

Roll No.

Total Pages : 03

BT-6/J-22

46154

ANALYSIS AND DESIGN OF ALGORITHMS
IT-302N/PE-IT-S310A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) What is the difference between Big(O) and Omega notation ? Explain using suitable examples.
(b) Write the algorithm for transpose of a matrix $m \times n$ and determine the time complexity of the algorithm using frequency count method.
2. (a) What is meant by divide and conquer approach ? Write divide and conquer recursive algorithm of quick sort and compute its time complexity.
(b) Explain the properties of an algorithm with an example and describe the Algorithm Analysis of Binary Search.

Unit II

3. (a) Distinguish between Dynamic Programming and Greedy Method.
(b) What are the principles of optimality ? Explain, how travelling sales person problem uses the dynamic programming technique with example.
4. (a) State the Greedy Knapsack. Find an optimal solution to the Knapsack instance $n = 3$, $m = 20$, $(P_1, P_2, P_3) = (25, 24, 15)$ and $(W_1, W_2, W_3) = (18, 15, 10)$.
(b) Write the control abstraction of greedy method.

Unit III

5. (a) Write the backtracking algorithm for N-queen's problem. Give time and space complexity for 8-queen's problem.
(b) Explain the 0-1 Knapsack solution using Branch and Bound Method.
6. (a) Write notes on the following :
 - (i) LC-Search
 - (ii) Branch and Bound (BB)
 - (iii) FIFO-BB.
(b) What is a Hamiltonian Cycle ? Explain how to find Hamiltonian path and cycle using backtracking algorithm.

Unit IV

7. (a) What is a graph ? Write the breadth first search algorithm for graph traversal and compute its space complexity.
(b) What is the difference between B tree and B+ tree ? Discuss the insertion operation in B+ tree.
8. (a) What is Binary Search Tree (BST) ? Write the algorithm for insertion and deletion of node in BST.
(b) Give the definition of NP-complete. Prove that TSP is NP-complete.

