

MSC IT 1st Semester

Subject Code : MS 12

Subject Name : Algorithm Analysis And Design

Block 1 – Data Types Fundamentals

Unit 1- Basic of Algorithms: Algorithm, Abstract Data Type, The Running Times Of a Program, Good Programming Practice.

Unit 2- Basic Data Type: The data type “list”, Static and Dynamic Memory Allocation, Pointers, Linear Linked List, Array implementation of list, Pointer implementation of list, Doubly, link lists, Stack, Queues, Mapping.

Unit 3- Basic Operations and Sets: Sets, An ADT with union, intersection and difference, Bit vector implementation of sets, Link-list implementation of sets, The data dictionary.

Unit 4- Algorithms Analysis Techniques: Efficiency of algorithms, Analysis of recursive programs, Solving recurrence equation.

Block 2 – Design Of Algorithms

Unit 1- Algorithms Design Technique: Divide and conquer algorithms, Dynamic programming, Greedy algorithm, Minimum-cost spanning trees, Minimum Spanning Tree, Prim’s Algorithm, Kruskal’s Algorithm, Shortest Paths, Dijkstra’s Algorithm, Backtracking.

Unit 2- Algorithms for External Storage: A Model of External Computation External sorting, Characteristics of External Sorting, Criteria for Developing an External Sorting Algorithm, Important Uses of External Sorting, Merge Sort--A Digression, Top-Down Strategy, Bottom-Up Strategy, Storing Information in Files, Hashed Files, Indexed Files.

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Unit 3- Memory Management: The Issues in Memory, Garbage Collection Algorithms For Equal-Sized Block (Collection in Place), Buddy system (Distribution of blocks, Allocation blocks, | Returning blocks to available storage), Storage compaction and Compaction problem.

Unit 4- NP Complete Problem : Introduction, Polynomial-time, Abstract Problems, Encoding, NP-Completeness and Reducibility, NP-Completeness, Circuit Satisfiability, NP-Complete Problems, The Vertex-cover Problem, The Hamiltonian-cycle Problem, The Traveling-salesman Problem.

Block 3 – Dynamic Programming

Unit 1- Automata: Introduction, Basic Terms, Deterministic Finite Automata, Non Deterministic Finite Automata, Terminal Question.

Unit 2- Dynamic Programming: Introduction, Principle of Optimality, Recursive nature of Computations in, Dynamic Programming(DP), Chained Matrix Multiplication, Matrix-Chain, Multiplication Using Dynamic Programming, Knapsack Problem, Summary, Terminal Questions.

Unit 3- Languages & Grammar: Introduction, | Operation performs on the string:, Regular Expression, Algebra of Regular Expressions, Grammar, Ambiguity in Grammar , Summary, Terminal Question

Block 4 – Special Topics

Unit 1- Patern Matching Strategies (Algorithms): The Naïve Alogorithm, Naïve String matching, Brute-Force Algorithm, Boyer-Moore algorithm,

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Knuth-Morris-Pratt algorithm, Knuth-Morris-Pratt (KMP) Algorithm for, String Matching, Example of the Knuth-Morris-Pratt Alogorithm.

Unit 2- Greedy Algorithms: Introduction, Greedy Approach, Characteristics and Features of Problems solved by greedy Algorithms, Structure Greedy Algorithm, Knapsack Problem, Huffman Encoding, Horn Formulas, Traveling Salesperson Problem: Brute Force, Greedy, and Heuristics.

Unit 3- Special Tress: Red Black Tree, Definition, Balance Property of Red-Black Trees, Red-Black Tree Insertion, Red-Black Tree Insertion Example, Red-Black Tree Deletion, Red-Black Tree Deletion Example, Augmenting., Red-Black Trees, Heaps and Heap Tree, Complete Tree, Heaps, Addition to a heap, Storage of complete trees.