

Code No: 5405AA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech I Semester Examinations, June/July - 2019

ADVANCED ALGORITHMS

(Computer Science)

Time: 3hrs

Max.Marks:75

**Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART - A****5 × 5 Marks = 25**

- 1.a) Express the function  $f(n) = 5n^3 + 5n^2 + 10n$  in  $\Theta$  notation. [5]
- b) Write short notes on hash tables. [5]
- c) Describe various elements of the greedy strategy. [5]
- d) Define Graph and list any three application area of graph. [5]
- e) State and explain vertex-cover problem. [5]

**PART - B****5 × 10 Marks = 50**

2. Explain how divide and conquer method is applied to solve Strassen's matrix multiplication problem. [10]

**OR**

3. Consider the following recurrence  $T(n)=T(n/3)+T(2n/3)+n$  Obtain asymptotic bound using recursion tree method. [10]

4. Suppose the following list of numbers is inserted in order into an empty binary search tree: 45, 32, 90, 34, 68, 72, 15, 24, 30, 66, 11, 50, 10 construct the binary search tree. [10]

**OR**

5. Show the Red-Black tree that results after the successive insertions of the keys 51, 48, 45, 23, 30 into an initially empty tree. Delete 51 from the resultant tree. [10]

6. Deduce a recursive definition for finding the minimum cost of Matrix-Chain multiplication problem. Find an optimal parenthesisation of a matrix chain product whose sequence of dimension is:  $\langle 5*10, 10*3, 3*12, 12*5, 5*50, 50*6 \rangle$  [10]

**OR**

7. Given the characters  $S \langle a, b, c, d, e, f \rangle$  with the following probability  $P = \langle 29, 25, 20, 12, 05, 09 \rangle$ . Build a binary tree using greedy Huffman algorithm. [10]

8. Explain Dijkstra's algorithm for finding the shortest path in a given graph. [10]

**OR**

9. Write algorithm to find Minimum Spanning Tree (MST) using Kaushal's method and compute its time complexity. [10]

10. Design the algorithm to solve the following instance of the sum of subsets problem  $S=\{5,10,12,13,15,18\}$  and  $d=30$ . [10]

**OR**

11. What is travelling salesman problem? Find the solution of following travelling salesman problem. [10]

$\infty$	20	30	10	11
15	$\infty$	16	4	2
3	5	$\infty$	2	4
19	6	18	$\infty$	3
16	4	7	16	$\infty$

---ooOoo---

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