Total No. of Questions : 8] *[Total No. of Printed Pages : 4*

Roll No .....

MCA-404

M.C.A. IV Semester

Examination, May 2018

Design and Analysis of Algorithms

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

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

   b) Solve the following recurrence relations:

   i) $T(n)=T\left(\frac{n}{2}\right)+c \qquad T(1)=1$

   ii) $T(n)=9T\left(\frac{n}{3}\right)+4n^6 \qquad T(1)=1$

2. a) Sort the following list using quick sort and give its running time

   A = {5, 7, 9, 4, 10, 12, 2, 8, 1}

   b) Given an algorithm for strassen's multiplication. Explain how a divide and conquer strategy is applicable for it? Also analyze the algorithm.

3. a) Differentiate between depth first search and breadth first search.

   b) Write the basic difference between prim's algorithm and Kruskal's algorithm. **rgpvonline.com**

4. a) Consider n=7, m=15, $(P_1, P_2 \ldots P_7) = (10, 5, 15, 7, 6, 18, 3)$ and $(W_1, W_2, \ldots W_7) = (2, 3, 5, 7, 1, 4, 1)$. Obtain the optimal solution for this knapsack problem.

   b) Draw the portion of state space tree generated by LC branch and bound for the following knasback 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.

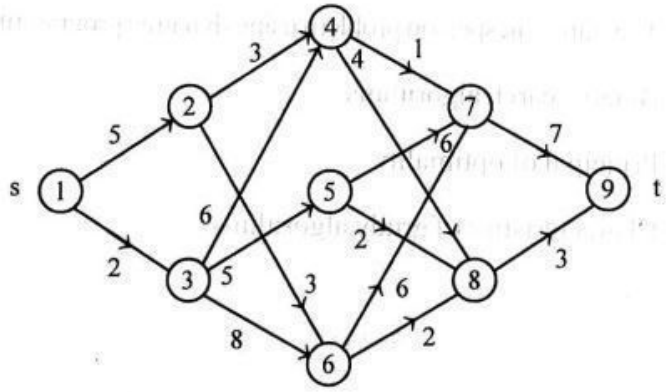
5. a) Consider the travelling salesperson instance defined by cost matrix

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

   i) Obtain the reduced cost matrix

   ii) Obtain the portion of the state space tree that will be generated by LCBB.

b) Find a minimum cost path from '*s*' to '*t*' in multistage graph problem using dynamic programming?



6. a) What is Backtracking? Discuss the 8 queen problem using backtracking.

b) Obtain the optimal solution to the Knapsack problem n = 3, m = 20, $(P_1, P_2, P_3) = (25, 24, 15)$ and $(W_1, W_2, W_3) = (18, 15, 10)$ using backtracking.

7. a) Discuss the relationship between class P, NP, NP-compute and NP-hard problems with examples of each class.

b) Briefly explain the following:

i) Polynomial and non polynomial time complexity

ii) Algebraic algorithms.

8. Write short notes on any four of the following:

a) String processing algorithms

b) Traveling salesperson problem using dynamic programming

c) Binary search algorithms

d) Principal of optimality

e) Characteristics of grudy algorithms

******