
Question Paper consists of FIVE units, each carrying 14 marks
Each unit has TWO questions; either of them should be answered
All parts of a question must be answered at one place.

UNIT-I

1. a) Define time complexity and space complexity, and explain their significance in algorithm analysis. 7M
b) Illustrate the union and find algorithms for disjoint sets with a suitable example. 7M

(OR)

2. a) Compare the properties of Big Oh, Omega, and Theta notations with examples. 7M
b) Explain the process of finding connected components in a graph using disjoint sets. 7M

UNIT-II

3. a) Explain the divide and conquer strategy and demonstrate its application in merge sort. 7M
b) Discuss the greedy approach and apply it to solve the job sequencing with deadlines problem. 7M

(OR)

4. a) Analyze the time complexity of binary search and quick sort algorithms. 7M
b) Describe Kruskal's algorithm for constructing a minimum cost spanning tree. 7M

UNIT-III

5. a) Explain the dynamic programming solution for the 0/1 knapsack problem with an example. 7M
b) Discuss the application of dynamic programming in solving the all-pairs shortest path problem. 7M

(OR)

6. a) Describe the matrix chain multiplication problem and its solution using dynamic programming. 7M
b) Explain the construction of an optimal binary search tree using dynamic programming. 7M

UNIT-IV

7. a) Explain the backtracking technique and solve the graph coloring problem using it. 7M
b) Describe the N-Queens problem and its solution using backtracking. 7M

(OR)

8. a) Discuss the sum of subsets problem and its solution using backtracking with an example. 7M
b) Explain the Hamiltonian cycle problem and how backtracking is applied to solve it. 7M

UNIT-V

9. a) Describe the FIFO branch and bound approach and apply it to the 0/1 knapsack problem. 7M
b) Explain the basic concepts of NP-hard and NP-complete problems with examples. 7M

(OR)

10. a) Discuss the branch and bound technique and its application to the traveling salesman problem. 7M
b) Explain the significance of Cook's theorem in the context of NP-completeness. 7M