

BCA111 Discrete Mathematics

Mathematical Logic:

Statements, Connectives, Statement formulas, Truth functional rules, Interpretation of formulas, Tautologies, Equivalence, Functionally complete set of connectives, Normal forms, Inference, Theory of statement calculus, Consistency of premises,

Predicates, statement functions, Quantification, Interpretation of predicate formulas, Inference theory for predicate calculus, Informal & formal proofs

Set Theory:

Relations Relation matrix, Transitive closures, Partitions and equivalence relations, Characteristic functions of a set, Principle of inclusion and exclusion, its applications

Directed Graphs:

Definition Simple digraphs, Matrix representations, Paths, Distances, Connectedness of digraphs, Path and reachability matrices, Boolean sum and product of bit matrices, Warshall's algorithm for transitive closure of relations

References:

1. Discrete Mathematical Structures with Application to computer Science- Tremblay & Manohar
2. Discrete Mathematical Structures- Preparata and Yeh

BCA112 Design and Analysis of Algorithms

Algorithm Analysis Techniques:

Recurrences: substitution, iteration and master methods.

Divide-and-conquer: general approach, binary search, matrix multiplication.

Greedy algorithms: general approach, activity selection, knapsack problem, minimum-spanning tree, Diskstra's algorithm, Huffman code

Dynamic Programming

General approach, matrix-chain multiplication, all-pairs shortest paths, binary search tree, traveling salesperson, 0/1 knapsack problem

Backtracking

N-queen problem, sum of subsets, knapsack problem, generation of all cliques, traveling salesperson problem, Graph coloring.

Lower Bound Theory

Decision tree; Reduction method; Amortized analysis; NP-completeness; Approximation algorithms

References:

1. Fundamental of Computer algorithms – Horowitz and Sahni
2. Design Methods and Analysis of Algorithms – S.K. Basu
3. The Design and Analysis of Computer Algorithms – Aho, Hopcraft and Ullaman

BCA113 Java Programming

Basics:



Comparison of C++ and JAVA, JAVA and Internet, JAVA support systems, JAVA environment, JAVA program structure, Tokens, Statements, JVM, Constant and Variables, Data Types, Declaration of variables, Scope of variables, Symbolic constants, Type Casting Operators: Arithmetic, Relational, Logical assignments. Increment and Decrement, Conditional, Bitwise, Special, Expressions and its evaluation.

Classes and Inheritance:

Defining a Class, Adding variables and Methods to classes, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control.

Array, Interface and Exception Handling:

Arrays: One Dimensional and Two Dimensional, Strings, Vectors, Wrapper Classes. Interface: Defining Interface, Extending Interface, Implementing Interface, Accessing Interface Variable. Exception Handling: Concepts of Exceptions, Types of Exception, Try and Catch keyword, Nested Try and Catch.

Thread Concepts and Applet:

Threads: Creating Threads, Extending Threads Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization. Package: System Packages, Using System Package, Adding a Class to a Package, Hiding Classes.

Applets: Local and Remote Applets, Writing Applets, Applets life cycle, Creating an executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, Passing parameters to Applets, Aligning the display, HTML Tags and Applets, Getting input from the user.

References:

1. E. Balagurusamy, "Programming in Java", TMH Publications.
2. Peter Norton, "Peter Norton Guide to Java Programming", Techmedia Publications.
3. Naughton, Schildt, "The Complete Reference JAVA 2", TMH.
4. Dustin R. Callway, "Inside Servlets", Addison Wesley.

BCA114 Computer Organization

Basic building blocks of digital computer- Essential & non-essential components; Types of storage elements- Static memory, Dynamic Memory, EDORAM, SDRAM, NVRAM, DDRAM etc.

Basic model of stored program computer, Organization of CPU. Instruction sets: Reduced, Complex. Addressing schemes, Instruction execution mechanism.

Memory organization: RAM, ROM, Memory hierarchy, Cache memory & its organization. Concept of virtual memory

I/O devices with special reference to modern peripheral devices, Data transfer schemes: Hand shaking, Polling, DMA.

Microprocessor: Basics, block diagrams, components of a microprocessor. Architecture , Instruction set, addressing modes of 8085. Simple assembly language programming.

References:

1. Digital Design: M.Morris Mano (PHI)
2. Digital circuits & logic design: S.C.Lee (PHI)



3. Digital electronics (circuits, systems & ICs): S.N.Ali (Galgotia pub.)
4. Digital electronics: W.H.Gothmann (PHI)
5. Switching theory: A.K Gautam (Katsons)

BCA115 Data Base Management System

Introduction

Data, information and knowledge, Characteristics of database approach, Data independence, Architecture of database system, Data dictionary, Types of database language, database system life cycle, Overview of hierarchical, network and relational model.

Relations and Codd's rules, Concepts of keys, Relation Algebra – Select, Project, Joins, Set operations, Update operations – tuple relational calculus, Relational Calculus vs. relational algebra. Data definition, data manipulation, view definition, nested queries, updation, Embedded SQL, Handling of nulls and cursors.

Data Models

Conceptual, Logical and Physical design, ER models, ER diagrams, Strong and weak entity sets. Generalization. Specialization and Aggregation, Conversion of ER model into relational schemas

Normalization

Normalization concepts, Functional dependencies and dependency preservations, Normal forms – 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, DKNF, Indexing, File organization, De-normalization, Clustering of tables and indexes.

Transaction Handling

Transaction recovery, System recovery, two phase commit, concurrency problems, locking, deadlocks, security, discretionary and mandatory access control, data encryption

Distributed databases

Overview of query processing, concurrency control and recovery in distributed databases, overview of client/server architecture and its relationship with distributed databases, performance benchmark and performance tuning of databases.

References:

1. Introduction to Database System – C.J. Date
2. Database Systems – Mcfadden et.al.
3. Database Concepts – Navathe et.al.
4. Database Structured Techniques for Design Performance – S. Atre

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