MASTER OF COMPUTER APPLICATIONS

Curriculum and Syllabus

(For Students admitted from academic year 2015 – 2016 onwards)

UNDER CHOICE BASED CREDIT SYSTEM

DEPARTMENT OF COMPUTER APPLICATIONS

FACULTY OF SCIENCE AND HUMANITIES

SRM UNIVERSITY

SRM NAGAR, KATTANKULATHUR – 603 203

MASTER OF COMPUTER APPLICATIONS
(For students admitted from the academic year 2015-16)

CURRICULUM

SEMESTER I

Category	Course Code	Course Title	L	T	P	Total LTP	C
Compulsory Core	PCA15101	Programming in C with Lab	3	1	3	7	4
	PCA15102	Data Structures	3	1	0	4	3
	PCA15103	Digital Computer Fundamentals	3	1	0	4	3
	PCA15104	Operating Systems	3	1	0	4	3
	PCA15105	Web Technology with Lab	3	1	3	7	4
Supportive course	PCA15106	Principles of Programming Languages	3	1	0	4	3
Total			18	6	6	30	20

SEMESTER II

Category	Course Code	Course Title	L	T	P	Total LTP	C
Compulsory Core	PCA15201	Object Oriented Programming using C++ with Lab	3	0	3	6	4
	PCA15202	Database Management Systems with Lab	3	0	3	6	4
	PCA15203	Computer Networks	3	1	0	4	3
Elective 1	PCA15E01	AI & Expert Systems	3	1	0	4	3
	PCA15E02	Design & Analysis of Algorithms					
	PCA15E03	Computer Architecture					
Non-Major Elective 1		Open Elective I	2	0	0	2	2
Supportive course 1	PCA15204	Discrete Mathematics	2	3	0	5	3
Supportive Course 2	PCA15205	Mini Project – Basic	0	1	2	3	1
Total			16	6	8	30	20

SEMESTER III

Category	Course Code	Course Title	L	T	P	Total LTP	C
Compulsory Core	PCA15301	Software Engineering	3	1	0	4	3
	PCA15302	Linux administration and Network Programming with Lab	3	2	2	7	4
Choice Based Core 1	PCA15303	Programming in Java with lab	3	0	3	6	4
	PCA15304	Visual programming Using C# with Lab					
Elective 2	PCA15E04	Data Base Administration	3	1	0	4	3
	PCA15E05	Human Computer Interactions					
	PCA15E06	Network Security					
Non-Major Elective 2		Open Elective II	2	0	0	2	2
Supportive Course	PCA15305	MAT LAB	1	0	1	2	2
Supportive Course	PCA15306	Personality Development – I	2	1	0	3	2
Total			17	5	6	28	20

SEMESER IV

Category	Course Code	Course Title	L	T	P	Total LTP	C
Compulsory Core	PCA15401	Software Testing & Quality Assurance with Lab	3	0	3	6	4
Choice Based Core 1	PCA15402	Advanced java with Lab	3	0	3	6	4
	PCA15403	ASP.NET with Lab					
Elective 3	PCA15E07	Adhoc Wireless Networks	3	1	0	4	3
	PCA15E08	Cyber Law and Crimes					
	PCA15E09	Object Oriented Analysis & Design With UML					
Elective 4	PCA15E10	Digital Image Processing with MAT Lab	2	1	2	5	3
	PCA15E11	Android Application Development					
	PCA15E12	Microprocessor and its applications					

Category	Course Code	Course Title	L	T	P	Total LTP	C
Non-Major Elective 3		Open Elective III	2	2	0	4	2
Supportive Course 1	PCA15404	Term Paper and Seminar **#** (Internal Evaluation)	1	1	0	2	2
Supportive Course 2	PCA15405	Personality Development – II	2	1	0	3	2
Total			16	6	8	30	20

SEMESTER V

Category	Course Code	Course Title	L	T	P	Total LTP	C
Compulsory Core 1	PCA15501	XML and Web services with Lab	3	1	3	7	4
Choice Based Core	PCA15502	Data Mining and Data Warehousing with Lab	3	2	2	7	4
	PCA15503	Open Source Technologies with lab					
Elective 5	PCA15E13	Information Storage and Management	3	1	0	4	3
	PCA15E14	Content Management System					
	PCA15E15	E-Commerce and M-Commerce					
Elective 6	PCA15E16	Cloud Computing	3	1	0	4	3
	PCA15E17	Social Network Analysis					
	PCA15E18	Neural Networks					
Elective 7	PCA15E19	Big Data and its applications	3	1	0	4	3
	PCA15E20	Compiler Design					
	PCA15E21	Wireless Application Protocols					
Compulsory Core 2	PCA15504	Mini Project – Advanced	0	1	3	4	3
*Total			15	7	8	30	20

* Includes mandatory Industry Visit of 3 days for each student

SEMESTER VI

Category	Course Code	Course Title	L	T	P	Total LTP	C
Compulsory Core 1	PCA15601	Career Comprehensive Course	2	1	0	3	2
	PCA15602	Project Work	4	3	20	27	18
		Total	**6**	**4**	**20**	**30**	**20**

Total Credits to be earned for the degree   : 120

OPEN ELECTIVES

SEMESTER III & V

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E52	PROGRAMMING IN JAVA WITH LAB	1	0	1	2	2
PCA15E81	CONTENT MANAGEMENT SYSTEM	1	1	0	2	2
PCA15E83	CLOUD COMPUTING	1	1	0	2	2

SEMESTER II & IV

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E51	DATABASE MANAGEMENT SYSTEMS	1	0	1	2	2
PCA15E53	WEB TECHNOLOGY WITH LAB	1	0	1	2	2
PCA15E82	CYBER LAW AND CRIMES	1	1	0	2	2

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15101	PROGRAMMING IN C WITH LAB	3	1	3	7	4

Instructional Objectives:
1. To learn the programming concepts and write simple programs in C.
2. To understand sequential steps or procedures to solve any given problem.
3. To enable the learner to become an application developer using this language.

UNIT I - Introduction
C Fundamentals: Introduction to C - The C Character Set - Identifiers and Keywords - Data Types- Constants- Variables and Arrays- Declarations- Expressions- Statements- Symbolic Constants - Operators and Expressions: Arithmetic Operators - Unary Operators- Relational and Logical Operators- Assignment Operators - The Conditional Operator- Library Functions- Data Input and Output: The getchar() Function- The putchar() Function- The scanf() Function- The printf() Function- The gets() and puts() Functions.

UNIT II - Control Statements
Branching Statements: if...else - switch – Looping Statements: while - do...while - for - Nested Control Structures - break - continue - Comma Operator- go to.

UNIT III - Functions and Arrays
Overview of functions - Defining a Function - Accessing a Function - Function Prototypes- Passing arguments to a function – Recursion - Program Structure: Storage Classes - Automatic Variables - Global Variables - Static Variables - Multifile Programs- Arrays: Defining an Array- Processing an Array- Passing Arrays to Functions- Multidimensional Arrays- Arrays and Strings.

UNIT IV - Pointers
Fundamentals of Pointer- Pointer Declarations - Passing Pointers to Functions - Pointers and One Dimensional Arrays - Dynamic Memory Allocation - Operations on Pointers - Pointers and Multidimensional Arrays - Arrays of Pointers - Passing Functions to Other Functions

UNIT V - Structures, Unions and Data Files

Structures and Unions: Defining a Structure- Processing a Structure- User Defined Data Types- Structures and Pointers- Passing Structures to Functions- Self Referential Structures – Unions - Data Files: Opening and Closing a Data File- Creating a Data File- Processing a Data File- Unformatted Data Files

TEXT BOOK

1. Gottfried B.S. (1997), **Theory and problems of Programming with C,** Schaum's Outline Series, Tata McGraw Hill, New Delhi (For 1 to 5 units)

REFERENCES

1. Deitel H.M. & Deitel P.J. (2001), **How to Program C,** Prentice Hall India, New Delhi.
2. Kanetkar Y (1995), **Let us C,** BPB Publications, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15102	DATA STRUCTURES	3	1	0	4	3

Instructional Objectives:

1. To learn Several data structure concepts like stack, queue, linked list, trees and files
2. To learn the Applications of data structures.
3. To improve the Problem solving quality using data structure techniques.
4. To enable the learner to aim for careers in Data Analysis and Software Designs.

UNIT I - Data Structures and Algorithms

Data structures & algorithms**-**Introduction to Data Structures and algorithms, Data structure operations, control structures, complexity of algorithms, asymptotic notations for complexity, Variables, data types, string operations, word processing, pattern matching algorithms, Linear Arrays, Representation of linear arrays, traversing linear arrays, inserting and deleting linear arrays, pointers, Records.

UNIT II - Concepts of Linked Lists

Linked lists**-**Representation of linked lists in memory, traversing a linked list, searching a linked list, insertion in to a linked list , deletion from a linked list- header linked lists, memory allocation – two way lists, operations on two way lists .

UNIT III - Representation of Stacks and Queues

Stacks & queues-Array representation of stacks, Linked representation of stacks Arithmetic expressions, Towers of Hanoi, Array representation of queues, Linked representations of queues, Deques, priority queues.

UNIT IV - Trees and Graphs Traversal

Trees-General Trees- binary Trees-representation of binary trees, traversing, binary trees -traversal algorithms of binary trees, path lengths- Huffman's algorithm, graph theory terminology, representations of graphs, Warshalls's algorithms, operations on graphs, traversing a graph- topological sorting

UNIT V - Sorting and Searching Algorithms

Sorting-bubble sort, binary search, linear search, Quick sort, Heap sort, insertion sort, selection sort, merging, Radix sort, Hashing

TEXT BOOKS:

1. Ellis Horowitz & Sartaj Sahni (1992), **Fundamentals of Data Structures,** Galgotia Book Source, 2nd Edition, New Delhi (UNIT I & 2)
2. Seymoutr Lipschutz (2006), **Data Structures,** Tata Mc Graw Hill, 2nd Edition, New Delhi.(UNIT III, 4, & 5)

REFERENCES

1. Aho V, Hopcroft, E., Ullman, D., (1993), **Data Structures and Algorithms,** Pearson Education, 1st Edition, New Delhi.
2. Alfred V, Aho Johne, Hopcroft (2008), **Data Structures and Algorithms,** Pearson, NewDelhi.
3. Mark Allen Weiss (2008), **Data Structures and Algorithm Analysis in C,** Pearson, 2nd Edition, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15103	DIGITAL COMPUTER FUNDAMENTALS	3	1	0	4	3

Instructional Objectives:

1. To impart knowledge on the fundamentals of digital systems.
2. To describe the logical functioning of the circuits to the learners.

UNIT I - Overview of Number Systems

Binary Number System: Binary to Decimal and Decimal to Binary Conversion - Hexadecimal number System : Hexadecimal to Decimal and Decimal to Hexadecimal conversion - Hexadecimal to Binary and Binary to Hexadecimal Conversion – Octal Number system : Octal to Decimal and Decimal to Octal Conversion –Complementation - Logical Gates : AND,OR, NOT, NAND, NOR, EX-OR and EX-NOR.

UNIT II - Boolean algebra and K-Map

Laws of Boolean algebra - DeMorgan's Theorems - Logical Expressions: Sum of Product – Product of Sum - Simplification of Boolean expression: Using Boolean algebra - Using Karnaugh Map - Using Mc Clausky Method.

UNIT III- Combinational Circuits

Binary addition: Half adder - Full adder - Four bit binary adder - BCD adder - Binary Subtraction Half subtractor- Full subtractor – Multiplexer - Demultiplexer-Decoder - Encoder- Flip flops: SR Flip flop - D Flip flop - JK Flip flop - T Flip flop.

UNIT IV -: Sequential Circuits

Registers - Shift Registers- Asynchronous counters - Synchronous counters - Ring counter - Design of synchronous counters.

UNIT V - ALU

Introduction to Arithmetic Unit - Design of Arithmetic Unit - Design of Logic Unit - Design of ALU - Control Unit- Design of Control Unit.

TEXT BOOK

1.	Bartee T.C. (2008), **Digital Computer Fundamentals,** McGraw Hill, New Delhi.(For 1 to 5 units)

REFERENCES

1.	Donald P Leach, Albert Paul Malvino, Goutham Saha (2008), **Digital Principles and Applications,** Tata McGraw Hill, 6th Edition (Special Indian Edition), New Delhi.
2.	Morris Mano, M (2008), **Digital Logic and Computer Design,** Pearson Education, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15104	OPERATING SYSTEMS	3	1	0	4	3

Instructional Objectives:
1. To introduce different types of Operating Systems.
2. To learn about components of Operating Systems.
3. To implement Input / Output and File Systems.
4. To enable the learner to aim for careers in Software Development with knowledge on OS.

UNIT I - Introduction to Operating System
Basic OS Concepts- Organization- Architecture-Structure of OS- OS Operations- OS Services -System Calls-Types- System Programs- System Design and Implementation

UNIT II - Process Management and Scheduling
Overview of Process Scheduling- Operations on Processes – Cooperating Processes – Inter process Communication-Shared Memory - Message Passing Systems- CPU Scheduling - Scheduling Concepts- Scheduling Criteria- Scheduling Algorithms- Multiprocessor Scheduling.

UNIT III - Process Synchronization and Deadlocks
Critical Section Problem- Peterson's solution -Semaphores- Classic Problems of Synchronization- Monitors – Deadlocks characterization –Methods - Prevention- Avoidance – Detection- Deadlock Recovery.

UNIT IV - Memory Management
Swapping- Contiguous Memory Allocation- Paging-Hardware support - Protection-Shared Pages- Structure of page table- Segmentation- Virtual Memory- Demand Paging- Page Replacement Methods- Thrashing.

UNIT V - Storage Management
File Concepts- Access Methods- Directory Structures- Protection -File System Structure-Implementation- Directory Implementation- Allocation Methods- Disk Structure- Disk Scheduling algorithms

TEXT BOOK
1. Silberschatz, Galvin & Gagne (2009), **Operating system principles,** John Wiley & Sons, 7th Edition, New York (For 1 to 5 units).

REFERENCES

1. Milan Milenkovic (2003), **Operating System Concepts and Design,** McGraw Hill, New Delhi.
2. Andrew S. Tennenbaum (1997), **Modern Operating System,** Prentice Hall India, New Delhi.
3. Deital (1990), **An Introduction to Operating System,** Pearson Education, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15105	WEB TECHNOLOGY WITH LAB	3	1	3	7	4

Instructional Objectives:
1. To provide knowledge on Internet and its related concepts.
2. To enrich the knowledge of scripting languages.
3. To introduce advance HTML tags.
4. To enable the learner to become a Web Designer.

UNIT I - Introduction to Internet and World Wide Web
Introduction to networks, LAN,MAN and WAN, History of the Internet, Email concepts, Sending and Receiving files by E-mail, Intranet, Web system Architecture, Exploring HTTP, URL, Domain Name System, Web Browsers, Web Pages

UNIT II - Hypertext Markup Language and Web Design
Basics of HTML, HTML Document display, Formatting Text, Link, Lists, Images, Tables, Forms, Frames, Website Design consideration, Case study : Designing Layout of a web page for any Domain

UNIT III - Usage of Cascading Style Sheet
 Syntax of CSS, Style sheets types, Properties and Text attributes Padding, List properties, List Properties, Positioning, Margins, Colors, Properties and Table attributes

UNIT IV - Fundamentals of Java Script
DHTML**,** HTML and JavaScript, JavaScript Elements, Variables, Operators, Flow Control Statements, Arrays, Functions, Event Handling, Browsers and JavaScript, Web Pages and JavaScript, Frames and JavaScript, Validation of User Form

UNIT V - Server-Side Programming

Client-Side Scripting and Server-Side Scripting, Servlets – Definition, Advantages, Life Cycle of a Servlets, Creating a Servlet and Configuring, Java Sever Page – Life Cycle and Structure of JSP, Active Server Pages – Creating an ASP, IIS installation for ASP, Built-in Objects, Exploring Forms, Comparison of ASP over JSP.

TEXT BOOK

1. Deven N. Shah (2012), **A Complete Guide to Internet and Web Programming,** DreamTech Press, New Delhi (For 1 to 5 units).

REFERENCES

1. Raj Kamal (2002), **Internet and Web Technologies**, TataMcGraw Hill, New Delhi.
2. Margaret Levine Young (2002), **Internet: The Complete Reference**, TataMcGraw Hill, Second Edition, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15106	PRINCIPLES OF PROGRAMMING LANGUAGES	3	1	0	4	3

Course Objectives:

1. To Learn the High level language concepts and grammars.
2. To perform study of imperative languages.
3. To able to derive functions and binding of values.
4. To able to study of relations and their implementation.

UNIT I - PRELIMINARY CONCEPTS

High Level Languages, Issues in Programming - Case studies, Programming paradigms, Language implementation. Syntactic Structure — Language representation, Abstract Syntax tree, Lexical syntax, Context Free Grammars, Variants of CFG, Issues involved and Normal Forms for CFG.

UNIT II - IMPERATIVE LANGUAGES

Structured Programming — Need and Design issues. Block Structures (Pascal), types arrays, records, sets, pointers, procedures, parameter passing, scope rules (in C).

UNIT III - OBJECT ORIENTED LANGUAGES

Grouping of data and Operations — Constructs for Programming Structures, abstraction Information Hiding, Program Design with Modules, Defined types, Object oriented programming — concept of Object, inheritance, Derived classes and Information hiding – Templates- Exception handling (Using C++ and Java as example language).

UNIT IV - FUNCTIONAL PROGRAMMING

Functional Programming — Features, Implementation, Types — values and operations, Product of types. Lists and Operations on Lists, Functions from a domain to a range, Function Application, Lexical Scope. Bindings of values and functions (Using Haskell/ Lisp as example language)

UNIT V - LOGIC PROGRAMMING

Formal Logic Systems, Working with relations and their implementation (Using Prolog as example). Database query Languages, Exception handling (Using SQL as example)

TEXT BOOK

1. Pratt, Zelkowitz, "Programming Languages: Design and Implementation Edition, Pearson Education," 2nd Edition, 2004

REFERENCES

1. Ravi Sethi, "Programming Language Concepts and Constructs", Pearson Education, 2006
2. Kenneth C. Louden, "Programming Languages- Principles & Practice", Thomson, 2nd Edition
3. Doris Appleby, Julius J. Vandekopple, "Programming Languages: Paradigms and Practice", McGraw Hill, 1997
4. Damir Medak and Gerhard Navratil, "Haskell-Tutorial", Available on the Web, Feb2003.
5. Paul Hudak, John Peterson and Joseph H. Fasel, "A gentle Introduction to Haskell-98",2004
6. Tucker A.B, Robert, Noonan, "Programming Languages", McGraw Hill, 2002.

SEMESTER – II

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15201	OBJECT ORIENTED PROGRAMMING USING C++ WITH LAB	3	0	3	6	4

Instructional Objectives:
1. To introduce the concepts of Object Oriented Programming.
2. To learn the concepts of class & objects.
3. To become a Software Developer.

UNIT I - Introduction to Object Oriented Programming and C++
Object Oriented Programming Paradigm - Basic concepts of Object Oriented Programming - Benefits of OOP - Object Oriented Languages - Applications of OOP. Beginning with C++ - Tokens, Expressions and Control Structures - Functions in C++.

UNIT II - Class, Objects and Constructors
Classes and Objects – Constructors and Destructors: Default Constructors parameterized Constructors, Multiple Constructors in a class, Constructors with default Arguments, Dynamic initialization of objects, Copy Constructors, Dynamic constructors, Destructors.

UNIT III - Operator overloading & Type conversion
Operator Overloading – overloading unary , binary operators using member function & friend functions - Overloading I/O operators – manipulation of strings using operators - Type Conversions – Built in to class type – Class to built in type – one class to another class –arrays

UNIT IV - Inheritance, virtual functions & polymorphism
Extending Classes: Defining derived classes, single, Multilevel, Multiple, Hierarchical and Hybrid Inheritance. Virtual Base Classes, Abstract Classes – Constructors in derived classes – Polymorphism – Compile time & run time polymorphism - Pointers – pointers to objects -   Virtual Functions – Pure virtual functions.

UNIT V - I/O operations and Files

Managing Console I/O Operations: C++ Streams, C++ Stream Classes, unformatted I/O Operations, Formatted Console I/O operations, Managing output with Manipulators – Working with Files: Classes for File Stream Operations, Opening and closing a file, Detecting end-of-file, File Modes and Error handling during file operations.

TEXT BOOKS

1. Herbert Schildt (2001), C++ The Complete Reference, TATA McGraw Hill, Third Edition, New Delhi

REFERENCES

1. Balagurusamy E(2007), Object Oriented Programming with C++, TATA McGraw Hill, Third Edition, New Delhi
2. Rob McGregor (2001), Using C++ - Prentice, Hall India, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15202	DATABASE MANAGEMENT SYSTEMS WITH LAB	3	0	3	6	4

Instructional Objectives:

1. To understand the concepts of database security and reliability.
2. **To enable the learner to become a Database application programmer.**

UNIT I - Introduction and Conceptual Modeling

Purpose of database system - Advantages of DBMS - file processing System-View of data-Data abstraction-Data Independence - Data models - Database languages - Database users - Database Administrator - DBMS system structure.

UNIT II - SQL and PL/SQL

SQL: Data Definition Language Statements – Data manipulation language statements – Transaction Control Language Statements - Data Control Language statements – SQL Scalar functions – Group functions – Set operators – Joins. PL/SQL: Basics – Trigger – Exception Handling.

UNIT III - Relational Model and Normalization

Entity Relationship model basic concepts - Relational Algebra - Pitfalls in relational Database design – Decomposition – Functional Dependency – Normalization: 1NF - 2NF-3NF - BCNF- Multi value dependency and 4NF - 5NF.

UNIT IV - Data Storage

Data Storage: Physical Storage media – Magnetic Disks – RAID – Tertiary storage – File and Record organization. Indexing: Primary index – Secondary indices – B tree Index – B+ tree Index. Hashing: Static indexing – Dynamic indexing.

UNIT V - Transaction Management

Transaction Management: Basic concepts – Implementation of Atomicity and Durability - Serializability – Implementation of Isolation. Concurrency control: Types of locks - Two Phase locking Protocol - Timestamp based Protocols. Recovery System: Types of failure – Log based recovery - Shadow paging.

TEXT BOOK

1. Abraham Silberschatz, Henry F. Korth, Sudarshan, S (2005), **Database System concepts,** Fourth Edition, McGraw Hill, New Delhi (For 1 to 5 units).

REFERENCES

1. Kevin Loney, Gerorge Koch (2002), **Oracle The Complete Reference,** McGraw Hill, New Delhi.
2. Ragu Ramakrishnan (1998), **Database management Systems,** WCB / McGraw Hill, New Delhi.
3. Alexis Leon, Mathews Leon (1999), Database Management Systems, Vikas Publishing House Pvt. Ltd., New Delhi.
4. Date C.J (2003), **An Introduction to database,** version 2, Addison Wesley, New York.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15203	COMPUTER NETWORKS	3	1	0	4	3

Instructional Objectives:

1. To understand data communication and networking with little or no background in data communication.
2. To enable the learner to become developers, IT staff and help desk professional.

UNIT I - INTRODUCTION

Network hardware, network software, OSI reference model, TCP/IP reference models - Comparison of OSI reference model, TCP/IP reference models Physical Layer: Theoretical basis for data communication, guided transmission media, wireless transmission media, modulation, multiplexing, structure of the telephone system, the mobile telephone system spectrum allocation.

UNIT II - DATALINK LAYER

Design issues, Error detection and correction, elementary data link protocols, sliding window protocols. THE MEDIUM ACCESS CONTROL SUB LAYER: Static

and dynamic channel allocation – multiple access protocols- classic Ethernet physical layer, classic Ethernet Mac sub layer protocol, Bluetooth architecture, RFID architecture.

UNIT III - THE NETWORK LAYER
DESIGN issues - routing algorithms-congestion control algorithms-tunneling-routing – fragmentation.

UNIT IV - THE TRANSPORT LAYER
Elements of transport layer protocols- UDP-TCP PROTOCOL-delay tolerant networking.

UNIT V - THE APPLICATION LAYER
DOMAIN NAME SYSTEM - architecture and services of Email-world wide web-streaming audio and video-content delivery.

TEXT BOOK
1. Andrew S. Tanenbaum "Computer Networks", V Edition, Pearson Education.

REFERENCES
1. Green P – Computer Network Architectures and protocols, Plenum Press, 1982.
2. Harry Katzan – An Introduction to "Distributed Data Processing", a Petrocelli Book, New York / Princeton.
3. Tittel – Theory and problem of Computer Networking, Schaum's outline series. TMH.
4. Godbole – Data Communication & Networking, TMH.
5. Lean Garcia – Communication Networks : Fundamental Concepts & Key Architecture, TMH.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E01	AI AND EXPERT SYSTEMS	3	1	0	4	3

Instructional Objectives:
1. To impart knowledge on Artificial Knowledge concepts
2. To learn all searching algorithms and Hill-climbing procedures
3. To improve their gaming skills and learn about Expert system
4. To enable the learners for aspiring careers in the field of Artificial Intelligence.

UNIT I - Introduction to AI & AI Techniques

Introduction to types of knowledge - Ai Techniques and Production system - Control strategies - Breadth-First Algorithm - Depth-First Algorithm - Heuristic Search - Problem characteristics and production system characteristics - Best-first Search.

UNIT II -: Knowledge Representation Using Predicate Logic

Knowledge Representations – Mappings - Approaches to knowledge representations – simple and Inheritable - Approaches to knowledge representations –Inferential & Procedural knowledge - Predicate logics – symbols and rules - Sample examples on predicates logics - Representing simple facts in logic - Representing knowledge using rules – PROLOG - Forward and Backward reasoning - Truth Maintenance System - Statistical reasoning - Bayesian Networks

UNIT III - Weak – and – Strong Slot Filler Structures

Weak – slot – filler structure - Semantic nets – intersection search - Making some important distinctions on semantic nets - Partitioned semantic net - Partitioned semantic net - Creating Frames - Strong-slot-filler structures – conceptual dependencies - Actions and Rules – CD - Scripts introduction and components - Creating a sample script for RESTAURANT - CYC & CYC

UNIT IV - Game Playing & Planning

Game playing techniques – The Minimax Search Procedure -Iterative deepening - Depth first iterative deepening - How to plan a system –Components of a planning System – Goal Stack Planning -Hierarchical planning - Reactive systems – Understanding -

UNIT V - Learning &Expert Systems

Types of learning - General learning models - Expert system components and descriptions - Expert system shells - Types Explanation - Knowledge Acquisition - issues

TEXT BOOKS
1. Elaine Rich, Kevin Knight, Shivashankar B Nair (2009) – **Artificial Intelligence** – Third Edition-TataMcGraw Hill, New Delhi (For 1 to 5 units).

REFERENCES
1. Patterson W Dan (2009, 2013), **Introduction to Artificial Intelligence and Expert system** – Prentice Hall of India, New Delhi.
2. Peter Jackson (1999), **Introduction to Expert systems** – 3rd Edition – Addison-Wesley, New York.
3. Craig Larman – **Applying UML & Patterns: An Introduction to Object oriented analysis and design** – Addison Wesley Professional, 3rd Edition, 2004.
4. H. Srimathi, H.Sriram, and A. Krishnamoorthy – Object **oriented analysis and design   using UML** – Scitech publication, 2nd edition, 2006.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E02	DESIGN AND ANALYSIS OF ALGORITHMS	3	1	0	4	3

Instructional Objectives:
1. To analyze the algorithms, with the optimization on time and memory effectiveness.
2. To develop the system design based on the given requirements.
3. To enable the learner to aim for careers in software development.

UNIT I - Introduction
Introduction to algorithm- Algorithm Specification - Performance Analysis - Space Complexity- Performance Analysis II Time Complexity- Asymptotic Notations

UNIT II - Divide and Conquer Method and Greedy Method
Divide and Conquer - Binary Search- Finding the Maximum and Minimum – Quick sort - Strassens Matrix Multiplication- Greedy Method – Knapsack Problem -Tree Vertex Splitting Problem –Job Sequencing with Deadlines -Minimum Cost Spanning Trees - Prims Algorithm – Kruskal Algorithm - Transitive Closure - Single Source Shortest Paths.

UNIT III - Dynamic Programming

Dynamic Programming – General Method - Multistage Graphs - String Editing – Travelling Salesperson Problem - Connected components and Spanning Trees - Bi-connected Components and DFS.

UNIT IV - Backtracking and Branch and Bound

Backtracking - General Method - 8 Queens Problem - Sum of Subsets - Knapsack Problem -Branch and Bound: The Method-LC Search - Branch and Bound: The Method-Bounding 0/1 Knapsack Problem-LC Branch and Bound - 0/1 Knapsack Problem-FIFO Branch and Bound - Travelling Salesperson (*).

UNIT V - Lower Bound Theory and NP Complete / Hard Problems

Lower Bound Theory-comparison trees - Oracles and Adversary Arguments - NP Complete and Hard Problems – Basic Concepts - Cooks theorem(*)- NP Hard Graph problems- CDP, NCDP, CNDP - Cooks theorem-II - DHC, TSP, AOG - NP-Hard Scheduling Problems

TEXT BOOK
1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran (2008), **Fundamentals of Computer Algorithms,** University Press, Second Edition, New Delhi (For 1 to 5 units).

REFERENCES
1. Puntambekar A.A. (2010), **Design and analysis of algorithms,** First Edition, Technical Publications, Pune.
2. Chandra Mohan (2008), **Design and analysis of algorithms,** Prentice Hall of India, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E03	COMPUTER ARCHITECTURE	3	1	0	4	3

Instructional Objectives:
1. To learn the structure and behavior of the various functional modules of the computers.
2. To provide the hardware knowledge for the user.
3. To enable the learner to aim careers in Hardware Engineering and Academics.

UNIT I - Register Transfer Language

Register Transfer Language - Register Transfer - Bus and Memory Transfer - Arithmetic Micro Operations - Arithmetic Micro Operations-Continue - Logic Micro Operations - Shift Micro Operations - Arithmetic Logic Shift unit.

UNIT II - Basic Computer Operations

Instruction Codes - Computer Registers - Computer Instructions - Timing and Control - Instruction Cycle - Memory reference Instructions - Input Output and Interrupt - Complete Computer Description - Design of Basic Computer - Design of Accumulator logic.

UNIT III - CPU Organization

Introduction to CPU - General Register Organization - Stack Organization - Instruction Formats - Addressing Modes - Data Transfer and Manipulation - Data Transfer and Manipulation-cont. - Program Control – RISC – CISC.

UNIT IV - I/O Interface

Peripheral Devices - Input Output Interface - Asynchronous Data Transfer - Asynchronous Data Transfer-cont. - Modes of Transfer - Priority Interrupt - Priority Interrupt-cont. – DMA – IOP - Serial Communication.

UNIT V - Memory Organization

Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory - Virtual Memory - Virtual Memory Continuation - Memory Management Hardware.

TEXT BOOK

1. Morris Mano, M (2002), **Computer System Architecture,** Prentice Hall of India, New Delhi

REFERENCE

1. Sivarama P.Thandamudi (2003), **Fundamental of Computer Organization & Design,** Springer, New York.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15204	DISCRETE MATHEMATICS	2	3	0	5	3

Course Objectives:

1. To understand Logic and mathematical reasoning and to count /enumerate objects in a Systematic way.

2. To understand Mathematical induction and recursion. To understand Set theory, relations and functions and to Read, understand and Construct mathematical arguments.
3. To understand Recurrence Relation, Generating functions and Algebraic Systems and Boolean algebra

UNIT I - MATHEMATICAL LOGIC

Statements- Connectives- Truth tables- Normal forms DNF and CNF-,PCNF and PDNF- Validity using truth tables- Inference theory of statement calculus- Direct and Indirect method- Inference theory of statement calculus using CP Rule - Consistency and Inconsistency.

UNIT II - COUNTING PRINCIPLES

Mathematical logic- problems- Pigeonhole Principle-Generalized Pigeonhole principle-Principle of inclusion and exclusion (simple Problems only)

UNIT III - RECURRENCE RELATIONS

Recurrence relation-Formation of Recurrence relation – solution of Recurrence Relation-Solution of Homogeneous Recurrence relation-Solution of Non-Homogeneous recurrence relation-- Formation of Generating functions-Solution of Recurrence relations using generating functions.

UNIT IV - ALGEBRAIC SYSTEMS

Groups- Properties of Groups -Cyclic groups and its properties -Permutation groups-Subgroups – homomorphism-Isomorphism- Lagrange's Theorem-Normal subgroups-Fundamental Theorem of Groups

UNIT V - BOOLEAN ALGEBRA

Relation -.Types of relations-Equivalence relations- Partial orderings-Poset-Lattice-Hasse diagram-Boolean algebra-simple properties (Simple Problems in Boolean algebra)

TEXT BOOKS
1. Tremblay J.P. and Manohar R. - Discrete Mathematical Structures with applications to Computer Science - Tata Mc Graw Hill Edition, 2001
2. Prof. Sundaresan V, Ganapathy Subramanian K.S and Ganesan K.- Discrete Mathematics - New revised edition, 2002 .

REFERENCES

1. Alan Doerr and Kenneth Levasseur - Applied Discrete Structures for Computer Science – Galgotia   publications, 1992
2. Kenneth H Rosen - Discrete Mathematics and its applications- Tata McGraw Hill,7th ed, 2011.
3. Liu C.L - Elements of Discrete Mathematics - 2ndedition, McGraw Hill Publications, 2002

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15301	SOFTWARE ENGINEERING	3	1	0	4	3

Instructional Objectives:
1. To gain knowledge about various Software Engineering Paradigms.
2. To carry out testing at various levels by applying the Testing Tactics
3. To identify the Software Risks and Prepare suitable Mitigation Plans
4. To understand the Quality Assurance and Change Management Activities
5. To enable the learner to aim careers in Software Engineering related fields.

UNIT I - Introduction to Software Engineering
Characteristics of software -The Changing Nature of software – Legacy Software and Software myths – A Generic view of process – Software Engineering: A layered Technology and A process framework - Capability Maturity Model Integration -Process Models – Prescriptive models -Specialized Process Models and The Unified Process -An agile view of Process.

UNIT II - Requirements Analysis and Design
System Engineering - Requirements Engineering – Requirements Engineering Tasks - Initiating the Requirements Engineering Process-Eliciting Requirements – Building the Analysis Model - Analysis Modeling Approaches – Data Modeling Concepts and Scenario based Modeling and Flow Oriented Modeling– Design Engineering - Software Design Concepts- The Design Model

UNIT III - Testing Strategies and Tactics
Introduction to Testing - Definition of Testing Terminologies-Testing Strategies for Conventional Software-Validation Testing - System Testing - Debugging Process-Testing Tactics – White Box Testing - Black Box Testing - Testing for Specialized Environments

UNIT IV - Project Management, Estimation and Scheduling
Project Management Spectrum - The People and the Product- The Process and the Project -Metrics for Process and Projects-Estimation - The Project Planning Process – Resources - Decomposition Techniques - Empirical Estimation Models - Project Scheduling Concepts – Timeline charts and Tracking the Scheduling

UNIT V: Quality, Change and Risk Management

Reactive and Proactive Risk Strategies – Software Risks –Risk Identification and Risk Projection – Risk refinement and Risk Mitigation, Monitoring and Management -Quality Concepts -Software Quality Assurance -Software Reviews and Formal Technical Reviews -Statistical Quality Assurance -The Software Configuration Management and the SCM Repository -Business Process Reengineering - Reverse Engineering

TEXT BOOK
1. Roger, S. Pressman (2004), **Software Engineering: A Practitioner Approach,** McGraw Hill International Edition, Sixth Edition, New Delhi (For 1 to 5 units).

REFERENCES
1. Waman, S Jawadekar (2004), **Software Engineering: Principles and Practice,** McGraw Hill Education Pvt. Limited, New Delhi.
2. Rohit Khurana (2011), Software Engineering-Principles and Practices, Vikas Publishing House Pvt. Ltd., Second Edition, New Delhi.
3. Chairperson, Counting Practices Committee, Valerie Marthaler, EDS, Troy, Michigan, Function Point Counting Practices Manual Release 4.1.1, The International Function Point User Group, April 2000.
4. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli (1991), **Fundamentals of Software Engineering,** Prentice Hall of India, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15302	LINUX ADMINISTRATION AND NETWORK PROGRAMMING WITH LAB	3	2	2	7	4

Instructional Objectives:
1. To provide a background on the UNIX system call interface.
2. To learn Advanced Programming concepts in UNIX Environment.
3. To introduce network programming under UNIX.
4. To enable the learner to become Unix System Analyst / Unix Administrator in the IT Industries.

UNIT I - LINUX   SHELL AND FILE STRUCTURE
Introduction to Linux- Linux distribution-operating systems and Linux-History of Linux and Unix –Linux Overview-Open source software –Linux Software -The shell- The shell Scripts and programming-Shell configuration-Linux files-Directories and archives

UNIT II - INTERNET AND NETWORK SERVICES

Managing services - system startup files - starting services - service management - service scripts-FTP server-The FTP user account-Running vsftpd-configuring vsftpd- vsftpd access controls - web servers - apache web server-apache configuration files - apache configuration and directives –apache configuration tools.

UNIT III - FILES AND PROCESS CREATION
Study of Open, Close, Read, Write, Lseek, Dup, stat, fstat, and lstat functions-.File Types - File Access Permissions -Study of Access, Link and Unlink Functions-Reading Directories - Time and Date Routines- Setjmp and Longjmp Functions-fork and Vfork –wait-waitpid.

UNIT IV - SIGNALS AND INTER PROCESS COMMUNICATION
Signal concepts, signal function -kill and raise – alarm and pause – abort and sleep – Pipes –FIFO-System V IPC – Message Queue- – Example Program - Semaphores - Example Program -Shared Memory- Example Program.

UNIT V - SCOCKET PROGRAMMING AND DAEMON PROCESS
Sockets –Elementary TCP Sockets -TCP Echo Client/ Server -Elementary UDP Sockets -UDP Echo Client/ Server-gethostbyname& gethostbyaddr, getservbyname& getservbyport – getaddrinfo- Syslogd Daemon -syslog function - inetd Daemon –Broadcast Addresses – Unicast Versus Broadcast -Multicast Addresses -Multicasting Versus Broadcasting on LAN, Multicasting on WAN .

TEXT BOOKS:
1.   Richard Petersen - Linux **: The Complete Reference ,Sixth edition .**
2.   Richard Stevens .W & Stephen Rago (2005), A**dvanced Programming in the UNIX Environment,** 2nd Edition, Pearson Education, New Delhi (UNIT I, 2 & 3).
3.   Richard Stevens .W (1999), **UNIX Network Programming, Volume II,** Prentice Hall, New   Delhi (UNIT IV & 5).

REFERENCE
1.   Stephen A.Rago (1993), **Unix System V Network Programming,** Addison Wesley, New York.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15303	PROGRAMMING IN JAVA WITH LAB	3	0	3	6	4

Instructional Objectives:

1. To understand the principles and concepts of object programming.
2. To learn multithreading concepts.
3. To enable the learner to pursue careers in Java solution Architect/Java Programmer

UNIT I - Introduction to Java

The Creation of Java- The Java Buzzwords- An Overview of Java- Data Types,- Variables-Arrays- Operators- Control Statements.

UNIT II - Object Oriented Concepts

Introducing Classes- Overloading Methods- Introducing Access Control- Introducing final- Inheritance Basics- Method Overriding- Using Abstract Classes- The String Constructors- Special String Operations- String Comparison- StringBuffer.

UNIT III - Packages Interference Exception Handling and Multithreading

Packages – Interfaces - Exception Handling - The Java Thread Model - The Main Thread - Creating a Thread - Thread Priorities – Synchronization - Interthread Communication.

UNIT IV - Applet, AWT and Event Handling

Applet Basics - Applet Architecture - An Applet Skeleton - Simple Applet Display Methods - Requesting Repainting - The HTML APPLET Tag - AWT Classes - Window Fundamentals - Working with Graphics - Event Handling **-** The Delegation Event Model - Event Classes - Event Listener Interfaces.

UNIT V - Java Console Input and Output and File

Enumerations - I/O Basics - Reading Console Input - Writing Console Output - The PrintWriter Class - Reading and Writing Files - Collections Overview - The Java I/O Classes and Interfaces – File - The Stream Classes - The Byte Streams - The Character Streams.

TEXT BOOK
1. Herbert Schildt (2007), Java: The Complete Reference, The McGraw-Hill, Seventh Edition, New Delhi.

REFERENCES
1. Horstmann S., Gray Cornell (2001), Core Java 2 Volume In, Fundamentals, Addition Wesley, New York.
2. Amold and Gosling, J. (2000), The Java Programming Language, Addition Wesley, 2nd Edition, New Delhi.

3.   Art Gittleman (2002), Ultimate Java Programming, Wiley Publications, New York.
4.   Herbert Schildt (2007), Java: The Complete Reference, The McGraw-Hill, Eight Edition, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15304	VISUAL PROGRAMMING USING C# WITH LAB	3	0	3	6	4

Instructional Objectives:
1.   To gain knowledge in the concepts of the .NET framework as a whole and the technologies that constitute the framework.
2.   To gain knowledge about various object oriented concepts in C#.
3.   To gain programming skills in C# both in basic and advanced levels.
4.   To enable the learner for aiming careers in software development related fields.

UNIT I - C# Language Fundamentals
The .NET Framework - Common Language Runtime - Managed vs. Unmanaged Code - An Overview of C#: Object-Oriented Programming- Simple Programs- Using Code Blocks - Semicolons, Positioning, and Indentation - The C# Keywords – Identifiers - The .NET Framework Class Library - Data Types, Literals, and Variables: Value Types – Integers – Floating Point Types - The decimal Type – Characters- The Bool Type - Output Options – Literals – Variables - Scope and Lifetime of Variables - Type Conversion and Casting.

UNIT II - Operators and Control Structures
Operators: Arithmetic Operators- Relational and Logical Operators- The Assignment Operator- The Bitwise Operators- The?: Operator- Operator Precedence- Program Control Statements: The if Statement- The switch Statement- The for Loop- The while Loop- The do…while Loop- The for each Loop- Using break- Using continue- The goto Statement.

UNIT III - Object-Oriented Concepts in C#

Classes and Objects: Class Fundamentals – Creating Objects - Reference Variables and Assignment – Methods – Constructors - The new Operator- Garbage Collection and Destructors- The this Keyword- Arrays: One-Dimensional Arrays- Two-Dimensional Arrays- Multidimensional Arrays- Jagged Arrays- Assigning Array References- the Length Property- Implicitly Typed Arrays- Strings– Methods and Classes: Controlling Access to Class Members- Passing References to Methods- ref and out Parameters- Variable Number of Arguments- Return Objects- Method Overloading- Overload Constructors- Object Initializers- The Main( ) Method- Recursion- Understanding static- Static Classes

UNIT IV - Operator Overloading, Inheritance & Interfaces

Operator Overloading-Operator Overloading Fundamentals-Handling Operations on C# Built-in Types-Overloading the Relational Operators-Overloading true and false-Overloading the Logical Operators-Conversion Operators-Operator Overloading Tips and Restrictions-Indexers and Properties-Indexers-Properties- Use Access Modifiers with Accessors - Using Indexers and Properties- Inheritance-Member Access and Inheritance-Constructors and Inheritance- Inheritance and Name Hiding-Creating a Multilevel Hierarchy-Calling Constructors- Base Class References and Derived Objects-Virtual Methods and Overriding-Using Abstract Classes-Using sealed to Prevent Inheritance-The object Class-Interfaces: Using Interface References-Interface Properties-Interface Indexers-Interfaces Can Be Inherited-Explicit Implementations-Interface and an Abstract Class-Structures- Enumerations

UNIT V - Exception Handling Using I/O and Delegates

Exception Handling-The System.Exception Class-Exception Handling Fundamentals-Using Multiple catch Clauses-Catching All Exceptions-Nesting try Blocks-Throwing an Exception-Using finally-Deriving Exception Classes-Catching Derived Class Exceptions-Using checked and unchecked – Using I/O – The Stream Classes-Console I/O-FileStream and Byte-Oriented File I/O-Character- Based File I/O-Redirecting the Standard Streams-Random Access Files-Using StringReader and StringWriter –Delegates – Delegates - Anonymous Functions - Anonymous Methods - Lambda Expressions – Events

TEXT BOOK
1. Herbert Schildt (2009), **C# 3.0: The Complete Reference,** McGraw-Hill, New Delhi

REFERENCES

1. Jesse Liberty (2002), **Programming C#,** Second edition, O'Reilly Media Inc, Cambridge,USA
2. Paul Deitel, Harvey Deitel (2011), **C# 2010 For Programmers, Deitel Developer Series,** Fourth Edition, Pearson Education, New Delhi.
3. Robinson et al.,(2002), **Professional C#** -2nd Edition, Wrox Press (John Wiley, New York).

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E04	DATABASE ADMINISTRATION	3	1	0	4	3

Instructional Objectives:
1. To provide a reliable, consistent, secure, and available corporate-wide data.
2. To distinguish database administration and data administration
3. To introduce several database operation and maintenance issues.
4. To enable the learner to become a Data Base Administrator.

UNIT I - Basics of the Oracle Database Architecture
Oracle Server Architecture - Connect Users to Servers and Processing queries, changes and commits - Oracle Universal Installer - Setting up OS and Password File Authentication Oracle Enterprise Manager Components - Creating Parameter File - Starting and Shutting an Instance - Opening and Closing a Database - Getting and Setting Parameter Values -Managing Sessions - Monitoring ALERT and Trace Files - Creating an Oracle Database

UNIT II - Managing the Physical Database Structure
Managing Control Files - Maintaining Redo Log Files – Planning - Troubleshooting and Archive Redo Log Files - Logical Structure of the Database - Creating and Changing Tablespace - Temporary Segments - Changing and Relocating Tablespaces - Storage Structures and Relationships - Obtaining Storage Structures Information

UNIT III - Managing Database Objects
Planning and Creating Rollback Segments - Maintaining Rollback Segments - Managing Tables - Oracle Data types Creating and Controlling Tables - Analyzing and Retrieving Information about Tables - Creating Different Indexes - Reorganizing Indexes - Dropping Indexes of database directory - Integrity Constraints and Triggers - Implementing Integrity Constraints and Triggers - Maintaining Integrity Constraints and Triggers
UNIT IV - Managing Database Use

Creating Database Users - Altering and Monitoring Existing Users - Administering Profiles -Controlling Resource Use and Administering Passwords - System Privileges - Object Privileges - Granting and Revoking Privileges - Controlling OS and Auditing

UNIT V - Overview of Backup and Recovery
Backup Considerations – Recovery Considerations - Components for Backup and Recovery -Redo Logs - Checkpoints and Achieves - Multiplexing Control Files & Redo Logs - Types of Failures - Configuring Redo Log Archiving - Multiplexing and Archiving Redo Log Files - Recovery Implications and Performing Offline, Online Backups

TEXT BOOK
1.   Jason Couchman and Ulrike Schwinn (2001), **DBA Certification Exam Guide,** Osborne/McGraw-Hill, New York (For 1 to 5 units).

REFERENCES
1.   Donald K.Burleson (2006), **Oracle Tuning The Definitive Reference,** 2nd Edition, Rampant Tech. Press, North Carolina.
2.   Craig S.Mullins (2002), **Database Administration: The Complete Guide to DBA Practices and Procedures,** Addison Wesley, 2nd Edition, New York.
3.   Kevin Loney (2008), **Oracle Database 11G: The Complete Reference,** McGraw Hill, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E05	**HUMAN COMPUTER INTERACTIONS**	3	1	0	4	3

Course Objectives:
1.   To learn the design principles of developing a Human Computer Interface
2.   Study of tools and devices required for designing a good interface
3.   .Brain computer Interfaces , principles and their tools

UNIT I – INTRODUCTION
Introduction: Importance of user Interface – definition, importance of good design - Benefits of good design - A brief history of Screen design - The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II – DESIGN PROCESS – SCREEN DESIGN
Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions. Screen Designing : Design goals– Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design

UNIT III –WINDOWS AND MULTIMEDIA
Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls; Components– text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT IV–SOFTWARE TOOLS AND DEVICES
 Software tools – Specification methods, interface –Building Tools # Interaction Devices – Keyboard and function keys pointing devices – speech recognition digitization and generation – image and video displays – drivers.

UNIT V–BRAIN COMPUTER INTERFACE

BCI concepts- Overview of brain organization, neural function, encoding models, and BCI techniques – EEG – waveform and signals from brain – VEP – tools for recording and analyzing – applications areas.

TEXT BOOKS:

1.   Wilbert O Galitz, "The essential guide to user interface design", 3rd Ed , Wiley , 2007.

REFERENCES

1.   BenShneidermann , Catherine Plaisant, "Designing the user interface, Strategies for effective Human Computer Interaction", 3rd Edition, Pearson Education, 2008.
2.   Alan Dix, Janet Finlay, GreGoryd, Abowd, Russell Beale,"Human – Computer
2.   Interaction", 3rd edition, Pearson Education, 2004.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E06	NETWORK SECURITY	3	1	0	4	3

Course Objectives:

1.   To understand the concept of Transport Level Security, Wireless Network Security and Electronic Mail Security
2.   To know about the IP Security
3.   To gather extensive Knowledge about the System Security

UNIT I - TRANSPORT LEVEL SECURITY

Web Security considerations - Secure Socket Layer SSL Architecture - SSL Record Protocol Change Cipher - Spec Protocol - Handshake Protocol - Cryptographic Computations - Transport Layer Security - Version Number-MAC - Pseudorandom Function - Alert Codes – HTTPS - Connection Initiation & Closure - SSH Transport Layer Protocol – Connection Protocol

UNIT II - WIRELESS NETWORK SECURITY

IEEE 802.11 Wireless LAN overview, IEEE802.11i Wireless LAN Security IEEE802.11i Services - IEEE802.11I Phases of Operation - Discovery Phase - Authentication Phase - Key Management Phase - Protected Data Transfer Phase - IEEE802.11i Pseudorandom Function - Wireless Application Protocol Overview - Operational Overview - Wireless Markup Language - WAP Architecture - Wireless Application Environment WAP protocol Architecture - Wireless Transport Layer

Security WTLS Sessions and Connections WTLS Protocol Architecture - Cryptographic algorithms - WAP End-to-End Security

UNIT III - ELECTRONIC MAIL SECURITY

Pretty Good Privacy - Notation - Operation Description - Cryptographic Keys and Key Rings - Public Key Management - S/MIME RFC 5322 MIME - S/MIME Functionality and Messages - S/MIME Certificate Processing - Enhanced Security Services - Domain Identified Mail Internet Mail Architecture E-Mail Threats -DKIM Strategy DKIM Functional Flow

UNIT IV - IP SECURITY

IP Security Overview - IP Security Policy - Security Associations Security Associations Database - IP Traffic Processing - Encapsulating Security Payload ESP Format Encryption and Authentication Algorithms - Padding Anti-Replay Service Transport and Tunnel Modes - Combining Security Associations Authentication Plus Confidentiality - Basic Combinations of Security Associations - Internet Key Exchange Key Determination Protocol - Header and Payload Formats

UNIT V - SYSTEM SECURITY

Intruders Intruder Behavior Patterns Intrusion Techniques - Intrusion Detection - Audit Records Statistical Anomaly Detection - Rule-Based Intrusion Detection The Base-Rate Fallacy - Distributed Intrusion Detection Honeypots - Intrusion Detection Exchange Format - Password Management - Password Protection - Password Selection Strategies - Malicious Software - Types Of Malicious Software - Viruses - Virus Countermeasures – Worms - Distributed Denial of Service Attacks – FIREWALLS - Needs of Firewalls - Firewall Characteristics - Types of Firewalls - Firewall Basing - Firewall Location and Configurations

TEXT BOOK
1. William Stallings - **Cryptography and Network Security -** Pearson Education, New   Delhi, 5th Edition, 2011. (Chapter 16 – 19 and online chapter 20 – 22)

REFERENCES
1. Behrouz A. Forouzan, Debdeep Mukhopadhyay - **Cryptography and Network Security -** Tata McGraw-Hill Education Pvt. Ltd., 2nd Edition, 2011
2. Charles Pfleeger - **Security in computing -** Prentice Hall of India, 4th Edition, 2006.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15305	MAT LAB	1	0	1	2	2

Instructional Objectives:
1. To learn the fundamentals of programming and its environment
2. To be able to apply programming skills in their area of specialization
3. To learn to work with team members in developing mini projects

UNIT I
Practicing the environment for programming to familiarize Workspace – Directory – Windows – Edit options – Help – Shortcuts, etc., - Simple exercise to familiarize basic commands.

UNIT II
Data types – Constants and Variables – Operators – Input-output functions – reading and storing data – Assignment statements – Control Structures – Iterative statements.

UNIT III
Vectors and Matrices – Commands to operate on vectors and matrices – Matrix Manipulations – Arithmetic – Relational and Logical operations on Matrices.

UNIT IV
Polynomial Evaluation - Roots of Polynomial - Arithmetic operations on Polynomials – Basic Graphics: 2D, 3D plots.

UNIT V
Printing labels - Grid & Axes box - Text in plot – Bar and Pie chart – Histograms – Animation – Experiments in solving simple real life problems based on above aspects.

TEXT BOOKS
1. www.scilab.org
2. Rudra Pratap., "Getting started with MATLAB", Oxford University Press, 2010.
3. Bansal R.K.Goel A.K., Sharma M.K., "MATLAB and its Applications in Engineering", Pearson Education, 2012.

Subject	Title of the Subject	L	T	P	Total	C

Code					LTP	
PCA15306	PERSONALITY DEVELOPMENT - I	2	1	0	3	2

Instructional Objectives:
1. To inculcate reading habit and develop effective reading skills.
2. To improve basics of grammar.
3. To help students to spot common errors in English.
4. To familiarize students with vocabulary and their application in context.
5. To improve aptitude skills, problem solving skills and reasoning ability.

UNIT I - Reading Skills & Grammar
Reading Comprehension - Fundamentals of Grammar – Parts of Speech I - Fundamentals of Grammar – Parts of Speech II -Fundamentals of Grammar – Articles, Modifiers & Determiners - Fundamentals of Spotting Errors Grammar – Concord Rule - Fundamentals of Grammar – Tenses-Sentence Correction.

UNIT II - Vocabulary & Verbal Logic
Synonyms – Antonyms   - Examples – Case study - Sentence Completion - Word Analogy   - Examples – Case study   - Critical Reasoning - Examples – Case study.

UNIT III - Numbers & Algebra
Numbers I - Numbers II – Logarithm -Simple Equations- Ratio & Proportion

UNIT IV - Modern Mathematics
Percentage, Profit & Loss - Venn Diagram- Permutation –Combinations - Probability

UNIT V - Reasoning
Analytical Reasoning I - Analytical Reasoning II- Logical Reasoning –Blood Relations / Directions - Logical Reasoning – Number series - Logical Reasoning – Coding /Decoding/ Odd man out

TEXT BOOKS
1. Thomson A.J. & Martinet A.V. (1986), **A Practical English Grammar,** Oxford University Press, USA, 4th Edition (For 1 to 2 units).
2. Wren & Martin (1991), **High School English Grammar and Composition,** Faber &Faber, First Canadian Edition, Canada (For 1 to 2 units).
3. Dinesh Khattar (2013), **Quantitative Aptitude   for Competitive Examinations,** Pearson Education, 2nd Edition (For 3 to 4).

4.	Agrawal R.S. (2012), **Quantitative Aptitude for Competitive Examination,** S.chand Publishing, New Delhi (For 3 to 5 units).

REFERENCES

1.	Barron's NEW GRE (2012), 19th Edition, Galgotia Publications Pvt. Ltd., New Delhi.
2.	Barron's GMAT (2012), 14th Edition, Galgotia Publications Pvt. Ltd., New Delhi.
3.	Cambridge Advanced Learner's Dictionary (2008), 3rd Edition, Cambridge University Press, London.
4.	Norman Lewis (1949), **Word Power Made Easy**, Pocket Books, New York.
5.	Edgar Thorpe (2003), **Objective English**, 4th Edition, Pearson education, New Delhi.
6.	Arun Sharma (2012), **Logical Reasoning,** Tata McGraw Hill, New Delhi.
7.	Edsar Thorpe (2007), **Test of Reasoning -** Tata McGraw Hill, 4th edition, New Delhi.
8.	Agarwal, R.S. (2012), **Verbal & Non Verbal Reasoning,** S.Chand Publishing, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15401	SOFTWARE TESTING & QUALITY ASSURANCE WITH LAB	3	0	3	6	4

Instructional Objectives:
1. To impart knowledge on the fundamentals of software testing and Quality assurance
2. To provide a complete, comprehensive coverage of various software testing methods.
3. To develop test cases using manual testing.
4. To enable the learner to become a **Software Tester / Quality Assurance Member**

UNIT I - Testing Fundamentals
The Psychology of Testing-Software Testing Principles-Code Inspections-An Error checklist for Inspections-Walkthroughs-Desk Checking-Peer ratings.
Definition of bug-Reasons for bug occurrence-Cost of bugs-Role of a software tester-Software tester traits-Software Development life cycle models-Testing axioms-Software testing terms and definitions.

UNIT II - Testing Methodologies
White box testing: Statement coverage-Decision coverage-Condition coverage-Decision-condition coverage-Multiple-condition coverage. Black box testing: Equivalence Partitioning-Boundary-value analysis-Cause-effect graphing-Error guessing.

UNIT III - Levels of Testing
Unit testing-Incremental testing: Top-down testing-Bottom-up testing. System testing: Facility-Volume-Stress-Usability-Security-Performance-Storage-Configuration-Compatibility-Installability-Reliability-Recovery-Serviceability-Documentation-Procedure.Acceptance testing-Case study: Test case design.

UNIT IV - Applying Testing Skills
Configuration Testing -Compatibility Testing-Usability Testing-Testing the Documentation- Web Site Testing –Testing for Software Security.

UNIT V - Automated Testing, Test Tools & Bug Reporting
Automated Testing and Test Tools: -Benefits-Test Tools-Software Test Automation-Bug Bashes and Beta Testing-Writing and Tracking Test Cases: Goals-Test Case Planning Overview-Bug's Life cycle-Bug Tracking System-Software Quality Assurance-Case study: Usage of open source test tool like Selenium and Sikuli for Functional/Regression testing.

TEXT BOOKS
1. Glenford J. Myers (2008), **The Art of Software Testing** - John Wiley &Sons, Second Edition, New Delhi (For Unts 1, 2 & 3).
2. Ron Patton (2007), **Software Testing** – Pearson Education, Second Edition, New Delhi (For Units 1, 4 & 5).

REFERENCES
1. William E Perry (2000), **Effective Methods for Software Testing,** John Wiley & Sons, Second Edition, New York.
2. Boris Beizer (1995), Black-Box Testing: -**Techniques for Functional Testing of Software and Systems,** John Wiley & Sons, New York.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15402	ADVANCED JAVA WITH LAB	3	0	3	6	4

Instructional Objectives:
1. To import the knowledge on the advanced concept of Java Programming skills.
2. To provide a basic understanding and knowledge of the latest java programming concept.
3. To equip the students in programming skills used to relate with the IT industry.
4. To enable the learner for aiming careers such as programmers (Java), Developers and Program analysts.

UNIT I - Components of Swing
The Origins of Swing - Components and Containers - Exploring Swing - JLabel and ImageIcon – JtextField - The Swing Buttons – JtabbedPane – JscrollPane – Jlist – JcomboBox – Trees – Jtable.

UNIT II - RMI & BEAN
Remote Method Invocation (RMI) - A Simple Client/Server Application Using RMI - Java Beans - What is a Java Bean? - Advantages of Java Beans – Introspection - Bound and Constrained Properties – Persistence - Customizers - The Java Beans API - A Bean Example.

UNIT III - Servlets
Servlets – Background - The Life Cycle of a Servlet - Using Tomcat for Servlet Development - A Simple Servlet - The Servlet API - The javax.servlet Package - Reading Servlet Parameters - The javax.servlet.http Package - Handling HTTP Requests and Responses - Using Cookies - Session Tracking.

UNIT IV - JDBC Concepts
JDBC Objects – JDBC Driver Types – JDBC Packages – A Brief Overview of the JDBC Process – Database Connection – Associating the JDBC/ODBC Bridge with the Database – Statement Objects - .ResultSet – Model Programs – Tables – Inserting Data into Table.

UNIT V - JSP & EJB
Java Server Pages – JSP – JSP Tags – Tomcat – Request String - Enterprise JavaBeans – Deployment Descriptors – Session Java Bean – Entity Java Bean – Message-Driven Bean – The JAR File.

TEXT BOOKS
1. Herbert Schildt (2007), JAVA The Complete Reference – McGraw-Hill, 7th Edition, New Delhi (For Units 1, 2 &3).
2. Jim Keogh (2002), J2EE The Complete Reference, Tata McGraw-Hill Edition, New Delhi (For Units 4 & 5).

REFERENCES
1. Horstmann S, Gary Cornell (2013), Core Java 2 volume 2 - Advanced Features- PRENTICE HALL, 9th Edition, New Delhi.
2. Hans Bergsten (2003), JavaServer Pages, 3rd Edition – O'Reilly.
3. Herbert Schildt (2007), JAVA: The Complete Reference, McGraw-Hill, 8th Edition, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15403	ASP.NET WITH LAB	3	0	3	6	4

Instructional Objectives:
1. To learn .NET framework and Life cycle
2. To understand ASP.NET control and ADO.NET Concepts
3. To acquire a working knowledge of creating and consuming Web Services
4. To enable the learner for aiming careers in Web Application Development and Micro Soft solution/product development

UNIT I - Introduction to .NET and ASP.NET
Introduction to .NET & its Benefits – Architecture of .NET Framework – CLR – CTS – Exploring Visual Studio – ASP.NET introduction & Features – Life cycle of ASP.NET – File Types – Exploring ASP.NET web pages – page directives – Application structure – states.

UNIT II - ASP.NET Controls
Standard controls – Validation controls – Rich web controls – Data controls – Navigation controls – Login controls – Web parts controls – HTML controls – Creating web applications – Deployment.

UNIT III - ADO.NET
ADO.Net framework – ADO.NET managed providers – Data set – Data source controls – Data binding – Working with: Grid view – Data list – Form View – Repeater control – Designing web application.

UNIT IV - LINQ Queries and Security
Introduction to LINQ Queries – Standard Query operators – LINQ to objects – LINQ to ADO.NET – LINQ to XML - LINQ Data source control – Lambda Expression – Security in ASP.NET: Login control – Password Recovery – CreateUserWizard.

UNIT V - Caching, Configuration and Web Services
Caching in ASP.NET – Output caching – Data caching – Globalization – Internationalization – Localization - Authentication-Authorization – Introduction to Web services - Infrastructure of web services – Code model – Properties – creating web services.

TEXT BOOK

1. Kogent (2010), **ASP.NET 4.0 Black Book** – **Platinum Edition,** Dreamtech Press,New Delhi (For 1 to 5 units).

REFERENCES
1. Stephen Walther, Kevin Hoffman, Nate Dudek (2011), ASP.NET 4 Unleashed, Pearson, New Delhi.
2. Kogent **(2010), ASP.NET 3.5 in Simple Steps,** Dreamtech Press,New Delhi.
3. Greg Buczek(2010), **ASP.Net Developer's Guide,** Tata McGraw Hill publishing Company Ltd., New Delhi.
4. Mathew Mac Donald (2010),   **ASP.NET Complete Reference ,** Tata McGraw Hill publishing Company Ltd., New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E07	ADHOC WIRELESS NETWORKS	3	1	0	4	3

Instructional Objectives:
1. To impart knowledge about wireless networks, wireless applications and current trends with wireless nodes
2. To learn about the adaptation of routing protocols with ad hoc networking
3. To enable the learner for aiming careers in System / Network administration

UNIT I - Introduction
Fundamentals of Wireless Communication technology – **The Electromagnetic Spectrum** – Spectrum Allocation – **Radio Propagation Mechanisms** – **Characteristics of the Wireless Channel -** Path loss – Fading – Interference – Doppler Shift – Transmission Rate Constraints – **Modulation Techniques** – Analog modulation –Digital Modulation – **Multiple Access Techniques** – Frequency Division Multiple Access – Time Division Multiple Access -Code Division Multiple Access – Space Division Multiple Access – **Voice Coding** – Pulse Code modulation – Vocoders.

UNIT II - Wireless LANs and PANs
Introduction – **Fundamentals of WANs** – Technical Issues – Network Architecture – **IEEE 802.11 Standard** – Physical Layer – Basic MAC layer mechanisms – CSMA/CA Mechanism – other MAC layer Functionalities – other Issues – **HYPERLAN Standard** – HYPERLAN/1 – HYPERLAN/2 – **BlueTooth** – BlueTooth Specifications – Transport Protocol Group – Middleware Protocol Group – **HomeRF**

UNIT III - Wireless Wans and Mans
Introduction- The cellular concept – Capacity Enhancement – Channel Allocation Algorithms – Handoffs – **Cellular Architecture** – **The First Generation Cellular Systems** – Advanced Mobile Phone System – **The Second Generation Cellular Systems** – Global System for Mobile Communications – Data over Voice Channel – GSM Evolution of Data Services – Other 3G Standards – **The Third Generation Cellular Systems** – 3G Standards – The Problems with 3G Systems – **Wireless in local loop** – Generic WLL Architecture – WLL Technologies – Broadband Wireless Access – **Wireless ATM.**

UNIT IV - Ad Hoc Wireless Networks
Introduction – **cellular** and adhoc wireless networks – Applications of Ad hoc wireless networks – **Issues in Ad hoc wireless Networks** – Medium access Scheme – Routing – Multicasting – Transport layer protocols – Pricing scheme – Quality of Service Provisioning – Self-Organization – Security – Addressing and Service Discovery – Energy Management – Scalability – Deployment Consideration – **Ad hoc Wireless Internet**

UNIT V - MAC Protocols for Ad Hoc Wireless Networks
Introduction – Issues in Designing a MAC Protocol for Ad hoc Wireless Networks –Design Goals of MAC Protocol for Ad hoc Wireless Networks – Classifications of MAC Protocols – 'Contention-Based' Protocols -Contention- Based Protocols with Reservation Mechanisms - Contention-Based MAC Protocols with Scheduling Mechanisms – MAC Protocols That use Directional.

TEXT BOOK
1.   Siva Ram Murthy C and B.S. Manoj (2004), Ad hoc Wireless Networks Architecture and Protocols, Addison Wesley, 2nd Edition, New York

REFERENCE
1.   Charles E. Perkins (2004), **Ad Hoc Networking,** Addison Wesley, 2nd Edition, New York.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E08	CYBER LAW AND CRIMES	3	1	0	4	3

Instructional Objectives:
1. To learn the principles of computer investigations and digital evidence.
2. To learn about jurisdiction, chain of evidence, legal authority, social, legal, and ethical implications.
3. To prepare students for careers in homeland defense, law enforcement, or commercial IT security.

UNIT I - Information Age and Cyber Crime
Cyber Space - Relationship between Computers Crime and Law - Brief Historical Perspective of Criminal Law - Classification of Crimes - Criminal Responsibility - Theories of A etiology of Crime - Theories and objectives of Punishment - The Organized Crime - The "White-Collar" Crime - Cyber Crime - Cyber Crime : Definition of "Computer Crime" - Computer Crime categories - Types of Computer Crimes -Classification of Computer Crime - Crime on Web - Indian Scenario - Cyber Jurisdiction - Definition of Cyber Jurisdiction - Model for Jurisdictional Analysis

UNIT II - Cyber Crime and Criminal Codification in India
Indian Penal Code : I to III - Indian Penal Code : IV to VI - Indian Penal Code : VII to IX - Indian Penal Code : X to XII - Indian Penal Code : XIII to XV - Indian Penal Code : XVI to XVIII - Protection of Intellectual Property –I – Patents - Indian Patent Law - Trade Marks – Databases

UNIT III - Protection of Intellectual Property – II
Copyrights - Digital Signature - Working of Digital Technology - Privacy Issues in the Information Age - Privacy and Surveillance - Privacy: Meaning - Legal Perspective and Framework - Kind and Pattern Intrusions Motive - Methods of Attack - Topology of Intruders - Global Differences - Future Issues

UNIT IV - Communication Network as Surveillance Tool
The Web – Intelligence- Tool – Espionage - The Interlude - Data and Information Processing - The operations - The Tradecraft - The armament - Economic Intelligence and Attacks - Web or Net Crimes - Information Warfare - Hackers Psychology and Laws Related To Hacking - Genesis of the term Hacker - Theories of Delinquency

UNIT V - Identity and Information Theft

Identity Theft case Files - Avoid being an Easy Target - Cyber Fraud and Electronic Misuse - Definition of Computer Fraud or cyber Fraud - Characteristics Cyber Fraud Offence - How the Victims and Cyber Fraud are Deceived? - The legal Issues - Fraud-Related Offenses - Protection of Cyber Crimes - Encryption in Crime and Terrorism - Law Enforcement Options - Other Technologies for Hiding Evidence - Concealing Crimes through Anonymity

TEXT BOOK

1. Prof. Parag Diwan, Dr. Suri R.K and Dr. Sanjay Kaushik (2003), **Cyber Crime** (Volume : 11,IT Encyclopaedia.com , Pentagon Press, New Delhi, 4th Edition (For 1 to 5 units).

REFERENCE

1. Johnson, Thomas A. (2006), Forensic Computer Crime Investigation Boca Raton-Fla: CRC –Press, New York.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E09	OBJECT ORIENTED ANALYSIS AND DESIGN WITH UML	3	1	0	4	3

Course Objectives:

1. To ensure quality and reusability while developing software
2. To analyze and design the problem domain using unified Object approach
3. To identify and categorize business, access and view layer objects of the application
4. To derive OOA & OOD phases using UML diagrams and CASE tools

UNIT I - OO BASICS

An **O**verview of OO Systems Development – Introduction, Views, Methodologies, Need, Overview of Unified Approach; **O**bject **B**asics – Introduction, Philosophy, OO Concepts – Object Relationships, Associations, Aggregations and Object Containment, Advanced Topics and Case Study; **OOSD** – SD Process, Building HQ S/W, Use Case Driven Approach, Reusability.

UNIT II - METHODOLOGIESM, MODELING AND UML

Methodologies – Introduction, Rumbaugh, Booch and Jacobson **M**ethodologies; Patterns and Frameworks; Unified Approach; **UML** – Introduction UML Diagrams - Class, Use-Case, Behavior and Implementation Diagrams - Model Management - UML Extensibility and Meta Model.

UNIT III - OOA: IDENTIFYING USE CASES AND CLASSIFICATION

Identifying **U**se **C**ases **-** Introduction, Business Object Analysis, Use Case Driven OOA: Unified Approach, Business Process Modeling – Use-Case Model, Developing Effective Documentation – Case Study; **OA: C**lassification – Introduction, Approaches – Noun Phrase, Common Class Patterns, Use Case Driven, CRC; Naming Classes.

UNIT IV - IDENTIFYING ORAM AND OO DESIGN

Identifying **O**bject **R**elationships**, A**ttributes and **M**ethods – Introduction, Associations, Super- Sub Class and Part – of Relationships – Case Study. Class and Object Responsibility, Defining Attributes and Methods for ViaNet bank Objects; **OOD P**rocess and **A**xioms - Introduction, Corollaries, Design Patterns; **D**esigning **C**lasses – Introduction, OOD philosophy, OCL, The Process, Class Visibility, Designing Methods for ViaNet Bank Objects, Packages and Managing Classes.

UNIT V - ACCESS LAYER AND VIEW LAYER

Access **L**ayer – Introduction, DBMS, Logical and Physical DB Organization and Access Control, Distributed Databases and Client Server Computing, OODBMS, Object Relational Systems, Multi Database Systems, Designing Access Layer Classes; Case study; **View Layer** – Introduction, Design view layer classes, Macro and Micro Level Process, Purpose of a View Layer Interface, Prototyping the User Interface, Case Study.

TEXT BOOK

1. Ali Bahrami – **Object Oriented System Development** – Tata McGraw Hill, 2008.

REFERENCE:

1. Grady Booch, Ivar Jacobson, James Rumbaugh - **The Unified Modeling Language User Guide -** Pearson Education, 2nd edition, 2005.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E10	DIGITAL IMAGE PROCESSING WITH MAT LAB	2	1	2	5	3

Course Objectives:

At the end of the course the learner is expected:

1. To know about image fundamentals and mathematical transforms necessary for image processing.
2. To gather knowledge about image enhancement techniques
3. To know about **image restoration** procedures.
4. To learn the image compression procedures.
5. To study the image segmentation and representation techniques.

UNIT I - Digital image Fundamentals

Overview of Digital Image Processing – Fields that use Digital image processing – Fundamental steps in Digital Image Processing – Components of an Image Processing System – Elements of visual perception – Background on MATLAB and the Image Processing Toolbox - The MATLAB Working Environment

Unit II - Image Representation & Transformations

Digital Image Representation - Reading Images - Displaying Images - Writing Images –Image Types - Array Indexing - Intensity Transformations and Spatial Filtering - Intensity Transformation Functions - Histogram Processing and Function Plotting - The 2-D Discrete Fourier Transform - Computing and Visualizing the 2-D DFT in MATLAB - Filtering in the Frequency Domain - Properties of 2D Fourier Transform

Unit III - Image Enhancement :

Image Enhancement in spatial domain: Histogram Equalization – Enhancement using Arithmetic / Logic Operations – Spatial Filtering – Smoothing & Sharpening Spatial Filters. Image Enhancement in Frequency domain: Filtering in the frequency domain – Smoothing & Sharpening

Unit IV - Image Compression :

Fundamentals – Image Compression models – Lossless Compression: Variable Length Coding – LZW Coding – Bit plane Coding – predictive coding –Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression Standards – JPEG standards – MPEG standards

Unit V - Image Segmentation & Representation

Edge Detection – Thresholding – Region based Segmentation – Chain codes –
Polynomial approximation – Boundary Segments – Case study using MATLAB.

TEXT BOOKS:
1. Rafael C Gonzalez, Richard E Woods, 2nd Edition - **Digital Image
    Processing** – Pearson Education - 2003.
2. Rafael C Gonzalez, Richard E Woods, Steven Eddins , 2nd Edition - **Digital
    Image Processing using MATLAB** – Pearson Education - 2003.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E11	ANDROID APPLICATIONS DEVELOPMENT	2	1	2	5	3

Instructional Objectives:
1. To understand mobile application development trends and Android
    platform
2. To analyze the need of simple applications, game development, Location
    map based services
3. To enable the learner for aspiring careers in Android Mobile application
    development areas

UNIT I - Android Fundamentals
Mobile Application development and trends – Android overview and Versions –
Android open stack, features – Setting up Android environment (Eclipse, SDK,
AVD)- Simple Android application development – Anatomy of Android applications
– Activity and Life cycle – Intents, services and Content Providers

UNIT II - Android User Interface
Layouts: Linear, Absolute, Table, Relative, Frame, Scrollview, Resize and
reposition - Screen orientation – Views: Textview, EditText, Button, ImageButton,
Checkbox, ToggleButton, RadioButton, RadioGroup, ProgressBar,
AutocompleteText, Picker, Listviews and Webview– Displaying pictures with
views: Gallery and ImageView, ImageSwitcher, Gridview – Displaying Menus:
Helper methods, Option and Context

UNIT III - Data Persistence
Shared User preferences – File Handling: File system, System partition, SD card
partition, user partition, security, Internal and External Storage – Managing data

using SQLite – Content providers: Data sharing with query string, projections, filters and sort and User defined content providers

UNIT IV - Messaging, Networking and Services
SMS Messaging: Sending and Receiving – Sending email and networking – Downloading binary and text data files – Access Web services – Local and remote services, Asynchronous threading, communication and binding services

UNIT V - Location Access and Publish Android application
Location based services: Display map, zoom control, view and change, Marking, Geocoding, Get location - Publish Android applications and Deployment

TEXT BOOK
1. WeiMeng Lee (2012), "Beginning Android Application Development", Wrox Publications (John Wiley, New York) (For 1 to 5 units).

REFERENCES
1. Ed Burnette (2010), "Hello Android: Introducing Google's Mobile Development Platform", The Pragmatic Publishers, 3rd edition, North Carolina USA
2. Reto Meier (2012), "Professional Android 4 Application Development", Wrox Publications (John Wiley, New York).
3. ZigurdMednieks, Laird Dornin, Blake Meike G, Masumi Nakamura (2011), "Programming Android: Java Programming for the New Generation of Mobile Devices", OReilly Media, USA

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E12	MICROPROCESSOR AND ITS APPLICATIONS	2	1	2	5	3

Course Objectives:
1. To understand the basic concepts underlying a programmable device such as data-buses, machine cycles, various processes of data flow, internal register architecture, programming and interfacing.
2. To understand practical design of microcomputer based on the Components of and function of 8086 Architecture
3. To understand how the system works under minimum and maximum mode and signal functions

UNIT I - MICRO COMPUTER AND MICROPROCESSOR
An Introduction -Overview of microcomputer structure- Microprocessor evolution and types - The 8086 microprocessor family –overview -8086 internal architecture -Pin configuration of 8086 -Program development steps - Assembly language Program development tools -Writing assembly programs

UNIT II - 8086 INSTRUCTION DESCRIPTION AND ASSEMBLER DIRECTIVES
8086 Addressing Mode-Instruction set Introduction -Arithmetic instruction - logical instruction -String, Procedure and macros - Loop Instruction , Jump Instruction - Move, stack and Rotate Instruction -BIT Manipulation Instruction - String manipulation instruction -Assembly language Program -Assembler Directives

UNIT III - 8086 SYSTEM CONNECTIONS AND INTERRUPT APPLICATIONS
Basic 8086 Microcomputer System -Using Logic Analyzer to observe Microprocessor Bus Signals -Minimum Mode system -Troubleshooting a simple 8086 based Microcomputer -8086 Interrupt and Interrupt Responses -8086 Interrupt Types -Hardware and software Interrupt Applications -8259 Priority Interrupt Controller -Software Interrupt Applications

UNIT IV - DISPLAY CONTROLLER AND DMA
Keyboard / Display Controller -8254 software- programmable Timer/Counter - 8254A counter modes and applications- Digital Signal processing and digital filters -DMA data transfer -signal of 8257 -internal architecture of 8237-A Micro computer based industrial process control -Robotics and embedded controller –

UNIT V - 80286, 80386, 80486 MICROPROCESSORS
Introduction to Multi-user / Multitasking Operating system -Time Slicing Scheduling -Memory Management -Virtual Memory -Intel 80286 Microprocessor Architecture-80286 Real Address mode Protected mode operation-Intel 80386 Microprocessor Architecture-80386 Real Address mode Protected mode operation-Intel 80486 Microprocessor Architecture

TEXT BOOKS:
1. Douglas V. Hall – **Microprocessors and Interfacing** – **Programming and Hardware** – McGraw Hill – Second Edition - 1991. (Chapter No. 2 – 11,13,15)

REFERENCES
1. Yu-Chengh Liu and Gibson – **Microcomputer systems 8086/8088 family** – Prentice Hall – Second Edition - 1996.
2. Ray A.K and Bhurchandi – **Advance Microprocessors and Peripherals, Architecture programming and Interfacing** – McGraw Hill International – First Edition – 2000.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15405	PERSONALITY DEVELOPMENT - II	2	1	0	3	2

Instructional Objectives:
1. To improve the ability of the students to solve aptitude problems in Arithmetic and Menstruation.
2. To make them prepare and give professional presentations.
3. To introduce students to the nuances of vocabulary.
4. To enable students the art of writing resumes and give interviews.

UNIT I - Arithmetic
Averages - Mixtures & Solutions - Time & Work - Pipes & Cisterns - Time, Speed Distances I - Time, Speed & Distances II.

UNIT II - Modern Mathematics & Menstruation
Data Sufficiency - Data Interpretation - Cubes - Menstruation – Clocks – Calendars.
UNIT III - Presentation Skills
Extempore - Company Profile/Area of Interest/Recent Developments

UNIT IV - Analytical Reading
Reading Comprehension & Critical Reasoning - Level 2 - Cloze test – Anagrams

UNIT V - Interview Skills & Vocabulary Building
CV Writing - Self Profiling –Mock Interview - One Word Substitution – Homonyms – Idioms - Phrasal Verbs - Odd Word
TEXT BOOKS:

1. Dinesh Khattar (2013), **Quantitative Aptitude for Competitive Examinations,** Pearson Education, 2nd Edition (For 1 to 2 Units)
2. Agrawal, R.S. (2012), **Quantitative Aptitude for Competitive Examination,** S.chand Publishing, New Delhi (For 1 to 2 Units).

REFERENCES

1. Arun Sharma (2012), **Logical Reasoning,** Tata McGraw Hill, New Delhi.
2. Edgar Thorpe (2007), **Test of Reasoning,** Tata McGraw Hill, 4th Edition, New Delhi.
3. Agarwal R.S. (2012), **Verbal & Non Verbal Reasoning,** S.Chand Publishing, New Delhi.
4. Oxford Dictionary of English Idioms (2010), 3rd edition, Oxford University Press, New York.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15501	XML AND WEB SERVICES WITH LAB	3	1	3	7	4

Instructional Objectives:

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

1. Write a XML application using structure and presentation technologies
2. Apply XML manipulation technologies such as XSLT, XPath, XLink and XQuery
3. Do Program Manipulation and Dynamic access through DOM architecture
4. Develop web services and ensure security
5. Understand the need of semantic web

UNIT I

Role of XML, XML language basics, XML Revolution, XML Technology family, Simple XML fie creation, and XML Namespaces

UNIT II

XML document rule, XML structuring, XML presentation technologies, XML Transformation, XSLT, XQUERY, XLINK, XPATH

UNIT III

XML Parsers, XML DOM architecture, Classes of DOM family, Combining XML DOM and XSL, Relational Database and XML

UNIT IV

SOAP protocol, XML-RPC, HTTP, SOAP faults and SOAP attachments, Web services, UDDI, XML security

UNIT V

Semantic web Technology, Layered Architecture, RDF and OWL representation

TEXT BOOK

1. Frank. P. Coyle - **XML, Web Services and the data revolution -** Pearson Education, 2002

REFERENCES

1. Gavin Powel - **Beginning XML Databases** - Wrox Press, 2007
2. Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh, - **Developing Java Web Services** - Wiley Publishing Inc., 2004
3. Grigoris Antoniou and Frank Van Harmelen,-**A Semantic Web Primer -** The MIT Press, Cambridge, Massachusetts London, England, 2004
4. Sandeep Chatterjee, James Webber, - **Developing Enterprise Web Services** -, Pearson Education, 2004
5. McGovern, et al., - **Java Web Services Architecture** -, Morgan Kaufmann Publishers, 2005.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15502	DATA MINING AND DATA WAREHOUSING WITH LAB	3	2	2	7	4

Instructional Objectives:
1. To impart knowledge about Data Mining
2. To know about various techniques used in Data Mining
3. To design data warehouses for the companies
4. To enable the learner for aiming careers in Data Warehouse Management

UNIT I - Data Mining Concepts & Architecture
Introduction – Data Mining Definitions, Tools, Applications - Data Mining - Learning: Definition, Anatomy of Data Mining. Types of Knowledge – Knowledge Discovery Process- introduction, Evaluation, Stages, Operations and Architecture of Data Mining.

UNIT II - Data Mining Techniques
Visualization Techniques – Likelihood & distance-Neural Networks-Decision Tree technique-Constructing decision trees-ID3 algorithm-Genetic algorithms: Crossover & mutation -Clustering: Distance function-K-means algorithm - Hierarchical Clustering - Association rules: Apriori algorithm – Real Time Applications and Future Scope.

UNIT III - Data Warehousing Concepts & Architecture
Introduction – Goals- Process Architecture- Load Manager-Warehouse Manager-Query Manager - DWH Objects - Fact table & Dimension table – DWH Users - Data Warehouse Schemas: Star schemas-Snowflake Schemas.

UNIT IV - Data Warehouse Partitioning & Aggregation
Horizontal Partitioning-Vertical Partitioning-Hardware Partitioning-Software partitioning Methods-Aggregation-Designing Summary tables-Designing Summary tables

UNIT V - Data Marts, Meta Data, Backup & Recovery
Data Marts: Introduction-Estimating Design – Cost-Meta Data-Backup: Types of backup-Backup the data warehouse – SureWest Online Backup-Recovery: Strategies-various Testing Strategies-Various Recovery models, Disaster Recovery procedure

TEXT BOOKS:
1. Prabhu S, Venkatesan N (2006), **Data Mining & Warehousing** – New Age International – First Edition, New Delhi (For Units 1 & 2).
2. Sam Anahory, Dennis Murray (2004), **Data warehousing in real world** – Pearson Education, New Delhi (For Units 3, 4 & 5).

REFERENCES
1. Pieter Adriaans, Dolf Zantinge (2005), **Data Mining** – Pearson education, New Delhi.
2. Alex Berson, Stephen J Smith (2004), **Data Warehousing, Data mining & OLAP** – Tata McGraw Hill Publications, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15503	OPEN SOURCE TECHNOLOGIES WITH LAB	3	2	2	7	4

Instructional Objectives:
1. To understand the basics and advantages of open source
2. To learn the open source software MySQL, PERL, PHP and PYTHON.

UNIT I - INTRODUCTION
Definitions and History – Open source Operating Systems – FreeBSD – Linux - Open Source Server Applications – Apache – other servers -Open Source Desktop Applications - How Open Source Software Is Developed.

UNIT II - MYSQL
Introduction – mysql server administration and security - setting the root password – checking mysql server status – shutdown the server - adding a user – creating a database – creating tables – inserting and updating data – new user access to the database.

UNIT I - PERL
Installing the Perl DBI and mysql DBD – Introduction to DBI – Building basic applications – Building WebPages with DBI – Case Study: Producing an E-commerce website.

UNIT IV - PHP
PHP Installation – PHP WebPages – PHP and forms – PHP mysql configuration – PHP mysql functions – connecting mysql with PHP – selecting data from mysql database. Case study: Building mysql enabled application with PHP.

UNIT V - PYTHON
Getting mysql for python – importing mysql for python – connecting with database – passing query to mysql – mysql insertion for python – Creating users and granting access. Case study: creating mysql enables application using python

TEXTBOOKS:
1. Paul Kavanagh, **Open Source Software: Implementation and Management,** Elsevier Digital Press, 2004. (unit -1)
2. Steve Suchring, **Mysql Bible** – John Wiley 2002 (UNIT II – 4).
3. Albert Lukaszewski, **Mysql for Python**, PACKT publishing Ltd, 2010

REFERENCES
1. Rasmus Lerdorf and Levin Tatroe, **Programming PHP** – O'Reilly 2002
2. Wesley J Chun , **Core Python Programming** - Prentice Hall 2001
3. Martin C Brown, **Perl : The Complete Reference** - Tata McGraw-Hill 2 nd Ed., 2009
4. Vikram Vaswani, **MySQL : The Complete Reference** - Tata McGraw-Hill 2009 - 2 nd Ed.,
5. Steve Holzner, PHP : The Complete Reference Tata McGraw-Hill 2009 - 2nd Ed.,

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E13	INFORMATION STORAGE AND MANAGEMENT	3	1	0	4	3

Instructional Objectives:
1. To import knowledge on Information Storage and Management Technologies for the recent trends.
2. To provide a variety of solutions for storing, managing, accessing, protecting, securing, sharing and optimizing information
3. To help the learners to learn the developments that have taken place in the area of information storage and management.

UNIT I - Introduction
Introduction to Storage Technology - information storage, evolution of storage technology and architecture, data center infrastructure, information life cycle; Storage System Environment – storage system environment components, disk drive components, logical components of Host; Data Protection – implementation of RAID, RAID Array components, RAID levels, and performance comparisons.

UNIT II - DAS, SCSI, and Storage Networking
Direct Addressed Storage – Type of DAS, benefits and limitations, Disk Drive Interfaces, Parallel SCSI; Storage Area Networks – evolution, components of SAN, Fiber Channel(FC) connectivity, FC architecture, FC Topologies; Network Attached Storage – Benefits of NAS, components of NAS, protocols, i/o operations.

UNIT III - IP SAN, CAS and Storage Virtualization
IP SAN-introduction, components of iSCSI, FCIP; Content Addressed Storage(CAS) – fixed content and archives, types of archives, CAS Architecture; Storage Virtualization – forms of virtualization, taxonomy, Storage Virtualization Challenges, types of storage virtualization.

UNIT IV - Business Continuity
Introduction - Information Availability, BC terminology, BC planning lifecycle, Business impact analysis- Backup and recovery – purpose and considerations, topology , technologies; local replication - Uses of Local Replicas, Data Consistency, Replication Technologies.

UNIT V - Storage Security and Management

Storage Security **-** Storage security framework, Risk Triad, Storage security domains, security implementations in storage Networking; Managing the Storage Infrastructure - Monitoring the Storage Infrastructure, Storage Management Activities, Storage Infrastructure Management Challenges.

TEXT BOOK

1. EMC Corporation, **Information Storage and Management**, Wiley India, New

REFERENCES

1. Robert Spalding (2003), **Storage Networks: The Complete Reference**, Tata McGraw Hill, New Delhi.
2. Meeta Gupta (2002), **Storage Area Network Fundamentals**, Pearson Education Limited, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E14	CONTENT MANAGEMENT SYSTEM	3	1	0	4	3

Course Objectives:

At the end of this course the learner is expected :

1. To acquire basic knowledge about CMS
2. To gather extensive knowledge in designing skills in CMS
3. To learn about various types of CMS

UNIT I - CONTENT

Defining Data, Information, and Content - Content Format - Content Structure - Content Functionality - What Is Content Really?

UNIT II - CONTENT MANAGEMENT

Understanding Content Management - Major Parts of a CMS - The Branches of Content Management - Knowing When You Need a CMS - Component Management versus Composition Management - The Roots of Content Management - The Branches of Content Management

UNIT III - DOING CONTENT MANAGEMENT PROJECTS

Doing CM Projects Simply - Staffing a CMS - Working within the Organization - Getting Ready for a CMS - Securing a Project Mandate - Doing Requirements Gathering - Doing Logical Design - Selecting Hardware and Software - Implementing the System.

UNIT IV - DESIGNING A CMS

Designing a CMS Simply - The Wheel of Content Management - Working with Metadata - Cataloguing - Designing Publications - Designing Content Types - Designing Content Access - Designing -Designing Personalization - Designing Workflow and Staffing Models.

UNIT V - Building a CMS & Case Study
Building a CMS Simply - Building Collection Systems - Building Management Systems - Building Publishing Systems. Case Tools – Joomla – SharePoint.

TEXT BOOKS:
1. Bob Boiko – **Content Management Bible, 2nd Edition** - Wiley Publishing, Inc.- 2005

REFERENCES
1. Eric Tiggeler - **Joomla! 3 Beginner's Guide** - PACKT Publishing – 2013.
2. Sofia Hauschildt **- CMS Made Simple 1.6 Beginers Guide** – PACKT Publishing – 2010.
3. Ishai Sagi – **SharePoint 2010 How To** – Pearson Education – SAMS 2011.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E15	E-COMMERCE AND M-COMMERCE	3	1	0	4	3

Instructional Objectives:
1. To impart knowledge on E-Commerce, Various applications connected with E-Commerce and M-Commerce and legal issues of e-commerce.
2. To enable the learner for aiming careers in special software development involving E-Commerce and M-Commerce technologies.

UNIT I - Introduction to E-Commerce, Business of Internet, N/W Security & Firewalls
E-Commerce Framework, E-Commerce and Media Convergence - Anatomy of E-Commerce Applications - E-Commerce Consumer and Organization Applications - Telco/Cable/Online Companies- National Independent ISPs- Regional-level ISPs - Local level ISPs - Service Providers Abroad- Network Interconnection Points - Internet Connectivity Options - Client-Server Network Security - Emerging Threats - Firewalls and Network Security - Data and Message Security - Challenge Response Systems- Encrypted Documents and E-Mail.

UNIT II - E-Commerce &WWW, Consumer Oriented E-Com, E-Payment System
Architectural Framework for E-Com - WWW as the Architecture - Web background: Hypertext Publishing - Technology behind the Web - Security and the Web - Consumer Oriented Applications - Mercantile Process Models - Types of Electronic Payment System - Digital Token based e-payment systems - Smart Card e-payment system -Credit Card e - payment system- Risk and e-payment system - Designing e-payment system

UNIT III - Inter Organizational Commerce & EDI, EDI Implementation, Advertising and Marketing on the Internet
EDI - EDI Application in Business - EDI: Legal, Security and Pr   ivacy Issues - EDI and E-commerce - Standardization and EDI - EDI Software Implementation - EDI Envelope for Message Transport–Value Added Networks - Internet based EDI - The New Age of Information Based Marketing - Advertising on the Internet - Charting the Online Marketing Process - Market Research

UNIT IV - Challenges of the Internet Business- Business and Technology, M-Commerce
Challenges of the internet business - Business and technology - Positive and negative effects of the internet - Value chain - Planning and execution - M-commerce-what is m-commerce? - Mobility and m-commerce - Location information: Asset

UNIT V - Customer Care, Billing and Revenue Assurance, the Internet Business Model: the Future and its Economics
Mobility & customer care - Billing and revenue assurance – OSS - The internet business model: Future and its economics - Public right and regulation - Internet Based model – OP - The next generation internet: Mobile Internet - The Next Generation Internet: Economics

TEXT BOOKS:
1.   Kalakota &Whinston **(16), Frontiers of Electronic Commerce** – Addison Wesley, New York (For Units 1, 2 & 3).
2.   Louis(P J) (2001), **M-Commerce Crash Subject: The Technology And Business Of Next generation** – McGraw Hill, New York (For Units 4 & 5).

REFERENCES
1. Henry chan, Raymond Lee, Tharam Dillon, Elizabeth Change (2001), **E-Commerce Fundamental and Applications** –John Wiley & Sons Ltd., New York.
2. David Whiteley (2000), **E- Commerce, Strategy, Technologies and Applications** – Tata McGraw hill, New Delhi.
3. Pandey U.S, Rahul Srivastava, SaurabhShukla (2007), **E-Commerce and its Applications** - S.Chand& Co., New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E16	**CLOUD COMPUTING**	3	1	0	4	3

Instructional Objectives:
1. To understand the need of cloud computing in the IT sector
2. To know the cloud service providers and the kind of services offered by them
3. To analyze the benefits of cloud in business continuity by applying cloud services, security and virtualization features
4. To enable the learner for aspiring careers in Cloud / Software Product development areas.

UNIT I - Cloud Fundamentals
Cloud computing Definition – Cloud Models such as NIST, Cube, Private, Public, Hybrid and Community clouds – Cloud Characteristics – Benefits, Disadvantages, Challenges and obstacles of Cloud Computing – Cloud Cost Measurement, Capital expenditure, Total cost and SLA – Cloud Architecture – Types of Cloud Services (IaaS, PaaS, SaaS, IdaaS).

UNIT II - Cloud Platforms
Abstraction – Load balancing and virtualization : case study Google cloud – Hypervisors : Case study VMware vSphere - Machine Imaging – Capacity Planning with baseline metrics, measurement, load testing, network capacity and scaling – PaaS services : Case study Force.com – PaaS Frameworks: Case study Drupal, Eccenbtex AppBase Spuarespace ,WaveMaker and Wolf.

UNIT III - Cloud Service Providers
Google Web Services : Explore and survey Google Application, Google analytics, Google Translate, Google Toolkit, APIs and Google App Engine - Amazon Web services: Components, Elastic Compute Cloud (EC2), Amazon Storage Systems, Amazon Elastic Block Store, and Amazon Database Services – Microsoft Cloud Services : Windows Azure platform and Windows Live.

UNIT IV - Cloud Infrastructure and Security

Cloud Management: Responsibilities, Lifecycle, Management Products and Standards -Cloud security: CSA Cloud Reference Model – Implement Cloud security for Infrastructure, Data, Network, Storage and Host - Disaster recovery and management.

UNIT V - SOA, Storage and Backup

Network service model infrastructure, Communication and Management of SOA – Moving applications to cloud, Service attributes and Cloud bursting – Cloud storage, provisioning, unmanaged and managed storage – Cloud backup, types and features and storage interoperability – Cloud Mail services.

TEXT BOOKS:

1. Barrie Sosinsky (2011), "Cloud Computing Bible", Wiley Publishing Inc., New York
2. Kris Jamsa (2012), "Cloud Computing: SaaS, PaaS,IaaS, Virtualization, Business Models, Security and More", Jones and Bartlett Learning LLC, Boston, USA

REFERENCES

1. George Reese (2009), "Cloud Application Architectures: Building Applications and Infrastructures in the cloud" ,O'Reilly Media Inc. Cambridge,USA
2. Anthony T Velte, Toby J Velte, Robert Elsenpeter (2010), "Cloud Computing: A practical approach" , McGrawHill, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E17	SOCIAL NETWORK ANALYSIS	3	1	0	4	3

Course Objectives:
1. To understand the concept of semantic web and related applications.
2. To learn knowledge representation using ontology.
3. To understand human behavior in social web and related communities.
4. To learn visualization of social networks.

UNIT I - INTRODUCTION

Introduction to Semantic Web: Limitations of current Web – Development of Semantic Web - Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network

analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web-based networks – Applications of Social Network Analysis.

UNIT II - MODELLING, AGGREGATING AND NOWLEDGE REPRESENTATION

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation – Ontology languages for the Semantic Web: Resource Description Framework – Web Ontology Language - Modeling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals – Ontological representation of social relationships - Aggregating and reasoning with social network data – Advanced representations.

UNIT III - EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS

Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks – Definition of community – Evaluating communities – Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks – Multi – Relational characterization of dynamic social network communities.

UNIT IV - PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES

Understanding and predicting human behavior for social communities – User data management - Inference and Distribution – Enabling new human experiences – Reality mining – Context – Awareness - Privacy in online social networks – Trust in online environment – Trust models based on subjective logic – Trust network analysis – Trust transitivity analysis – Combining trust and reputation – Trust derivation based on trust comparisons – Attack spectrum and countermeasures.

UNIT V - VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS

Graph theory – Centrality – Clustering – Node -Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix - based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications – Cover networks – Community welfare - Collaboration networks – Co-Citation networks.

TEXT BOOKS:
1. Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.

REFERENCES
1. Guandong Xu, Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
2. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé -Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
4. John G Breslin, Alexander Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E18	NEURAL NETWORKS	3	1	0	4	3

Course Objectives:
At the end of this course the learner is expected:
1. To understand the basics of ANN and comparing with Human Brain
2. To distinguish the various architectures of building an ANN
3. To describe the Pattern classification in Neural Networks

UNIT I - INTRODUCTION TO CELL AND THEIR STRUCTURES
Action potential, dendrites, synapse and axon Biological Neural Network Vs Artificial Neural Network History and Applications of ANN. Different Architectures of ANN-Different Learning algorithms of ANN-Common activation functions Development process of ANN, Setting of weights, simple OR function simulation McCullosh and Pitts model MP model simulation of OR,AND,NOT functions.

UNIT II - SIMPLE NEURAL NETS FOR PATTERN CLASSIFICATION
Learning algorithms, Supervised and Unsupervised - Hebbian network architecture - Hebbian network algorithm and Application - Perceptron network architecture and its limitations -XOR problem and its solution - Perceptron applications - Adaline architecture and learning -Back propagation network, BP Algorithm Derivation of weight adjustment terms

UNIT III - PATTERN ASSOCIATION

Pattern Association preliminaries-Pattern associator properties Associative memories and networks -Auto associative net, algorithm and weight setting-Hetero associative net, algorithm and weight setting Problems related to Associative memories -Bidirectional associative memories, weight setting and algorithms -BAM and its various forms -Problems related to BAM.

UNIT IV - NEURAL NETS BASED ON COMPETITION

Competitive networks -Lateral inhibition nets, Maxnet, Mexican Hat etc.- Kohonen SOM architecture -SOM learning algorithm-Advantages of SOM and its applications -Learning Vector Quantization-LVQ advantages and disadvantages -Counter-propagation networks Architecture-CPN algorithm and applications

UNIT V - ADAPTIVE RESONANCE THEORY AND NEOCOGNITRON

ART-1 architecture and operation -ART-1 algorithm and applications -ART-II architecture and operation-ART-II algorithm and applications -Probabilistic Neural Network,Architecture and algorithm-Cascade Correlation Network and itsAdvantages -Cascade Correlation learning algorithm -Neocognitron architecture -Neocognitron learning algorithm

TEXT BOOKS:

1. Laurene Fausett - **Fundamentals Of Neural Networks-Architectures, Algorithms and Applications -** Pearson Education, 2004
2. James A.Freeman and David.M.Skapura - **Neural Networks Algorithms, Applications and Programming Techniques -** Pearson Education , 2002.

REFERENCES

1. Yegnanarayana B. - **Artificial Neural Networks -** Prentice - Hall, of India, 2001.
2. Simon Haykin - **Neural Networks - A Comprehensive Foundation -** Pearson Ed. – 2001.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E19	BIG DATA AND ITS APPLICATIONS	3	1	0	4	3

Instructional Objectives:
1. To understand the nature of data & carry out intelligent data analytics.
2. To know various modern data analysis tools & trends in data analysis.
3. To gain knowledge in Hadoop Distributed File Systems and Applications of Big Data using Pig and Hive services.

UNIT I - Introduction to Big Data

Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT II - Mining Data Streams

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III - Hadoop

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures- Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features

UNIT IV - Hadoop Environment

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud

UNIT V - Frameworks

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications.

TEXT BOOKS:
1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007(units 1, 2 & 3).
1. Tom White " Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012 (Units 4 & 5).

REFERENCE
1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E20	**COMPILER DESIGN**	3	1	0	4	3

Course Objectives:
At the end of this course, the learner is expected:
1. To understand, design and implement a lexical analyzer
2. To develop, design and implement a parser
3. To interpret code generation schemes
4. To describe optimization of codes and runtime environment

UNIT I - INTRODUCTION TO COMPILERS

Introduction to compiler - translators - Structure of compiler - Compiler writing tools - Regular expression – NFA – DFA – conversion from NFA to DFA - Minimizing the DFA- Problem solving in NFA & DFA

UNIT II - SYNTACTIC SPECIFICATION AND PARSING

Context-free grammars – ambiguity -Parse trees - Parser types - Shift-reduce parsing - Operator-precedence parsing - Top-down parsing - Predictive parsers-Problem solving in Parsers.

UNIT III - SYNTAX-DIRECTED TRANSLATION AND SYMBOL TABLE

Syntax-directed translation schemes - Implementing of syntax-directed translators - Intermediate code - postfix notation - Parse trees- syntax trees - Contents of symbol table - Data structures for symbol table - Representing scope information

UNIT IV - ERROR DETECTION AND CODE OPTIMIZATION

Errors - Lexical-phase errors - Syntactic-phase errors - Semantic errors - Principal sources of optimization - Loop optimization - DAG representation of basic blocks - Value numbers and algebraic laws - Global data-flow analysis

UNIT V - CODE GENERATION

Object programs - Problems in code generation - A machine model - A simple code generator - Register allocation and assignment - Code generation from DAG's – A Heuristic ordering for DAG's –Optimal ordering for Trees -Common Sub expression- Peephole optimization

TEXT BOOK

1. Alfred V Aho and Jeffery D. Ullmam – **Principles of Compiler Design** – Naraosa Publishing House - 2002

REFERENCE

1. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D.Ullman, **Compilers, principles, techniques, and tools** – Pearson Education - 2009.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E21	WIRELESS APPLICATION PROTOCOLS	3	1	0	4	3

Instructional Objectives:

1. To impart knowledge on Wireless Technology, WML Script functions, Wireless Application Protocol and its application areas.
2. To enable the learner for aspiring careers in WAP related specialized software field.

UNIT I - Mobile Internet Standard

Key services: Productivity Applications – Information and transactional services – Life Enhancing management – Characteristics of the mobile Internet – Current web Technologies – Origins of WAP – WAP architecture – Components of WAP standard – Network Infrastructure services – Design principle – other standards.

UNIT II - WML

Introduction to WML – Document model – WML Authoring – URL Identify – Markup Basics – Basic content – Events , tasks & Bindings – Variables – Images, tables and links - controls – miscellaneous markup – Application security.

UNIT III - WML Script and WTAI

WML Script overview – Language Basics : Variables – operators – statements – Functions – Pragmas – standard libraries – WTAI overview – WML Script development – Binary WML script.

UNIT IV - User Interface Design

Web site design – structure usability methods – design guidelines – selected WML elements – navigation and user input – Appearance and presentation – standard HTTP Header – CC/PP document – End to End communication – profile composition.

UNIT V - Push Messaging and WTA

Push messaging: overview – Access protocol – Addressing – MIME media types – Proxy gateway – WTA: Architecture – Client Framework – WTA server and security – Design consideration – Application creation.

TEXT BOOK

1.   Singhal S Bridgman T, Suryanarayana L, Mauney D, Alvinen J, Bevis D, Chan J, Hild S (2011), **WAP- The Wireless Application Protocol,** Pearson publications, New Delhi

REFERENCE

1.   Steve Mann & Scott Sbihli (2000), **Wireless Application Protocols,** Wiley Computer Publishing, New York.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E51	DATABASE MANAGEMENT SYSTEMS	1	0	1	2	2

Instructional Objectives:
1.   To understand the concepts of database security and reliability.
2.   To enable the learner to become a Database application programmer.

UNIT I - Introduction and Conceptual Modeling
Purpose of database system - Advantages of DBMS over file processing System-View of data-Data abstraction-Data Independence - Data models - Database users - Database Administrator - DBMS system structure.

UNIT II - SQL
Data Definition Language Statements – Data manipulation language statements – Transaction Control Language Statements - Data Control Language statements

UNIT III - Functions
scalar functions – Group functions – Set operators – Joins. PL/SQL: Basics – Trigger – Exception Handling.

UNIT IV - Relational Model and Normalization
Entity Relationship model basic concepts – Relational model - Decomposition – Functional Dependency – Normalization: 1NF - 2NF-3NF - BCNF- Multi value dependency and 4NF - 5NF.

UNIT V - Data Storage
Data Storage: Physical Storage media – Magnetic Disks – File and Record organization. Indexing: Primary index – Secondary indices. Hashing: Static hashing – Dynamic hashing.

TEXT BOOK
1. Abraham Silberschatz, Henry F. Korth, Sudarshan, S (2005), **Database System concepts,** Fourth Edition, McGraw Hill, New Delhi (For 1 to 5 units).

REFERENCES

1. Kevin Loney, Gerorge Koch (2002), **Oraclei The Complete Reference,** McGraw Hill, New Delhi.
2. Ragu Ramakrishnan (1998), **Database management Systems,** WCB / Mc Graw Hill, New Delhi.
3. Alexis Leon, Mathews Leon (1999), Database Management Systems, Vikas Publishing House Pvt. Ltd., New Delhi.
4. Date C.J (2003), **An Introduction to database,** version 2, Addison Wesley, New York.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E52	PROGRAMMING IN JAVA WITH LAB	1	0	1	2	2

Instructional Objectives:
1. To understand the principles and concepts of object programming.
2. To learn multithreading concepts.
3. To enable the learner to pursue careers in Java solution Architect/Java Programmer

UNIT I - Introduction to Java
The Creation of Java- The Java Buzzwords- An Overview of Java- Data Types,-Variables-Arrays- Operators- Control Statements.

UNIT II - Object Oriented Concepts
Introducing Classes- Overloading Methods- Introducing Access Control-Introducing final- Inheritance Basics- Method Overriding- Using Abstract Classes-The String Constructors- Special String Operations- String Comparison- String Buffer.

UNIT III - Packages Interference Exception Handling and Multithreading
Packages – Interfaces - Exception Handling - The Java Thread Model - The Main Thread - Creating a Thread - Thread Priorities – Synchronization - Interthread Communication.

UNIT IV - Applet, AWT and Event Handling
Applet Basics - Applet Architecture - An Applet Skeleton - Simple Applet Display Methods - Requesting Repainting - The HTML APPLET Tag - AWT Classes - Window Fundamentals - Working with Graphics - Event Handling **-** The Delegation Event Model - Event Classes - Event Listener Interfaces.

UNIT V - Java Console Input and Output and File

Enumerations - I/O Basics - Reading Console Input - Writing Console Output - The PrintWriter Class - Reading and Writing Files - Collections Overview - The Java I/O Classes and Interfaces – File - The Stream Classes - The Byte Streams - The Character Streams.

TEXT BOOK

1. Herbert Schildt (2007), Java: The Complete Reference, The McGraw-Hill, Seventh Edition, New Delhi (For 1 to 5 units).

REFERENCES

1. Horstmann S, Gray Cornell (2001), Core Java 2 Volume In, Fundamentals, Addition Wesley, New York.
2. Amold and Gosling, J. (2000), The Java Programming Language, Addition Wesley, 2nd Edition, New Delhi.
3. Art Gittleman (2002), Ultimate Java Programming, Wiley Publications, New York.
4. Herbert Schildt (2007), Java: The Complete Reference, the McGraw-Hill, Eight Edition, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E81	CONTENT MANAGEMENT SYSTEM	1	1	0	2	2

Course Objectives:

At the end of this course the learner is expected :

1. To acquire basic knowledge about CMS
2. To gather extensive knowledge in designing skills in CMS
3. To learn about various types of CMS

UNIT I - CONTENT

Defining Data, Information, and Content - Content Format - Content Structure - Content Functionality - What Is Content Really?

UNIT II - CONTENT MANAGEMENT

Understanding Content Management - Major Parts of a CMS - The Branches of Content Management - The Roots of Content Management.

UNIT III - DOING CONTENT MANAGEMENT PROJECTS

Doing CM Projects Simply - Staffing a CMS - Getting Ready for a CMS - Doing Requirements Gathering - Doing Logical Design - Selecting Hardware and Software - Implementing the System.

UNIT IV - DESIGNING A CMS

Designing a CMS Simply - The Wheel of Content Management - Working with Metadata - Cataloguing - Designing Publications - Designing Content Types - Designing Content Access - Designing Workflow and Staffing Models.

UNIT V - Building a CMS & Case Study

Building a CMS Simply - Building Collection Systems - Building Publishing Systems. Case Tools – Joomla.

TEXT BOOKS:

1.   Bob Boiko – **Content Management Bible, 2nd Edition** - Wiley Publishing, Inc.- 2005

REFERENCES

1.   Eric Tiggeler - **Joomla! 3 Beginner's Guide** - PACKT Publishing – 2013.
2.   Sofia Hauschildt **- CMS Made Simple 1.6 Beginners Guide** – PACKT Publishing – 2010.
3.   Ishai Sagi – **SharePoint 2010 How To** – Pearson Education – SAMS 2011.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E53	WEB TECHNOLOGY WITH LAB	1	0	1	2	2

Instructional Objectives:

1.   To provide knowledge on Internet and its related concepts.
2.   To enrich the knowledge of scripting languages.
3.   To introduce advance HTML tags.
4.   To enable the learner to become a Web Designer.

UNIT I - Introduction to Internet and World Wide Web

History of the Internet, Email concepts, Sending and Receiving files by E-mail, Intranet, Domain Name System, Web Browsers, Web Pages.

UNIT II - Hypertext Markup Language

Basics of HTML, HTML Document display, Formatting Text, Link, Lists, Images, Tables, Forms, and Frames.

UNIT III - Usage of Cascading Style Sheet

Syntax of CSS, Style sheets types, Properties and Text attributes Padding, List properties, List Properties, Positioning, Margins, Colors, Properties and Table attributes

UNIT IV - Fundamentals of Java Script

Introduction to JavaScript, JavaScript Elements, Variables, Operators, Control Statements, Arrays, Functions.

UNIT V - Server-Side Programming

Client-Side Scripting and Server-Side Scripting, Servlets – Definition, Active Server Pages –Comparison of ASP over JSP.

TEXT BOOK

1. Deven N. Shah (2012), **A Complete Guide to Internet and Web Programming,** DreamTech Press, New Delhi

REFERENCES

1. Raj Kamal (2002), **Internet and Web Technologies**, TataMcGraw Hill, New Delhi.
2. Margaret Levine Young (2002), **Internet the Complete Reference**, TataMcGraw Hill, Second Edition, New Delhi.

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E82	**CYBER LAW AND CRIMES**	1	1	0	2	2

Instructional Objectives:

1. To learn the principles of computer investigations and digital evidence.
2. To learn about jurisdiction, chain of evidence, legal authority, social, legal, and ethical implications.
3. To prepare students for careers in homeland defense, law enforcement, or commercial IT security.

UNIT I - Information Age and Cyber Crime

Cyber Space - Relationship between Computers Crime and Law - Brief Historical Perspective of Criminal Law - Classification of Crimes - Cyber Crime : Definition of "Computer Crime" - Computer Crime categories - Types of Computer Crimes - Classification of Computer Crime - Crime on Web - Indian Scenario - Definition of Cyber Jurisdiction

UNIT II -Cyber Crime and Criminal Codification in India

Indian Penal Code : I to III - Indian Penal Code : IV to VI - Indian Penal Code : VII to IX - Indian Penal Code : X to XII - Indian Penal Code : XIII to XV

UNIT III - Protection of Intellectual Property – II

Copyrights - Digital Signature - Working of Digital Technology - Privacy Issues in the Information Age - Privacy and Surveillance - Privacy: Meaning - Legal Perspective and Framework - Kind and Pattern Intrusions Motive - Methods of Attack - Topology of Intruders - Global Differences.

UNIT IV- Communication Network as Surveillance Tool

The Web – Intelligence- Tool – Espionage - The Interlude - Data and Information Processing - The operations - The Tradecraft - The armament - Economic Intelligence and Attacks - Web or Net Crimes - Hackers Psychology and Laws Related To Hacking - Genesis of the term Hacker

UNIT V - Identity and Information Theft

Identity Theft case Files - Avoid being an Easy Target - Cyber Fraud and Electronic Misuse - Definition of Computer Fraud or cyber Fraud - Characteristics Cyber Fraud Offence - The legal Issues - Fraud-Related Offenses - Protection of Cyber Crimes Encryption in Crime and Terrorism - Law Enforcement Options

TEXT BOOK

1.   Prof.Parag Diwan, Dr.R.K.Suri and Dr. Sanjay Kaushik (2003), **Cyber Crime,** Volume: 11, IT Encyclopaedia.com , Pentagon Press, New Delhi, 4th Edition.

REFERENCE:

1.   Johnson, Thomas A. (2006), Forensic Computer Crime Investigation Boca Raton-Fla: CRC–Press, New York

Subject Code	Title of the Subject	L	T	P	Total LTP	C
PCA15E83	**CLOUD COMPUTING**	1	1	0	2	2

Instructional Objectives:
1. To understand the need of cloud computing in the IT sector
2. To know the cloud service providers and the kind of services offered by them
3. To analyze the benefits of cloud in business continuity by applying cloud services, security and virtualization features
4. To enable the learner for aspiring careers in Cloud / Software Product development areas.

UNIT I - Cloud Fundamentals
Cloud computing Definition – Cloud Models such as NIST, Cube, Private, Public, Hybrid and Community clouds – Cloud Characteristics – Benefits, Disadvantages, Challenges and obstacles of Cloud Computing– Types of Cloud Services (IaaS, PaaS, SaaS, IdaaS).

UNIT II - Cloud Platforms
Abstraction – Load balancing and virtualization: case study Google cloud – Hypervisors : Case study VMware - Machine Imaging – Capacity Planning with baseline metrics, measurement, load testing, network capacity and scaling.

UNIT III - Cloud Service Providers
Google Web Services: Explore and survey Google Application, APIs and Google App Engine   - Amazon Web services: Components, Elastic Compute Cloud (EC2), Amazon Storage Systems, Amazon Elastic Block Store, and Amazon Database Services.

UNIT IV - Cloud Infrastructure and Security
Cloud Management: Responsibilities, Lifecycle, Management Products and Standards -Cloud security: CSA Cloud Reference Model – Implement Cloud security for Infrastructure, Data, Network, Storage and Host.

UNIT V - SOA, Storage and Backup
Network service model infrastructure, Communication and Management of SOA – Moving applications to cloud, Service attributes and Cloud bursting – Cloud storage, provisioning, unmanaged and managed storage.

TEXT BOOKS:
1. Barrie Sosinsky (2011), "Cloud Computing Bible", Wiley Publishing Inc., New York
2. Kris Jamsa (2012), "Cloud Computing: SaaS, PaaS,IaaS, Virtualization, Business Models, Security and More", Jones and Bartlett Learning LLC, Boston, USA

REFERENCES
1. George Reese (2009), "Cloud Application Architectures: Building Applications and Infrastructures in the cloud" ,O'Reilly Media Inc. Cambridge,USA
2. Anthony T.Velte, Toby J. Velte, Robert Elsenpeter (2010), "Cloud Computing: A practical approach" , McGrawHill, New Delhi.