

Code No: 114CS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2017

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) Define order of growth. [2]
- b) If $f(n) = 5n^2 + 6n + 4$ then prove that $f(n)$ is $O(n^2)$. [3]
- c) Define a spanning tree and minimum spanning tree. [2]
- d) Define articulation point. [3]
- e) Define greedy method. [2]
- f) State the principle of optimality. [3]
- g) List the application of Backtracking. [2]
- h) Define E-node. [3]
- i) Define class P. [2]
- j) Explain briefly about optimization problem. [3]

PART-B**(50 Marks)**

- 2.a) Write the pseudo code that input of n integers and output them in non decreasing order.
- b) Describe the Master's theorem. Solve the following recurrence relations by using Master's theorem.
 - i) $T(n) = 4T(n/2) + n$
 - ii) $T(n) = 2T(n/2) + n \log n$ [5+5]

OR

- 3.a) Define recurrence equation? Find the time complexity of merge sort from recurrence relation using substitution method.
- b) Write the pseudo code for binary search and analyze the time complexity. [5+5]
- 4.a) Compare and contrast BFS and DFS.
- b) Define strongly connected components. Explain the properties of strongly connected components. [5+5]

OR

- 5.a) Discuss about various binary tree traversal methods with example.
- b) Differentiate greedy and dynamic programming. [5+5]
- 6.a) Discuss about fractional knap sack problem. Consider the following instance of knapsack problem $n=3$, $m=20$, profits $(p_1, p_2, p_3) = (25, 24, 15)$ and weights $(w_1, w_2, w_3) = (18, 15, 10)$. Obtain the optimal solution using greedy approach.
- b) Compute all pair shortest path for following graph shown in figure 1. [5+5]

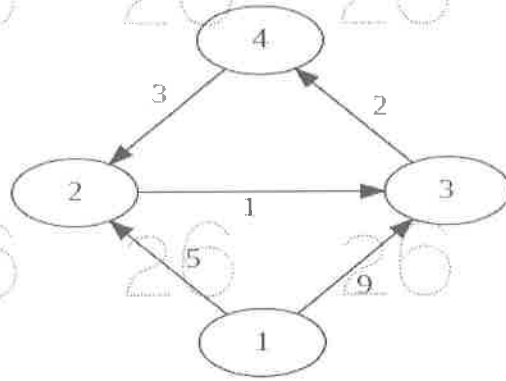


Figure: 1
OR

- 7.a) Write the pseudo code for dijkshra's algorithm for single source shortest path problem.
 b) Describe travelling-sales person problem. Find the minimum cost tour for the following graph using dynamic programming. Costs of the edges are given by matrix shown in figure 2. [5+5]

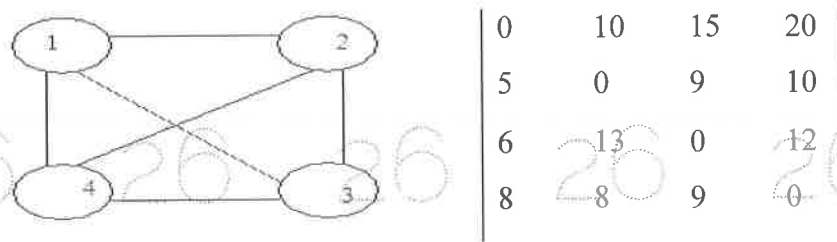


Figure: 2

8. What is graph coloring problem? Describe the back tracking technique to m-coloring with following planar graph shown in figure 3. [10]

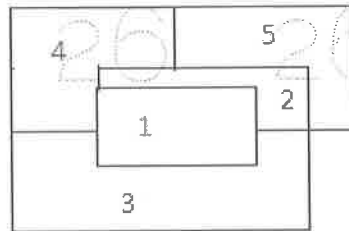


Figure: 3
OR

9. Write about Hamiltonian cycle. Draw portion state space tree for the following graph shown in figure 4. [10]

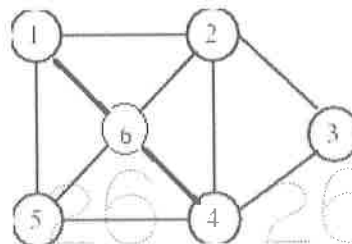


Figure: 4

- 10.a) Write short notes on 3-SAT problem.
 b) Briefly explain deterministic and non deterministic algorithms with example. [5+5]

OR

- 11.a) Describe about clique problem.
 b) Give the relation between...