[6262]-125

T.E. (Information Technology)
DESIGN AND ANALYSIS OF ALGORITHM
(2019 Pattern) (Semester - I) (314445(A)) (Elective - I)

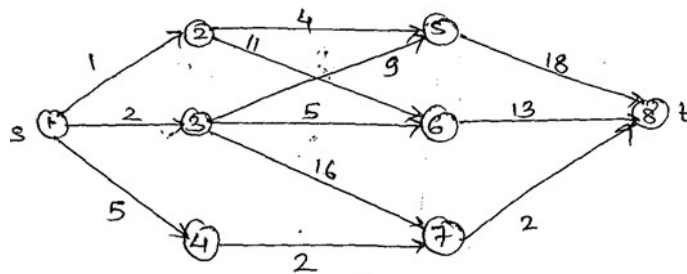*Time : 2½ Hours]*   *[Max. Marks : 70*
Instructions to the candidates:
1) *Neat diagrams must be drawn wherever necessary.*
2) *Figures to the right indicate full marks.*
3) *Assume suitable data, if necessary.*

Q1) a) Define and explain Travelling Salesperson problem using dynamic programming. **[9]**

b) What is Multistage Graph? Find the minimum cost path from source (s) to sink(t) of the multistage graph given below. **[9]**

OR

Q2) a) Explain Principle of Optimality? Differentiate between backtracking and dynamic method. **[9]**

b) Solve the following instance of Knapsack problem by dynamic programming approach:
n = 6, M = 165 and (pl, p2, p3, p4, p5, p6) = (wl, w2, w3, w4, w5, w6) = (100, 50, 20, 10, 7, 3). **[9]**

Q3) a) Explain 8-Queen problem and explain the following terms with respect to 8-Queens problem. **[8]**
i) State space tree
ii) Live node
iii) Static tree
iv) Solution state
v) Answer state

P.T.O

b) Discuss and analyze problem of graph coloring using backtracking with the help of example. **[9]**

OR

Q4) a) State the principle of backtracking and write backtracking algorithm for N-Queen problem. **[8]**

b) Let W = {5, 7, 10, 12, 15, 18, 20} and M = 35. Find all possible subsets of W that sum to M. Construct the portion of state space tree. **[9]**
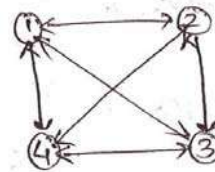
Q5) a) Explain the following : **[9]**

i) Bounding Function

ii) Branch & Bond

iii) LC search

b) Write an algorithm for FIFO branch & bound. **[9]**

OR

Q6) What is traveling salesperson problem? Find solution to the following TSP using branch & bound. **[18]**

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

Q7) a) What do you mean by P, NP, NP – Hard and NP complete problem? Give an example of each category. **[9]**

b) Prove that 3-SAT is NP complete. **[8]**

OR

Q8) a) Differentiate between **[9]**

i) P and NP class

ii) NP complete and NP-Hard class

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

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