

Paper-III (MCA-303) : Algorithms

UNIT- I

Algorithms Analysis: Algorithms and structured programming. Analysing algorithms, Asymptotic behavior of an algorithm, Order notations, time and space complexities (polynomial, logarithmic and exponential), average and worst case analysis, lower and upper bounds.

UNIT- II

Algorithm design strategies: Divide and conquer (Merge sort, Quick sort, matrix multiplication). Greedy method (knapsack problem, job sequencing with deadlines, minimum spanning trees). Basic search & Traversal Techniques (Breadth first and Depth first traversals of Graphs).

UNIT- III

Dynamic programming: 0/1 knapsack, Travelling salesman problem

Backtracking: 8-queen problem, sum of subsets, Graph coloring, 0/1 Knapsack

Branch & Bound: 0/1 knapsack, Travelling salesman.

Algorithms on Graphs: Minimum cost spanning trees, depth-first search, bi-connectivity, strong connectivity, path finding problem, transitive closure algorithm

UNIT- IV

Matrix algorithms: Basics, Strassen's matrix-multiplication algorithm, LU and LUP decomposition, inversion of matrices

Data structures for set manipulation problems: Fundamental operation on sets, a simple disjoint-set union algorithm, tree structures for UNION-FIND problem, applications and extensions of the UNION-FIND algorithm.

UNIT- V

Pattern matching algorithms: Finite automata and regular expression, recognition of regular expression, patterns, recognition of substrings, Conversion from NFA to DFA

Taxonomy of Classes: Problem classes P, NP, NP-hard and NP-complete, Theorems for some NP-complete problems

Text/Reference Books:

1. Fundamentals of Computer Algorithms, E. Horowitz, S. Sahni, Galgotia Publications, 1985.
2. Design & Analysis of Computer Algorithms, Av. Aho, J.E. Hopcroft, & J.D. Ullman, Addison Wesley, 1974.
1. Design and Analysis of algorithms, S.K. Basu, PHI Publications

