Total No. of Questions :5]   [Total No. of Printed Pages :2

Roll No ....

CS/IT - 404

B.E. IV Semester Examination, December 2014
Analysis And Design of Algorithm
*Time : Three Hours*

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

1. a) What do you mean by performance analysis of an algorithm? Explain.

   b) What are the different asymptotic notations used? Explain.

   c) Explain any one application that can be solved by divide and conquer.

   d) Write down Stassen's algorithm for multiplication?

OR

   How recursive algorithms are analysed? Analyze the execution time of recursive algorithm for tower of Hanoi; problem.

2. a) What do you mean by feasible solution?

   b) What is minimum spanning tree?

   c) Write the general characteristics of Greedy algorithm.

   d) Find the shortest path from vertex 1 to vertex 3 in the following weighted graph using Dijkstra's greedy algorithm.
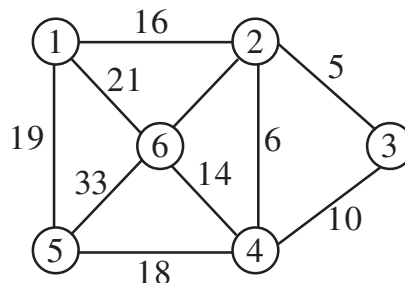
OR

   Find the optimal binary merge tree (pattern) for ten files whose length are 28, 32, 12, 5, 84, 53, 91, 35, 3 and 11. Also find its weighted external path length.

3. a) What is principle of optimality? Explain with example.

   b) Write the characteristics of dynamic programming.

   c) Give the commonly used designing steps for dynamic programming algorithm.

   d) Consider the knapsack instance with 5 objects and a capacity M = 11, profits P= (5, 4, 7, 2,3) and weights w = (4, 3, 6, 2, 2). Solve it using dynamic programming approach.

OR

What is multistage graph problem? Discuss its solution based on dynamic programming approach. Give a suitable algorithm and find its computing time.

4. a) Explain the use of bounding function.

   b) Explain how to solve sum of subset problem.

   c) What is Hamiltonian cycle? Explain how it can be solved using backtracking algorithm?

   d) Draw the portion of state space tree generated by LC branch and bound for the following knapsack instance

   $n = 4$, $(P_1, P_2, P_3, P_4) = (10, 10, 12, 18)$, $(w_1, w_2, w_3, w_4) = (2, 4, 6, 9)$ and m = 15.

OR

Consider the travelling salesman on instance defined by cost matrix

$$\begin{bmatrix} \infty & 7 & 3 & 12 & 8 \\ 3 & \infty & 6 & 14 & 9 \\ 5 & 8 & \infty & 6 & 18 \\ 9 & 3 & 5 & \infty & 11 \\ 18 & 14 & 9 & 8 & \infty \end{bmatrix}$$

5. a) Explain binary search tree. List out its properties.

   b) Explain 2-3 trees with help of suitable example.

   c) What is P, NP class problems? Explain the concept with suitable example.

   d) Obtain height tranced tree stooky with empty tree on the following sets of instructions.

   Dec, Jan, Apr, Mar, Jul, Aug, Oct, Feb, Nov, May, June

OR

Constant on AVL tree for the following list {5, 6, 8, 3, 2, 4, 7} by inserting the elements successively starting with empty tree.

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