of business operations in financial transaction.
2. Apply cost accounting methods to evaluate and project business performance.
3. Recognize and understand ethical issues related to the accounting profession.
4. Prepare financial statements in accordance with Generally Accepted Accounting Principles.
5. Prepare and evaluate operating as well as working capital management.

**TEXT BOOK:**

N. P. Srinivasan and M. Sakthivel Murugan “Accounting for Management”, S. Chand Publishing; First edition, 2011

**REFERENCE BOOKS:**

1. R.K. Sharma, Shashi. K. Gupta, “Practical Problems in Management Accounting and Financial management”, Kalyani Publishers, 2010.
2. M N Arora, “Cost and Management Accounting”, Himalaya Publications; Third Edition, 2013.
3. Dr. Kaustubh A. Sontakke ‘Financial Accounting’, Himalaya Publishing House, 2014.
4. I.M. Pandey, “Financial Management”, Eleventh Edition , Vikas Publishing, 2015.
5. T.S. Reddy and A. Murthy, “Financial Accounting”, Margham Publications; Sixth Edition, 2012.

**E-COMMERCE**  
**(Sub. Code: 18PCAE42)**

**SEMESTER : IV**

**ELECTIVE IV : 4.2**

**HOURS : 4**

**CREDITS : 4**

**UNIT I**

Introduction to E-Commerce: The revolution is just beginning, Ecommerce: A Brief History, Understanding E-commerce: Organizing Themes.

**UNIT II**

E-commerce business models and concepts, The internet and World Wide Web: Ecommerce infrastructure: E-commerce Business Models, Major Business to Consumer (B2C) business models, Major Business to Business (B2B) business models, Business models in emerging E-commerce areas, How the Internet and the web change business: strategy, structure and process, The Internet: Technology Background, The Internet Today, Internet II- The Future Infrastructure, The World Wide Web, The Internet and the Web : Features.

**UNIT III**

Building an ecommerce web site, Security and Payment: Building an E-commerce Web Site: A systematic Approach, The e-commerce security environment, Security threats in the e-commerce environment, Technology solution, Management policies, Business procedures, and public laws, Payment system, E-commerce payment system, Electronic billing presentment and payment.

**UNIT IV**

E-commerce marketing concepts, Online retailing and services: Consumer online: The Internet Audience and Consumer Behaviour, Basic Marketing Concepts, Internet Marketing Technologies, B2C and B2B E-commerce marketing and business strategies, The Retail sector, Analyzing the viability of online firms, E-commerce in action: E-tailing Business Models, Common Themes in online retailing, The service sector: offline and online, Online financial services, Online Travel Services, Online career services.

**UNIT V**

Social networks, auctions, and portals: Social networks and online communities, Online auctions, E-commerce portals

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Demonstrate an understanding of the foundations and importance of E-commerce.
2. Demonstrate an understanding of retailing in E-commerce.
3. Analyze the impact of E-commerce on business models and strategy.
4. Describe Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational.
5. Describe the infrastructure for E-commerce.
6. Assess electronic payment systems.

**TEXT BOOK**

Kenneth C. Laudon, E-Commerce: Business, Technology, Society, Fourth Edition, Pearson, 2015

**REFERENCE BOOK**

S. J. Joseph, E-Commerce: an Indian Perspective, PHI, 2012.

## ANDROID APPLICATION DEVELOPMENT

(Sub. Code: 18PCA51)

SEMESTER : V

CORE

HOURS : 4

CREDITS : 4

### UNIT I TOOLS, BUILDING BLOCKS, USER INTERFACE

**Quick Start** : Installing the Tools – Creating and Running on the Emulator – Running on Phone – **Key Concepts** : The Big Picture – It's Alive – Building Blocks – Using Resources – safe and secure – **Designing the user Interface** : Design by Declaration – creating the opening screen – using alternate resources – About Box – Applying Theme – Adding Menu – Adding settings – Debugging.

### UNIT II 2D GRAPHICS, MULTIMEDIA, STORING LOCAL DATA

**Exploring 2D Graphics** : Learning the Basic – Adding Graphics – Handling Input – Creating Keypad – Making Improvements – **Multimedia** : Playing Audio – Playing Video – Adding sounds – **Storing local Data** : Adding options – using preferences API – Saving Instance state – Accessing the internal file system – Accessing SD cards.

### UNIT III BEYOND THE BASICS, LOCATION, SQL DATA

**The Connected World** : Browsing the Internet – web with a view – Java script to java – using web services – **Location Sensing** : GPS & Location – Set Sensors – Birds Eye view – **Putting SQL to work** : SQL lite – SQL 101 – Database Program – Data Binding – using & Implementing ContentProvider.

### UNIT IV 3D GRAPHICS, NEXT GENERATION, MULTI TOUCH

**3D Graphics in Open GL** : Understanding 3D graphics – OpenGL Introduction – OpenGL program – Rendering and Building a model – **Next Generation** : Lights, Camera, Action – Applying Texture – Peekaboo – Measuring Smoothness – **Multi Touch** : Introduction – Building the Touch – Touch Events.

### UNIT V IMAGE, WIDGET, WALLPAPER

**Image** : Image Transformation – Implementing the Drag Gesture – Implementing Pinch Zoom - **Widget** : Creating First Widget – Calling all widget- Running the widget – Keep Up to Date – **Wallpaper** : Creating wall paper – Building a Drawing Engine – Managing the Surface – Making the wallpaper visible.

## **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Understand the concepts and learn the tools for developing applications on mobile platforms like Android.
2. Create Android Applications based on simple User Interfaces.
3. Develop android applications involving 2D and 3D graphics.
4. Understand the concept of SQL Lite and database applications in Android.
5. Generate Android Applications involving Location and Multi-Touch capabilities.

## **TEXT BOOK**

Ed Burnette, “**Hello Android: Introducing Google’s Mobile Development Platform**”, The Pragmatic Programmers, New Delhi, 4th Ed., 2015.

## **REFERENCE BOOKS**

1. Wei-Meng Lee, “**Beginning Android 4 Application Development**” Wiley India Pvt. Ltd., 2012.
2. James C. Sheusi, “**Android Application Development for java Programmers**”, Cengage Learning India Private Limited, New Delhi, 2013.
3. Jeff Friesen, “**Learn Java for Android Development**”, Apress, 2014.

## **DATA MINING**

**(Sub.Code: 18PCA52)**

**SEMESTER : V**

**CORE**

**HOURS : 4**

**CREDITS : 4**

### **UNIT I INTRODUCTION TO DATA MINING**

Introduction – Data Mining: Motivation – On what kind of data – Data Mining Functionalities – Technologies used – Major Issues in Data mining – Data Objects & Attribute types – Basic statistical descriptions of data – Measuring data similarity & dissimilarity.

### **UNIT II DATA PREPROCESSING, DATA WAREHOUSE**

Data Pre-processing – Data Cleaning – Data Integration and Transformation – Data Reduction – Discretization and Concept Hierarchy Generation. Data Warehouse & OLAP Technology – What is a DataWarehouse? – A Multi-dimensional data model – Data Warehouse architecture – DataWarehouse Implementation – Data Cube technology – Multidimensional data analysis in cube space.

### **UNIT III MINING FREQUENT PATTERNS, ASSOCIATIONS AND CORRELATIONS**

Basic concepts – Efficient and Scalable Frequent Itemset Mining Methods – Mining Various kinds of Association Rules – From Association Mining to Correlation Analysis – Constrained-Based Association Mining.

### **UNIT IV CLASSIFICATION**

What is Classification – Issues regarding Classification – Classification by Decision Tree Induction – Bayesian Classification – Rule Based Classification – Support Vector Machines – Other Classification methods.

### **UNIT V CLUSTERING AND DATA MINING APPLICATIONS**

Cluster Analysis – Types of data in cluster Analysis – A Categorization of major clustering methods – Partitioning methods – Hierarchical methods – Applications and Trends in Data Mining – Data Mining Applications.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to know

1. Types of data and the basic functionalities of data mining.
2. Data preprocessing methods and introduction to Data warehouse
3. Frequent itemset mining methods and association rules, which leads to data analysis.
4. Various Classification techniques.
5. Formation of clusters and its categories.
6. Applications of data mining and research opening areas.

**TEXT BOOK**

Jiawei Han, Micheline Kamber, “Data Mining: Concepts and Techniques”, Third Edition, Morgan Kaufmann Publishers, 2012.

**REFERENCE BOOKS**

1. Mohammed J. Zaki, Wagner Meira JR, “Data Mining and Analysis”, First Edition, Cambridge University Press, 2014.
2. Charu C. Aggarwal, “Data Mining”, First Edition, Springer, 2015.
3. Gordon S. Linoff, Michael J.A. Berry, “Data Mining Techniques”, Third Edition, Wiley Publishing Inc., 2011.

**J2EE AND J2ME**  
**(Sub. Code: 18PCA53)**

<b>SEMESTER : V</b>	<b>CORE</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
---------------------	-------------	------------------	--------------------

**UNIT I J2EE MULTI-TIER ARCHITECTURE AND SERVLETS**

J2EE Multi-Tier Architecture – Client Tier Implementation – Web Tier Implementation – Enterprise JavaBeans Tier Implementation – Enterprise Information Systems Tier Implementation. Java Servlets: Benefits of using a Servlet – A simple Java Servlet. Reading Data from a Client – Sending data to a Client – Working with Cookies – Tracking Sessions.

**UNIT II JSP AND REMOTE METHOD INVOCATION**

JSP: JSP Tags – Variables and Objects – Methods – Control Statements –Loops – Cookies – Session Objects – RMI: Remote Method Invocation Concept – Remote Interface – Passing Objects – The RMI Process – Server Side – Client Side.

**UNIT III EJB FUNDAMENTALS**

EJB Fundamentals – Types of Beans – Distributed Objects and Middleware – Contents of an Enterprise Bean – Developing an EJB Component – Deploying the Bean – Looking up a Home Object – Running the system.

**UNIT IV SESSION BEANS AND ENTITY BEANS**

Introduction to Session Beans : Session Bean Lifetime – Session Bean Subtypes – Special Characteristics of Stateful Session Beans – Life Cycle Diagrams for Session Beans – Introduction to Entity Beans : Persistence Concepts – Features of Entity Beans.

**UNIT V J2ME BASICS AND HIGH LEVEL DISPLAY**

J2ME Overview – Inside J2ME – J2ME and Wireless Devices – J2ME Architecture – Device Requirements – Run Time Environment – MIDlet Programming - J2ME Software Development Kits - J2ME Wireless Toolkit – J2ME User Interfaces – Display Class – Command Class – Item Class.

High Level Display Screen Class – Alert Class – Form Class – Item Classes: ChoiceGroup, DateField, Gauge, StringItem, TextField, and ImageItem – List Class – TextBox Class – Ticker Class.

## **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Describe J2EE Multi-Tier Architecture and develop servlet programs.
2. Develop JSP applications and illustrate RMI concept.
3. Examine Enterprise bean and classify the types of beans.
4. Develop distributed web applications using session beans.
5. Describe the J2ME architecture and apply High Level Display classes.

## **TEXT BOOKS**

1. Jim Keogh, "The Complete Reference J2EE", Tata McGraw Hill Edition, 2017.
2. Ed Roman, Scott Ambler, Tyler Jewell, "Mastering Enterprise JavaBeans", Third Edition, Wiley Publications, 2004.
3. James Keogh, "The Complete Reference J2ME", Tata McGraw Hill Edition, 2017.

## **REFERENCE BOOKS**

1. Rashmi Kanta Das, "J2EE Made Easy", First Edition, Vikas Publishing House, 2014.
2. Wetherbee, Chirag Rathod, Raghu R. Kodali and Peter Zadronzy, "Beginning EJB 3 : Java EE", Seventh Edition, Dreamtech Press, 2013.
3. Virender Singh, "Learn EJB in the simple way", Amazon Kindle Edition, 2016.
4. Sing Li, Jonathan, Knudsen, "Beginning J2ME From Novice to Professional", Third Edition, APress, 2012.

## **SOFTWARE TESTING**

**(Sub. Code: 18PCA54)**

**SEMESTER : V**

**CORE**

**HOURS : 4**

**CREDITS : 4**

### **UNIT I INTRODUCTION**

Introduction: Testing Process – Software Testing Terminologies – The V Shaped Software Life Cycle Model – Functional Testing: Boundary Value Analysis – Equivalence Class Testing.

### **UNIT II FUNCTIONAL AND STRUCTURAL TESTING**

Functional Testing: Decision Table Based Testing – Cause-Effect Graphing Technique – Structural Testing: Control Flow Testing – Data Flow Testing – Slice Based Testing – Mutation Testing.

### **UNIT III SOFTWARE VERIFICATION**

Software Verification: Verification Methods – SRS – SDD Document Verification – Source Code Reviews – User Documentation Verification – Software Project Audit – Creating Test Cases from Requirements and Use Cases: Use Case Diagram and Use Cases – Generation of Test Cases from Use Cases – Guidelines for generating validity checks – Strategies for Data Validity – Database Testing.

### **UNIT IV REGRESSION TESTING AND OBJECT ORIENTED TESTING**

Selection, Minimization and Prioritization of Test Cases for Regression Testing: Regression Testing – Regression Test Cases Selection – Reducing the number of Test Cases – Risk Analysis – Code Coverage Prioritization Techniques – Software Testing Activities: Levels of Testing – Debugging – Software Testing Tools – Software Test Plan – Object Oriented Testing : Path Testing – State Based Testing – Class Testing.

### **UNIT V METRICS AND MODELS IN SOFTWARE**

Metrics and Models in Software Testing: Software Metrics – Categories of Metrics – Object Oriented Metrics used in Testing – Software Quality Attributes Prediction Models – Testing Web Applications.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Realize the importance of testing in SDLC.
2. Analyze various functional and structural testing techniques.
3. Get familiar with testing activities and object oriented testing.
4. Know the metrics and models in software testing.
5. Perform web applications testing.

**TEXT BOOK**

Yogesh Singh, “Software Testing”, First Edition, Cambridge University Press, 2012.

**REFERENCE BOOKS**

1. William E. Perry, “Effective Methods for Software Testing”, Third Edition, John Wiley, 2015
2. Glenford J. Myers, Tom Badgett, Corey Sandler, “The Art of Software Testing”, ThirdEdition, Pearson Education, 2011.

## **PRACTICALS : ANDROID APPLICATION DEVELOPMENT**

**(Sub. Code: 18PCAL55)**

<b>SEMESTER : V</b>	<b>CORE</b>	<b>HOURS : 5</b>	<b>CREDITS : 2</b>
---------------------	-------------	------------------	--------------------

1. Android Application Life Cycle Activity
2. Different Layouts with Simple Controls
3. Working With Colors
4. Working With Text Using Styles
5. Check Boxes and Radio Buttons
6. Spinner and Date Picker.
7. Canvas, Paint and Bitmap.
8. Image Manipulation
9. Menu Creation
10. Implicit Intents
11. Explicit Intents
12. Adding Audio & Video
13. Pop-up dialog Boxes and Toasts.
14. Create An Application Using Links
15. Widgets
16. Wallpapers
17. Data Storing & Retrieving.

**PRACTICALS : J2EE AND J2ME**

**(Sub. Code : 18PCAL56)**

<b>SEMESTER : V</b>	<b>CORE</b>	<b>HOURS : 5</b>	<b>CREDITS : 2</b>
---------------------	-------------	------------------	--------------------

1. Simple Servlet Program
2. Servlet Life Cycle Program
3. Session Tracking using HttpSession Object.
4. Implementing Cookies using Servlet
5. Accessing Database with Servlet using JDBC
6. Simple JSP Program
7. Implementing Session Tracking using JSP
8. Implementing Cookies using JSP
9. Accessing Database with JSP using JDBC
10. Program using implicit JSP objects
11. Program using RMI
12. Accessing Database using RMI
13. Simple J2ME Midlet
14. Program using Item class and ItemStateChangedListener
15. Program using Alert Classes, Form Classes
16. Program using Gauge Class
17. Program using ChoiceGroup Classes
18. Program to high level display using List Class, Text Box ,Ticker
19. Program using StringItem, TextField and DateField Classes

## **MOBILE COMPUTING**

**(Sub. Code: 18PCAE51)**

<b>SEMESTER : V</b>	<b>ELECTIVE V : 5.1</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
---------------------	-------------------------	------------------	--------------------

### **UNIT I WIRELESS COMMUNICATION FUNDAMENTALS**

Introduction : Applications-Wireless Transmission: Frequencies for radio transmission- signal propagation- multiplexing cellular systems- MAC: Motivation for MAC-SDMA-FDMA-TDMA-CDMA.

### **UNIT II TELECOMMUNICATION SYSTEMS**

GSM : Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services, DECT-UMTS AND IMT-2000, Satellite Systems: History-Applications-Basics-routing-localization-Handover.

### **UNIT III WIRELESS LAN**

Infrared vs radio transmission – IEEE 802.11: Architecture-physical layer- MAC layer- management- 802.11b – 802.11a – HIPERLAN- Bluetooth: Architecture - radio layer - baseband-LMP-L2CAP-Security-SDP.

### **UNIT IV MOBILE NETWORK LAYER**

Mobile IP :Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations, DHCP-Mobile ad-hoc networks.

### **UNIT V MOBILE TRANSPORT LAYER**

Traditional TCP, Classical TCP improvements-Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.WAP: Architecture- WDP-WTLS-WTP-WSPWAE- WML AND WML Script.

## **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Acquire general concepts in Wireless Communication Fundamentals.
2. Describe the basic concepts and principles in mobile computing.
3. Understand the concept of Wireless LANs and Mobile Networks.
4. Explain the structure and components for Mobile IP and Mobile networks.
5. Acquire the knowledge to Mobile Transport Layer.

## **TEXT BOOK**

Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2012.

## **REFERENCE BOOKS**

1. William Stallings, "Data And Computer Communications", Tenth Edition, Pearson Education, 2017
2. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", Second Edition, PHI Learning Pvt. Ltd., 2015.
3. Raj Kamal, "Mobile Computing", Second Edition, Oxford University Press, 2011.

# DIGITAL IMAGEPROCESSING

(Sub. Code : 18PCAE52)

**SEMESTER : V**

**ELECTIVE V : 5.2**

**HOURS : 4**

**CREDITS : 4**

## **UNIT I DIGITAL IMAGE FUNDAMENTALS**

The Origins of Digital Image Processing - Examples of Fields that Use Digital Image Processing - Fundamental Steps in Digital Image Processing - Components of an Image Processing System - Elements of visual perception- Light and the Electromagnetic Spectrum - Image Sensing and Acquisition - Image Sampling and Quantization - Some Basic Relationships Between Pixels - Linear and Nonlinear Operations.

## **UNIT II IMAGE ENHANCEMENT**

Some Basic Gray Level Transformations - Histogram Processing - Enhancement Using Arithmetic/Logic Operations - Basics of Spatial Filtering - Smoothing Spatial Filters - Sharpening Spatial Filters - Combining Spatial Enhancement Methods.

## **UNIT III IMAGE RESTORATION**

A Model of the Image Degradation/Restoration Process - Noise Models - Restoration in the Presence of Noise Only - Spatial Filtering - Periodic Noise Reduction by Frequency Domain Filtering - Linear, Position-Invariant Degradations - Estimating the Degradation Function - Inverse Filtering - Minimum Mean Square Error (Wiener) Filtering - Constrained Least Squares Filtering - Geometric Mean Filter Geometric Transformations

## **UNIT IV IMAGE COMPRESSION**

Fundamentals - Image Compression Models - Elements of Information Theory - Error-Free Compression - Variable-Length Coding - LZW Coding - Bit-Plane Coding - Lossless Predictive Coding - Lossy Compression - Lossy Predictive Coding - Transform Coding - Wavelet Coding.

## **UNIT V IMAGE SEGMENTATION**

Detection of Discontinuities - Edge Linking and Boundary Detection - Thresholding - Region-Based Segmentation - Segmentation by Morphological Watersheds - The Use of Motion in Segmentation - Representation - Boundary Descriptors - Regional Descriptors - Relational Descriptors.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Understand the image fundamentals and mathematical transforms necessary for image processing.
2. Get clear idea about the image enhancement techniques.
3. Describe the image restoration procedures.
4. Gain knowledge about the image compression Techniques.
5. Understand the image segmentation and representation techniques.

**TEXTBOOK**

Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Second Edition, Pearson, 2004.

**REFERENCE BOOK**

Anil K. Jain, "Fundamentals of Digital Image Processing", Pearson, 2002.

**COMPILER DESIGN**  
**(Sub. Code : 18PCAE53)**

<b>SEMESTER : V</b>	<b>ELECTIVE V : 5.3</b>	<b>HOURS : 4</b>	<b>CREDITS : 4</b>
---------------------	-------------------------	------------------	--------------------

**UNIT I INTRODUCTION TO COMPILERS , FINITE AUTOMATA AND LEXICAL ANALYSIS**

**Introduction to Compilers:** Compilers and Translators – Need of translators – The Structure of a Compiler – Lexical Analysis – Syntax Analysis – Intermediate Code Generation – Optimization - Code Generation – Book Keeping – Error Handling – Compiler-writing tools.

**Finite Automata and Lexical Analysis:** The Role of the Lexical Analyzer – A simple approach to the Design of Lexical Analyzers – Regular Expressions – Finite Automata – From Regular Expressions to Finite Automata – Minimizing the number of states of DFA – A Language for specifying Lexical Analyzers – Implementation of a Lexical Analyzer.

**UNIT II SPECIFICATIONS OF PL, PARSING TECHNIQUES**

**The Syntactic Specifications of Programming Languages:** Context-Free Grammars – Derivations and Parse trees – Capabilities of Context-Free Grammars.

**Basic Parsing Techniques:** Parsers – Shift Reduce Parsing – Operator-Precedence Parsing – Top-Down Parsing – Predictive Parsers.

**UNIT III EFFICIENT PARSERS, DIRECTED TRANSLATION**

**Automatic Construction of Efficient Parsers:** LR Parsers – The Canonical Collection of LR(0) items – Constructing SLR parsing tables – Constructing Canonical LR parsing tables – Constructing LALR parsing tables – Implementation of LR parsing tables – Constructing LALR sets of items.

**Syntax-Directed Translation:** Syntax-Directed Translation Schemes – Implementation of Syntax-Directed Translators – Intermediate Code – Postfix Notation – Parse Trees and Syntax Trees – Three-address code, Quadruples and Triples – Translation of Assignment Statements – Boolean Expressions

## **UNIT IV SYMBOL TABLES, RUN-TIME STORAGE ALLOCATION, ERROR DETECTION AND RECOVERY**

**Symbol tables:** The contents of a Symbol Table – Data Structures for Symbol Tables – Representing Scope Information.

**Run-time Storage Allocation:** Implementation of a Simple Stack Allocation Scheme – Implementation of Block-Structured Languages.

**Error Detection and Recovery:** Errors – Lexical Phase Errors – Syntactic Phase Errors – Semantic Errors.

## **UNIT V CODE OPTIMIZATION AND GENERATION**

**Introduction to Code Optimization:** The Principle Sources of Optimization – Loop Optimization – The DAG Representation of Basic Blocks – Global Data-Flow Analysis. **Code generation:** Object Programs – Problems in Code Generation – A Machine Model – A Simple Code Generator – Register Allocation and Assignment – Code Generation from DAGs – Peephole Optimization.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Know about different phases of a compiler.
2. Know about Parsing Techniques.
3. Describe about symbol tables, error detection and recovery.
4. Acquire knowledge about code optimization and code generation.
5. Design a compiler.

### **TEXT BOOK**

1. Alfred V.Aho and Jeffrey D.Ullman, “**Principles of Compiler Design**”, Narosa Publishing House, 2002.

### **REFERENCE BOOKS**

1. Alfred V.Aho, Ravi Sethi and Jeffrey D.Ullman, “**Compilers - Principles, Techniques and Tools**”, Pearson Education, 2/E, 2008.
2. Des Watson “**A Practical Approach to Compiler Construction**”, Springer, 2017

**MINI PROJECT - I**  
**(Sub. Code : 18PCAR51)**

**SEMESTER : V**

**CREDITS : 4**

Every student is required to carry out Mini Project work during the IV Semester summer vacation under the supervision of a project guide provided by the Head of the Department of MCA. The project guide shall monitor progress of the student continuously. A candidate is required to present the progress of the Mini Project work during the V semester as per the schedule provided by the Head of the Department of MCA.

**COURSE OUTCOMES**

On successful completion of the course, the learners will be able to

1. Utilize the application of knowledge and techniques in theoretical classes for developing the s/w for real problems.
2. Gain deeper understanding in specific functional areas.
3. Explore career opportunities in their areas of interest.

The course MCA Mini Project-I is one that involves requirement analysis, feasibility analysis, Database design, coding, testing, implementation and maintenance.

## **PROJECT WORK AND VIVA VOCE**

**(Sub. Code : 18PCA61)**

<b>SEMESTER : VI</b>	<b>CREDITS : 16</b>
----------------------	---------------------

MCA students are required to do and submit a Major Project in VI semester. This project is basically for the implementation of the various technologies learned during all the 5 semesters in the real life scenario. The training would impart practical exposure to all the students in the industry. The students will be doing projects relating to the different specialization areas.

### **OBJECTIVE OF MAJOR PROJECT**

The primary objective of Major Project is to develop an application using practical experience and understanding of the theoretical principles learnt in previous semesters of MCA. Major Project is oriented towards developing the skills, knowledge and attitude needed to make an effective start as a member of the computer/IT profession.

Some of the expected advantages of Major Project to be gained by an MCA graduate:

- Systematic introduction to the ways of industry and developing talent and attitude, so that he/she can enjoy fully, a career in IT industry (as a Software Developer/ Trainee/ Software Engineer/Database Administrator etc.)
- Recognizing his/her responsibilities as a professional of the future.
- Understanding real life situations in industrial organizations and their related environments and accelerating the learning process of how his/her knowledge could be used in a realistic way.
- Understanding the formal and informal relationship in an industrial organization so as to promote favourable human relations and teamwork.
- Appreciating that IT is an expanding field and that learning has no limitations.
- Understanding that the problems encountered in the industry have unique solution and gaining experience to select the optional solution from the many alternatives available.

# SELF STUDY PAPERS

## CURRENT TRENDS IN COMPUTERS

(Sub Code: 18PCAS01)

**SEMESTER : I**

**SELF STUDY**

**CREDITS : 4**

### UNIT I CRM

Sales –Marketing and Service Management – What is BPO/BCP – Why it is required? – Guidelines – Merits/De-Merits – Call Center – Brief perspective technology wise – Functioning – Ethics – Disaster Recovery Management – Case Study.

### UNIT II E-BANKING

Transactions: Inter Banking– Intra Banking–Electronic Payments–Gateway Example –Securities in E-banking – SSL- Digital Signatures – Examples –Services Provided: TM– Smart Card–ECS(Electronic Clearing System)– Example –Telephone– Electricity Bills.

### UNIT III CONTENT MANAGEMENT, DISSEMINATIONS AND E-LOGISTICS

E-learning – Models WBT– CBT– VirtualCampus– LMS and LCMS– Video Conferencing–Chatting Bulleting– Building Online Community– Asynchronous/Synchronous Learning – E-Logistics: Logistics and Supplier Chain Management– Warehousing Management– Transportation/Distribution Management.

### UNIT IV GIS/GPS

What is GIS? –Nature of Geographic data– Spatial Objects and Data Models– Getting map on Computers– GIS standards and Standardization Process of GIS development– Implementation and Deployment phases– GPS Technologies – Real time usages.

### UNIT V BIOMETRIC TECHNOLOGIES AND EMBEDDED SYSTEMS

RFID– Retina Scanning–Facial Reorganization– Finger Print scanning – Hand geometry – DNA – Working principles – Application areas – Embedded Systems: Features and Types of Embedded Systems– Components of Embedded System–Applications of Embedded System– Palm Devices.

## **COURSE OUTCOMES**

On successful completion of the course, the learners will be able to

1. Know about the Customer Relationship Management.
2. Examine new innovations in E-Banking.
3. Demonstrate new trends and technologies E-Learning and E-Logistics.
4. Know about new GIS/GPS technologies.
5. Understand biometric technologies and embedded systems.

## **REFERENCE BOOKS**

1. Jawadekar, "Management Information System"
2. Laudon and Laudon, "Management Information System"
3. William Cheswick, Stevens, Aviel Rubin, "Fire Wall and Internet Security"
4. Amrit Tiwana, "The Essential Guide to Knowledge management"
5. George B. Karte, "The GIS Book"
6. Internet (Use of Search Engines Google, Yahoo, etc.)

## **WEB USER INTERFACE DESIGN**

**(Sub. Code: 18PCAS02)**

<b>SEMESTER : II</b>	<b>SELF STUDY</b>	<b>CREDITS : 4</b>
----------------------	-------------------	--------------------

### **UNIT I INTRODUCTION, WEB BROWSER BEHAVIOUR**

Introducing Web Navigation – Considering Navigation – The need for navigation – Web navigation design – Understanding Navigation – Information seeking – Seeking Information Online – Web browsing behavior – Information Shape – Experiencing information.

### **UNIT II NAVIGATIONS AND BROWSING MECHANISMS**

Mechanisms of Navigation – Step Navigation – Paging Navigation – Breadcrumb Trail Tree navigation – Site Maps – Directories Tag – Clouds – A-Z Indexes – Navigation Bars and Tabs – Vertical menus – Dynamic Menus – Drop Down Menus – Visualizing Navigation – Browsing Mechanisms.

### **UNIT III TYPES OF NAVIGATIONS, LABELING SYSTEMS**

Types of Navigations – Categories of Navigation – Page types – Labeling Navigation – The Vocabulary Problem Aspects of Good Labels – Labeling Systems.

### **UNIT IV EVALUATION METHODS**

Evaluation – Qualities of successful navigation – Evaluation Methods.

### **UNIT V ARCHITECTURE, SITE MAPS**

Architecture – Persuasive Architecture – Navigation Concept – Information Structures – Organizational Schemes – Site maps.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Understand the web user interface design.
2. Examine the types of navigations.
3. Understand the evaluation methods.
4. Describe the persuasive architecture and organizational schemes.

**TEXT BOOK**

1. James Kalbach, “Designing Web Navigation Optimizing the User Experience”, O’ Reilly Publications.

**CYBER SECURITY**  
(Sub. Code: 18PCAS03)

**SEMESTER : I**

**SELF STUDY**

**CREDITS : 4**

**UNIT I INTRODUCTION**

Introduction to information systems, Types of information Systems, Introduction to Cyber Security: Information Security, Computer Security, Network Security, and Application Security, Need for Information security, Information Assurance and Security Risk Analysis.

**UNIT II TYPES OF THREATS AND ATTACKS**

Introduction to Threats and Threat Vectors, Threat Sources and Targets, Types of Threats: Viruses, Worms, Trojans, Advanced Persistent Threats (APT's), Steganography, Types of Attacks: Manual, Physical, Network and Application Layer Attacks; Electronic Payment System, e- Cash, Credit/Debit Cards.

**UNIT III DATA/INFORMATION SECURITY**

**Data/Information Security:** Introduction to Structured and Unstructured Data, Approaches to Securing Unstructured Data, Data Loss Prevention (DLP), Overview of Information Rights Management (IRM); Introduction to Encryption: Symmetric Key Cryptography, Public Key Infrastructure, Digital Signatures.

**UNIT IV FIREWALLS, VIRTUAL PRIVATE NETWORK**

**Network Security:** Overview of Firewalls, Types of Firewalls, Functions of Firewall, Overview of Virtual Private Networks (VPN's), Types of VPN's, Basics of VPN Protocols, Overview of Intrusion Detection Systems (IDS), Types and Features of IDS.

**UNIT V INFORMATION SECURITY, COPY RIGHT LAW**

Overview of ISO Standard for Computer and Information Security, IT Act 2000 and subsequent amendments, Copyright Act, Patent Law; Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Examine the types of information systems and security.
2. Describe about types of threats and attacks.
3. Demonstrate encryption and digital signatures.
4. Analyze firewalls and virtual private networks.
5. Understand Copyright Act and Intellectual Property Law.

**REFERENCE BOOKS**

1. Rhodes-Ousley, Mark, “ Information Security: The Complete Reference”, Second Edition, McGraw Hill, 2013.
2. V.K. Pachghare, “Cryptography and information Security”, Second Edition, PHI Learning Pvt. Ltd., 2015.
3. Surya Prakash Tripathi, Ritendra Goel, Praveen Kumar Shukla ,”Introduction to Information Security and Cyber Laws”, First Edition, Wiley Dreamtech Press, 2014.
4. Chander, Harish, "Cyber Laws and IT Protection”, First Edition, PHI Learning Private Ltd., 2012.

## INTERNET OF THINGS

(Sub. Code : 18PCAS04)

<b>SEMESTER : IV</b>	<b>SELF STUDY</b>	<b>CREDITS : 4</b>
----------------------	-------------------	--------------------

### **UNIT I INTRODUCTION AND DOMAIN SPECIFIC IoTS**

Introduction – Definition and Characteristics of IoT – Physical design of IoT – Logical Design of IoT – IoT enabling technologies – IoT levels and Deployment templates – Domain Specific IoTs: Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health and Lifestyle.

### **UNIT II IoT SYSTEM MANAGEMENT AND DESIGN METHODOLOGY**

IoT and M2M: Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT – Software Defined Networking – Network Function Virtualization – Need for IoT System Management SNMP – Network operator requirements – NETCONF – YANG – IoT System Management with NETCONF-YANG – IoT Design methodology.

### **UNIT III IoT SYSTEMS LOGICAL DESIGN AND PHYSICAL DEVICES**

IoT Systems-Logical Design using Python - Python data types and data structures – Control flow – Functions – Modules – Packages – File Handling – Date/Time operations – Classes – Python packages for IoT – IoT Physical devices and endpoints: Basic building blocks of IoT devices – Exemplary device: Raspberry Pi – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python.

### **UNIT IV IoT PHYSICAL SERVERS, CLOUD OFFERINGS AND CASE STUDIES**

Introduction to Cloud storage models and Communication APIs – WAMP-AutoBahn for IoT – Xively Cloud for IoT – Python Web Application Framework - DJANGO – Designing a RESTful Web API – Amazon Web Services for IoT – Amazon EC2 – Amazon Autoscaling – Amazon S3 – AmazonRDS – Case studies illustrating IoT – Smart Lighting – Home Intrusion System – Smart Parking – Weather Monitoring System – Forest Fire Detection – Smart Irrigation – IoT printer.

## **UNIT V DATA ANALYTICS AND TOOLS FOR IoT**

Introduction – Apache Hadoop – Mapreduce Programming Model – Hadoop Mapreduce Job Execution – Mapreduce Job Execution Workflow – Hadoop Cluster Setup – Tools for IoT – Chef – Setting up Chef – Chef Case studies – Puppet – Puppet case study – IoT Code Generator.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Describe the characteristics, physical and logical design of IoT.
2. Identify various domain specific IoTs.
3. Differentiate IoT and M2M.
4. Explore the IoT design methodology.
5. Develop applications using Raspberry Pi with Python.
6. Interpret various Amazon web services for IoT.
7. Illustrate the applications of IoT in various fields.
8. Apply the knowledge of IoT system for data analysis.
9. Describe the tools for IoT namely Chef and Puppet.
10. Explore the working of IoT Code Generator tool.

### **TEXT BOOK**

Arshdeep Bahga, Vijay Madiseti, “Internet of Things: A Hands-on Approach” , First Edition, Universities Press, 2016.

### **REFERENCE BOOKS**

1. Ammar Rayes, Samere Salam, “Internet of Things – From Hype to Reality”, First Edition, Springer Publishers, 2017.
2. Raj Kamal, “Internet of Things Architecture and Design Principles”, First Edition, Mc-Graw Hill Education, 2017.
3. Agus Kurniawan, “Smart Internet of Things Projects”, First Edition, Packt Publishing Ltd., 2016.

**M - COMMERCE**  
**(Sub.Code : 18PCAS05)**

<b>SEMESTER : V</b>	<b>SELF STUDY</b>	<b>CREDITS : 4</b>
---------------------	-------------------	--------------------

**UNIT I ELECTRONIC COMMERCE**

Traditional commerce and E-commerce – Internet and WWW – Role of WWW – Value Chains – Strategic Business And Industry Value Chains – Role of E-commerce. Packet Switched Networks – TCP/IP Protocol Script – Internet Utility Programmes – SGML, HTML And XML – Web Client And Servers – Web Client/Server Architecture – Intranet And Extranets – Web Based Tools For E-commerce – Security.

**UNIT II MOBILE COMMERCE**

Introduction – Infrastructure of M-Commerce – Types Of Mobile Commerce Services – Technologies Of Wireless Business – Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non- Internet Applications In M-Commerce – Wireless/Wired Commerce Comparisons.

**UNIT III MOBILE COMMERCE-TECHNOLOGY**

A Framework For The Study Of Mobile Commerce – NTT Docomo’s I-Mode – Wireless Devices For Mobile Commerce – Towards A Classification Framework For Mobile Location Based Services – Wireless Personal And Local Area Networks –The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks.

**UNIT IV MOBILE COMMERCE- THEORY AND APPLICATIONS**

The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portal – Factors Influencing The Adoption of Mobile Gaming Services – Mobile Data Technologies And Small Business Adoption And Diffusion – E-commerce in The Automotive Industry – Location- Based Services: Criteria For Adoption And Solution Deployment – The Role of Mobile Advertising In Building A Brand – M-commerce Business Models.

## **UNIT VBUSINESS-TO-BUSINESS MOBILE E-COMMERCE**

Enterprise Enablement – Email and Messaging – Field Force Automation (Insurance, Real Estate, Maintenance, Healthcare) – Field Sales Support (Content Access, Inventory) – Asset Tracking and Maintenance/Management – Remote IT Support – Customer Retention (B2C Services, Financial, Special Deals) – Warehouse Automation – Security.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Get knowledge of mobile commerce applications and technologies.
2. Understand requirements of diverse m-commerce services.
3. Get skills to identify and design the infrastructure-support for mobile commerce services.
4. Obtain critical knowledge of wireless infrastructure for location-based services.
5. Get high-level knowledge of management challenges in mobile commerce services.
6. Understand multiple factors in adoption and usage of mobile commerce services.
7. Get an awareness of emerging trends and development in mobile commerce.

### **TEXT BOOKS**

1. E.Brian Mennecke, J.Troy Strader, “Mobile Commerce: Technology, Theory and Applications”, Idea Group Inc., IRM press, 2003.
2. Ravi Kalakota, B.Andrew Whinston, “Frontiers of Electronic Commerce”, Pearson Education, 2003.

### **REFERENCE BOOKS**

1. P. J. Louis, “M-Commerce Crash Course”, McGraw- Hill Companies, February 2001.
2. Paul May, “Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business”, Cambridge University Press, March 2001.

# ECC/VALUE ADDED PAPERS

## APTITUDE AND REASONING SKILLS

(Sub.Code: 18PCAEC01)

<b>SEMESTER : I</b>	<b>ECC</b>	<b>CREDITS : 4</b>
---------------------	------------	--------------------

### UNIT I ANALOGY, SERIES, CODING

**Analogy:** Verbal Analogy, Alphabet Analogy, Number Analogy

**Series:** Letter Series, Number Series

**Coding:** Letter Coding, Number Coding

Verbal Classification (Odd Man Out), Dissimilarity

### UNIT II ANALYTICAL REASONING

Analytical Reasoning: Direction, Family, Relation, Symmetric Relation, Ordering, Logical Diagram. Verbal Reasoning: Analogies, Series, Classification

### UNIT III PROBLEMS

Problems on Numbers, Simplification, Average

### UNIT IV PROBLEMS

Percentage, Ratio and Proportion, Partnership, Profit and Loss, Time and Distance, Time and Work, Problems on ages

### UNIT V PROBLEMS

Problems on Trains, Boats and Streams, Simple Interest, Compound interest

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to

1. Get basic skills in analogy.
2. Solve problems on analytical reasoning and verbal reasoning.
3. Get exposure on problems with simplifications and average.
4. Solve problems on percentage, partnership and time and work.
5. Get exposure on problems with trains, boats and simple interest.

**REFERENCE BOOKS**

1. Dr. R.S.Agarwal, "Reasoning", S.Chand & Co. Ltd Publications.
2. Dr. R.S.Agarwal, "Quantitative Aptitude", S. Chand & Co. Ltd Publications.
3. Deepak Agarwal, D.P. Gupta, "Quantitative Aptitude for Competitive Exams", Disha Experts.

## COMMUNICATION AND PRESENTATION SKILLS

(Sub.Code:18PCAEC02)

<b>SEMESTER : II</b>	<b>ECC</b>	<b>CREDITS : 4</b>
----------------------	------------	--------------------

### UNIT I BASICS OF COMMUNICATION

Understanding English Grammar – How to write and speak correctly – Speaking and writing with style – Word Choice.

### UNIT II ENGLISH FLUENCY

Methods for speaking English fluently – English pronunciation – Common mistakes speakers repeat – Use of slang – Body language – Developing the skills.

### UNIT III COMMUNICATION & PRESENTATION THEORIES

Verbal, Non-verbal communication – Making presentations – Listening skills – How to be a good communicator.

### UNIT IV THE ART OF EFFECTIVE COMMUNICATION

Significance of communication – Roadmap to effective communication – Principles for effective communication – The art and skill of good communication.

### UNIT V PUBLIC SPEAKING AND PRESENTATION

What is Public Speaking? – The art of public speaking – Language and Proficiency in Public Speaking – Group discussions and seminars.

### **COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to know the

1. Basics of English grammar.
2. Methods to speak English fluently.
3. Presentation and communication theories.
4. Principles of effective communication.
5. Various styles in public speaking.

### **REFERENCE BOOKS**

1. S. K. Mandal, “Effective communication & Public Speaking”, Jaico Publishing House, 2016.
2. Reena Gupta, “How to write and speak correct English”, Lotus Press and Publishers, 2012.
3. Namrata Palta, “The art of effective communication”, Lotus Press and Publishers, 2015.
4. Prem P. Bhalla, “7 steps to effective communication”, Goodwill publishing house, 2014.

# SCRIPTING LANGUAGES AND AJAX

(Sub.Code: 18PCAEC03)

**SEMESTER : III**

**ECC**

**CREDITS : 4**

## **UNIT I VB SCRIPT**

VBScript VB Script's Popularity – VBScript Defined – Platform or Host Dependence – Scripting Languages – Basics Embedding VBScript in HTML – VBScript to Display Information – Hiding VBScript from Older Browsers – Code Documentation and Formatting.

## **UNIT II VB SCRIPT CONTROLS AND ERROR HANDLING**

Variables – Subtypes – Constants – Variables Deformed – Declaring Variables – Naming Variables Variants and Subtype – Data Subtypes Conversion – Numeric and Literal Constants – Arrays Groups of Similar Variables – One Dimensional Arrays – Multi Dimensional Arrays – VBScript Operators Logic Operators – Arithmetic Operator Precedence – Comparison Operators Logic Operators- String Concatenation.

## **UNIT III JAVA SCRIPT**

**Introduction to JavaScript:** Adding JavaScript to HTML Documents – Event Handlers – Linked Scripts – JavaScript Pseudo-URL – JavaScript Entities – JavaScript Applications – History of JavaScript.

## **UNIT IV JAVASCRIPT CORE FEATURES**

**JavaScript Core Features-Overview:** Basic Definitions – Language Characteristics – Variables – Basic Data Types – Composite Types – Flow Control Statements – Loops – Functions – Input and Output in JavaScript – Regular Expressions – Comments Line.

## **UNIT V AJAX**

Introduction to Ajax – XMLHttpRequest Object – Data Formats.

**COURSE OUTCOMES:**

On successful completion of the course, the learners will be able to know

1. Basics of VB Script and Java Script.
2. Methods of error handling.
3. Features of Java Script.
4. Usage of Ajax.

**REFERENCE BOOKS**

1. Jusanner clark and Team, “VB Script Programmer Reference”,Shroff Publications and Distributors Pvt.Ltd.,2000.
2. Adrian Kingsley-Hughes, Kathie Kingsley-Hughes, Daniel Read,"VBScript Programmer's Reference", Third Edition, Wiley Publishing.
3. Thomas Powell and Fritz Schneider, "JavaScript 2.0 The Complete Reference", Second Edition, McGraw-Hill.
4. Yehuda Shiran and Tomer Shirar, “Learn Advanced Java Script Programming”, BPB Publications, New Delhi
5. Thomas Powell, "Ajax: The Complete Reference", McGraw-Hill
6. Ronald Huereca, " WordPress and Ajax- *An in-depth guide on using Ajax with WordPress* ", Second Edition.

# FREE AND OPEN SOURCE SOFTWARE DEVELOPMENT

(Sub. Code: 18PCAEC04)

<b>SEMESTER : IV</b>	<b>ECC</b>	<b>CREDITS : 4</b>
----------------------	------------	--------------------

## UNIT I LINUX

Open Source Software: Introduction – The Web Explained, Linux – The Choice of a GNU Generation: Introduction – Basic Unix – Shell – Owner, Groups, Permissions, Ownership – Processes – PATH and Environment – Commands – File system.

## UNIT II APACHE WEB SERVER

Apache: Introduction – Starting, Stopping, and Restarting Apache – Configuration – Securing Apache – Create the Web Site – Apache Log Files

## UNIT III MySQL Basic

MySQL: MySQL root user – Various commands and Queries – Database Independent Interface – Table Joins – Loading and Dumping a Database.

## UNIT IV PROGRAMMING LANGUAGES

Perl : Perl Documentation – Perl Syntax Rules – Object – Oriented Programming.  
Embperl : Installing Embperl – A Quick Example – Embperl Commands – Posted Data – Other Embperl Variables.

## UNIT V PHP

PHP : Introduction – Embedding PHP into HTML – Configuration, Basic programs – Language Syntax – Built – In PHP Functions – PHP and MySQL.

## **COURSE OUTCOMES:**

1. Be exposed to the context and operation of free and open source software (LAMP).
2. Be familiar with participating in a Linux and Apache.
3. Learn scripting language like Perl.
4. Learn programming language like PHP.
5. Learn some important database tools and techniques in MySQL.

## **TEXT BOOK**

James Lee, Brent Ware, "Open Source Web Development with LAMP: Using Linux, Apache, MySQL, Perl and PHP", Addison Wesley, 2009

## **REFERENCE BOOKS**

1. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a Nutshell", Sixth Edition, O'Reilly Media, 2009.
2. Mohammed J. Kabir, "Apache Server 2Bible", Hungry Minds Inc., 2002.
3. James Lee, "Beginning Perl", Third Edition, Apress, 2010.
4. Steve Suehring, Tim Converse and Joyce Park, "PHP6 and MySQL Bible", Wiley Publishing Inc., 2009.

# IT INFRASTRUCTURE MANAGEMENT

(Sub. Code: 18PCAEC05)

<b>SEMESTER : V</b>	<b>ECC</b>	<b>CREDITS : 4</b>
---------------------	------------	--------------------

## UNIT I INTRODUCTION

Introduction: Network and internet – computing resources, information technology, IT infrastructure management, infrastructure – IT Infrastructure management – challenges in IT infrastructure management – design issues of IT organizations and IT infrastructure – determining customers’ requirements – IT systems management process – IT service management process – information system design process – patterns for IT systems management – IT infrastructure library.

## UNIT II SERVICE DELIVERY PROCESS

Service Delivery Process: Service level management– financial management – IT service continuity management – capacity management – availability management.

## UNIT III SERVICE SUPPORT PROCESS

Service Support Process: Configuration management – incident management – problem management – change management – release management.

## UNIT IV STORAGE MANAGEMENT

Storage Management: Introduction to storage – backup and storage – archive and retrieve – disaster recovery – space management – database and application protection – Bare Machine Recovery (BMR) – data retention.

## UNIT V SECURITY MANAGEMENT AND IT ETHICS

**Security Management:** Introduction – computer security – internet security – physical security – identity management – access control – intrusion detection. **IT**

**Ethics:** Introduction – intellectual property – privacy and law – computer forensics – ethics and internet – cyber crimes.

**COURSE OUTCOMES:**

1. Describe about Computing Resources.
2. Examine service delivery and support process.
3. Understand storage management and data retention.
4. Get an exposure on security management and IT ethics.

**TEXT BOOKS**

1. Phalguni Gupta, Surya Prakash, Umarani Jayaraman, "IT Infrastructure and its Management", Tata McGrawHill Education Private Limited, 2009.
2. Simon Adams, "ITIL V3 Foundation Handbook", Updated Edition, Stationery Office Books (TSO) Publisher, 2009.

**REFERENCE BOOKS**

1. Ivanka Menken, "ITIL V3 Foundation Certification Exam Preparation Course in a Book for Passing the ITIL V3 Foundation Exam", Second Edition, The Art of Service, 2009.
2. Van Haren, "Passing the ITIL Foundation", Van Haren Publishing, 2011.