MCA-12 Design and Analysis of Algorithms

Unit 1 : Introduction to Algorithms

Algorithm, analysis, time complexity and space complexity, O-notation, Omega notation and Theta notation, Heaps and Heap sort, Sets and disjoint set, union and find algorithms. Sorting in linear time.

Unit 2 : Divide and Conquer

Divide and Conquer: General Strategy, Exponentiation. Binary Search, Quick Sort and Merge Sort

Unit 3 : Greedy Method

General Strategy, Knapsack problem, Job sequencing with Deadlines, Optimal merge patterns, Minimal Spanning Trees and Dijkstra's algorithm.

Unit 4 : Dynamic Programming

General Strategy, Multistage graphs, OBST, 0/1 Knapsack, Traveling Salesperson Problem, Flow Shop Scheduling

Unit 5 : Backtracking

Backtracking: General Strategy, 8 Queen's problem, Graph Coloring, Hamiltonian Cycles, 0/1 Knapsack

Unit 6 : Branch and Bound

General Strategy, 0/1 Knapsack, Traveling Salesperson Problem

Unit 7 : NP-Hard and NP-Complete Problems

Basic concepts, non-deterministics algorithms, NP-HARD and NP-COMPLETE classes, COOKS theorem

Suggested readings:

1. Horowitz Sahani, " Fundamentals of Computer Algorithms", Golgotia
2. Coremen Leiserson etal, " Introduction to Algorithms", PHI
3. Brassard Bratley, "Fundamental of Algorithms", PHI
4. M T Goodrich etal, "Algorithms Design", John Wiley
4. A V Aho etal, "The Design and analysis of Algorithms", Pearson Education