

Code No: 114CT

**R13**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B.Tech II Year II Semester Examinations, October/November - 2016**

**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) Define Theta notation. [2]
- b) What is meant by Bi-connected components? [3]
- c) Discuss minimum cost spanning tree. [2]
- d) Write the applications of greedy algorithm. [3]
- e) What is meant by Multistage graph? [2]
- f) State the Travelling sales person problem. [3]
- g) Describe about Backtracking. [2]
- h) What is meant by Hamiltonian cycle? [3]
- i) Define P and NP. [2]
- j) Differentiate between Dynamic Knapsack and Branch and Bound Knapsack problem. [3]

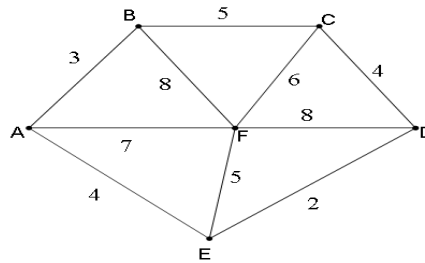
**PART-B**

**(50 Marks)**

- 2.a) Describe UNION and FIND algorithms.
  - b) Derive the time complexity for quick sort. [5+5]
- OR**
- 3.a) Define time complexity. Describe different notations used to represent these complexities.
  - b) Explain the Strassen's matrix multiplication. [5+5]
- 4.a) Write a greedy algorithm to the Job sequencing with deadlines.
  - b) Design a linear-time algorithm for solving the single source shortest path algorithm. [5+5]

**OR**

- 5.a) Find the minimum cost spanning tree for given graph using Kruskals algorithm.



- b) Develop an algorithm for greedy strategies of knapsack problem. [5+5]
- 6.a) Define merging and purging rules in O/1 knapsack problem.  
b) Develop an algorithm of all pairs shortest path problem. [5+5]
- OR**
7. Construct an optimal binary search tree for the following data:  $n=4$ ,  $(a_1, a_2, a_3, a_4) = (\text{do}, \text{if}, \text{int}, \text{while})$ ,  $p(1:4) = (3, 3, 1, 1)$  and  $q(0:4) = (2, 3, 1, 1, 1)$ . [10]
- 8.a) Explain the graph coloring problem with an example.  
b) Explain the n-queen problem using backtracking. [5+5]
- OR**
9. Use the LC approach to solve the Knapsack problem with  $n=3$ ,  $m=20$   
 $(P_1, P_2, P_3) = (25, 24, 15)$ ,  $(W_1, W_2, W_3) = (18, 15, 10)$ . [10]
- 10.a) Compare and Contrast between NP-Hard and NP-complete.  
b) Write an algorithm to solve the Knapsack problem with the Branch and Bound. [5+5]
- OR**
- 11.a) Briefly explain Cook's theorem.  
b) Describe clique decision problem. [5+5]

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