Total No. of Questions : 8]   [Total No. of Printed Pages : 2

Roll No ....

CS-4004 (CBGS)

B.E. IV Semester

Examination, November 2019

Choice Based Grading System (CBGS)

Analysis and Design of Algorithm

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

iii) Assume any data suitable.

1. a) What are the rules of manipulate Big-Oh expressions and about the typical growth rates of algorithm?   7

   b) Discuss the steps in mathematical analysis for recursive algorithm. Do the same for finding the factorial of a number.   7

2. a) Find the optimal binary merge tree (pattern) for ten files whose length are.   7
   28, 32, 12, 5, 84, 53, 91, 35, 3 and 11 also find its weighted external path length.

   b) Explain the memory function method for the Knapsack problem and give the algorithm.   7

3. Apply Warshall's algorithm to find the transitive closure of the digraph defined by the following adjacency matrix.   14

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

   i) Prove that the time efficiency of Warshall's algorithm is cubic.

   ii) Explain why the time efficiency of Warshall's algorithm is inferior to that of the traversal based algorithm for sparse graphs represented by their adjacency lists.

4. a) Explain how branch and bound techniques can be used to solve travelling sales person problem.   7

   b) What is Hamiltonian cycle? Write an algorithm to find all Hamiltonian cycle in graph?   7

5. Explain the relationship between class P, NP, NP-complete and NP hard problem with example of each class.   14

6. a) Solve the recurrence relation: 7
   $T(n) = 3\ (n/4) + n$

   b) Tabulate the difference between Kruskal's and Prism's algorithm. http://www.rgpvonline.com   7

7. Using Dijkstra's algorithm, find out the shortest distance from the source vertex 's' to the rest of the vertices in the given graph. Also write the order in which all the vertices of the graph are visited.   14
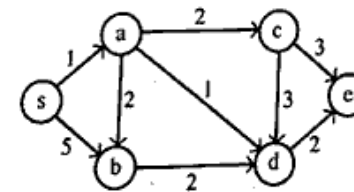
8. Write short notes on: 14
   a) Master's Theorem
   b) Tractable and Non-Tractable problem
   c) Closest - Pair problem
   d) Perfect matching in bipartite graphs.

******