

2 nd Semester	MCA02002	Analysis and Design of Algorithms	L-T-P 3-0-0	3 CREDITS
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Module-I: (8 Periods)

Notion of Algorithm : Growth of functions, Recurrences: The Master method, The Substitution method, The Iteration method, Asymptotic Notations and Basic Efficiency Classes (Use of Big O, θ , etc.) in analysis of algorithms, Mathematical Analysis of few Non-Recursive and Recursive Algorithms.

Module-II: (8 Periods)

Sorting and Searching Techniques : Selection Sort, Bubble Sort, Insertion Sort, Sequential Search, Binary Search, Depth First Search and Breadth First Search, Balanced Search Trees, AVL Trees, Red-Black Trees, Heaps and Heap Sort, Disjoint Set and their Implementation, Divide and Conquer Paradigm of problem solving, Complexity analysis and understanding of Merge Sort, Quick Sort, Binary Search Trees.

Module-III: (8 Periods)

Greedy Techniques: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's and Bellman Ford Algorithm, Huffman Trees, Knapsack problem.

Dynamic Programming Paradigm : Floyd-Warshall Algorithm, Optimal Binary Search trees, Matrix Chain Multiplication Problem, Longest Common Subsequence Problem, 0/1 Knapsack Problem, Maximum Network Flow Problem.

Module-IV: (8 Periods)

String Matching Algorithms: Naive string matching algorithm, The Rabin-Karp Algorithm, string matching with Finite Automata, Knuth Morris Pratt string matching algorithm.

Backtracking: n-Queen's problem, Hamiltonian Circuit problem, Subset-Sum problem, State Space Search Tree for these problems

Module-V: (8 Periods)

Branch and Bound: Travelling Salesman Problem and its State Space Search Tree.

Introduction to Computability: Polynomial-time verification, NP-Completeness and Reducibility, NP-Complete problems.

Approximation Algorithms: Vertex Cover Problem.

Books:

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", PHI Publication.
2. A.V. Aho, J. E. Hopcroft and J.D.Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education.
3. R. S. Salaria, Khanna, "Data Structure & Algorithms", Khanna Book Publishing Co. (P) Ltd.