SYLLABUS

FOR

Master of Computer Application (MCA) Programme

SHRI GURU RAM RAI UNIVERSITY DEHRADUN

Program Structure

Master of Computer Application (MCA)

FIRST SEMESTER

S. No	Course No.	Subject	Period			Sessional			Examination		Credit
			L	T	P	TA	CT	INT	ESE	Sub. Total	
Theory											
1.	MCA 101	Problem Solving using 'C' Language	3	1	0	10	30	40	60	100	4
2.	MCA 102	Web Programming	3	1	0	10	30	40	60	100	4
3.	MCA 103	MFCS	3	1	0	10	30	40	60	100	4
4.	MCA 104	Computer Network	3	1	0	10	30	40	60	100	4
5.	MCA 105	Computer System Architecture	3	1	0	10	30	40	60	100	4
6.	MCA 106	Professional Communications & Seminar	3	1	0	10	30	40	60	100	4
Practical											
1.	MCA P11	C Programming -Lab	-	-	2	-	-	50	50	100	1
2.	MCA P12	Web Programming- Lab	-	-	2	-	-	50	50	100	1
3.			-	-							
Total			**18**	**6**	**4**	**60**	**180**	**340**	**460**	**800**	**26**

L	: Lecture
T	: Tutorial
P	: Practical
TA	: Teacher Assessment
CT	: Class Test
INT	: Internal Assessment
ESE	:End Semester Examination
SUB TOT.	: Subject Total

SECOND SEMESTER:

S. No	Course No.	Subject	Evaluation – Scheme								Credit
			Period			Sessional			Examination		
			L	T	P	TA	CT	INT	ESE	Sub. Total	
Theory											
1	MCA 201	Data Structure using 'C'	3	1	0	10	30	40	60	100	4
2	MCA 202	Java Programming	3	1	0	10	30	40	60	100	4
3	MCA 203	DBMS	3	1	0	10	30	40	60	100	4
4	MCA 204	Graph Theory	3	1	0	10	30	40	60	100	4
5	MCA 205	Computer Graphics	3	1	0	10	30	40	60	100	4
6	MCA 206	CBNST	3	1	0	10	30	40	60	100	4
Practical											
7	MCA P21	Data Structure Lab	-	-	2	-	-	50	50	100	1
8	MCA P22	Java Programming Lab	-	-	2	-	-	50	50	100	1
9	MCA P23	SQL Lab			2			50	50	100	1
Total			18	6	6	60	180	390	510	900	27

L	: Lecture
T	: Tutorial
P	: Practical
TA	: Teacher Assessment
CT	: Class Test
INT	: Internal Assessment
ESE	: End Semester Examination
SUB TOT.	: Subject Total

.

THIRD SEMESTER:

S.No	Course No.	Subject	Period			Sessional			Examination		Credit
			L	T	P	TA	CT	INT	ESE	Sub. Total	
Theory											
1	MCA 301	Operating System	3	1	0	10	30	40	60	100	4
2	MCA 302	Elective I	3	1	0	10	30	40	60	100	4
3	MCA 303	Algorithm Analysis & Design	3	1	0	10	30	40	60	100	4
4	MCA 304	Software Engineering	3	1	0	10	30	40	60	100	4
5	MCA 305	Artificial Intelligence	3	1	0	10	30	40	60	100	4
6	MCA 306	Software Testing	3	1	0	10	30	40	60	100	4
Practical											
7	MCA P31	Unix Lab	-	-	2	-	-	50	50	100	1
8	MCA P32	Elective I Lab	-	-	2	-	-	50	50	100	1
9	MCA P33	Minor Project			4			50	50	100	2
Total			18	6	8	60	180	390	510	900	28

L	: Lecture
T	: Tutorial
P	: Practical
TA	: Teacher Assessment
CT	: Class Test
INT	: Internal Assessment
ESE	:End Semester Examination
SUB TOT.	: Subject Total

FOURTH SEMESTER:

S. No	Course No.	Subject	Period			Sessional			Examination		Credit
			L	T	P	TA	CT	INT	ESE	Sub. Total	
Theory											
1	MCA 401	Android Programming	3	1	0	10	30	40	60	100	4
2	MCA 402	Elective II	3	1	0	10	30	40	60	100	4
3	MCA 403	Network Security & Cryptography	3	1	0	10	30	40	60	100	4
4	MCA 404	Elective III	3	1	0	10	30	40	60	100	4
5	MCA 405	Elective IV	3	1	0	10	30	40	60	100	4
Practical											
1.	MCA P41	Android Lab	-	-	2	-	-	50	50	100	1
2.	MCA P42	Elective -2 Lab	-	-	2	-	-	50	50	100	1
3	MCA P43	Project						100	200	300	10
Total			15	5	4	50	150	400	600	1000	32

L	: Lecture
T	: Tutorial
P	: Practical
TA	: Teacher Assessment
CT	: Class Test
INT	: Internal Assessment
ESE	:End Semester Examination
SUB TOT.	: Subject Total

Elective Papers

MCA 302

Elective 1(Any One)
302.1 Advance Java
302.2 Python
302.3 PL/ SQL

MCA402

Elective 2 (Any One)

402.1 PHP Programming
402.2 C# Dot Net
402.3.Data Science

MCA 404

Elective 3 (Any one)

MCA 404.1 Mobile Computing
MCA 404.2 Big Data
MCA 404 .3 Cloud Computing

MCA 405

Elective 4 (Any one)

MCA 405.1 Supply Chain Management
MCA 405.2 E-Commerce
MCA 405.3 Enterprise Resource Planning

FIRST SEMESTER

MCA 101 PROBLEM SOLVING USING 'C' LANGUAGE

Course Objective
- To learn 'C' Programming in MS-DOS environment.
- To learn different condition statements and iterations
- To Learn functions, pointer, arrays
- Understanding functional hierarchy and code organization.
- To learn file management and permissions.

Course Outcome
- To apply basic data structure to create programs
- To apply conditions and iterations to create program structures.
- Ability to work with arrays.
- To implement file permissions and create text files.

Pre-requisite: NIL

UNIT I - Introduction To 'C' Language

History of 'C' language, Programming paradigms: Top-down and Bottom-up, Structure of a C program, Character sets, Constants and variables, Identifiers and keywords. Data types. operators and expressions, Precedence and associativity of operators in 'C'. Type conversion and type casting. Symbolic constants. Input-output library functions -getchar(), putchar() ,scanf(), printf(), gets(), puts() etc. C Library- commonly used header files. Conditional control statements- if, if-else, nested if-else, else-if ladder, multiple branching control statements ,switch-case. Loop control statements- while, do-while, for, nested loops. Jump control statements- break and continue. goto, exit and return statements.

UNIT II - Arrays and Functions

Arrays: defining an array, passing array to a function, two-dim and multi-dim array, matrix addition and multiplication, multi-dimensional arrays. Strings in 'C'- operations and functions of strings. Storage classes. Functions: Syntax, return value; parameter passing - call by value, call by reference; return statement, calling a function, recursion basics,library functions.

UNIT III - Pointers and preprocessor directives

Pointers- address-off operator, value-at operator, pointer declaration and its use. Passing pointer to a function. Various operations on pointers. pointers and arrays, array of pointers. C-pre-processor- basics, #include, #define, #undef, conditional compilation directive- #if, #else, #elif, #ifdef and #ifndef, #error. Command line arguments in C.

UNIT IV – Structure & Union

Defining a structure, pointer to structures, structure within structure. Array of structures, structure variable and structure pointer. Union- similarity and difference between structure and unions. Dynamic memory management functions- malloc() ,calloc(), free(), realloc() etc.

UNIT V - File Handling and Related Functions

FILE data structure. File opening modes- read, write, append and others. Operations on file- open, read, write and close. Appending contents in a binary and text file, unformatted data files. Various library functions- fopen() ,read() ,write(), fprintf() and fscanf() ,fseek(), ftell() etc.

Reference Books:

1. Gottfried (Schaum series), Programming and problem solving in 'C',TMH.
2. Kanetkar Y.P., Let us C, BPB Publications
1. The C programming language, Kernighan and Ritchie, PHI
2. The Spirit of C, Cooper Mullish, Jaico Publishing House, Delhi
3. Pointers in C, Kanetkar Y.P. , BPB Publications
4. Programming in C ,Jeeyapoovan,Pearson Education

MCA 102 WEB PROGRAMMING (HTML, CSS, Java Script)

Course Objective
- To acquire knowledge and skill for creation of web site
- To create web applications using tools and techniques.
- To learn client side programming language and tools.

Course Outcome
- Design basic website using HTML and CSS
- Implement dynamic web pages with validation using Java Script.
- Plan, develop, debug, and implement interactive client-side and server-side web applications.

Pre-requisite: NIL

Unit-I: Introduction

Introduction to the internet, introduction to html terminology. Designing webpages: design considerations and planning. Basic tags and document structure, html tags- head, title, body, metadata etc.

Unit II: Web Page Formatting

Paragraph operations- creating and appending paragraphs, line breaks, preformatted text, changing a page's background color, div element. Text items and objects: headings, comments, block quotes, horizontal lines. Inserting special characters- <, >, blank spaces etc. Using various lists- Numbered (ordered) lists, bulleted (unordered) lists, nested lists, definition lists etc.

Unit III: Link, Table and Iframe

Type of links- Text and image links. Opening a page in a new window and new tab. Linking to a specific area in the same page (bookmarks), linking to an e-mail address, linking to other types of files. Images: Adding images using <img> tag, resizing an image, using alternative text, image labels etc. Inserting a table, table borders, table headers, colspan and rowspan. Iframe- Inserting iframes, setting height and width, using an iframe for a link target.

UNIT IV: Forms and Audio-Video controls

Forms- Form elements, input tag, text box, text area, check box, menu list, radio button, submit button, reset button etc. Adding audio and video on webpage, linking to audio and video files, using YouTube to display video.

UNIT V: Cascading Style Sheets

CSS and its Types- inline, internal and external, Structure of each CSS type. Working with CSS- Creating CSS, Adding Comments, Using id and class. Text in CSS- Emphasizing text (bold and italic), decoration, indentation, transformation, text alignment. Backgrounds in CSS- Colors, Images, Fixed Images. Images in CSS- Opacity, floating images, image galleries etc. Box Model in CSS- Margin, Padding, Border, Outline. Navigation Bar- Vertical navigation bar, horizontal navigation bar- inline and floating. Tables in CSS-Borders, cell width and height, color, text element and table padding.

UNIT VI: JavaScript

JavaScript and Browsers. Client-side scripting. JavaScript development tools. JavaScript case sensitivity and comments. Variables, datatypes, reservewords, Operators, Control statements- if-else, loops, break, continue and labels, functions and event handling, Dialog boxes- alert, confirm and prompt. JavaScript library functions- string, arrays, date, math. Introduction to advanced JavaScript- RegEx, DOM, ImageMaps, Form validation.

Book References:

1. HTML & CSS: The Complete Reference, Fifth Edition, Thomas A. Powell.
2. Burdman, "Collaborative Web Development", Addison Wesley
3. Sharma & Sharma, "Developing E-Commerce Sites" Addison Wesley
4. IvanBayross, "Web Technologies Part-I" BPB Publications

MCA 103 MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Course Objectives:-
1. Understand different Types of Discrete Structures.
2. Express a Logic Sentence in Terms of Predicates, Quantifiers, and Logical Connectives.
3. Understand Recursive Definitions.

Course Outcome:
1. Analyze Properties of Algebraic Structures Such as Groups,
2. Apply the Operations of Sets and use Venn Diagrams to Solve Applied Problems;
3. Use and Analyze Recursive Definitions
4. Understand, Explain and Apply the Basic Principles of Sets and Operations in Sets to Solve the Problems of matrices

Prerequisite: Knowledge of Basic Math's

UNIT Proposition Logic

Proposition, logical connectives, truth tables, tautologies, contradiction, normal forms(conjunctive and disjunctive), validity of an argument, converse, inverse, contrapositive, Universal and existential quantifiers.

UNIT II Matrix

Definition & types of matrix ,Matrix addition and multiplication ,Transpose and inverse of matrix, Rank of matrix, linear independence/dependence of vectors, Consistency of System of Linear Equations and its Solution, Eigen values and Eigenvectors, Cayley-Hamilton Theorem, Diagonalization.

UNIT -III Relations and functions

Cartesian product of sets, relation, types of relation, equivalence relation, equivalence classes, matrix and graph representation of a relation, closure of a relation, partial order relation, Hasse diagram.

UNIT IV Graph Theory

Binary opertions, groups and properties, subgroups, cyclic groups and properties, group of permutations, orbit, cycles and alternating group, cosets, Lagrange's theorem.

UNIT -V Lattices & Posets

Posets, Well ordered set, maximal and minimal element, greatest and least element, least upper bound, greatest lower bound, Lattices, properties of Lattices, Isomorphism, Some special lattices: Bounded lattice and complemented lattices, distributive lattice Modular lattice, Complete lattice.

UNIT -VI Recurrence relation

Homogenous and Non homogenous equation, Discrete numeric function, basis operations, convolution, recurrence relation, solution by iteration method, undetermined coefficient method, generating function method.

Reference Books:

1.   Liptschutz, Seymour, "Discrete Mathematics", TMH.
2.   Trembley, J.P. & R. Manohar,"Discrete mathematical Structure with Application to Computer Science", TMH.
3.   Kenneth H. Rosen, "Discrete Mathematics and its applications', TMH.
4.   Doerr Alan and Levasseur Kenneth, "Applied Discrete Structure for Computer Science, Galgotia Pub.
5.   Gersting "Mathematical Structure for Computer Science", WH freeman and Macmillan
6.   Hopcroft J.E. Uliman J.D., "Introduction to Automata Theory, Language and Computation" Narosa Pub. House,
7.   Peter Grossman, "Discrete Mathematics for Computer", Palgrave Macmillian.

MCA 104 - COMPUTER NETWORKS

Course Objectives:-

1. Build an Understanding of the Fundamental Concepts of Computer Networking.
2. Familiarize the Student with the Basic Taxonomy and Terminology of the Computer Networking Area.
3. Introduce the Student to Advanced Networking Concepts
4. Preparing the Student for Advanced Courses in Computer Networking.

Course Outcome:-

1. Demonstrate the Basic Concepts of Networking, Networking Principles, Routing Algorithms, IP Addressing and Working of Networking Devices.
2. Demonstrate the Significance, Purpose and application of Networking Protocols and Standards.
3. Describe, compare and contrast LAN, WAN, MAN, Intranet, Internet, and Various Switching Techniques.
4. Explain the working of Layers and the various protocols of OSI & TCP/IP model.

Prerequisite: NIL

UNIT –I Introductory Concepts

Goals and Applications of Networks, Need of Network, Elements of Network, Network structure and architecture, OSI &TCP/IP reference model, Transmission modes, networks topology, Guided and un Guided Media , High Speed networks: FDDI ,FDDI, switching methods, Integrated services digital networks.

Unit-II Data Link Layer

Framing, error control (Single parity bit checking ,2D parity bit checking, checksum, CRC, Hamming Error Correction code),Elementary data link protocols:- sliding windows protocols(Stop & Wait ARQ ,GO Back to N & Select repeat ARQ) , High Level Data Link Control
Medium access sub layer:-
Channel allocations (static and dynamic channel allocation) , ALOHA Protocols- Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA/CD,CSMA/CA.

Unit-III Network Layer

Point-to Point networks, routing algorithms ,Adaptive and Non adaptive Routing algorithm, (Distance vector and Link state routing algorithm) , congestion control strategies & algorithms(Token bucket and leaky bucket algorithm), internetworking, IPV4 & IP Datagram, IP addresses, Class of IP,Subnetting,masking,IPv6.

Unit-IV Transport Layer

Design issues, connection management, Three way handshaking, TCP window Management, User Datagram Protocol, Transmission Control Protocol, Port number and socket address.

Unit-V Application Layer

Network Security, symmetric and Asymmetric encryption algorithm ,DES, RSA algorithms, Domain Name System, Simple Network Management Protocol, Electronic mail, SMTP, POP, File Transfer Protocol, Hyper Text Transfer Protocol.

Reference Books

1. W. Stallings, "Data and Computer Communication", Macmillan Press
2. Forouzan, "Data Communication and Networking", TMH
3.Data Communication & Computer Network ,Tanenbaum

MCA 105 COMPUTER SYSTEM ARCHITECTURE

Course Objectives:

To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits. This course will also expose students to the basic architecture of processing, memory and I/O organization in a computer system.

Course Outcomes:

After studying this course the students would:
1. Have a thorough understanding of the fundamental concepts and techniques used in digital electronics.
2. Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
3. Analyze the performance of commercially available computers and develop logic for assembly language programming.

Course Contents:

UNIT 1 – Logic Gates and Boolean Algebra

Logic Gates: AND, OR, NOT, XOR, XNOR, NAND and NOR as Universal Gates.
Boolean Algebra: Boolean postulates and laws , De Morgan's Theorem, Principle of Duality, Boolean expression, Boolean function, Minimization of Boolean expressions, Sum of Products (SOP), Product of Sums(POS), Minterm-Maxterm, Canonical forms , Karnaugh Map Simplification-Don't care conditions.

UNIT 2- Logic Circuits

Combinational Circuits: Half Adder, Full Adder, Half Subtractor, Full Subtractor, Serial Adder/Subtractor, Parallel Adder/ Subtractor, Decoder, Encoders, Multiplexers, Demultiplexers.
Sequential Circuits: Latch, Flip Flops- SR, JK, Data, Toggle,
Registers: Shift register functions, Serial in/serial out shift registers, serial in/parallel out shift registers, Parallel In/ Parallel out shift registers, bidirectional Shift registers and Counters

UNIT 3 – Computer Organization

Basic Organization: Micro-Operations, Register Transfer Micro-Operations, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Bus and Memory Transfers, Programming Registers, CPU organization.
Instruction Formats, Three- Address Instructions, Two – Address Instructions, One- Address Instructions, Zero Address Instructions
Addressing modes, CISC Characteristics vs. RISC Characteristics.

UNIT 4 -Memory & I/O Organization

Memory Hierarchy, Main Memory, Auxiliary Memory, Cache Memory, Virtual Memory.
Input-Output Organization- Data Transfer Techniques-Synchronous and Asynchronous Data Transfer, DMA

Books Recommended:

1. Computer System Architecture, Morris Mano, PHI
2. William Stallings, "Computer Organization and Architecture", Prentice Hall of India, Sixth Edition.
3. Computer Architecture, Carter, Schaum Outline Series, TMH
4. Digital Principles &Applications,MalvinoLeach.,TMH.

MCA 106 PROFESSIONAL COMMUNICATIONS

Course Objective:

- Enhance the Employability and Career Skills of students
- Orient the students towards grooming as a professional.
- Make them Employable.
- Develop their confidence and help them attend interviews successfully and achieve growth by acquiring professionalism as a habit.

Course Outcome

- To inculcate professional and ethical attitude at the work place.
- To effective communication and interpersonal skills.

Pre-requisite: NIL

UNIT I

Introduction to Soft Skills– Hard skills & soft skills – employ-ability and career Skills—Grooming as a professional with values—Time Management—Conflict management ,Anger management-Stress Management

UNIT II

Self-Introduction-organizing the material – Written communication -Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics – brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/online interview -one to one interview &panel interview –CV writing ,Job application , FAQs related to job interviews

References:
1. Effective Communication and soft skills **Author** Nitin bhatnagr and Mamta bhatnagar ,**Publisher** - Pearson Publication.
2. Basic Communication skills for technology **Author**-Rutherford **,Publishe**r -Pearson Publication

3. Business Communication **Author** N Gupta ,**Publisher** -Sathya Bhawna Publication

SECOND SEMESTER

MCA 201 DATA STRUCTURE

Course Objectives:

• To develop proficiency in the specification, representation, and implementation of Data Types and Data Structures.
• To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
• To get a good understanding of applications of Data Structures.
• To develop a base for advanced computer science study.

Course Outcome:

- Select appropriate data structure as specified to applied problem.
- Implement operations like searching, insertion, deletion etc.
- Implement linear and Non-Linear structure

Prerequisites: Any programming language like C, C++

Unit –I

Introduction: Basic Terminology, Elementary Data Organization, Structure operations, Algorithm Complexity and Time-Space trade-off
Arrays& Linked list: Array Definition, Representation and Analysis, Single and Multidimensional, Sparse Matrices, Recursive definition and processes, recursion in C, example of recursion, Tower of Hanoi

Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array

Unit - II

Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues**.**

Unit - III

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, path length algorithm**.** Huffman Algorithm. Binary Search Tree (BST), Insertion and Deletion in BST.

Unit – IV

Sorting: Selection sort, Bubble sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort,.
Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies.

Unit - V

Introduction to Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal
File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing,

References

1. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia
2. R. Kruse etal, "Data Structures and Program Design in C" Pearson Education
3. A M Tenenbaum etal, "Data Structures using C & C++", PHI
4. Lipschutz, "Data Structure", TMH
5. AdamDrozdek, "Data Structures and Algorithms in C++", Thomson Asia
6. Pal G. Sorenson, "An Introduction to Data Structures with Application", TMH.

MCA 202 JAVA PROGRAMMING

Course Objective

- This subject will help to improve the analytical skills of object oriented programming
- To understand importance of classes and objects in Java.
- To understand the concept of inheritance in Java.
- To understand the different files stream in Java

Course Outcome

On successful completion of this course, the student should be able to:

- Implement Object Oriented Programming concept using basic syntaxes of control structure.
- Identify class and object member of a class and relationship among them.
- Demonstrate an introductory understanding of graphical user interfaces, multi-threaded programming, and event-driven programming.

Pre-requisite: NIL

Unit-I

Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If , else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue. Single and Multidimensional Array, String class, String Buffer class, Operations on string, Command line argument, Use of Wrapper Class.

Unit-II

Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class. Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding Handle multilevel constructors – super keyword ,Stop Inheritance - Final keywords, Creation and Implementation of an interface, Interface reference, instance of operator, Interface inheritance, Dynamic method dispatch, Understanding of Java Object Class.

UNIT-III

Package, Import statement, Exception Handling, Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class.
Multithreaded Programming,Use of Multithread programming, Thread class and Runnable interface , Thread priority, Thread synchronization.

UNIT-IV

Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File InputStream, File Output Stream, InputStreamReader, OutputStreamWriter, FileReader, FileWriter, Buffered Reader, Collection Classes List, ArrayList, Enumeration, Vector, Properties, Introuduction to Java.util package.

Unit V

Java Applet, Applet Life Cycle, invoking java applet, applets tags, using Graphics, Color, Font classes, applet textfield, Introduction to AWT, GUI components Button, TextField, ComboBox, Panel etc. Event Handling.

Reference Books:

1. Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.
2. Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.
3. Murach's Beginning Java 2, Doug Lowe, Joel Murach and Andrea Steelman, SPD
4. Core Java Volume-I Fundamentals, Eight Edition, Horstmann & Cornell, Pearson Education.
5. The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.
6. Java Programming, D. S. Malik, Cengage Learning.
7. Big Java, 3rd Ed., Horstmann, Wiley-India.

MCA 203 DATA BASE MANAGEMENT SYSTEM

Course Objective
Students will try to learn:
- Learn and practice data modelling using the entity-relationship and developing database designs.
- Understand the use of Structured Query Language (SQL).
- Apply normalization techniques to normalize the database
- Understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access.

Course Outcome
Students will be able to:
- Understand the fundamentals of a database systems
- Design and draw ER and EER diagram for the real life problem.
- Convert conceptual model to relational model and formulate relational algebra queries.
- Design and querying database using SQL.
- Analyze and apply concepts of normalization to relational database design.
- Understand the concept of transaction, concurrency and recovery.

Pre- requisites: No Pre- requisites require.

UNIT I – Basic concepts
Database , Characteristics of the Database, Approach & advantages of using DBMS. Data Models, Schemas& Instances. Database abstraction & Data Independence. Overall structure of Database ,Data Dictionary, Database Users ,Role of DBA.Data Modeling using the Entity-Relationship Model -Entity types, Entity Sets, Attributes andKeys, Relationship & its Types, Enhanced ER Model- Specialization , Generalization, Aggregation.

UNIT II –Relational Model, Languages & Systems

Relational Data Model Concepts and Constraints. Relational Algebra, select, project & join operations. Overview of keys (primary, composite, foreign, alternate, candidate), relational Calculus.

UNIT III – Relational Data Base Design

Function Dependencies & Normalization, Normal forms (INF, 2NF, 3NF & BCNF). Lossless join & Dependency preserving, decomposition, multivalued dependencies, join dependencies (4NF & 5NF).

UNIT IV – Transactions, Concurrency Control, Recovery Techniques

Basic concept, ACID properties, transaction state, concurrent executions, concurrency control, basic idea of serializability, view and conflict serializabllity, Recovery techniques, failure classification , log based recovery, locking protocols, shadow paging , checkpoints.
UNIT V – SQL - DDL statements, DML statements, Views, sequence, synonyms, sub queries, joins, transaction commands, specifying constraints, Indexes in SQL.

Reference Books
1. Elmsari and Navathe, "Fundamental of Database System", Addison Wesley. New York.
2. H.Korth& A. Silberschatz, "DATABASE SYSTEM CONCEPTS", TMH.
3. Date. CJ, "An Introduction to Database System", NarosaPublishingHouse. New Delhi.
4. Desai, B, "An Introduction to Database Concepts", GalgotiaPublications. New Delhi.
5. Ullman. J.D, "Principles of Database Systems", Galgotia Publications, New Delhi.

MCA-204   GRAPH THEORY

Course objective:-
1. To know various terminology of graph
2. To know the application of graph theory to solve real life problem, engineering problems
3. To learn & understand various algorithms and theorems of graph theory.

Course outcome:
1. define basic notions in graph theory
2. account for the basics in chromatic graph theory
3. account for basic properties of matchings
4. account for the theory of paths and the degree of connectedness of a graph
5. prove the theorems that are treated in the course

Prerequisite: NIL

UNIT I Introduction to Graphs

Definition of a graph, applications of graph, finite and infinite graphs, degree of a vertex, types of graphs, isomorphism, sub-graphs, walk, path, circuit, connectedness, operations on graphs, Euler graph, Hamiltonian graph, circuits and cut-sets. Planar graph, Euler's polyhedron formula, Kuratowski's graphs, detection of planarity, geometric dual, combinatorial dual, thickness and crossings.

UNIT II Trees and shortest path algorithms

Tree Basics & Properties, pendent vertices, distance, center , diameters, radius, eccentricity, rooted and binary trees, On counting tress, Depth of Tree, spanning tree, Minimum Spanning Tree , fundamental circuits and cut-sets, finding all spanning trees of a graph.
Shortest distance Algorithms: Algorithms of Prims & Kruskal ,Dijkstra's Algorithm

UNIT III Matrix representation of directed & undirected graphs

Incidence matrix of graph, sub matrices of A(G), circuit matrix, fundamental circuit matrix and rank of B, cut set matrix, relationships among A_f , B_f and C_f , adjacency matrices, path matrix, rank- nullity theorem. Directed graph , Types of directed graphs, Directed paths and connectedness, Euler digraph, Trees with directed edges, Fundamental circuit in digraph, Matrices A, B, C of digraph, adjacency matrix of digraph.

UNIT IV Graph Coloring

Partitioning of graph, Chromatic number, Wetch-Powell Algorithm, Chromatic partitioning, Chromatic polynomials, Decomposition theorem, Five Color theorem , Edge coloring, Chromatic Index, Region coloring, matching & covering, Four color problem.

UNIT V Network Flow & Enumeration of graph

Network flows, max flow mincut algorithm, Enumeration and its types, Counting of labeled and unlabeled trees, Polya's counting theorem, Cayley's Theorem.

Reference Books:

1. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.
2. Grimaldi R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley, 1994.
3. Clark J. and Holton D.A, "A First Look at Graph Theory", Allied Publishers, 1995.
4. Mott J.L., Kandel A. and Baker T.P. "Discrete Mathematics for Computer Scientists and Mathematicians" Prentice Hall of India, 1996.
5. Liu C.L., "Elements of Discrete Mathematics", Mc Graw Hill, 1985.
6. Rosen K.H., "Discrete Mathematics and Its Applications", Mc Graw Hill, 2007.

MCA 205 COMPUTER GRAPHICS

L T P
3 1 0

Course Objective

- To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithm.
- To understand basic principle of 2 dimensional graphics such as transformation, translation etc.
- To discuss various line clipping algorithms.
- To discuss Bezier curve and surfaces

Course Outcome

- To list the basic concept used in computer graphics.
- Implement various line and circle algorithms and scans convert the basic geometrical primitive transformation.
- Implement various lines clipping algorithm.
- To describe importance of viewing and projection
- Basic idea of multimedia devices

Pre-requisite: NIL

Unit I – Computer Graphics and output primitives

Concepts and applications, Random and Raster scan devices, CRT, LCD ,TFT , plasma panels ,DLP , Printers, Keyboards, Mouse, Scanners, Graphics Software, output primitives, Pixel ,frame buffer, function for segment, segmenting display file ,posting and un-posting & appending segment, Free storage allocation ,display file structure.

Unit II Line and circle drawing algorithm

DDA, Bresenham's. Line and Circle generating algorithm, Midpoint circle drawing algorithms: Attributes of output primitive, Antialising, Area filling: Filled area primitive: Scan-line Polygon fill Algorithm, boundary fill algorithm, flood fill algorithm.

Unit III – 2-D-Transformation, Viewing, Clipping

Two-dimensional Transformations: Translation, scaling, rotation, reflection, shear, matrix representation of all homogeneous coordinates composite transformation. 2D-projections– parallel and perspective projection, 2D dimensional viewing, Viewing pipeline, Window-to-view port transformation. Clipping operations, Line Clipping: Cohen Sutherland, Liang-barsky, , concave & convex polygon ,Polygon Clipping, Sutherland Hodgeman polygon.

Unit IV – 3-D Transformation and Visible surface detection

3D object representations: Polygon Surface, Tables, Plane Equation. Curved lines and Surfaces: Spline representation, Interpolating and approximation curves, continuity conditions Cubic Splines, Bezier curves, B-Spline curves: characteristics and generation, Visible Surface detection Algorithm: Object based and image based methods, depth comparison, A-Buffer, Back face removal, Scan-line method, Area subdivision method.

Unit V – Overview of Multimedia

Overview of multimedia, Classification, basic concept of sound/audio MIDI: devices, messages, software. Speech, Video and Animation: Basic concept, computer-based animation, methods of controlling animation, display of animation, and transmission of animation. Lossless compression, Lossless compression, Image compression.

References Books:

1. Computer Graphics by Donand Hearn & M. Pauline Baker PHI.
2. Multimedia Computing Communication & Applications " By Ralf Steimnety & Kerla Neshtudt." Prince Hall.
3. Principles of Interactive Compo Graphics; W.M.Newman & Robert F Sproull.
4. Computer Graphics by Rogers TMH.
5. Introduction to Computer Graphics Anirban Mukhopadhyay & Arup Chattopadhyay.
6. Schaum's outlines – Computer Graphics Mc Graw Hill International Edition.5
7. Principles of Multimedia by Ranjan Parekh TMH.
8. "Multimedia Systems Design", P.K.Andleigh & K. Thakrar, Prentice Hall Pvt. Ltd.

MCA 206 COMPUTR BASED NUMERICAL AND STATISTICAL TECHNIQUES

Course Objectives:

With the current deployment of computer technology and tools, it is very important to develop efficient algorithms for solving problems in science, engineering, technology, insurance & banking. Thus, the objective of this course is to enable students to obtain an intuitive and working understanding of numerical methods for the basic problems of numerical analysis and gain experience in the implementation of numerical methods using a computer. They would also gain an appreciation of the concept of error in these methods and the need to analyze and predict it.

Prerequisites:

Basic knowledge of functions, logarithmic, trigonometric and exponential functions, graph of a function, polynomials, and roots of a polynomial, differentiation and integration.

UNIT- I Fixed &Floating point Arithmetic

Representation of floating point numbers, Representation of Integers, Operations, Normalization, Errors in numerical computation.

UNIT II: Interpolation and approximation

Difference tables, Polynomial Interpolation: Newton's forward and backward formula Central Difference Formulae: Sterling's, Bessel's formula , Gauss forward and backward formula. Interpolation with unequal intervals: Lagrange's , hermit Interpolation, Newton Divided difference formula.

UNIT III: Numerical Differentiation and Integration and Differential equation

Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules. Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge Kutta methods

UNIT IV: Solution of Linear and Nonlinear equations

Gauss Elimination , Gauss Seidal iterative method ,Solution of Nonlinear equation using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, zeros of polynomials.

UNIT V: Basic Statistics

Measure of central tendency :Mean, Medain, Mode , Curve Fitting , Method of least squares, fitting of straight lines, polynomials, exponential curves, Correlation and Regression analysis: Introduction, Scatter Diagram, Types of Correlation, Karl Pearson's Method, Linear regression.

Reference Books:

1. Jain Iynger, "Numerical Analysis", PHI-2014
2. Gerald & Wheatley, "Applied Numerical Analyses", AW-2003
3. Gerald & Wheatley, "Applied Numerical Analyses", AW, 2003
4. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age
5. SP Gupta , Statistical Methods, Sultan &Chand sons

THIRD SEMESTER

MCA 301 OPERATING SYSTEM

Course Objective:
- To understand main components of OS and their functions.
- To study process management and scheduling.
- To understand concept of memory management.
- To understand the concept of Disk Organization.

Course Outcome:
- Describe important computer system resources and the role of operating system.
- Understand the process management policies and scheduling of processes by CPU.
- Evaluate the requirement for process synchronization.
- Identify the use and evaluate storage management policies.

Prerequisite: NIL

UNIT I Introduction to operating system

Introduction to Operating Systems Evolution of operating systems, operating systems concepts, types of operating systems, different views of the operating system, operating system services, System calls, Types of system calls. Operating system Structure, Layered Approach, Microkernels, Virtual machines.

UNIT II Process & Scheduling Algorithms

Process Management Process concept, operation on processes, Inter-process communication, mutual exclusion, Process scheduling, Basic Concepts, Scheduling criteria, Scheduling algorithms, Process Synchronization, Inter process Synchronization, Critical section Problem, Semaphores, Monitors, Message passing. Deadlocks, System Model, Deadlock characterization, Deadlock prevention, Deadlock avoidance.

UNIT III Memory management

Memory Management Memory management, swapping, contiguous memory allocation, relocation & protection, Memory management, Paging, Segmentation, Intel Pentium Segmentation, Intel Pentium Paging, Virtual memory, demand paging, performance of demand paging, Page replacement algorithms: FIFO, Optimal, LRU, Counting based page replacement.

UNIT IV File & I/O

File & I/O Management Files system structure, file system implementation, Directory Implementation. Allocation Methods, contiguous allocation, Linked allocation, Indexed allocation Disk organization, disk space management, disk scheduling, Disk Management, RAID Structure.

Reference Books:
1. Operating System Concepts by James L. Peterson, Abraham Silberschatz (Addison-Wesley)
2. Operating System Concepts &. Design by Milan Milenkovic (MGH).
3. Modern Operating System by Andrew .S. Tanenbaum (PHI)
4. An Introduction to Operating Systems by Haevey M Dietel(Addison Wesley)

MCA 302.1 ADVANCE JAVA PROGRAMMING

L	T	P
3	1	2

Course Objective

- Learn how to create a GUI in Java
- Server side programming with the help of Servlet and JSP
- Design and Develop Web applications
- Database connection with the help of Java JDBC

Course Outcome

- Apply event handling on AWT and Swing components
- Create Dynamic Web pages using Servlets and JSP
- Access database records through java program using JDBC

Pre-requisite: Knowledge of Java Programming

UNIT I Graphical user interface

Layout managers: (flow layout, border layout, card layout grid bag layout, grid layout), AWT controls (labels, buttons, canvases, checkboxes, checkbox group, choices, textfields, textareas, lists, scrollbars, panels,split panes, Progress bar , windows, frames, menus, menu bars).
Java Swing: Working with JFrame, JApplet, Jpanel, JTextfield, JPassword Field, Jbutton, Jcheckbox, Jradio button, Jlist, Jscrollpane, Jcombobox, Jmenu, Jmenubar, JMenuItem, Jpopup Menu, JTree, JTable.
Event Handling: Event delegation model or event class hierarchy, all classes and interfaces of event delegation model, programs related to event.

UNIT II Java Bean

Java Beans, Preparing a Class to be a Java Bean, Creating a JavaBean, JavaBean Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean, JSDK

UNIT III JDBC Connectivity

Java   Database   Connectivity   (JDBC): JDBC Classes and its important methods , Merging Data from Multiple Tables: Joining, Manipulating Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures C.

UNIT IV Servlets

Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, The Javax.servlet Package, Accessing a Servlet using an HTML   page, Handling   HTTP   get   Requests , Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession.

UNIT V Java Server Pages (JSP)

Introduction to JSP and webserver ,Tomcat Apache,XAMP, WAMP, JavaServer   Pages   Overview, A First JavaServer Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries

Reference Books:

1. Herbert Schildt (2006), "The Complete Reference Java 2 (Updated to Cover J2SE 1.4)", Ed. 05, Tata McGraw-Hill .
2. Cay S. Horstmann Gary Cornell, " Core Java 2 Volume-I Fundamentals", Ed-07, PEARSON Education.
3. Michael Morgan, "Java 2 for Professionals Developers", Ed. 01, SAMS, Techmedia.
4. Bruce Echel, " Thinking in Java, The Definitive Introduction to Object-Oriented Programming in the Language of World-Wide-Web", Ed-03, PEARSON Education.
5. Philip Heller and Simon Roberts, "Java 2 Developer's Hand Book", BPB Publication.

MCA 302.2 PYTHON PROGRAMMING

Course Objective
Students will try to learn:

- To understand why Python is a useful language for developers.
- To learn how to design and program Python applications.
- To learn how to use lists, tuples, and dictionaries in Python programs.
- To learn how to identify Python object types.
- To learn how to use indexing and slicing to access data in Python programs.
- To define the structure and components of a Python program.
- To learn how to write loops and decision statements in Python.
- To learn how to write functions and pass arguments in Python.
- To learn how to read and write files in Python.
- To learn how to design object oriented programs with Python classes.
- To learn how to use class inheritance in Python for reusability.
- To learn how to use exception handling in Python applications for error handling.
- To learn about the regular expressions

Course Outcome
Students will be able to:

- Develop cost-effective robust applications using the latest Python trends and technologies
- Understand the way of writing program in Python.
- Knowledge about data structures, control structures, creating user-defined functions and lambda expressions in Python
- Use if-else statements and switch-case statements to write programs in Python to tackle any decision-making scenario
- Master Object-oriented programming to create an entire Python project using objects and classes
- Store and retrieve information using variables
- Using the List, Set, Tuple and Dictionary in the programs.
- Finding the expressions using the regular expression
- Reading and writing in file.

Pre- requisites: No Pre- requisites require.

Unit I

Introduction: History, Features, Setting up path, Working with Python, Basic Syntax, Variable and Data Types, Operator
Conditional Statements: If, If- else, Nested if-else, Looping: For, While, Nested loops, Control Statements: Break, Continue, Pass

Unit II

String Manipulation: Accessing Strings, Basic Operations, String slices, Function and Methods

Unit III

Lists: Introduction, Accessing list, Operations, Working with lists, Function and Methods, sorting, searching

Tuple: Introduction, Accessing tuples, Operations, Working, Functions and Methods
Sets: Introduction, Accessing sets, Operations, Working, Functions and Methods

Dictionaries: Introduction, Accessing values in dictionaries, Working with dictionaries, Properties, Functions

Sets: Introduction, Accessing values in sets, Working with dictionaries, Properties, Functions

Unit IV

Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables, Python Lambda, recursion
Modules: Importing module, Math module, Random module, Packages, Composition

Unit V

Input-Output: Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files
Function: Exception Handling , Exception, Exception Handling, Except clause, Try ? finally clause, User Defined Exceptions

Unit VI

OOPs concept: Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding

Unit VII

Regular expressions: Match function, Search function, Matching VS Searching, Modifiers Patterns Database handling in Python using sqlite

Reference Books:

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2. R. Nageswara Rao,"Core Python Programming", dreamtech
3. Wesley J. Chun. "Core Python Programming -Second Edition", Prentice Hall
4. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Pyhon", Wiley

MCA 302.3 PL /SQL

Course Objective:

Writing different Queries to access the database.
Develop and maintain programs in the platform they have studied.
Get a hands-on experience on the concepts learnt during the course

Course Outcome:

Enhance the knowledge and understanding of Database analysis and design.
Enhance the knowledge of the processes of Database Development and Administration using SQL and PL/SQL.
Enhance Programming and Software Engineering skills and techniques using SQL and PL/SQL.

Prerequisite: Knowledge of programming language.

UNIT I SQL and Advance SQL

SQL Commands and Data types, Operators and Expressions, Introduction to SQL * Plus,Managing Tables and Data,Creating and Altering Tables (Including constraints) , Data Manipulation Command like Insert, update, delete , SELECT statement with WHERE, GROUP BY and HAVING clause, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL BETWEEN, EXISTS, LIKE, Join and its types (Non EuqiJoin,EquiJoin,Outer Join, Natural Join, Self Join), subqueries , Built in functions. Advance SQL:View , Synonyms, Index ,Sequence.

UNIT II Introduction to PL/SQL & Cursors

SQL v/s PL/SQL , PL/SQL Block Structure , Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.) , % TYPE and % ROWTYPE , Implicit Cursor, Cursor Attributes, Writing Explicit Cursors (Cursor function, declaring, opening, fetching data from cursor), Cursor FOR loop. Advanced Explicit Cursors (Cursor with Parameter) .

UNIT III Error handling ,Transaction control & Security in PL/SQL

Exception Types, Predefined Exception, User Defined Exception, Raise ApplicationError., Locks, Types of locks, Application of Locks, Transaction Control Statements , Commit, Rollback, Savepoint, Application of Save Point,

UNIT IV PL/SQL Database Objects

Anonymous PL/SQL and named Block, Developing stored Procedures, formal and actual parameters, IN, OUT and INOUT parameters, Creating Functions, Stored Functions, User Defined Functions. Creating Packages, Component of Package, Developing Package, Overloading procedures and Functions

UNIT V Triggers and Collection

Triggers Types of triggers, Create DML Triggers (Row trigger, Statement triggers, Before and after triggers, using OLD and NEW qualifier) , Firing (Timing), Statement Level Triggers and Row Level Triggers, Create Instead of and Disabled Triggers, Manage, Test and Remove Triggers. Collection in PL/SQL Object Types, Nested Tables, Variable Arrays, Associative Arrays/ Index by table Array.

Reference Books:
1. Baron Schwartz , High Performance MySQL, O'Reilly.
2. VikramVaswani , The Complete Reference MySQL , McGraw Hill Educations.
3 Ivan Bayross ,PL/SQL Programming ,TMH.
4 Oracle Complete Reference, Oracle Press

MCA 303 ANALYSIS AND DESIGN OF ALGORITHMS

L	T	P
3	1	0

Course Objective:
- To teach paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice.
- To make students understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms.
- To explain different computational models (e.g., divide-and-conquer), order notation and various complexity measures (e.g., running time, disk space) to analyze the complexity/performance of different algorithms.
- To teach various advanced design and analysis techniques such as greedy algorithms, dynamic programming & Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Course Outcomes: After successful completion of this course, student will be able to

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Prerequisite: The readers should have basic knowledge of programming and mathematics. The readers should know   data structure very well

UNIT-I

Algorithms, Analysis of Algorithms, Design of Algorithms, and Complexity of Algorithms Growth of Functions: Asymptotic notations, Mathematical Analysis of Non-Recursive and Recursive Algorithms. Recurrences and Solution of Recurrence Equations- The Substitution method, The Recurrence–Tree Method, The Master Method.

UNIT-II

Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort, Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort . Red-Black Trees, Augmenting Data Structure.

UNIT-III

Greedy Technique: Fractional Knapsack Problem, Activity Selection Problem.Dynamic Programming: 0/1 Knapsack Problem, Matrix-Chain Multiplication. Backtracking: Hamiltonian Circuit Problem; Branch-and-Bound: Assignment Problem, Traveling Salesperson Problem;

UNIT-IV

Graph: Introduction, Representation of Graph, BFS, DFS, Minimum Spanning Tree: Prims Algorithm, Kruskal Algorithm, Single Source.
Shortest Paths: Bellman-Ford Algorithm, Dijkstra Algorithm, All Pair Shortest Paths: Floyd-Warshall Algorithm,
Flow Network: Maximum flow -min cut theorem.

UNIT-V

NP-Completeness: P, NP, NP-Hard & NP-Complete Class, Reducibility & NP-Complete Problems. Approximation Algorithms: The Vertex Cover Problem, The Set Covering Problem

Reference Books:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India,
2. Ellis Horowitz, Sartaj Sahni, S.Rajasekharan: Fundamentals of ComputerAlgorithms, 2nd Edition, Universities press,
3. Anany Levitin: Introduction to The Design & Analysis of Algorithms, 2nd Edition,Pearson Education.
4. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning.
5. Baase: Computer Algorithms: Introduction to Design and Analysis, 2nd ed., Addis

MCA 304 SOFTWARE ENGINEERING

Course Objective:
- To understand the nature of software development and software life cycle.
- Explain methods for capturing specifying, visualizing analyzing software requirement.
- To know basic of testing and understanding concept of software quality assurance.
- To understand the concept of software cost model.

Course Outcome:
- Define various software applications domain and remember different process model.
- Explain need for software specifications.
- Convert requirement model into design model.

Prerequisite: NIL

UNIT I Introduction to Software Engineering

Introduction Evolution of Software Engineering, Software Engineering: A layered technology, process frame work and software engineering paradigms, Software process technology, Software Requirements Analysis, Analysis Principles, Modeling the system architecture, Software prototyping and specification.

UNIT II Software Design

Software Design Design Process, Concepts, Principles, Architectural Design, Data Design, Mapping requirements into Software Architecture, Effective modular design, Procedural Design, Interface design, HCI design

UNIT III Software Cost Model

Software Quality Planning and Project Management Evaluation of individual projects: Technical assessment, cost-benefit analysis (Evaluation Techniques), and Risk evaluation, Concept of Software Project Management and its importance, software cost estimation techniques, different types of project metrics, Models for cost estimation (COCOMO, Putnam's, function point), Introduction to project scheduling, project schedules, project and activities, scheduling activities, Schedule development methods (Critical Path Method, Critical Chain Scheduling, PERT).

UNIT IV Software Quality Assurance

Software Quality Assurance Introduction, Quality Planning, Quality Assurance, Quality Control, Tools and Techniques of Quality Control, Pareto analysis, Six Sigma, Cost of Quality, software quality metrics (McCal's Quality Model, Boehm's Quality Model, Dromey's Quality Model), Capability maturity models.

UNIT V Project Management

Project Management – Definitions; Factors Influencing Project Management – Project Manager, Project Management Activities, Stakeholders; Project Communication; Project Development Phases; Project Charter; Statement of Work (SoW); Project Management Associations.

Reference Books:

1.Software Engineering, Rogers G. Pressman, MH
2.Fundamentals of Software Engineering,2nd Ed. ,Ghezzi,PHI
3. Software Engineering, Pankaj Jalote, PHI
4.Classical and Object Oriented Software Engineering, Schach, TMH
 5.Software Engineering: Principles & Practice,Van Vliet,SPD/JOHN WILEY
 6.Software Engineering, K.K.Aggarwal & Yogesh Singh, New Age International

MCA 305 ARTIFICIAL INTELLIGENCE

Course Objective:

- To create application and understanding of both the achievements of AI and theory underlying those achievements.
- To introduce concept search in AI with help of Heuristic search technique.
- To introduce the concept of Natural Language Processing.
- To introduce the concept of Knowledge Representation.

Course Outcome:

- Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agent.
- Develop intelligent algorithm constraint satisfaction and Game Playing
- Apply concept of Natural Language Processing to problems leading to understanding of cognitive computing.
- Describe Expert system and components of Expert System.

Pre-requisite: Knowledge of Programming Language and Data Structure.

UNIT I General Issues and overview of AI

The AI problems: what is an AI technique; Characteristics of AI applications Problem Solving, Search and Control Strategies General Problem solving; Production systems; Control strategies; forward and backward chaining Exhaustive searches: Depth first Breadth first search.

UNIT II Heuristic Search Techniques

Hill climbing; Branch and Bound technique; Best first search and A* algorithm; AND/OR Graphs; Problem reduction and AO* algorithm; Constraint Satisfaction problems Game Playing Min Max Search procedure; Alpha-Beta cutoff; Additional Refinements.

UNIT III Knowledge Representation

First Order Predicate Calculus; Skolemnisation ; Resolution Principle and Unification; Inference Mechanisms Horn's Clauses; Semantic Networks; Frame Systems and Value Inheritance; Scripts; Conceptual Dependency AI Programming Languages Introduction to LISP, Syntax and Numeric Function; List manipulation functions; Iteration and Recursion.

UNIT IV Natural Language Processing and Parsing Techniques

Context – Free Grammar; Recursive Transition Nets (RTN); Augmented Transition Nets (ATN); Semantic Analysis, Case and Logic Grammars; Planning Overview – An Example Domain: The Blocks Word; Component of Planning Systems; Goal Stack Planning (linear planning).

UNIT V Expert Systems

Introduction to Expert Systems, Architecture of Expert Systems; Expert System Shells; Knowledge Acquisition; Case Studies; MYCIN..

Reference Books:

1. Elaine Rich and Kevin Knight: Artificial Intelligence – Tata McGraw Hill.
2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems – PrenticeHall of India.
3. Nils J. Nilsson: Principles of Artificial Intelligence – Narosa Publication house.
4. Artificial Intelligence : A Modern Approach, Stuart Rusell, Peter Norving, Pearson Education 2nd Edition.
5. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education.
6. Artificial Intelligence by Gopal Krishna, Janakiraman.on-Wesley, California, 2002

	L	T	P
MCA 306 SOFTWARE TESTING	3	1	0

Course Objectives:

To gain knowledge of the concept of Software Testing
Learning outcome

- Basic and conceptual knowledge of concepts behind the need of Software Testing
- Detailed knowledge of the different types, and levels of Software Testing

Pre-requisites

Understanding of Software Engineering concepts

Syllabus
UNIT 1: Introduction to Testing

Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System Testing, Basic Terminologies, V Shaped Software Lifecycle Model

UNIT 2: Functional Testing

Black-box Testing, Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing

UNIT 3: Structural Testing.

White-box Testing, Basis Path Testing: Program Graph, DD Path graph, Cyclomatic Complexity, Graph Matrices, Control Flow Testing: Statement Coverage, Branch Coverage, Condition Coverage, Path Coverage

TEXT BOOKS:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, Seventh Edition, McGraw Hill Education.2009.

2. Yogesh Singh, Software Testing, Cambridge University Press,2011

L T P
3 1 2

FOURTH SEMESTER

MCA 401   ANDROID PROGRAMMING

Course Objective:

Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

Course Outcomes:

By the end of the course, student will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more.

Prerequisite:

To learn Android Studio, you must have the basic knowledge of Java programming language

UNIT I Introduction to Android

History of Android, The Open Handset Alliance, Android Core building blocks, Android Architecture, Android SDK, Creation of New AVD, DVM, Creating run configuration, Building a sample Android application.

UNIT II Android Application Design Essentials

Anatomy of Android Application, Android terminologies, Aplication Context, Activities, Activity lifecycle. Services, Intents and its Types ,

Android Manifest File and its common settings,Using Intent Filter, Android Fragments, Android Preferences.

UNIT III Android User Interface Design Essentials

User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes),Android Toast, Event handling, Images , Designing User Interfaces with Layouts.

UNIT IV Using Common Android APIs

Using Android Data and Storage APIs ,Managing data using SQLite,Sharing Data between Applications with Content Providers,Using Android Networking APIs , Using Android Telephony APIs Text

Reference Books:
1. Lauren Darcey and Shane Conder, "Android Wireless Application Development",
Pearson Education2nd edition.
 2. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd.
 3. Mark L Murphy, "Beginning Android", Wiley India Pvt. Ltd.
4. Sayed Y Hashimi and Satya Komatineni, "Pro Android", Wiley India Pvt. Ltd.

L T P
3 1 2

MCA 402.1 PHP PROGRAMMING

Course Objective:

- Student review client side web technology used for static web pages.
- To gain ability to develop responsive web applications.
- To use server side technology for dynamic web applications

Course Outcome:

- Design static and dynamic web page.
- Use of MySQL to access data records.
- Forms design using HTMLs

Prerequisite: Knowledge of a programming language, Data Structure, HTML

UNIT I Introduction to PHP

History of PHP, basic syntax, variable and constant, datatypes, operators and expressions. Decision making-if-else, switch case, loops, nesting control statements. PHP and HTML together.

UNIT II Function in PHP

Define a function, call-by-value and call-by-reference, recursive functions, strings and its operations-searching, replacing, formatting, string library functions. PHP arrays- index based and associative arrays, array looping- index and associative based using each () and foreach(). Useful PHP library functions.

UNIT III HTML Forms and Files

Handling Html form with PHP- capturing form, generating file uploaded form, form redirection. Working with file and directories- opening, closing, copying, renaming and deleting a file. Working with directories-creating and deleting directories. File uploading and downloading.

UNIT IV Session and Cookies

Session handling in PHP- creating and destroying sessions, session variables. Cookies and session handling, deleting cookies.

UNIT V Database Connectivity

Introduction to RDBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing queryJoin (Cross joins, Inner joins, Outer Joins, Self joins) , Exception Handling Understanding Exception and error, Try, catch, throw, Error tracking and debugging.

Reference Books:

1. Learning PHP, MySQL, books by ' O' riley Press

L T P

3 1 2

MCA 402.2 C# PROGRAMMING AND DOT NET FRAMEWORK

Course Objective:

This course is designed to provide the knowledge of Dot Net Frameworks along with C# , ADO.NET and ASP.NET.

Course Outcomes:

After completion of the course the student will be able-
- Learn about MS.NET framework developed by Microsoft.
- Be able to understand use of C# basics, Objects and Types, Inheritance etc
- To develop, implement and creating Applications with C#.
- To develop, implement, and demonstrate Component Services, Threading, Windows services, web etc.
- To develop, implement and creating Applications with ADO.NET and SQL server
- You will be able to using XML in ASP.NET etc.

Prerequisite:

C# programming is very much based on C and C++ programming languages, so if you have a basic understanding of C or C++ programming, then it will be fun to learn C#. Apart from it if you have basic knowledge of SQL then it will very helpful to work with ADO.NET.

UNIT I

Introduction to .NET Framework And **C#**
.NET framework, MSIL, CLR and its components, CLS, CTS, Just in time (JIT) Compiler,Base class library, Namespaces, Assemblies, DLL -Hell Problem, Garbage Collection.
Introduction to C#, Visual studio console app, Boxing and Unboxing, loops, Array, Enumerations, structures.

UNIT II C# Object oriented programming

OOPs, Classes and objects, ,Encapsulation, Inheritance, Polymorphism, Abstract class, Sealed class, Interface ,Constructor and Destructors, Method Overloading ,Method overriding, Operator Overloading, Modifiers, Indexers , Collections Namespaces, Delegates, Event handling , Exception Handling.

UNIT III   IO and Threads

Multithreading, Thread pooling ,Appdomains, Concurrency and synchronization-   Locks, Monitors, Mutexes, System.IO, Streams, TextWriter, TextReader, BinaryWirter, BinaryReader.

UNIT IV ADO.Net, C# windows forms for data control

Grid, Datasource and databinding controls, Connected and disconnected scenarios, Dataset, connections, Adapters, commands, datareaders. Windows Forms and Controls in details:Windows form , Windows Forms Properties and Events, Windows Form Controls etc.

UNIT V ASP.NET

 Introduction to ASP.NET, Architecture ,Working with Web and HTML Controls, Server Controls , Overview of ASP.NET Validation Controls, Data base connectivity using ASP.net. Introduction of XML, Using XML with ASP.net
Master Pages, Displaying Data with the Grid View Control ,State management.

Reference Books:

1. Addison Wesley –C# Developers Guide to ASP.Net
2. Wiley," Beginning Visual C# 2008",Wrox

3. Claudia M. Baca, Patti, PMP: Project Management Professional Workbook, Sybex, Workbook
4. C#.Net Developers Guide- Greg Hack, Jason Werry, SaurabhNandu. (SyngRess)
5. Wrox Press Professional C# 3rd Edition – Simon Robinson, Jay Glynn

L	T	P
3	1	2

MCA 402.3   DATA SCIENCE USING PYTHON

Course Objective

Students will try to learn:
- Understating the concept of Data Science
- Using the data science using Python
- Understanding the use of NumPy in data science and how it is different from Python List
- To understand the dataframe, reading csv, tsv file and working on it.
- Handling the missing value and data cleansing
- Understanding the concept of visualize the numbers in graphs using the Python libraries Metplotlib and Seaborn

Course Outcome
Students will be able to:
- Solving and analysis the data using Numpy, Pandas
- Visualizing the data using Metplotlib and Seaborn

Pre- requisites: Knowledge of Programming in Python

Unit I

NumPy: Introduction, NumPy Array, NumPy Array Size, NumPy Array Shape, NumPy Mathematical Functions, NumPy Trigonometric Functions, NumPy Random, NumPy String Operations

Unit II

Pandas: Pandas Series, Pandas DataFrame, Pandas Read_csv, Pandas Write csv File, Data Cleansing, Pandas Handling Missing Values, Pandas concat(), Pandas join(), Pandas append(), Pandas GroupBy

Unit III

Metplotlib: Matplotlib Line Plot, Matplotlib Histogram, Matplotlib Bar Chart, Matplotlib Pie Chart, Matplotlib Scatter Plot, Matplotlib Subplot, Matplotlib Save Figure, Matplotlib Image Show

Seaborn: Introduction, Seaborn Line Plot, Seaborn Histogram, Seaborn Barplot

Reference book:
1. Pandas for everyone, Python Data Analysis by Daniel Y. Chen, Pearson publication
2. Laura Igual, Santi Seguí, "Introduction to Data Science - A Python Approach to Concepts,
3. Techniques and Applications", Springer
4. Wes McKinney, "Python for Data Analysis", O'Reilly
5. Luca Massaron, John Paul Mueller, "Python for Data Science for Dummies"

```
L  T  P
3  1  0
```

MCA 403 NETWORK SECURITY AND CRYPTOGRAPHY

Course Objectives:
1. Aware and Understand the Challenges and Scope of Information Security.
2. Gain the Knowledge of Basic Security Concepts
3. Learn and Understand the Importance of Cryptographic Algorithms and Their Uses.
4. Learn and Understand Access Control Mechanism Used for User Authentication and Authorization.
5. Understand and Practice the Sockets Layer (SSL).
6. Aware and Learn the Usages of Secure Internet Protocol (IP) and HTTPS

Course Outcome:
1. Explain the Principles of Cryptography and Cryptanalysis Including Symmetric and Asymmetric Encryption, Hashing, and Digital Signatures.
2. Explain the Fundamental Notions of Threat, Vulnerability, Attack and Countermeasure.
3. Be able to Identify the Security Goals of an Information System, Point Out Contradictory Goals.
4. Implement the Various Security Algorithms.
5. Analyze the Root Causes of Attacks &Suggest Appropriate Solution for Different Types of Security Breach Scenario.

Prerequisite: Knowledge of Computer Network

UNIT I Introduction To security

Basic aspects of Network security,   Attacks active & passive attacks, Types of attack,VIRUS and its categories, Conventional Encryption, Conventional Encryption Model, Substitution & transposition techniques, Bit level encryption and operations .Block Cipher Design Principles, Block Cipher Modes of Operations, , steganography, Differential & Linear Cryptanalysis

UNIT II Conventional Encryption Algorithms

DES,DES Algorithm, ,DES strength ,2DES, 3 DES, Men in Middle attack, DES standard, AES, Blowfish, International Data Encryption Algorithm IDEA, RC-5, CAST-128, RSA, Key Distribution, Deffie Hellmen Key Exchange Algorithm, Random Number Generation.

UNIT III Message Authentication & Hash Functions

Authentication Requirements, Authentication Functions, Message Authentication Codes MAC,HMAC, Hash Function ,Birthday Attacks, Message Digest Algorithm : MD5 & SHA, Digital Signature, Digital Signature Standard (DDS), Proof of Digital Signature Algorithm, Digital certificate. , X.509,X.25, Secure Electronic Transaction, , Authentication Protocol, Authentication Applications: Kerberos.

UNIT IV Email, Internet Security

 Secure Socket Layer, Directory Authentication Service, Electronic Mail Security,PEM, Pretty Good Privacy (PGP), IP security ,S/MIME Security: Architecture, Authentication Header, Encapsulating Security Payloads, ,cyberlaws

Reference Books :
1. William Stallings, "Cryptography and Network Security: Principles and Practice",Prentice hall, New Jersey
2. Johannes A. Buchmann, "Introduction to Cryptography" Springer-Verlag
3. Atul Kahate, "Cryptography and Network Security" TMH

```
L T P
3 1 0
```

MCA 404.1 MOBILE COMPUTING

Course Objectives:

To gain knowledge of the concept of wireless and mobile Computing

Course Outcome:

- Basic and conceptual knowledge of concepts behind wireless and mobile computing
- Basics of Ad hoc Networks along with the associated routing protocols for MANET

Pre-requisites:

Understanding of Computer Networks and routing in wired/wireless networks

UNIT 1

Introduction to Mobile Computing, Issues in Mobile Computing, Wireless Telephony, Digital Cellular Standards, cellular system architecture, Multiple Access Protocols : TDMA, FDMA and CDMA, GSM, GPRS, handoffs Near-far problem, channel allocation in cellular systems.

UNIT 2

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, TCP over wireless-Indirect TCP, 0Snoop Protocol, Fast retransmit and Mobile TCP, Mobile IP, WAP: Architecture, applications.

UNIT 3

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system (CODA), Disconnected operations.

UNIT 4

Mobile Agents computing, transaction processing in mobile computing environment, location management-static and dynamic, Ping pong effect, location based services.

UNIT 5

What is Ad-hoc Network? , Problems with Message Routing in Wireless Ad-hoc Mobile Networks, Dynamic State Routing (DSR), Route Maintenance and Routing error, Fisheye Routing (FSR), Ad-hoc on Demand Distance Vector (AODV)

TEXT BOOKS:

1. Shambhu Upadhyaya, AbhijeetChaudhary, Kevin Kwiat, Mark Weises, "Mobile Computing", Kluwer Academic Publishers
2. UWE Hansmann, LotharMerk, Martin-S-Nickious, Thomas Stohe, "Principles of Mobile Computing", Springer International Edition

L T P
3 1 0

MCA 404.2 BIG DATA AND HADOOP

Course Objectives
Students will try to learn:
- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSql MapReduce.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Course Outcomes
- The students will be able to:
- Identify Big Data and its Business Implications.
- Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
- Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.
- Access and Process Data on Distributed File System

Pre- requisites : Should have knowledge of one Programming Language, Practice of SQL (queries and sub queries), exposure to Linux Environment.

UNIT I : INTRODUCTION TO BIG DATA AND HADOOP

Overview of Big Data: Introduction of Big Data, Big Data types, Analytics, Example of Big Data, Big Data Technologies, benefits of Big Data

Basics of Hadoop: Big Data and Hadoop, Hadoop architecture, components of Hadoop framework, Analysis Big Data with Hadoop

UNIT II : HDFS (Hadoop Distributed File System)

Hadoop distributed file system, Architecture of Apache Hadoop HDFC, HDFC file blocks, Hadoop clustering, YARN (Next Generation MapReduce), The MapReduce's engine, advantages of Hadoop, Hadoop platforms,

UNIT III : Map Reduce

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features, Map operations, NoSQL

Unit IV : Hadoop Eco System

HBase and Cassandra: Introduction to HBase, Row-Oriented and Column-Oriented data store, HDFC vs. HBase, HBase architecture, HBase data model,

Cassandra introduction, features of Cassandra, Data replication in Cassandra, components of Cassandra, Cassandra Query Language (CQL), Cassandra data model.

HIVE-the Data warehouse of Hadoop: Introduction, Hive data models, Hive Data file formats,
PIG- The higher level programming environment: Introduction, components of PIG, PIG execution modes, data formats and model, Pig vs SQL, Pig vs. MapReduce, Pig vs. HIVE.

Text Books
- VK Jain, "Big Data & Hadoop", Khanna Book Publishing Co. [P] Ltd.
- Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.

- Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

References
- Robert D. Schneider , "Hadoop for Dummies", Wiley publication
- Bernard Marr, "Big Data In Practice", Wiley publication
- Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
- Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
- Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
- Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007
- Pete Warden, "Big Data Glossary", O'Reily, 2011.
- Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.

MCA 404.3 CLOUD COMPUTING
Course Objectives:

L	T	P
3	1	0

1. To Learn Fundamentals of Cloud Computing

2. To Know Various Cloud Computing Technologies
3. To Understand Virtualization Fundamentals.
4. To Introduce Data Storage in Cloud
5. To Learn Elements and Services in Cloud Computing
6. To Learn Application Platform for Cloud Applications
7. To Introduce Various Cloud Services

Course Outcome:

1. Describe the Key concepts, Advantages, Limitations and Applications of Cloud Computing
2. Explain the various Models and services of Cloud.
3. Understand and Describe the Core Issues and challenges of cloud computing Such as Security, Privacy, and Interoperability
4. Select and Apply Suitable Technologies, Tools and Applications in the Cloud Computing .
5. Design and develop the efficient solutions of the Cloud Computing problems and issues with consideration of environment and sustainable development.
6. Analyze the interface requirement for deploying the Applications in Cloud

Prerequisite : Knowledge of Computer Network

DETAILED UNIT WISE SYLLABUS

UNIT-I   CLOUD COMPUTING FUNDAMENTALS:

Cloud Computing definition, benefits of cloud computing, characteristics of cloud, History of Cloud Computing, Cloud Architecture, cloud deployment Model: private, public, community and hybrid cloud public vs private clouds ,Cloud service model :IaaS, PaaS, SaaS. Challenges of cloud computing.

UNIT- II CLOUD VIRTUALIZATION

Virtualization, Characteristics, Virtualization in Cloud Computing, , Pros and cons of Virtualization – Types of Virtualization –System Vm, Process VM, Virtual Machine monitor – Virtual machine properties Hypervisors, Multitenancy, Types of Tenancy, Virtualization - Architecture Clustering, Grid Computing and Virtualization, Virtual Infrastructure, CPU Virtualization, Network and Storage Virtualization, Cloud Tools - VMware, Eucalyptus, Cloud Sim, Open nebula.

UNIT- III CLOUD COMPUTING APPLICATION PLATFORM

Tools for Building Cloud, Programming in the Cloud, Moving Applications to Cloud, Microsoft Cloud Services - Azure, Google Cloud Applications -Gmail, Calendar, Docs, Video etc., Google App Engine, Amazon Cloud Services EC2,open Stack ,Other Cloud Services – Cisco Webex Mail, Yahoo Zimbra, CRM & Salesforce.Com.

UNIT- IV MANAGEMENT OF CLOUD SERVICES:

Scalability of services vertical scaling & horizontal scaling Reliability, availability and calculation of availability & reliability . Performance and performance, security and disaster recover,

Cloud Economics :- Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, economic constraints.,

Reference Book:

1. GautamShroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press; 1 edition.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach" McGraw-Hill Osborne Media; 1 edition
    4. Dimitris N. Chorafas, "Cloud Computing Strategies" CRC Press; 1 edition

L T P
3 1 0

MCA 405.1   SUPPLY CHAIN MANAGEMENT

Course Objective:

1. To understand how Logistics, Supply Chain, Operations, Channels of Distribution fit in to various types of Business viz., Manufacturing, Service and Project.

2. To understand how Warehouse Management and, other functions in Logistics fits into Logistics & Supply chain management.

Course Outcome:

Identify and Analyze Business Models, Business Strategies and, corresponding Competitive Advantage.

Plan Warehouse and Logistics operations for optimum utilization of resources

Prerequisite: Basic knowledge of MIS, Knowledge of Web Technology, Basic knowledge of Sales and Marketting

Unit I- Introduction, Concept, Scope and advantages, Customer Relationship management (CRM) – Introduction, Concept, Scope and advantages , eCRM and its applications.

Unit II- Forecasting - Demand forecasting, planning for Supply Chain Management, Information technology in Supply Chain, Eight supply chain processes- Planning, Information, Source, Suppliers, Inventory, Production, Location, Transportation and Return of goods.

Unit III- Typical IT solutions- Electronic Data Interchange, Intranet and extranet, Supply chain performance measurement,

Unit IV- Data Warehousing, E- commerce, E – procurement, Bar coding technology, GPS, RFID, Information Systems in Supply Chain

Unit V- Case Study – Case Studies for SCM & CRM such as SCM Mumbai Tiffinwala, Live case study from IT perspective.

Reference Books
1. Supply Chain & Logistic Management by Bowersox, Closs & Cooper , TMGH, 2nd Edition
2. CRM at the speed of light by Paul Greenberg, YMH 2nd Edition.
3. Customer Relationship Management by Kristin Anderson and Carol Kerr, TMGH

MCA 405.2 E-COMMERCE

L T P
3 1 0

Course Objective:

Presents concepts and skills for the strategic use of e-commerce and related information technology from three perspectives: business to consumers, business-to-business, and intra-organizational. Examination of e-commerce in altering the structure of entire industries, and how it affects business processes including electronic transactions, supply chains, decision making and organizational performance.

Course Outcome:

Demonstrate an understanding of the foundations and importance of E-commerce
Analyze the impact of E-commerce on business models and strategy
Describe the infrastructure for E-commerce

Prerequisite: Basic online business skills

Unit-I

Basic of e-commerce- introduction, electronic commerce framework, anatomy of e-commerce applications, e-commerce consumer applications. mercantile process models, mercantile models from the consumer's perspective, mercantile from the merchant's perspective.

Unit-II

E-commerce types and terms- types of electronic payment systems, digital token-based electronic payment systems, smart cards & electronic payment systems, credit card- based electronic payment systems, risk & electronic payment systems, designing electronic payment systems.

Unit-III

Behavioral knowledge for e-commerce- intra organizational e-commerce, customization and internal commerce, supply chain management (scm) and e-commerce.

Unit-IV

New era of e-commerce- digital document and its types, corporate data warehouse, the new age of information based marketing, online marketing process, advertising on the internet

Unit-V

Information technology for e-commerce- consumer search and resource discovery, information search and retrieval-e-commerce catalogs and directories, information filtering for e-business, multimedia concepts, digital video and electronic commerce

Reference Books

1. Kenneth C. Laudon, E-Commerce : Business, Technology, Society, 4th Edition, Pearson

2. S. J. Joseph, E-Commerce: an Indian perspective, PHI

3. Ravi Kalakota, Andrew Winston, :Frontiers of Electronic Commerce" Addison Wesley.

L T P
3 1 0

MCA 405.3 ENTERPRISE RESOURCE PLANNING

UNIT- I Introduction to ERP

Enterprise Resource Planning Introduction What Is ERP? Need of ERP. Advantage of ERP Growth of ERP

UNIT-II ERP and related technologies

Business Process Re-Engineering (BPR) Management Information System (MIS) Decision Support System (DSS) Executive Support System (ESS) Data Warehousing, Data Mining On-Line Analytical Processing (OLAP) Supply Chain Management Customer Relationship Management.

UNIT-III ERP Modules and Vendors

Finance Production Planning, Control and Management Sales and Distribution Human Resource Management Inventory Control System Quality Management ERP market

UNIT IV ERP Implementation of Life Cycle

Evaluation and selection of ERP package Project planning, Implementation, Team Training and Testing End User Training and Going Live Post Evaluation and Maintenance

UNIT V ERP Case Studies

Post Implementation review of ERP packages in manufacturing, Services and Others Organizations

Reference Books:

1. Enterprise Resource Planning, Alexis Leon
2. ERP Ware: ERP Implementation Framework ,V.K. Garg&N.K. Venkita Krishnan
3. ERP Concepts &Planning ,V.K. Garg&N.K. Venkita Krishnan