

Code No: 114CS

**R13****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year II Semester Examinations, May - 2015****DESIGN AND ANALYSIS OF ALGORITHMS****(Computer Science and Engineering)****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) Explain amortized complexity [2M]
- b) Show that if  $f(n) = a_m n^m + \dots + a_1 n + a_0$  then  $f(n) = O(n^m)$ . [3M]
- c) What is AND/OR graph? [2M]
- d) Take a graph of 5 nodes and traverse it in preorder, inorder, and postorder. [3M]
- e) What is traveling sales person problem? [2M]
- f) Can we solve 0/1 knapsack problem with greedy method? Comment on your answer. [3M]
- g) What is Hamiltonian cycle? [2M]
- h) What do you mean by bounding? [3M]
- i) What is meant by non-deterministic algorithm? [2M]
- j) What is NP-hard problem? [3M]

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

- 2.a) Write and explain the control abstraction for Divide and conquer.
  - b) Explain the theta notation used in algorithm analysis. [6+4]
- OR**
- 3.a) Sort the records with the following index values in the ascending order using quick sort algorithm. 2, 3, 8, 5, 4, 7, 6, 9, 1
  - b) What is probabilistic analysis? Give example. [6+4]
- 4.a) What is weighting rule for Union(i,j)? How it improves the performance of union operation?
  - b) What is biconnected graph? [6+4]
- OR**
- 5.a) Explain the Find algorithm with collapsing rule
  - b) What is spanning tree? [6+4]
- 6.a) What do you mean by forward and backward approach of problem solving in Dynamic Programming?
  - b) What is greedy strategy? [6+4]
- OR**
- 7.a) Discuss about all pairs shortest path problem with suitable example.
  - b) Discuss briefly about the minimum cost spanning tree. [6+4]

8. Draw the portion of the state space tree generated by LCBB for the knapsack instances:  $n=5$ ,  $(P_1, P_2, \dots, P_5) = (12, 10, 5, 9, 3)$ ,  $(w_1, w_2, \dots, w_5) = (3, 5, 2, 5, 3)$  and  $M=12$ . [10]
- OR**
9. What is sum-of-subsets problem? Write a recursive backtracking algorithm for sum of subsets problem. [10]
- 10.a) Discuss about cook's theorem.  
b) What is the satisfiability problem? [6+4]
- OR**
- 11.a) Explain the classes of P and NP.  
b) Differentiate between NP-complete and NP-Hard. [6+4]

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