

R13**Code No: 114CT****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year II Semester Examinations, May - 2015****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 are the properties of an algorithm? [2M]
- b) Write control abstraction algorithm of divide and conquer approach. [3M]
- c) What is optimal solution? [2M]
- d) Write Greedy method control abstraction for the subset paradigm. [3M]
- e) What is dominance rule? [2M]
- f) Explain how to estimate the minimum cost path in multistage graph by using forward approach. [3M]
- g) What is E-node and answer node? [2M]
- h) Distinguish between FIFOBB and LIFOBB. [3M]
- i) What is deterministic algorithm? [2M]
- j) Write non deterministic algorithm for satisfiability. [3M]

PART-B**(50 Marks)**

- 2.a) Derive the time complexity of Quick sort in an average case.
- b) Distinguish between Amortized analysis and Probabilistic analysis. [5+5]

OR

- 3.a) Explain how to reduce the complexity in union algorithm.
- b) Derive the time complexity of Merge sort. [5+5]

- 4.a) Find the optimal solution by using job sequencing with deadlines problem $n=5$, $(p_1, \dots, p_5)=(20, 15, 10, 5, 1)$ and $(d_1, \dots, d_5)=(2, 2, 1, 3, 3)$
- b) Write an algorithm of Kruskal's minimum cost spanning tree. [5+5]

OR

- 5.a) Explain about the single source shortest problem with an example.
- b) Write an algorithm of job sequencing deadlines. [5+5]

- 6.a) Find the minimum cost path from the source(6) to destination(3) by using backward approach in multistage graph shown in figure 1.

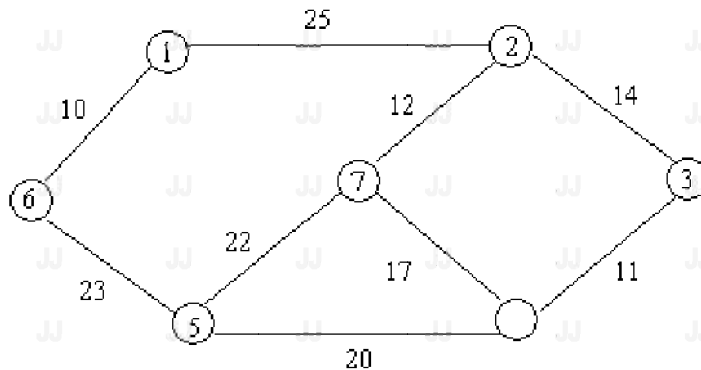


Figure: 1

- b) What are the applications of dynamic programming? [7+3]
OR
 7. Design a three stage system with device types D_1 , D_2 , D_3 . The costs all Rs. 20, Rs.15 and Rs 25 respectively. The cost of the system is to be no more than Rs.100. The reliability of each device type is 0.7, 0.6 and 0.5 respectively. [10]
 8. Solve the traveling sales man problem for the following graph shown in figure 2 by using branch and bound. [10]

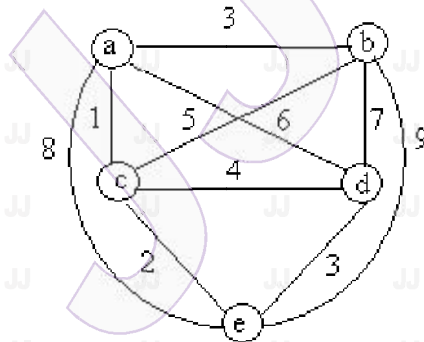


Figure: 2

- OR**
 9.a) $w = \{15, 7, 20, 5, 18, 10, 12\}$ $m=35$. Find all possible subsets of w that sum to m . Solve this using sum of subsets. Draw the portion of state space tree that is generated.
 b) Write an algorithm to estimate the efficiency of backtracking. [5+5]
 10.a) Explain the cook's theorem with an example.
 b) Show that the knapsack optimization problem reduces to the knapsack decision problem when all the p 's w 's and m are integer and the complexity is measured as a function of input length.
OR
 11.a) Show that the Hamiltonian-path problem is NP-complete.
 b) Explain the classes of NP-hard and NP-Complete. [5+5]

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