MCTA- 101 Mathematical Foundations Of Computer Application

Unit 1
Sets: Relationship between sets, Operations on sets, set identity, principle of inclusion and exclusion, Min-sets, Cut-sets. Relations, properties of binary relations, equivalence relations and partitions, partial ordering relations, functions, inverse functions, composition of functions and lattices, chains and anti-chains, complemented & distributive lattices, Boolean algebra, canonical forms

Unit 2
Prepositional logic, conjunction, disjunction and negation, interpretation of formulas in prepositional logic, Validity and consistency, normal form in prepositional logic and logic consequences, first order predicate logic

Unit 3
Introduction to finite state machine, finite state machine as models of physical system, equivalence machines, finite state machine as language recognizers.

Unit 4
Introduction to discrete numeric functions and generating functions, introduction to combinaric problems, introduction to recurrence relational and recursive algorithms, linear recurrence, relations with constant coefficients, Homogeneous solutions, particular solutions, total solutions.

Unit 5
Graph: Finite graphs, incidence and degree, isomorphism, sub graphs and union of graphs, connectedness, reachability, paths, and circuits, Eulerian graphs, tree: properties of trees, pendant vertices in tree, center of tree ,spanning trees and cut vertices, binary tree ,matrix representation of graph, incidence and adjacency matrix and their propertices, applications of graphs in computer science.
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Reference Books:
1. Discrete structure, Schaum series
2. C.L. Liu, Elements of Discrete mathematics
3. Sahni S., Concepts in Discrete Mathematics
4. Levy L.S., Discrete Structure of Computer Science
5. Kanneth H. Rosen, Discrete Mathematics & Its Applications, Mcgraw Hill

MCTA102 - Programming Systems

Unit 1
Introduction to software design principles, modularity abstract data types, data structures and algorithms, Linear data structures-Stacks, arrays, lists, queues and linked representations; Pre-fix in-fix and post-fix expressions; Recursion; Set operations; Hashing and hash functions; Binary and other trees, traversal algorithms, Huffman codes; Search trees, priority queues, heaps and balanced trees.

Unit 2
Models of computation. Algorithm analysis, order arithmetic, time and space complexities and average and worst case analysis, lower bounds.

Unit 3
Algorithm design techniques: divide and conquer, search and traversals. Dynamic programming. backtracking. branch and bound.

Unit 4
Sorting and searching algorithms, combinatorial algorithms, string processing algorithms. Algebraic algorithms, set algorithms. Hard problems and approximation algorithms.

Unit 5
Problem classes P, NP, NP-hard and NP-complete, deterministic and nondeterministic polynomial time algorithms., Approximation algorithms for some NP complete problems.

Reference books:**:**
1. D.E.Knuth, The Art of Computer Programming, Vols. 1 and 3, Addison Wesley
2.V Aho, JE Hopcroft, JD Ullman, Design & Analysis of Algorithms, Addison Wesley
3. Horowitz, S. Sahni, Fundamentals of Computer Algorithms, Galgotia Publishers
4. K.Mehlhorn, Data Structures and Algorithms, Vols. 1 and 2, Springer Verlag,
5. Purdom, Jr.and C. A. Brown, Analyses of Algorithms, Holt Rinechart and Winston,

MCTA- 103 Object Oriented Modeling and UML

Unit 1
Object Oriented Concepts: Objects and classes, methods messages, encapsulation, interface, implementation, reuse, inheritance and polymorphism, object oriented development life cycle. UML: Class relationships in UML, use cases, sequence diagrams, state models and activity diagrams.

Unit 2
Structural Modelling: Classes, Advance Classes, Relationships, class diagrams, interfaces, packages, instances and object diagrams.

Unit 3
Behavioral Modelling: modelling interaction, use cases, interaction diagrams, activity diagrams, events, signals, state machines, process, threads, time, space, state chart diagrams.

Unit 4
Architectural Modelling: Components, deployment, collaborations, pattern, frameworks, component & deployment diagram. An overview of CORBA, Java beans and .NET.

Reference Books:
1. G Booch, J Rambaugh. Ivar Jacobson, The UML User guide, Pearson Education.
2. Eric Brande, Software Design, John Wiley & Sons.
3. David William Brown, An Introduction to Object Oriented Analysis", John Wiley
4. Booch, Object Oriented Analysis and Design with Applications, Addision Wesley.
5. Schach, Stephen R., An introduction to Object Oriented Systems Analysis and Design with UML and unified process, 2003, TMH.

MCTA- 104 Advance DBMS

Unit 1
DBMS Concept introduction, data models, E-R diagram, Keys, Relational database schemas, integrity constraints, relational algebra and calculus, normalization, normal form.

Unit 2
Indexing, Query processing and optimization, concurrency control.
Distributed database: fragmentation transparency, distributed query processing and optimization, distributed transaction modal and concurrency control, distributed deadlock and commit protocol.

Unit 3
Object oriented and object relational databases: specialization generalization, aggregation and association, object, object identity, architecture of object oriented and object relational databases.

Unit 4
Web databases: accessing databases through web, web server, XML database.

Unit 5
Introduction to image and multimedia database and data structure. Data structure RTree, K-D tree, Quad tree, content based retrieval: color histogram.

Reference Books:
1.R. Elmasri, S. Navathe, Benjamin Cumming, Fundamentals of Database system
2. H.F. Korth and A. Silberschatz, Database concept, (II ed) McGraw Hill, 1991
3. C.J. Date, An Introduction to Database System Volume I (V ed), Addision Wesley
4. Narang, Object Oriented Database, Prentice – Hall of India, New Delhi.
5. W. Kim “Modern Database System”, 1995, Acin Press, Addision – Wesley.

MCTA- 105 Computer Graphics & Multimedia

Unit 1
Graphics Hardware: Basic of Computer Graphics, display technology, Raster Scan & Random scan display systems, Input devices.

Unit 2
Basic Raster Graphics for drawing 2_D primitives: Scan converting lines, circles, ellipse; filling rectangles, polygons, generating characters; antialiasing. Matrix representation and Homogeneous coordinates, two dimensional transformations, 2D line clipping, polygon clipping algorithms, window to viewport transformation.

Unit 3
Viewing in 3D: Three dimensional transformation, projections : Parallel, prospective, view points.

Unit 4
Representation of curves & surfaces, Besier method, B-spline methods.
Visible surface determination: Z-buffer, Algos, List priority algorithms, Scan line algorithms. Light and shading models: Illumination models, shading models for polygons, shading algorithms, Gouraud & Phong, color models like RGB, YIU, copy, HSV etc.

Unit 5
Introduction to multimedia, multimedia components; multimedia hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia tools, presentations tools, Authoring tools, presentations. Graphics animation : Tweeking, Morphing simulating accelerator, motion specification.

Reference Books:
1. Foley, Van Dam, Fundamentals of Interactive Computer Graphics, Addison Wesly
2. Hearn and Baker Computer Graphics, Prentice Hall of India
3. Rogers D.F. Procedural Elements of Computer Graphics, McGraw Hill
4. Prabhat K. And leigh and Kiran Thakkar, Multimedia System Design, PHI.
5. Roger S. David Mathematical Elements for Computer Graphics, McGraw Hill
6. R Steimnetz, K Nashtet, Multimedia Computing Communications & Appl., PHI
7. John F.K. Buford, Multimedia System, Addision Wesley