1	Introduction	● Concepts in algorithm analysis & design - motivation ● Complexity of an algorithm (Space and time Complexity), Analysis of time complexity of Insertion Sort by step count method ● Growth of functions, Asymptotic Notations (Big Oh, Omega, Theta)) ● Solving recurrences: Iterative method Substitution method, Recurrence Tree method ● Solving recurrences: Master theorem, Change of variable	5	1-5

2a	Divide and Conquer Approach	● Structure of Divide-and-Conquer algorithm design technique ● Analysis of divide-and-conquer run time recurrence relations of ■ Binary Search ■ Merge Sort ■ Quick Sort	3	6-8

2b	Greedy Approach	● Overview of Greedy design paradigm and Solving as well as analyzing the following problems using Greedy method: ■ Fractional knapsack problem ■ Job sequencing with deadlines ■ Huffman method of Optimal Coding ■ Finding Minimum spanning trees for a Graph: Kruskal's Method ■ Finding Minimum spanning trees for a Graph: Prim's Method ■ Finding Single Pair Shortest Path in a graph: Dijkstra's Method	6	9-14

3	Dynamic Programming Approach	● Overview of Dynamic Programming paradigm, Difference between Dynamic Programming and Divide & Conquer/Greedy Methods ● Solving as well as analyzing the following problems using Dynamic Programming method: ■ 0/1 Knapsack problem ■ Matrix Chain Multiplication ■ Longest Common Subsequence ● Multistage Graph problem - Forward and Backward Approach for solving ● Finding All Pair Shortest Paths in a Graph - Floyd Warshall Algorithm ● Notion of Optimal Binary Search Tree (OBST), Finding OBST using Dynamic Programming method ● Notion of Travelling Salesman Problem (TSP), Solving TSP using Dynamic Programming method	10	15-24

Amortized Analysis and Randomized Algorithms	● Notion and methods of Amortized Analysis of algorithms: Aggregate Analysis, Accounting Method, Potential Method ● Randomized Algorithms: Las Vegas and Monte Carlo algorithms ● Randomized Quick Sort and its analysis ● Minimum Cut in a graph - Karger's min cut algorithm	6	25-30

6.	Complexity Classes and Approximation Algorithms	● Concepts of Complexity Classes: P, NP, NP-Hard and NP-Complete ● Reducibility of problems ● Complexity Classes for the following selected problems: ■ Vertex Cover Problem ■ 3-CNF Satisfiability Problem ■ Maximal Clique Problem ■ Hamiltonian cycle Problem ■ Travelling Salesman Problem ● Notion of Approximation algorithms ● Approximation algorithms for following selective problems: ■ Vertex Cover Problem ■ Travelling Salesman Problem	10	31-40