Total No. of Questions : 10]

SEAT No. :

P1768

[Total No. of Pages : 3

[5460] - 598
T.E. (IT)
DESIGN AND ANALYSIS OF ALGORITHMS
(2015 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) How do we analyze and measure the time complexity of algorithm? What are the basic components, which contribute to space complexity? In what way the asymmetry between Big - Oh notation and Big - Omega notation helpful. **[5]**

b) Write an algorithm for finding out the maximum and minimum number in an array using divide and conquer. **[5]**

OR

Q2) a) Consider the following instance of the knapsack problem : n = 3, m = 20, (p1, p2, p3) = (25, 24, 15) and (w1, w2, w3) = (18, 15, 10). Solve it using greedy approach. **[5]**

b) Write a recursive algorithm and set up a recurrence relation for finding factorial of a given number and analyze it. **[5]**

Q3) a) Write a prims algorithm to find shortest path and analyze it. **[5]**

b) Compare **[5]**

i) Divide and conquer and Dynamic programming

ii) Greedy and Dynamic programming.

OR

P.T.O.

Q4) a) Solve the TSP problem using Dynamic Programming. **[8]**

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

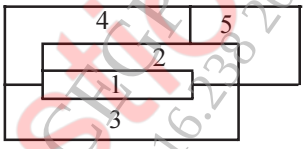
b) Define OBST? **[2]**

Q5) a) Write a recursive algorithm which shows a recursive formulation of the backtracking technique and explain it. **[8]**

b) If m = 30, Given data set w = {5, 10, 12, 13, 15, 18} find all possible subset of w that sum to m. Draw the portion of state space tree that is generated by sum of subset. Are there any differences in the computing time in given set of elements? w = {18, 15, 13, 12, 10, 5} And w = {15, 13, 5, 18, 10, 12} **[8]**

OR

Q6) a) Construct planar graph for following map. Explain how to find m - coloring of this planar graph by using m - coloring Backtracking algorithm. **[8]**



b) Write a recursive algorithm to find the Hamiltonian cycle using backtracking technique and explain it. **[8]**

Q7) Consider the travelling salesman instance defined by cost matrix. **[18]**

$$\begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$$

a) Obtain reduced matrix.

b) Obtain the portion of state space tree generated by LCBB.

OR

Q8) a) What is Branch and bound algorithmic strategy? Draw the portion of the sate space tree generated by LCBB for the following knapsack instances: N = 4, M = 15 and {p1,p2,p3,p4} = {10, 10, 12, 18}, (w1,w2,w3,w4) = (2, 4, 6, 9) **[10]**

b) What is least cost search? Explain in detail control abstraction for LC search. **[8]**

Q9) a) Explain the need and significance of parallel algorithms. Define the speedup of parallel algorithm. **[8]**

b) What do you mean by P, NP, NP - Hard and NP - Complete Problems? Give an example of each category. **[8]**

OR

Q10) a) State and explain pointer doubling concept with example. **[8]**

b) Prove that Clique problem is NP complete. **[8]**

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