

Unit No.	Topics
Unit 1	Introduction: Fundamentals of the Analysis of Algorithms. Performance Analysis-Space complexity, Time complexity, Efficiency –Asymptotic Notations and their properties. Mathematical analysis for Recursive and Non-recursive algorithms.
Unit 2	Brute Force and Divide & Conquer: Brute Force – Computing, Exhaustive Search. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort. Multiplication of Large Integers and Matrix Multiplication.
Unit 3	<p>Greedy Technique and Dynamic Programming: Greedy Technique –Fractional Knapsack problem, Optimal Merge pattern – Huffman Trees, Prim’s algorithm and Kruskal’s Algorithm, Shortest Path- Dijkstra’s algorithm, Bellman Ford algorithm.</p> <p>Dynamic programming – Principle of optimality. All pair shortest paths- Floyd’s algorithm, Matrix chain multiplication, 0/1 knapsack problem and Optimal Binary Search Trees.</p>
Unit 4	<p>Backtracking and Branch & Bound: Backtracking – n-Queen problem, Hamiltonian Circuit Problem, Subset Sum Problem, Graph colouring problem.</p> <p>Branch and Bound – LIFO Search and FIFO search – Knapsack Problem – Travelling Salesman Problem.</p>
Unit 5	NP-Hard and NP-Complete problems: Basic concepts, Non deterministic algorithms, NP – Hard and NP Complete classes, Cook’s theorem.

Suggested Readings:

1. T.H. Cormen, C. E. Leiserson, R. L. Rivest “**Introduction to Algorithms**”, The MIT Press, 4th Edition, 2022
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, “**Computer Algorithms**”, Silicon Press, 2nd Edition, 2007.
3. Michael T. Goodrich and Roberto Tamassia, “**Design and Analysis of Algorithms**”, Wiley, Edition 2021.
4. Jon Kleinberg And Eva Tardos, “**Algorithm Design**”, Pearson, 1st Edition, 2005.