Code No: 124CB

R15

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 $0(n^2)$.   [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]
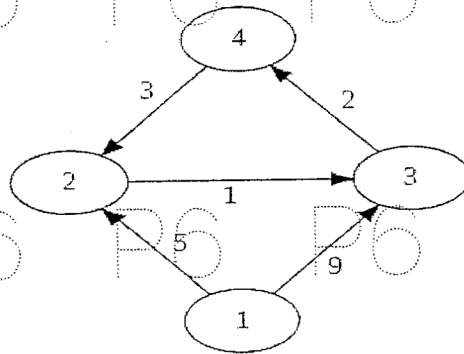
Figure: 1

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]
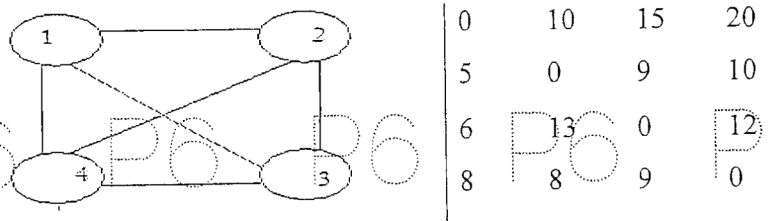

$$\begin{vmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{vmatrix}$$

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]
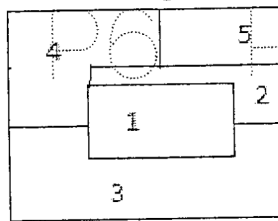

Figure: 3

OR

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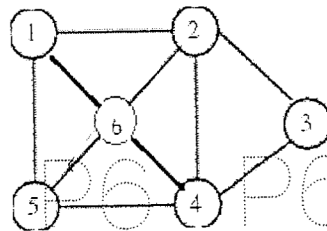

Figure: 4

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 NP Hard and NP Complete. [5+5]

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