

BT-6/M-21

46017

## ANALYSIS AND DESIGN OF ALGORITHMS

Paper-IT-352

Time : Three Hours]

[Maximum Marks : 100

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

## UNIT-I

1. (a) What are the rules of manipulate Big-OH expression and about the typical growth rate of algorithms?  
(b) What is an algorithm? Write the properties of an algorithm? How do you perform run time analysis of algorithms? (10+10=20)
2. (a) Compute the multiplication of given two matrix using Strassen's matrix multiplication method :

$$A = \begin{bmatrix} 1 & 0 & 2 & 1 \\ 4 & 1 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 5 & 0 & 2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 1 & 0 & 1 \\ 2 & 1 & 0 & 4 \\ 2 & 0 & 1 & 1 \\ 1 & 3 & 5 & 0 \end{bmatrix}.$$

- (b) Explore the divide and conquer algorithms. How do you analyze divide and conquer run time recurrence relations? (10+10=20)

## UNIT-II

3. (a) What is Greedy method/algorithm? Does it always give an optimal solution? Give argument to support your answer.
- (b) Write a note on single source shortest paths.  
(13+7=20)
4. (a) What is dynamic programming? Draw a comparison between dynamic programming and divide and conquer. Explain with an example.
- (b) What do you mean by longest common sequence?  
(13+7=20)

## UNIT-III

5. (a) Find the optimal solution to the Fractional Knapsack problem with given data :

Item	Weight	Benefit
A	2	60
B	3	75
C	4	90

- (b) What is back tracking? Write a detailed note on 8-queen problem.  
(10+10=20)
6. (a) Find the optimal solution using Branch and Bound for the following assignment problem :

	Job 1	Job 2	Job 3	Job 4
A	9	2	7	8
B	6	4	3	7
C	5	8	1	8
D	7	6	9	4

- (b) Outline an exhaustive search algorithm to solve travelling salesman problem. (10+10=20)

#### UNIT-IV

7. (a) Describe binary search tree with three traversal patterns. Give suitable example with neat diagram for all three traversal of binary search tree.
- (b) Differentiate between depth first and breadth first search. (13+7=20)
8. (a) Differentiate between polynomial *vs* non-polynomial time complexity.
- (b) Write note on Class P, Class NP and NP hard problem. (10+10=20)

