BT-5/D-21

45176

ADVANCED ALGORITHMS

Paper–PE-CS-T 307A

Time Allowed : 3 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) Explain Big-oh, Big-omega and Big-theta notations of the complexity with suitable examples. 7

    (b) What is Binary search tree? Write down the insertion algorithm of Binary search tree and insert the following elements: 35, 29, 17, 44, 55, 67, 3, 2, 114, 55, 15, 28, 88, and 41. Also, explain the problem of skewness in BST. 8

2. (a) Solve the following recurrence relation using Master theorem: 7

    $$T(n) = 2T(n/4) + \sqrt{n}$$

    (b) Using recursive tree method solve the following: 8

    $$T(n) = T(n/10) + T(9n/10) + n$$

UNIT-II

3. (a) What is Activity Selection problem? Solve following problem using greedy algorithm. Set of activity 8

    $$S = \{a_1\ a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9, a_{10}, a_{11},\}$$

l	1	2	3	4	5	6	7	8	9	10	11
s_i	1	3	0	5	3	5	6	8	8	2	12
f_i	4	5	6	7	8	9	10	11	12	13	14

    (b) Explain the fundamental steps of finding longest common subsequence using dynamic programming. Find LCS between two strings X=BACDB and Y=BDCB. 7

4. (a) Explain Strassen's algorithm to compute the matrix multiplication and analyze its complexity. Also multiply following matrix using Strassen's Algorithm. 8

$$X = \begin{bmatrix} 3 & 2 \\ 4 & 8 \end{bmatrix} \qquad Y = \begin{bmatrix} 1 & 5 \\ 9 & 6 \end{bmatrix}$$

(b) Write Huffman code for following symbols 7

Symbol	A	B	C	D	E	F
Frequency	45	12	13	16	9	5

UNIT-III

5. (a) Define spanning tree. Write the pseudo code of the Kruskal algorithm for finding minimum spanning tree. Also analyze its complexity. 8

(b) What is topological sort? Explain with an example. 7

6. (a) Explain Floyd-Warshall Algorithm to find all pair shortest path. Find all pair shortest path of following problem also analyze its complexity. 8
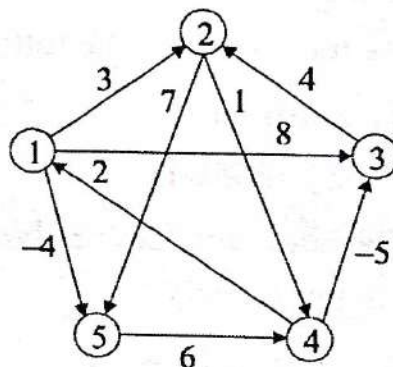
(b) Write shortest path Dijkstra Algorithm and explain its steps. 7

UNIT-IV

7. (a) Write Naive string matching algorithm and explain its working with an example. 7

(b) Write Rabin-Karp string matching algorithm. 8

8. Explain different components of Knuth-Morris-Pratt algorithm and explain them by taking an example. 15