Course Structure FOR
Master of Computer Application Program (wef session 2020-21)
School of Computer & Information Science, UPRTOU, Prayagraj

Semester	Course Code	Title of the Course	Max Marks	Credits
First	MCA-101	Computer Fundamental & Its Organization	100	4
	MCA-102	Discrete Mathematics	100	4
	MCA-103	C Programming	100	4
	MCA-104	Numerical Analysis	100	4
	MCA-105	Computer Organization	100	4
	MCA-106(P)	Practical Based on MCA -103 & 104	100	4
Credit of I semester			**600**	**24**
Second	MCA-107	Data Structures	100	4
	MCA-108	Organizational Behavior	100	4
	MCA-109	Software Engineering	100	4
	MCA-110	C++ and Object Oriented Programming	100	4
	MCA-111	Data Communication & Computer Network	100	4
	MCA-112(P)	Practical Based on MCA -107 & MCA-110	100	4
Credit of II semester			**600**	**24**
Third	MCA-113	Web Technology	100	4
	MCA-114	Operating System	100	4
	MCA-115	Java Programming	100	4
	MCA-116	Multimedia Technology	100	4
	MCA-117	Microprocessor and Its Applications	100	4
	MCA-118(P)	Practical Based on MCA -114 & MCA-115	100	4
Credit of III semester			**600**	**24**
Fourth	MCA-119	Database Management System	100	4
	MCA-120	Theory of Computation	100	4
	MCA-121	System Analysis and Design	100	4
	MCA-122	Python Programming	100	4
	MCA-123	Client Server Technology	100	4
	MCA-124(P)	Practical Based on MCA -119	100	4
Credit of IV semester			**600**	**24**
Fifth	MCA-125	Design and Analysis of Algorithm	100	4
	MCA-126	Computer Graphics	100	4
	MCA-127	Soft Computing	100	4
	MCA-128	Unix and Shell Programming	100	4
	MCA-129(P)	Practical Based on MCA -125 & MCA-129	100	4
	Discipline Centric Elective			
	MCA-EA OR MCA-EB	Information and Network Security OR Data Mining	100 OR 100	4 OR 4
Credit of V semester			**600**	**24**
Sixth	MCA-130	Project Work/Industrial Training*****	400	16
	MCA-131	Comprehensive Viva Voice	200	8
Credit of VI semester			**600**	**24**
Total Max Marks/ Credit			**3600**	**144**

Note: * The learners are required to report at School of Computer & Information Science just after completion of Fourth (IV) semester for the approval of synopsis for Project Work/Industrial Training. After the due approval of synopsis in Fifth (V) semester, learner has to complete the Project Work/Industrial Training during sixth semester and submit the Project Work/Industrial training report directly to Director, School of Computer & Information Science.

Detailed Syllabus

MCA- 101: Computer Fundamentals and Its Organization

Computer Basics: Algorithms. A Simple Model of a Computer, Characteristics of Computers. Problem-solving Using Computers**.**

Data Representation: Representation of Characters in computers, Representation of Integers, Representation of Fractions. Hexadecimal Representation of Numbers, Decimal to Binary Conversion, Error-detecting codes. Input & Output Devices. Description of Computer Input Units, Other Input methods. Computer Output Units Printers. Plotters)

Computer Memory: Memory Cell. Memory Organization, Read Only Memory, Serial Access Memory. Physical Devices Used to Construct Memories. Magnetic Hard Disk, floppy Disk Drives. Compact Disk Read Only Memory, Magnetic Tape Drives.

Processor: Structure of Instructions, Description of a Processor. Machine Language and Instruction set Processors used in desktops and lap tops. Specification of a desktop and Lap top computer currently available in the market (Specifications of Processor. motherboard &chipset, memory. interface & capacity of hard disk & DVD drives, 1/0 ports).

Computer Architecture: Interconnection of Units. Processor to Memory communication. LO to Processor Communication. Interrupt Structures, Multiprogramming. Processor Features, Reduced Instruction Set Computers (RISC), Virtual memory.

Software Concepts: Types of Software. Programming Languages. Software (Its Nature & Qualities). Programming Languages. Operating Systems: History and Evolution. Main functions of OS Multitasking. Multiprocessing. Time Sharing. Real Time Operating System with Examples

MCA-102 **Discrete Mathematics**

Block—01: Language of Mathematics and its application

Unit-01: Mathematical Logic: statements, operations, truth values, tautology and quantifiers.

Unit 02: Arguments: Rule of Detachment, Validity of a compound statement by using Truth Table , Validity using Simplification Methods, Validity using Rules of Inference, Invalidity of an Argument, Indirect Method of proof and Proof by Counter-Example.

Unit – 03: Boolean Algebra: Boolean Algbera, Principle of Duality, Isomorphic Boolean Algebras, Boolean Algebra as Lattices, Boolean Functions, Disjunctive Normal Form**,** Conjunctive Normal Form**,** Minimization of Boolean Functions (Karnaugh Map)

Unit – 04: Switching circuits and logical Circuits : Switching Circuits, Simplification of circuit, Non-Series Parallel Circuits, Relay Circuits, Logic Circuits

Block – 02: Set theory and its application

Unit-01: Set theory: sets, Subsets, Operations on Sets, Complementation, Intersection and Union, Laws Relating Operations, Distributive Laws and De Morgan's Laws.

Unit -02: Relation: Relation, binary relations in a Set, Domain and Range of a Relation, Total number of Distinct Relations, Relations as Sets of Ordered Pairs, Types of Relations, Composition of Relations, Equivalence relation in a set, Partition of a Set, Equivalence Class and Quotient set of a set.

Unit – 03: Partitions and Distributions: Equivalence Relations, Equivalence Classes, Properties of Equivalence Classes, Quotient set and Partition.

Unit – 04: Function: Functions, Direct and Inverse image, Inverse Functions, Operations on Functions, Composite of functions, Types of Functions and Connection between Equivalence relation and mapping.

Block – 03: Counting Process

Unit-01: Mathematical Induction: Principle of Mathematical Induction, Second Principle of Induction and Well ordering property.

Unit -02: Combinatorics: Basic counting principles**,** Principle of Disjunctive counting, Principle of Sequential counting and Ordered and Unordered Partitions.

Unit – 03: Permutation

Unit – 04: Combination

Block – 04: Probability theory and application

Unit-01: Binomial theorem: Binomial theorem, General term in a binomial expansion, Middle term in a binomial expansion and Binomial expansion for rational exponents.

Unit -02: Probability: Definition of Probability, Addition law for counting and Product law for counting.

Unit – 03: General Counting methods: General Counting method is the extension part of counting process. It discusses Sum and Product Rulesand The Pigeonhole Principle **.**

Unit – 04: The Inclusion- Exclusion Principle: inclusion-exclusion principle, Alternative form of the inclusion-exclusion principle and Onto Functions.

MCA-103 PROBLEM SOLVING AND PROGRAMMING THROUGH C

Block 1: Introduction to algorithms and program design

Unit 1: Introduction to Algorithms

Problem solving techniques, Algorithm

Unit 2: Pseudo-codes and Flowcharts

Tools of Algorithm, Pseudo codes, Flowchart

Unit 3: **Program design principles**

Introduction to computer programming, Program design principles, Programming techniques, Program Errors

Block 2: Introduction to the 'C' programming language

Unit 1: Introduction

History of C Language, Structure of a 'C' program, Creating and Executing a 'C' program,

Unit 2:Data Types in 'C'

Character Set of 'C' language, Trigraph characters, Tokens, Identifiers, Keywords, Constants, Data types, Variables

Unit 3:Storage Classes

Scope and lifetime of variable, Storage classes, Automatic storage class, Register storage class, Static storage class, External storage class

Unit 4:Input and Output Functions

Reading a single character, Writing a single character, Formatted Input-Output, Formatted Input, Formatted Output

Block 2: Operator and Control Structures

Unit 1: Operators and Expressions

Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and decrement operators, Conditional operators, Bitwise operators, Special operators, Operator Precedence and Associativity, lvalue and rvalue, Type casting: Promotion and Demotion of variable types

Unit 2: Decision Structures in 'C'

if statement, if else statement, nested if … else statement, switch statement, goto statment

Unit 3: Loop Structures in 'C'

for statement, while statement, do while statement, break statement, continue statement

Unit 4: Arrays

One dimensional array, Two dimensional array, Multidimensional arrays, Strings, String handling functions, Character functions

Block 3: Advanced Features of C

Unit 1: Pointers

Pointers and Address (&) operator, Pointer declaration and Initialization , Indirection operator, Pointer Arithmetic, Arrays and Pointers, Character strings and Pointers, Array of Pointers, Pointer to Pointer

Unit 2: Functions

Functions, user-defined functions, categories of function, returning non-integer values, function arguments, recursion, arrays as function arguments

Unit 3: Structures, Unions, enum and typedef

Structure definition, Structures within structures, Structures as function arguments, Pointers to structures, Unions, Enumerated data type, Type definition

Unit 4: File and Memory Management in 'C'

Files, File Pointer Variable, Opening a file, Reading and writing to files, File Status Functions, Random Access to files, Command Line Arguments, Memory management

Unit 5: Preprocessor Directives and Error reporting

Macro directives, Conditional directives, Control directives, Error reporting

MCA-104 **Numerical Analysis**

Block-I: Solutions of Non-Linear Equations in one Variable

Unite 1: Review of Calculus, Round off Error, Truncation Error, Some properties of equations, Iteration Methods for finding the roots (zero's) of an equation. Convergence Criterion, Initial Approximation to a Root, Bisection Method,

Unite 2: Fixed Point Iteration Method, Chord Methods for Finding Roots- Regula Falsi Method, Newton Raphson Method. Order of convergence.

Block-II: Solution of System of Linear Equations

Unite 3: Direct Methods- Preliminaries, Method of solution using inverse of matrix. Cramer's rule. Gauss Elimination Method, Gauss- Jordon Reduction Method, LU decomposition method. Crout's method.

Unite 4: Iterative Method- General Iteration Method, Jacobi's Iteration Method, Gauss-Seidal Iteration Method.

Block-III: Interpolation

Unite 5: Definition, Finite Differences: Forward differences, Backward differences, Central differences, Other differences operator, Relation between operators. Interpolation at Equally interval; Newton Gregory formula for forward differences and backward difference .

Unite 6: Interpolation at Unequally interval Lagrange's interpolation formula. Divided differences, Properties of divided differences, Newton's Divided difference interpolation formula.

Block-IV: Numerical Differentiation, Integration and Solutions of Differentiation Equations

Unite 7: Numerical Differentiation, Numerical Integration; Trapezoidal Rule. Simpson's One Third Rule, Simpson's Three Eight's Rule. Weddle's Rule.

Unite 8: Numerical Solution of Ordinary Differential Equations-(first order, second order and simultaneous) by Picard's Iteration Method, Euler's Method, Runge- Kutta Methods- 4^{th} Order.

MCA-105 Computer Organization

Block 1: Introduction to Digital Electronics

Unit 1: Introduction to number system: binary, octal, hexadecimal, Inter-conversion to different number system.

Unit 2: Boolean algebra and Logic Gates: De Morgan's theorem, Boolean Identity. OR, AND NOT NAND, NOR and Ex OR gates and there Truth Tables, Positive and Negative logic.

Unit 3: Reduction Techniques: Standard representation of Boolean expressions, SOP and POS forms, Combinational and sequential circuits, Minterm and Maxterm expressions, Map reduction techniques, K- tap. Code Conversions: Binary to Gray, BCD to decimal etc.

Unit 4: Binary Arithmetic: Half and Full Adder, Substractor, Multiplexer, Demultiplxer, Decoder, Encoders, Comparators.

Unit 5: Sequential Circuit: Flip Flops: S/R, J/K, D and T Latches, Digital Counters, Registers.

Block 2: Basic building blocks

Unit 1: Building blocks: I/O, Memory, ALU and its components, Control Unit and its functions

Unit 2: Instruction — word, Instruction and Execution cycle, branch, skip, jump and shift instruction, Operation of control. registers; Controlling of arithmetic operation.

Unit 3: Addressing techniques — Direct, Indirect, Immediate, Relative, Indexed addressing and paging. Registers —Indexed, General purpose, Special purpose, overflow, carry, shift, scratch, Memory Buffer register; accumulators; stack pointers; floating point; status information and buffer registers.

Block 3: Memory & I/O

Unit 1: Memory: Main memory, RAM, static and dynamic, ROM, EPROM, EEPROM, EAROM, Cache and Virtual memory.

Unit 2: I/O System: Buses, Interfacing buses, Bus formats- address, data and control, Interfacing keyboard, display, auxiliary storage devices and printers.

Unit 3: Introduction to Microprocessors and microcontrollers; Introduction to 8085 microprocessor, example of few instruction to understand addressing techniques, differences between microprocessors and microcontrollers. Interlocution to different processor families.

MCA-107 Data Structures

BLOCK - 1

UNIT 1: Introduction to data structure

Algorithm, Basic criteria for algorithms, Data type, Data structure, Data representation, linear and non linear data structure.

UNIT 2: Basics of algorithm

Algorithm, Basics of complexity of algorithm

UNIT 3:Array

Definition, Representation of array, Single and multi-dimensional array, address calculation (one dimensional, two dimensional, multidimensional), sparse matrices

BLOCK - 2

UNIT 4: Stack

Definition, Operations on stacks, Array representation and implementation of stadk; infix, prefix and postfix representation of expression and evaluation multiple stacks, Application of stacks.

UNIT 5: Recursion

Recursive definition and processes, some named problems of recursion, principle of recursion: designing recursive algorithm, how recursion works, tail recursion.

UNIT 6: Queue

Definition, operation on queues, circular queue, dequeue, priority queue, Application of queue.

BLOCK 3

UNIT 7: Linked List

Representation and implementation of single linked list, Operations in the singly linked list, stack and queue as a linked list, circularly linked list, doubly linked list, circularly doubly linked list, Application of linked list: polynomial representation and addition, garbage collection

UNIT 8: Tree

Basic terminology, binary tree, binary tree representation, complete binary tree, extended binary tree, array and linked list representations, traversing binary tree, threaded binary tree, binary search tree, Operations on BST, AVL tree, Operations on AVL tree, B-tree Insertion and deletion in B tree.

UNIT 9: Graph

Basic terminology Graph representation Depth first search, breadth first search, topological sort, connected components, spanning tree, minimum cost spanning tree, Kruskal's and prim's algorithm, Shortest path algorithms: Bellman Ford Algorithm, Dijkstra’s algorithm, Floyd-Warshall algorithm.

BLOCK - 4

UNIT 10: Searching and sorting

Sequential search, binary search, comparison and analysis, Selection sort, Bubble sort, Insertion sort, Heap sort, Quick Sort, Merge sort, Shell sort, radix sort.

UNIT 11: Hashing

Hash table, hash function, collision resolution strategies, hash table implementation.

UNIT 12: File Structure

Terminology, File organization, Sequential files, Direct File organization, Indexed Sequential file organization.

MCA-108 Organizational Behavior

BLOCK 1 Basics of Organizational Behavior

Unit 01 Nature of Organizational Behavior- Definition, Nature, Significance of Organizational Behavior, Forces Affecting Organizational Behavior

Unit 02 Evolution of the Concept of Organizational Behavior- Disciplines Contributing to Organizational Behavior, Classical Viewpoint of Human Organizational Behavior, Human Relations Approach, Behavior Science Approach

Unit 03 Model of Organizational Behavior- Management's Assumptions about People, Model of Organizational Behavior, Relevance of OB Models, Management Challenges

Unit 04 Recent trends in Organizational Behavior- Globalization, Information Technology and OB, Changing Workforce, Workplace Values and ethics

BLOCK 2 Basics of Individual Behavior

Unit 05 Types of Individual Behavior- The types of personality, Personality Traits, The Big Five Dimensions, Myers-Briggs Type Indicators

Unit 06 Perception and Behavior- The Perceptual Process, The role of environment, observer and object in perception, Errors in Perception, Perception and Behavior

Unit 07 Learning and Behavior- Learning in Organization, Classical Learning Theory, Social Learning Theory, Behavior Modification

Unit 08 Attitude and Behavior- Concepts of Attitude, Components of Attitude, Attitude Formation, Significance of Attitude in Managing Behavior

BLOCK 3 Motivations and Leadership

Unit 09 Motivation- Concept of Motivation, Need Based Theories, Expectancy Theory, Goal Setting Theory

Unit 10 Motivation: Practical Application- Application of needs based theories: Flexi benefits, Flexitime, Job Redesigning, Application of Expectancy Theory: Goal Alignment, Application of Goal Setting Theory: Management by Objectives

Unit 11 Leadership -Concept and Definition of Leadership, Styles of Leadership, Trait Theory, Behavioral Theories

Unit 12 Leadership: Contingency Perspectives - Path-Goal Theory, Hersey Blanchard Theory, Fiedler Theory, Transitional and Transformational Leadership

BLOCK 4 Group Dynamics and Culture

Unit 13 Groups in Organizations - Concept of Motivation, Group Membership, Group Structure and norms, Group Cohesiveness

Unit 14 Group Performance- Conformity, deviance, Group Processes: Groupthink, Group Shift**,** Group Decision Making

Unit 15 Transactional Analysis- Transaction as a unit of social interaction, Three ego states: Parents, adult and child, Four life Positions

Unit 16 Organizational Culture - Concept and Definition, Dimensions of Organizational Culture, Development of Organizational Culture, Managing culture, Strong vs Weak Culture

MCA-109 Software Engineering

UNIT-I Software Engineering Fundamentals: Definition of Software, Software characteristics, Software Applications. Software Process: Software Process Models - Waterfall model, prototyping model, spiral model, incremental model, concurrent development model. Project management Concepts: The Management Spectrum - The People, The Product The Process, The Project.

UNIT-II Software Process and Project Metrics : Measures , Metrics and Indicators , Software measurement Size -Oriented Metrics , Function - Oriented Metrics , Extended Function point metrics Software Project Planning : Project Planning Objectives , Software Project Estimation , Decomposition Techniques - Problem Based Estimation Process Based Estimation ,Empirical Estimation Models- The COCOMO Model Risk Analysis and Management: Software risks, Risk identification, Risk Projection, Risk Refinement, Risk Mitigation , Monitoring and Management.

UNIT-III Software Quality Assurance: Basic concepts- Quality, Quality Control, Quality Assurance, Cost of Quality , Software Quality Assurance (SQA) , Formal Technical Review Software Configuration Management: Baselines , Software Configuration Items, The SCM Process, Version Control, Change Control, Configuration Audit, Status Reporting. Analysis Concepts and Principles: Requirements Elicitation for Software, Analysis Principles. The Information Domain, Modeling, Partitioning, Essential and Implementation Views, Specification: Specification Principles, Representation, The Software Requirement Specification (SRS)

UNIT-IV Design Concepts and Principles: Design Principles, Design Concepts — Abstraction, Refinement, Modularity, Software Architecture, Control Hierarchy, Structural Partitioning, Data Structure. Software Procedure, Structure, Information Hiding, Effective Modular Design- Cohesion, Coupling Software Testing: Testing Objectives & principles, Unit Testing, Integration Testing (Top Down Integration , Bottom. Up Integration, Regression Testing, Smoke Testing), Validation Testing (Alpha and Beta Testing), System Testing (Recovery Testing, Security Testing, Stress Testing, Performance Testing).

UNIT-V Reengineering: Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering CASE Tools: What is CASE, Building Blocks of CASE, A Taxonomy of CASE Tools, Integrated CASE Environments, The integration Architecture, The CASE Repository.

MCA-110 C++ and Object oriented programming

BLOCK - 1

UNIT 1: Principles of object oriented programming

Object oricnted programming paradigm, Comparison with procedural programming, Basic concepts of object oriented programming, benefits of O0P, object oriented Languages, advantage of C++.

UNIT 2: Object Orient Programming System

Class, inheritance, abstraction, encapsulation and information hiding, polymorphism, overloading.

UNIT 3: Advanced concept

Dynamism (Dynamic typing., dynamic binding, late binding, dynamic loading). Structuring programs, reusability, organizing object oriented project,

BIOCK - 2

UNIT 5: Overview of C++

Tokens, keywords, identifiers and constants basic data types, user-defined and derived Data types, type compatibility, reference, variables type Casting, operator precedence, control structures, structure, function.

UNIT 6: Classes and objects

Class specification, class objects, accessing class members, scope resolution operator, data hiding, empty classes, Pointers within a class, passing objects as arguments, returning objects from functions, friend Functions and friend classes, constant parameters and member functions, structures and Classes, static members.

UNIT 7: Object initialization and cleanup

Constructors destructor, constructor overloading. order of construction and destruction, Constructors with default arguments, nameless objects, dynamic initialization through Constructors, constructors with dynamic operations, constant objects and constructor, static Data members with constructors and destructors, nested classes.

BLOCK - 3

UNIT 8: Operator overloading and type conversion

Defining operator overloading, overloading unary operators, overloading binary operators, overloading binary operators using friends, manipulation of strings using Operators, rules for overloading operators. type conversions.

UNIT 9: Inheritance: extending classes

Deriving derived classes, single multilevel, multiple, hierarchical, hybrid inheritance, Constructors & destructors in derived classes, constructors invocation and data members Initialization, virtual base classes, abstract classes, delegation.

BLOCK- 4

UNIT 10: Pointers, virtual functions and polymorphism

Pointers to objects, this pointer. pointers to derived classes, virtual functions, Implementation of run-time polymorphism, pure virtual functions.

UNIT 11: Working with files

Classes for file stream operations. opening and closing a file, file pointers and their Manipulations, sequential input and output operations, error handling during file Operations, command line arguments.

UNIT 12: Object Oriented Modeling

Need of object oriented Modeling, Simulation of real life problems using OOP concept: Example, Representation of problem using object and class diagrams at design level.

MCA-111 Data Communication and Computer Networks

Block 1: Computer Networks Basics

Introduction: Layered network architecture, Review of ISO-OSI Model. Data Communication techniques: Pulse code Modulation, (PCM), Data modems, Multiplexing techniques –Frequency-Division, Time-Division, Time-Division Transmission Media-Wires, Cables, Radio, Links, Fiber-Optic Links.

Asynchronous Transfer Mode (ATM); Cell Format, Layovers in ATM, Class 1,2,3,4 Traffic Random Access Data Networks, Concept of Random Access, Pure ALOHA; Throughput Characteristics Slotted ALOHA, Throughputs for Finite and Infinite, Population S-ALOHAS. MARKOV Chain Model for S- ALOHAS. Throughputs for Finite and Infinite, Population S- ALOHAS. MARKOV Chain Model for S-ALOHA.

Block 2: Data Link layer

Local Area Networks (LANs): IEEE 802.4 and 802.5 Protocols. Performance of Ethernet and Token ring protocols, FDDI Protocol , Distributed Queues Dual Bus (DQDB) Protocol.

Data Link Protocols: Stop and Wait Protocols: Noise Free and Noisy Channels Performance and Efficiency, Verification of protocols using Finite State Marching. HDLC Data Link Protocol.

Block 3: Network & Transport Layer

Network Layer Protocols: Design issue: Virtual circuits and Datagram.

Integrated Services Digital Network: Interfaces, Devices, Channel Structure. Dead Locks ad their avoidance Network Layer in ATM, Internetworking: Bridges, Routers and Gateways, Internet Architecture and Addressing.

Transport Layer Protocols: Design issues: Quality of Services, Primitives Connection Management: Addressing, Connection Establishment and Releases, Use of Timers, Flow Control and Buffering, Multiplexing, Crash Recovery.

Block 4: Upper Layer Protocols

Routing Algorithms: Optimality Principle, Shortest Path Routing- Dijkstra, Bellman – Ford and Floyd- War shall Algorithm.

Elements of TCP/IP Protocol: User Datagram Protocol Connection Management, Finite State Machine.

Session Layer Protocols: Dialog Management, Synchronization, OSI Session Primitives Connection Establishment Presentation and Application Layer Protocols: Presentation Concepts NMP- Abstract Syntax Notation-1 (ASN-1), Structure of Management, Management Information Base.

MCA-113 Web Technology

UNIT- I History of the Internet and World Wide Web - HTML 4 protocols HTTP. SMTP, POP3. MIME, IMAP. Introduction to JAVA Scripts - Object Based Scripting for the web. Structures - Functions - Arrays - Objects.

UNIT- II Introduction - Object refers, Collectors all and Children. Dynamic style, Dynamic position, frames. navigator, Event Model - On check - On load - Onenor - Mouse rel - Form process - Event Bubblers - Filters - Transport with the Filter - Creating Images - Adding shadows - Creating Gradients - Creating, Motion with Blur - Data Binding - Simple Data Binding - Moving with a record set - Sorting table data - Binding of an Image and table.

UNIT- III Database, Relational Database model - Overview, SQL - ASP - Working of ASP - Objects - File System Objects - Session tracking and cookies - ADO - Access a Database from. ASP - Serer side Active-X Components - Web Resources - XML - Structure in Data - Name spaces - DTD vocabularies DOM methods.

UNIT -IV Introduction -Servlet; Overview Architecture handling HTTP Request - Get and post request - redirecting request — multitier application, JS'V Overview Objects— scripting— Standard Actions — Directives. Brief survey of Web 2.0 technologies introduction to Semantic web and other current technologies

MCA-114 Operating System

BLOCK 1

UNIT 1: Introduction

Basic definitions, Batch processing, Multi-pr programming. Time sharing, multiprocessing; Structure and Functions of Operating System

UNIT 2: Process and thread

Process, Process states, State Transitions, Process Control Block, Context Switching, concept of thread, comparison between process and thread, Thread model, thread usage, implementing thread in kernel and user space.

UNIT 3: Process Scheduling

Scheduler, Scheduling criteria, Preemptive and non-preemptive scheduling, Process Scheduling, Process scheduling algorithms.

UNIT 4: Concurrent Process

Process Interaction, Shared Data and Critical Section, Mutual Exclusion, Synchronization, Classical Problems of Synchronization, Semaphores, Monitors.

BLOCK - 2

UNIT 5: Deadlock

Concept of deadlock, necessary condition for deadlock, resource allocation graph, deadlock prevention, deadlock avoidance, Banker's algorithm, Deadlock detection, deadlock recovery.

UNIT 6: Memory management

Address Binding, Dynamic Loading and Linking Concepts, Logical and Physical Addresses Contiguous and non-contiguous memory allocation, Paging, Segmentation, Virtual Memory, Demand Paging, Page fault, Page replacement algorithms, thrashing.

UNIT 7: Secondary memory management:

Free Space management, Disk Structure, Disk Scheduling, Formatting, Swap space Management.

UNIT 7: Case Study of UNIX

MCA-115 Java Programming

Block 1: Object Oriented Methodology and Java

Unit 1: Object Oriented Programming
Paradigms of Programming languages, Evolution of Object Oriented Methodology, Basic Concepts of OOApproach, Comparison of object oriented and procedure - oriented Approaches, Benefits of OOPS,Applications of OOPS. Classes and objects, Abstraction and Encapsulation, Inheritance, Method overriding and Polymorphism.

Unit 2: Java Language Basics
Introduction to Java, Primitive Data Type and Variables, Java Operators.

Unit 3: Expressions Statements and Arrays
Expressions, Statements, Control Statements, Selection Statements, Iterative Statements, Jump statements, Arrays.

Block 2: Object oriented concepts and Exceptions Handling

Unit 4: Class and objects
Class Fundamentals, Introducing Methods, this Keyword, Using objects as Parameters, Method overloading, Garbage collection, the ffinalize () Method.

Unit 5: Inheritance and Polymorphism
Inheritance Basics, Access, Multilevel, inheritance, Method overriding Abstract classes, Polymorphism, Final Keyword.

Unit 6: Packages and interfaces
Package, Accessibility of Packages, using Package members, Interfaces, Implementing interfaces, interface and Abstract classes, Extends and Implements together.

Unit 7: Exceptions Handling
Exception, Handling of Exception, Types of Exceptions, Throwing, Exceptions, writing Exception subclasses.

Block 3: Multithreading, I/O, and Strings Handling

Unit 8: Multithreaded Programming
Multithreading, The Main thread, JAVA Thread Model, Thread Priorities, Synchronization inJAVA, Inter thread Communication.

Unit : I/O In Java
I/O Basics, Streams and stream, Classes, the predefined streams, Reading from and writing to console, reading and writing files, the transient and volatile Modifiers, using instance of Native
Methods.

Unit 10: Strings and Characters
Fundamental of Characters and Strings, the String class, String operations, Data Conversion using value of () Methods, Strings Buffer and Methods.

Unit 11: Exploring Java I/O
Java I/O classes and interfaces, Stream classes, Text streams, Stream Tokenizer, Serialization,Buffered stream, print stream, Random Access file.

Block 4: Graphics and user interfaces

Unit 12: Applets
The applet class, Applet architecture, An applet Skeleton: Initialization and Termination, Handling events, HTML Applet TAG.

Unit 13: Graphics and user interfaces
Graphics contests and Graphics objects, user interface components, Building user interface withAWT, Swing - Based GUI, Layouts and layouts and layout Manager, Container.

Unit 4: Networking Features
Socket overview, reserved parts and proxy servers, Internet Addressing: Domain Naming Services (DNS), Java andThe Net: URL, TCP/IP Sockets, Datagrams.

MCA-116 Multimedia

UNIT-I Multimedia Technology: Meaning & scope of Multimedia; Elements of Multimedia; Creating multimedia applications; Multimedia file & I/O functions; Multimedia data structures; Multimedia file formats; Multimedia Protocols

UNIT-II Multimedia Audio: Digital sound; Audio compression & decompression; Companding: ADPCM compression; MPEG audio compression; True Speech; Special effects and Digital Signal Processing: Audio synthesis; FM synthesis: Sound blaster card; Special effect processors on sound cards; Wave table synthesis; MIDI functions; Speech synthesis & Recognition

UNIT-III Multimedia Video: Representation of Digital video; Video capture: Frame grabbing; Full motion video; Live video in a window; Video processor; Video compression & decompression; Standards for video compression & decompression; Playback acceleration methods

UNIT-IV Creating Multimedia Animation: Icon animation; Bit-map animation; Real-time vs Frame by Frame animation; Object modeling in 3D animation; Motion control in 3D animation; Transparency; Texture. Shadows, Anti-aliasing; Human modeling & Animation; Automatic motion control

UNIT-V Multimedia Authoring Tools: Project editor; Topic editor; Hot-spot editor; Developing a multimedia title; Multimedia text authoring systems; Usage of authoring tools

UNIT-VI Multimedia on LANs & Internet: Multimedia on LAN; Fast modems & Digital networks for multimedia; High speed digital networks; Video conferencing techniques; Multimedia interactive applications on Internet: Future Directions.

MCA-117 Microprocessor and its Applications

Unit 1

Introduction of Microcomputer System: CPU, I/Odevices, clock, memory, bussed architecture, tristatelogic, address bus, data bus and control bus.

Unit II

Semiconductor Memories: Development ofsemiconductor memory, internal structure anddecoding, memory read and write timing diagrams,MROM, ROM, EPROM, EEPROM, DRAM,

Unit III

Architecture of 8-bit Microprocessor:Intel 8085Amicroprocessor, Pin description and internalarchitecture.

Unit IV

Operation and Control of Microprocessor: Timingand control unit, op-code fetch machine cycle, Memoryread/write machine cycles, I/O read/write machinecycles, interrupt acknowledge machine cycle, state-transition diagram.

Unit V

Instruction Set:Addressing modes; Data transfer,arithmetic, logical, branch, stack and machine controlgroups of instruction set, macro RTL and micro RTLflow chart of few typical instructions; Unspecified flagsand instructions.

Unit VI

Assembly Language Programming: Assemblerdirectives, simple examples; Subroutines, parameterpassing to subroutines.

Unit VII

Interfacing: Interfacing of memory chips, addressallocation technique and decoding; Interfacing of I/Odevices, LEDs and toggle-switches as examples,memory mapped and

isolated I/O structure;Input/Outputtechniques: CPU initiated unconditionaland conditional I/O transfer, device initiated interrupt I/Otransfer.

Unit VIII

Interrupts:Interrupt structure of 8085Amicroprocessor, processing of vectored and non-vectored interrupts, latency time and response time;Handling multiple interrupts

Unit IX

Programmable Peripheral Interface: Intel 8255, pinconfiguration, internal structure of a port bit, modes ofoperation, bit SET/RESET feature, programming; ADC and DAC chips and their interfacing.

Unit X

Programmable Interval Timer: Intel 8253, pinconfiguration, internal block diagram of counter andmodes of operation, counter read methods,programming, READ-BACK command of Intel 8254.

Unit XI

Programmable Interrupt Controller 8253/8254: Pin configuration, Timer or counter, Internal structure, Interfacing with system, Mode (0,1,2,3,4,5), Reading timer, Read back command feature.

Unit XII

Programmable Interrupt Controller 8259A: Priority interrupt structure, Intel 8259, Pin configuration, Functional Block Diagram, Interrupt sequence, Initiallization control words ICW1, ICW2, ICW3, ICW4, Operation Comtrol Words(OCWs), Fully nested mode, EOI mode, Poll command, Reading status registers, Special fully nested mode, Cascade mode.

MCA-119 Data Base Management System

Unit 1: Introduction: Database Management System, Examples, Characteristics of the Database Approach, Advantage of using a Database Approach. Database System concepts and Architecture, Data Models, Schemes and Instances, DBMS Architecture and Data independence, Database Languages, Procedural and Non-procedural languages and Interfaces. Database System Environment, Classification of Database Management Systems.
Unit 2: ER Model: Database Modeling using the ER Model., Using High-Level conceptual Data Models for Database design, An example Database Application, Entity types, Entity Sets, Attributes and keys, Relationships, Relationship types, roles and Structural Constraints., Week Entity types, Refining the ER Design for the Company Database, ER Diagrams, naming conventions and design Issues, Conversion of ER Diagram to tables.

Unit 3: Relational Model: The Relational Data Model, Relational constraints. the Relational Algebra: Relational Model Concepts, Relational concepts and Relational Database Schemes, Update Operation and Dealing with Constraints Violations, Relational Database Design, Using ER-to-Relational Mapping.

Unit 4: Structured Query language: Data definition, Constraints and Schema changes in SQL 2, Basic Quires in SQL, More Complex SQL Quires, Insert, Delete and Update Statements in SQL, views(Virtual Tables) in SQL, Specifying general constraints as Assertion features of SQL. Integrity constrains, Triggers, Functional dependencies.

Unit 5: Normalization: Functional Dependencies and Normalization for Relational Database, Informal Design Guidelines for Schemes, Functional Dependencies, Normal Forms based on Primary keys, General Definitions of Second and Third Normal forms, Boyce Codd Normal form, Relational Database Design Algorithms and Further Dependencies, Algorithms for Relational Database Schema Design, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies, Other Dependencies and Normal Forms.

Unit 6: Transaction Processing Concepts: Introduction to Transaction Processing, Transaction and System Concept, Desirable properties of Transactions, Scheduling and Recoverability, Serializability of Scheduling, Transaction Support in SQL, Concurrency control techniques, Concurrency techniques for concurrency control, concurrency control based on timestamp based protocol, validation based protocol, deadlock handling, Database Recovery Techniques based on Immediate Update, Failure classification, Shadow Paging, Log based recovery, failure with loss of Nonvolatile Storage.

Unit 7: Emerging Trends in DBMS

Introduction to object oriented Database Management System, Introduction to client/Server Database, Introduction to Distributed Database, Introduction to Knowledge Databases.

MCA-120 Theory of Computation

Block 1 Regular Expression and Finite Automata

Unit-1: Alphabet, Strings and Languages

Set, Relations, Alphabet,Strings,Languages,Finite Representation of Languages, Chomasky Hierarchy

Unit-2: Finite Automata

Finite State Systems, Basic Definitions Non-Deterministic finite automata (NDFA), Deterministic finite automata (DFA), Equivalence of DFA and NDFA, Finite automata with epsilon transitions, Removal of epsilon transitions.

Unit-3: Regular Expressions

Regular Expressions-Definition, Algebraic Laws of RE,Finite Automata and Regular expressions,Conversion from RE to FA , Conversion from FA to RE , Arden's Theorem.

Unit-4: Introduction to Machines

Concept of basic Machine, Properties and limitations of FSM.Moore and mealy Machines, Equivalence of Moore and Mealy machines. Minimization of DFA.

Block 2 Context Free Grammar

Unit-5: Properties of Regular Language

The Pumping Lemma for Regular Sets, Applications of the pumping lemma, Closure properties of regular sets.

Unit-6:Context Free Grammar

Context Free Grammar(CFG)-Formal definition, sentential forms, leftmost and rightmost derivations, the language of CFG.

Unit-7: Normal Forms

Simplifications of CFG's- Removal of Useless Symbols, Removal of epsilon and Unit Production, Normal Forms-CNF and GNF.

Unit-8: Context Free Languages(CFL)

Closure Properties of CFL,Decision Properties of CFL,Application of CFG,Pumping Lemma for CFL.

Block 3 Pushdown Automata and Turing Machine

Unit-9: Push Down Automata

Formal Definition of Pushdown Automata, Pushdown Automata accepted by final state and empty state, Equivalence between CFG and PDA.

Unit-10: Turing Machine

Turing Machine(TM) –Formal Definition and behavior, Transitiondiagram, Instantaneous Description, Language of a TM,Variants of TM, Universal Turing Machine, Halting Problem, Church Thesis.

Unit-11: Undecidability

Recursive enumerable, Undecidable Problem About Turing Machines, Unsolvable Problems.

MCA-121 SYSTEM ANALYSIS AND DESIGN

Block – 1: System Concept, life cycle models

Unit 1: System Concept – An Introduction
Unit 2: The system development life cycle
Unit 3: Life cycle models
Unit 4: the role of the system analyst

Block – 2: System analysis

Unit 1: System Planning
Unit 2: information gathering
Unit 3: tools of structured analysis
Unit 4: feasibility study

Block – 3: System Design

Unit 1: System design and design methodologies
Unit 2: input/output and form design
Unit 3: file organization
Unit 4: data base design

Block – 4: System implementation

Unit 1: System testing
Unit 2: Implementation and project scheduling
Unit 3: hardware and software selection
Unit 4: security and disaster recovery

MCA-122 Python Programming

BLOCK 1: BASICS OF PYTHON

UNIT – 1: Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Python IDLE.

UNIT – 2: Tokens and Statements: Variables, Constants, Assignment, Multiple Assignment, Keywords, Punctuators, Identifiers, Input-Output, Indentation, Statements, Comments, Single Comment and Multiline Comment.

UNIT – 3: Data Types, Operators & Expressions: Types – Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Operators precedence, Expressions and order of evaluations Control Flow- if, if-else, if-elif-else, for, while, break, continue, pass .

BLOCK 2: DATA STRUCTURE IN PYTHON

UNIT – 4: Data Structures: Stack & Queue, Lists – Operations, Slicing, Methods; Tuples – Operations, Methods , Sets– Operations , Methods, Dictionaries– Operations , Methods, Sequences– Operations, Methods. Comprehensions– Operations , Methods.

UNIT – 5: Functions – Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function- Global and Local Variables.

UNIT – 6: Modules &Packages :Modules: Creating modules, import statement, from. Import statement, name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages.

BLOCK 3: OOPS IN PYTHON

UNIT – 7: Object-Oriented Programming OOP in Python: Classes, ' self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding.

UNIT – 8: Exception Handling : Error, and Exceptions: Difference between an error and Exception, Handling Exception, try except for block, Raising Exceptions, User Defined Exceptions

UNIT – 9: Python Libraries: Brief Tour of the Standard Library – Operating System Interface – String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression.

UNIT – 10: GUI Programming and Testing : Multithreading, GUI Programming, Turtle Graphics Testing: Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

BLOCK 4: MACHINE LEARNING IN PYTHON

UNIT – 11: Machine Learning Using Python : Machine Learning Basics, Features and Labels, Supervised and Unsupervised Learning.

UNIT – 12: Regression and Classification in Machine Learning: Simple Linear Regression, Multiple Regression, Data Collection for Machine Learning, Classification – Features and Types.

References:

- Python Programming: A Modern Approach, VamsiKurama, Pearson
- Learning Python, Mark Lutz, Orielly
- Think Python, Allen Downey, Green Tea Press
- Core Python Programming, W.Chun, Pearson.
- Introduction to Python, Kenneth A. Lambert, Cengage

MCA-123 Client Server Technology

Block 1: Introduction to Client-Server Computing

Unit 1: Introduction to Client-Server Computing

Introduction to Client-Server Architecture, Client-Server computing and its uses, historical development, downsizing and client server computing, mainframe computing, client-server technology and heterogeneous computing, advantages of client server computing.

Unit 2: Distributed Computing

Distributed Computing, File Server versus Client/Server Database, Computing platforms, Microprocessor integration and client server computing, implementations and scalability.

Unit 3: Designing Client-Server Applications

Fundamentals of client server design, division of labor, Transition to client-server programming; Interaction of client and server communication Techniques and protocols, implementing client server applications.

Block 2: Introduction to ASP.NET

Unit 4: Introduction to .NET Framework

Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language
(MSIL), Just-In –Time Compilation, Framework Base Classes.

Unit 5: Traditional ASP Basics

Introduction to ASP, How ASP Works, ASP Objects, Installing IIS on Windows 7 & Windows 8, Sample Programs, Importance's of Form tag and how it works.

Unit 6: ASP.NET Introduction & Controls

ASP.NET Introduction, First ASP.NET Application, Auto Postback Property, Event Handler, Parameters, Dynamically intializing Controls, IsPostBack property of Page class,

ListControls, Comparison between HtmlControls and WebControls, Control Properties and Methods, FileUpload Control

Block 3: Working with Forms and Controls

Unit 7: Working with Forms and Controls

Life Cycle of ASP.NET Page, Creating an ASP.NET Web Application Project, Creating Web Forms, Using Server Controls, Using Code-Behind Pages, Web Server Controls, Using Validation controls usage of skins and themes.

Unit 8: ADO.Net

Introduction to ADO.NET, .NET Framework data providers, Data Binding, Connecting to the Database, Accessing Data with DataSets, Displaying a DataSet in a List-Bound Control, Using Multiple Tables, Accessing Data with DataReaders, Disconnected operations with Data tables and Data sets, Connection pooling, Working with LINQ.

Unit 9: ASP.NET State Management

Application and Session Variables, Cookies, Storing Session Variables in a Database, Cleaning the session state, Types of Assemblies, Private vs. Shared assemblies, Creating and placing strongly named assemblies.

Unit 10: Configuration

Windows configuration, .net configuration, cashing, Types of Caching, SQL Cache Invalidation

Block 4: Client Side and Server Side Login Services

Unit 11: HTML & JavaScript

Understanding HTML Form Tag and elements within it, Javascript using Sample Programs, Working with CSS, Use Themes to Customize a Site,Web based security, ASP.NET authentication service, managing user,asp.net login controls, authorizing users.

Unit 12: ASP.Net Web Services

Introduction to web services, creating web services, invoking web services,

Unit 13: AJAX

Introduction to AJAX, AJAX.NET, Script Manager, Update Panel, Update Progress, Timer, AJAX Control Toolkit, server side support for AJAX, AJAX client support.

Unit 14: Developing a small application using ASP.NET for any case study.

MCA-125 DESIGN AND ANALYSIS OF ALGORITHMS Credit 4(3-1-0)

Overview: Introduction to basic techniques for designing and analyzing algorithms, including asymptotic analysis and recurrences; divide-and-conquer algorithms; lower bound for comparison based sorting methods, sorting in linear time, greedy algorithms; dynamic programming; backtracking and some graph algorithms for path problems.

BLOCK 1: Introduction and Design Strategies-I

UNIT 1: Introduction: Algorithm, Psuedo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Growth of functions: Asymptotic Notation, Recurrences: substitution method, master method.

UNIT 2: Divide and Conquer: General method, applications-Binary search, Finding the maximum and minimum, Quick sort, Heapsort, Strassen's Matrix Multiplication.

UNIT 3: Sorting in Linear Time: Lower bounds for sorting, Counting sort, Radix sort, Bucket sort, Medians and Order Statistics, Minimum and maximum.

BLOCK 2: Algorithm Design Strategies-II

UNIT 4: Greedy method: General method, applications- Knapsack problem, Job sequencing with deadlines, optimal two way merge patterns, Huffman codes, Minimum cost spanning trees: Prims and Kruskal's algorithm, Single source shortest paths: The Bellman-Ford algorithm, Dijkstra's algorithm.

UNIT 5: Dynamic Programming: General method, applications, capital budgeting problem, Multistage graphs, Matrix chain multiplication, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem.

BLOCK 3: Algorithm design strategies & Completeness

UNIT 6: Graph Algorithms: Introduction, representation of graphs, Breadth first search, depth first search, topological sort, strongly connected component, flow networks, ford-fulkerson method.

UNIT 7: Backtracking: General method, applications, 8-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT 8: Branch-And-Bound: The method, travelling salesperson problem, 15 puzzle problem.

UNIT 9: NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, satisfiability problem, reducibility.

TEXT BOOKS :

1. Introduction to Algorithms, second edition, T. H. Cormen, C. E. Leiserson, R.L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
2. Fundamentals of Computer Algorithms, Ellis Horowitz,Satraj Sahni and Rajasekharam,Galgotia publications pvt. Ltd.
3. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, John wiley and sons.

MCA-126 **Computer Graphics**

BLOCK 1: Raster Graphics and Clipping

Unit 1: Introduction to Computer Graphics

- What is Computer Graphics?
- Application of Computer Graphics
  - Presentation Graphics, Painting and Drawing, Photo Editing, Scientific Visualization, Image Processing, Digital Art, Education, training, Entertainment and CAD Simulation, Animation and Games
- Graphics Hardware
- Input and Output Devices
  - Touch Panel, Light Pens, Graphic Tablets, Plotters, Film Recorders

- Display Devices
- Refreshing Display Devices: Raster-Scan, Random-Scan
- Plasma Panel and LCD panels

Unit 2: Graphics Primitives

- **Points and Lines**
- Line-drawing Algorithms: **DDA Algorithm, Bresenham's line Algorithm**
- Circle-generating Algorithm: **Properties of Circles, Midpoint Circle of Algorithm**
- Polygon Filling Algorithm: Scan-Line

Unit 3: 2-D Viewing and Clipping

- Point Clipping
- Line Clipping: Cohen-Sutherland Line Clippings, Cyrus-Beck Line Clipping Algorithm
- **Polygon Clipping: Sutherland Hodgman Algorithm**
- Windowing Transformation

BLOCK 2: Transformations

Unit 4: 2-D and 3-D Transformations

- Basic Transformations: Translation, Rotation, Scaling, Shear
- **Composite Transformations: Rotations about a point, Reflection about a line**
- Homogeneous Coordinate Systems
- 3-D Transformations

Unit 5: Viewing Transformation

- Projections: Parallel Projection, Orthographic & Oblique Projections, Isometric Projections, Perspective Projections

BLOCK 3: Modeling & Rendering

Unit 6: Curves and Surfaces

- Polygon Representation Methods: Polygon Surfaces, Polygon Tables, Plane Equations, Polygon Meshes
- Bezier Curves and Surfaces: B**ezier Curves, Properties of Bezier Curves, Bezier Surfaces**
- Surface of Revolution

Unit 7: Visible – Surface Detection

- Depth Buffer Method
- Scan-Line Method
- Area-Subdivision Method

Unit 8: Polygon Rendering and Ray Tracing Methods

- **Illumination Model:** Ambient Reflection, Diffuse Reflection, Specular Reflection
- Shading: **Gouraud Shading, Phong Shading**
- Ray Tracing: **Basic Ray-Tracing Algorithm**

MCA-127 SOFT COMPUTING

Block 1: ARTIFICIAL INTELLIGENCE & SOFT COMPUTING

Introduction of Artificial Intelligence, Problem domain of AI, AI techniques, Rule based system, monotonic reasoning, non-monotonic reasoning, Uncertainty reasoning & Inference, Bayesian theory and dependency network, Limitation of AI, Soft computing paradigms, pattern classification, association and mapping.Pattern recognition techniques.

Block 2: FUZZY SET THEORY

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems.

Block 3: NEURAL NETWORK

Neural Network : Structure and Function of a single neuron: Biological neuron, artificialneuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain,characteristics and applications of ANN, single layer network, Perceptron training algorithm,Linear separability, Widrow&Hebb's learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN.Introduction of MLP, different activation functions, Error back propagation algorithm, derivation ofBBPA, momentum, limitation, characteristics and application of EBPA, Deep Learning: Convolution Neural Network, Recurrent Neural Network.

Block 4: GENETIC ALGORITHM

Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitnessfunction, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion,mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications &advances in GA, Differences & similarities between GA & other traditional method.

Text Books:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.
2. S. Rajasekaran and G.A.VijaylakshmiPai.. Neural Networks Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.

REFERENCES

1. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
2. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.

MCA-128 **Unix Shell Programming**

Block 1: Introduction to Unix Operating System

Unit 1: Introduction to Unix Operating System

Unix introduction - Basic Features, advantages, Basic Architecture of Unix system, Kernel, Types of shells: Bourne shell, C Shell, korn shell, unix commands

Unit 2: Working with Files and Directories

Unix file system, creating files, Listing Files and Directories, masking file permissions, directory permissions, removing a file forcibly, Mkdir, ls, pwd and cd,echo and cat,wc,ls –l, other useful variations of ls, tput command, control instructions in shell.

Unit 3: Unix File system-Boot block, super block, Inode table, data blocks, How Unix access files, storage files, Disk related commands: checking disk free space, dfsapce, du, ulimit.

Unit 4: Essential Commands of Unix

Password, cal, banner, touch, file, links with DOS, Commands for files and directories, cd, ls, cp, md, rm, mkdir, rmdir, more, less, creating and viewing files, using cat, file comparisons, file compression commands, unix manual page, setting PATH, System startup and shut-down.

Block 2: Redirection, vi editor, processes in UNIX

Unit 5: IO redirection and piping

Standard streams: standard input, standard output, standard error, operator >, piping, commonly used filter: cat, pg, more, head, tail, grep, sort, nl, pr, wc, tee, uniq, tr, cut, paste, lpr, examples using streams and filters

Unit 6: Vi editor

Introduction to vi editor,modes, status line commands, Opening & modifying a file, Saving a file and exiting vim, Search and Replace, undoing changes, yanking, Accessing multiple files, Window Commands, Interacting with system, Macros, vim configuration basics, syntax of ex commands, Addresses, Address symbols, options

Unit 7: Understanding Processes in UNIX

Processes in Unix, process fundamentals, connecting processes with pipes, Redirecting input output, manual help, Background processing, killing processes, managing multiple processes, changing process priority, scheduling of processes: at, batch, crontab command

Block 3: Shell programming in Unix

Unit 8: Basics of Shell programming

Basic of shell programming, various types of shells, shell programming in bash, Shell variables, shell keywords, assigning values to variables, unchanging variables, positional parameters, passing command line arguments, arithmetic in shell scripts, read, echo,

Unit 9: Decision Control Structures

Decision statements, if, else, elif, test command, nested if-else, forms of if, use of logical operators, case control structure.

Unit 10:Loop control structures

looping statements: while, until, for, reading from a file, using with command line arguments, nested loops, break statement, continue statement.

Block 4: Shell scripting in Unix

Unit 11: sed editor:

overview, uses of sed, sed operation, standard operations, pattern addressing, regular expressions, line information, I/O processing, yanking, putting, branching commands, multiline input processing.

Unit 12:Bash scripting-I
Bash scripting:Variables- variable assignment and variable scope, Operators, Command Line Arguments, Setting Values of Positional Parameters, Using Shift on Positional Parameters
Unit 13:Bash scripting-II
Control Flow Statements-Decision, loops and case statements, Arithmetic in Shell Script, Array, File and String Tests
Unit 14: gawk programming:
overview, command line syntax, standard options, Built in variables, operators, variable and array assignment, escape sequences, patterns and procedures, functions, file inclusion, output redirections, printf formats.

MCA-EA **Information and Network Security**

Block 1: Information security and Symmetric Ciphers

UNIT 1: Introduction: History, What is Information Security; Characteristics of Information; Information Security Model; Components of an Information Security; Aspects of Information security: Security attacks, Security Mechanism, and Security Services (X.800), Model for Network Security.
Unit 2: Classical Encryption Techniques: Historical background,symmetric cipher model, Substitution techniques, Transpositiontechniques, steganography.
Unit 3: Block ciphers and DES: Block cipher principles, Data encryption standard, strength of DES, differential and cryptanalysis, block cipher design principles, block cipher mode of operation.
Unit 4: Confidentiality Using Symmetric Ciphers: Placement of encryption function, traffic confidentiality, key distribution, random number generation.

Block 2: Public key Encryption and Hash Functions

Unit 5: Introduction to Number Theory: Prime numbers, Fermat's and Euler's theorem, discrete logarithm
Unit 6: Public Key Cryptography: Public-Key Cryptography Principles, RSA, Key Management: Diffi-Hellman key exchange.
Unit 7: Message Authentication and Hash Functions: Authentication requirements, Authentication Functions, Message Authentication codes, Hash Functions, SHA-1, MD5.
Unit 8: Digital Signatures: Digital signatures, Authentication protocols, Digital Signature standard

Block 3: Network Security Applications
Unit 9: Authentication Applications: Kerberos Motivation, X.509 authentication service
Unit 10: Electronic Mail Security: PGP: PGP Notation, PGP Operational Description, , S/MIME
Unit 11: IP Security:IP Security Overview, IP Security Architecture, Authentication Header
Uni12: Web Security: Web Security Threats, Web Traffic Security Approaches, Overview of Secure Socket Layer and Transport LayerSecurity, Overview of Secure Electronic Transaction

Block 4: Intruders and Viruses
Unit 13: Intruders: Intruders, Intrusion Techniques, Password Protection, Password Selection Strategies, Intrusion Detection,

Unit 14: Malicious Programs MaliciousPrograms, Nature of Viruses, Types of Viruses, Macro Viruses, Antivirus Approaches
Unit 15:Firewall: Firewall Characteristics, Types of Firewalls, Firewall Configuration

MCA-EB **Data Mining**

Block 1: Data pre-processing and Data ware housing

Unit 1: Processing and visualizing data
Data types, data quality, data pre-processing, measures of similarity, visualization
Unit 2: Data warehousing
Introduction to DATA Warehousing, Integration with Data Mining, Data-Mart, Concept of Data-Warehousing, Multi-Dimensional Database Structures. Client/Server Computing Model & Data Warehousing.
Unit 3: DATA Warehousing
DATA Warehousing. Data Warehousing Components, Building a Data Warehouse, Warehouse Database, Technical considerations & Implementation considerations of data warehouses, 3-level architecture of data warehousing.

Block 2: Data Mining and its Techniques

Unit 4: Introduction to Data Mining
Basic Data Mining Tasks, Data Mining Issues, Data Mining Metrics, Data Mining from a Database Perspective, Data Mining Definitions
Unit 5: Data Mining Techniques
Discovery of association rule, clustering, Classification, deviation detection
Unit 6: Specialised Data mining Techniques
Neural Network, Genetic Algorithm, Rough sets

Block 3: Data-mining Techniques in Detail

Unit 7: Descriptive Analytics – Cluster Analysis
Definition, Clustering Algorithms – Partitioning, Hierarchical, Density Based, Grid Based, Model Based, ConstraintBased Cluster AnalysisOutlier Analysis – Density Based and Distance Based
Unit 8: Predictive Analytics – Classification and Prediction
Definition, Decision Tree Induction, Lazy Learners - Bayesian Classification, Rule BasedClassification, Classification by Back-propagation and Support Vector Machines,
Unit 9: Mining Frequent Patterns, Associations and Correlations
Basic Concepts, Frequent Item-set Mining Algorithms, Mining Various Kinds of Association, Rules – Multilevel and Multidimensional, Association Rule Mining Vs Correlation Analysis

Block 4: Advance Data Mining Techniques
Unit 10:Web Mining
Web mining, Web content mining, Web structure mining, Web users mining,.
Unit 11: Text mining
Unstructured text, Episode Rule Discovery for Text, Hierarchy of Categories, Text-Clustering**.**
Unit 12: Spatial Mining
Spatial Mining Task, spatial mining clustering, Spatial Mining trends