

Code No: 114CT

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year II Semester Examinations, December - 2017****DESIGN AND ANALYSIS OF ALGORITHMS****(Information Technology)****Time: 3 Hours****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****(25 Marks)**

- 1.a) What is Big-oh Notation? [2]
- b) Define degenerated tree. [3]
- c) Analyze the time complexity of Prims Algorithm. [2]
- d) List any two differences of prims and Krushkal's algorithm. [3]
- e) What are the similarities between greedy and dynamic programming. [2]
- f) Write the steps of Dynamic Programming. [3]
- g) Define dead node. [2]
- h) Write the general method of branch and bound. [3]
- i) What is intractable problem? [2]
- j) What are the 2 stages of non-deterministic algorithm? [3]

**PART-B****(50 Marks)**

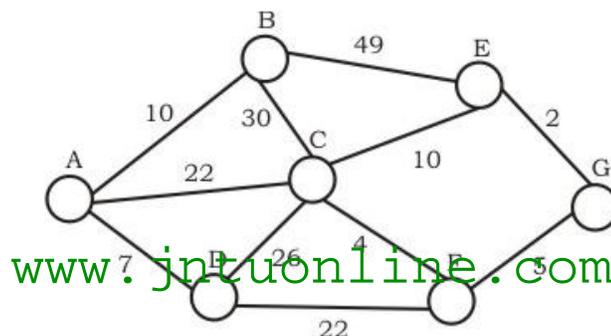
2. Write in detail about Master Theorem. Solve the following recurrence relation using master's theorem.
  - a)  $T(n) = 2T(n/2) + n\log(n)$ .
  - b)  $T(n) = 8T(n/2) + n^2$
  - c)  $T(n) = 9T(n/3) + n^3$ . [10]

**OR**

3. Show how quick sorts the following sequence of keys in ascending order 65, 70, 75, 80, 85, 60, 55, 50 and 45. Analyze the time complexity. [10]
4. Find the optimal solution of the Knapsack instance  $n=3$ ,  $m=20$ ,  $(p_1, p_2, p_3) = (25, 24, 15)$  and  $(w_1, w_2, w_3) = (18, 15, 10)$ . [10]

**OR**

5. What is minimum spanning tree? Explain Krushkals's Algorithm and apply for the graph given in figure below. [10]



6. Consider  $n=4$  and  $(q_1, q_2, q_3, q_4)=(do, if, int, while)$ . The values of  $r$  p's and  $q$ 's are given as  $p(1:4) = (2, 3, 1, 1, 1)$ . Construct the optimal binary search tree. [10]

**OR**

7. Explain in detail all pair shortest path problem with an example. [10]
8. The edge length of the directed graph are given by matrix. Find the optimal tour using branch and bound. [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       | $\infty$ |

**OR**

9. Draw and explain the portion of the tree for 4-queens problem that is generated during backtracking. [10]
10. What is NP-Hard class? Give any three examples. [10]

**OR**

- 11.a) Briefly explain Cooks-theorem.  
b) Discuss about Max Clique Problem. [5+5]

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