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Roll No.

Total Pages : 03

BT-6/M-19

36154

ANALYSIS OF DESIGN OF ALGORITHMS
IT-302N

Time : Three Hours]

[Maximum Marks : 75

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

Unit I

1. (a) What is the role of asymptotic in algorithm design ? Discuss in detail about the relationship of Big-Oh, Big-Omega and Theta notations with suitable examples. 7½
- (b) Explain Strassen's algorithm for matrix multiplication with suitable example. 7½
2. (a) Write an algorithm to sort elements using quick sort. Show that steps for the following list : (40, 80, 35, 90, 45, 50, 70). Also analyse the complexity of quick sort. 7½

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- (b) What do you mean by recurrence relation ? Solve the following recurrence relation using recursion tree method : 7½

$$T(n) = T(n/3) + T(2n/3) + Cn$$

Unit II

3. (a) Write and explain Kruskal's algorithm to find minimum spanning tree with suitable example and also analyse its time complexity. 7½
- (b) What are the elements of greedy approach ? Solve fractional knapsack problem using greedy approach by taking suitable example. 7½
4. (a) Write and explain algorithm for finding minimal path in a graph using Bellman Ford with the help of suitable example. Also explain its complexity. 7½
- (b) What do you understand by dynamic programming approach ? Write and explain the algorithm for longest common subsequence and compute the longest common subsequence between the two strings "AFSHBDA" and "ASFDHBA". 7½

Unit III

5. Discuss the basics of backtracking. How is backtracking useful to solve algorithmic problems ? Solve the 8-queen problem using backtracking algorithm. 15

6. (a) Solve the following instance of the knapsack problem using branch and bound technique ($W_{(\text{Capacity of knapsack})} = 15$).

Items	W (Weight)	V (Value)	
11	9	15	
12	6	6	
13	7	5	
14	2	1	7½

- (b) What is Travelling Salesmen Problem ? How can you solve this problem ? Explain. 7½

Unit IV

7. (a) Write the algorithm of breadth first graph traversal technique and also explain its time complexity. 7½

- (b) Define a Binary Search Tree (BST) ? Write an explain algorithm to perform deletion of an item in BST. 7½

8. (a) Discuss the classes P, NP, NP complete and NP hard with examples. How can you show that a problem is NP complete ? 7½

- (b) How can you find complexity of a non-deterministic algorithm ? Explain using a suitable example. 7½