

## ADVANCED MATHEMATICS

### MCTA-101

#### **Unit 1 : Partial Differential Equation**

Solution of Partial Differential Equation (PDE) by separation of variable method, Numerical solution of PDE (Laplace, Poisson's, Parabola) using finite difference Methods.

#### **Unit 2 : Matrices And Linear System Of Equations**

Solution of linear simultaneous equations by Gaussian elimination and its modification, Crout's triangularization method, Iterative methods-Jacobins method, Gauss-Seidal method, Determination of Eigen values by iteration.

#### **Unit 5 : Calculus Of Variations**

Euler-Lagrange's differential equation, The Brachistochrone problems and other applications. Isoperi-metric problem, Hamilton's Principle and Lagrange's Equation, Rayleigh-Ritz method, Galerkin method.

#### **Unit 4 : Fuzzy Logic**

Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their application.

#### **Unit 5 : Reliability**

Introduction and definition of reliability, derivation of reliability functions, Failure rate, Hazard rate, mean time t future & their relations, concepts of fault tolerant analysis.

#### **Reference Books:**

1. Higher Engineering Mathematics - by Dr. B.S. Grewal; Khanna Publishers
2. Calculus of Variations - by Elsgole; Addison Wesley.
3. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH.
4. Introductory Methods of Numerical Analysis by S.S. Shastri,
5. Calculus of Variations - by Galfand & Fomin; Prentice Hall.
6. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
7. Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
8. Numerical Solution of Differential Equation by M. K. Jain
9. Numerical Mathematical Analysis By James B. Scarborough
10. Fuzzy Logic in Engineering by T. J. Ross
11. Fuzzy Sets Theory & its Applications by H. J. Zimmersoms

## ADVANCE DATA STRUCTURES AND ALGORITHMS

### MCTA-102

#### UNIT-I

**Introduction:-** Basic Terminology, Data types and its classification, Algorithm complexity notations like big Oh, Array Definition, Representation and Analysis of Arrays, Single and Multidimensional Arrays, Address calculation, Array as Parameters, Ordered List and operations, Sparse Matrices, Storage pools, Garbage collection.

#### UNIT-II

**Recursion:-** Recursion-definition and processes, simulating recursion, Backtracking, Recursive algorithms, Tail recursion, Removal of recursion. Tower of Hanoi Problem.

**Linear Data Structure:** -Stack, Array Implementation of stack, Linked Representation of Stack, Application of stack, Queue, Array and linked implementation of queues, Circular queues, D-queues and Priority Queues.

#### UNIT-III

Introduction of Linked list, Implementation of Singly Linked List, Two-way Header List, Doubly linked list, Linked List in Array. Generalized linked list,

**Non Linear Data Structure:** -Trees: Basic terminology, Binary Trees, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Binary Search Tree (BST), Height-balanced and weight-balanced trees, B-trees, B+ -trees.

#### UNIT-IV

**Searching, Sorting And Design Techniques:** -Searching Techniques, Sorting- Internal Sorting, Bubble Sort, Insertion Sort, Quick Sort, Heap Sort, Bin Sort, Radix Sort, External Sorting, Merge Sort, Multi-way Merge Sort, Design Techniques - Divide and Conquer, Dynamic Programming, Greedy Algorithm, Backtracking, Local Search Algorithms.

#### UNIT-V

**Memory Management:** - Issues - Managing Equal Sized Blocks, Garbage Collection Algorithms for Equal Sized Blocks, Storage Allocation for Objects with Mixed Sizes, Buddy Systems, Garbage collection and compaction.

#### REFERENCES:

1. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education P
2. Lipschutz; Data structure (Schaum); TMH
3. R. Kruse et al, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002

**SOFTWARE ENGINEERING**  
**MCTA-103**

**UNIT-I**

**System Analysis and Design:-** Overview of System Analysis & Design , Business System Concept, System Development Life Cycle, Waterfall Model , Spiral Model, Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis, COCOMO model.

**UNIT II**

**Design related issues:-**System Requirement Specification – DFD, Data Dictionary, ER diagram, Process Organization & Interactions. System Design – Problem Partitioning, Top-Down And Bottop-Up design; Decision tree, decision table and structured English; Functional vs. Object- Oriented approach.

**UNIT III**

**Coding & Documentation:-**Coding & Documentation – Structured Programming, OO Programming, Information Hiding, Reuse, System Documentation. Testing – Levels of Testing, Integration Testing, Test case Specification, Reliability Assessment, Validation & Verification Metrics, Monitoring & Control.

**UNIT IV**

Coding standard and guidelines, programming style, code sharing, code review, software components, rapid prototyping, specialization, construction, class extensions, intelligent software agents, reuse performance improvement, debugging.

**UNIT V**

Software quality Assurance – Software quality factors – Quality assurance, quality metrics – Halstead's S/W Science. Software, Testing Techniques S/W testing fundamentals – White Box testing, Blackbox – testing, Validation Testing, system Testing, debugging, software maintenance maintainability – maintenance tasks – Reverse engineering and Re-engineering.

**TEXT BOOK:**

- 1.Roger S. Pressman – “Software Engineering”, Mc.Graw Hill.
2. Rajiv mall: Software engineering”,

## OBJECT ORIENTED TECHNOLOGY & UML MCTA-104

### UNIT-I

**C++ preliminaries:-** Tokens, Keywords, Variable, scope of variables, Data type, pointers, operators-scope resolution, member de-referencing operators, memory management operators, manipulators, type cast operators; Symbolic constants, Type compatibility, Dynamic initialization, Reference variable, Call by reference.

### UNIT-II

**Objects & Classes:-** abstract & declaration syntax, visibility label-private, public, protected, Inline concept, Static data member & member function, Array of objects, Pointer to objects & members, Array of pointers to objects.

#### **Functions:-**

Declaration & definition, exploring arrays & strings, function overloading, const function, Passing & returning object through function, The Friend function.

### UNIT-III

**Constructors & Destructors:-** Default constructors, default argument constructor, parameterized constructor, Copy constructor, Destructor.

**Inheritance and Polymorphism:-** Visibility modes, Single Inheritance, Multi-level Inheritance, Hierarchical Inheritance, Multiple Inheritance, Hybrid Inheritance, Virtual base class, abstract class. Function Overloading, Operator overloading, overloading unary, binary, string manipulation using operators. Run time - Virtual function, pointer to object, this pointer, pure virtual function.

### UNIT-IV

**Object Modeling Technique (OMT):-** object model, function model, relationship among models, object diagrams, state diagrams, data flow diagrams, analysis.

**Object oriented Design:** Overview of object design, Combination the models, Designing algorithms, design optimization, Implementation of control, Adjustment, Design of association

### UNIT-V

**Unified Modeling Language (UML):** Class diagram sequence diagram Use case diagram, Collaboration, diagram, state, chart diagram, Activity diagram, component diagram, deployment diagram, Object oriented Database: Relational Vs .object oriented database, the architecture of object oriented database, query language for Object Oriented database.

### Reference Books:

1. Rambaugh, James Michael, Blaha - "Object Oriented Modelling and Design" - Prentice Hall India/ Pearson Education
2. Jana, C++ & Object Oriented Programming, PHI
3. OOP in C++ by Lafore, Galgotia Pub.
4. Balagurusamy; Object oriented programming with C++; TMH

**ADVANCED COMPUTER NETWORK**  
**MCTA-105**

**UNIT- I**

**Introduction:Data Communication**, components, data representation, data flow.

**Networks**: distributed processing, network criteria, physical structures, network models, categories of network, inter connection of networks;

**The Internet**: brief history, internet today,

**UNIT- II**

**Protocols & standard layers**: protocols, standards, standard organization, internet standards,

**The OSI models**: layered architecture, peer to peer process, encapsulation,

**Layers in OSI model**: physical layer, data link layer, Network layer, transport layer, session layer , presentation layer , application layer.

**TCP/IP protocol suite**: physical and data link layers, network layer, transport layer, application layer,

**UNIT-III**

**Addressing**: physical address, logical address, port address, specific address.

**Blue tooth** : Architecture, blue tooth layers, Protocol stack, Frame structure ,**cellur Telephony**-frequency reuse Transmitting, receiving, roaming, **Satellite Networks** –GEO,LEO,MEO satellite.

**UNIT-IV**

Internetworking with TCP/IP, Basic concepts, Principles, Protocols and Architecture, Address handling Internet protocols and protocol layering. DNS, Applications: TELNET, RLOGN , FTP, TFTP, NFS, SMTP, IMAP, MIME, HTTP,STTP,DHCP, VOIP, SNMP.

**UNIT-V**

Introduction to Router, Configuring a Router, Interior & Exterior Routing, RIP, Distance Vector Routing, OSPF, BGP, Uni-cast, Multicast and Broadcast. Multicast routing protocols: DVMRP, MOSPF, CBT, PIM, MBONE, EIGRP, CIDR, Multicast Trees, Comparative study of IPv6 and IPv4.

**REFERENCES:**

- 1) Data communications and networking 4<sup>th</sup> edition Behrouz A Fourzan, TMH
- 2) Computer networks 4<sup>th</sup> edition Andrew S Tanenbaum, Pearson
- 3) Computer networks, Mayank Dave, CENGAGE
- 4) . Internetworking with TCP/IP: Comer.