

Time: 3 Hours

N.B. (1) Question one is Compulsory.

(2) Attempt any 3 questions out of the remaining.

(3) Assume suitable data if required.

Q. 1

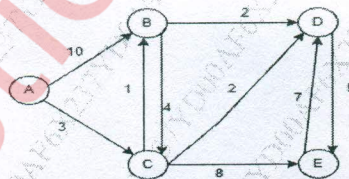
- a) What is job sequencing with deadlines? Let the number of jobs be  $n=4$ , with profits  $(P_1, P_2, P_3, P_4) = (100, 10, 15, 27)$  and deadlines  $(d_1, d_2, d_3, d_4) = (2, 1, 2, 1)$ . (05)  
Solve the problem to find the optimal solution using greedy method.
- b) Write algorithm for insertion sort and sort the following elements using the same: (05)  
22, 15, 11, 16, 19. Show all the passes.
- c) Give the algorithm to solve the N-Queen Problem using backtracking. Give any 2 (05)  
solutions for the 4-Queen Problem.
- d) Show the steps and find number of shifts to find the Pattern "aabc" in the Text (05)  
String "abaaabccb" using Naïve String Matching Method.

Q. 2

- a) Explain  $O$ ,  $\Omega$  and  $\Theta$  notations with appropriate equations and graphs. (10)
- b) Solve the sum of subsets problem using backtracking for the following:  $n=4$ , (10)  
 $m=17$ ,  $w = \{2, 7, 8, 15\}$ . Show the entire state space tree and find all the solutions.

Q. 3

- a) Write an algorithm for Merge Sort. Derive its time complexity using the (10)  
substitution method. Sort the following elements with using Merge Sort: 25, 11, 8, 39, 13, 12
- b) Find the single source shortest path for the following graph using Greedy Method. (10)  
Take vertex A as the source vertex



Q. 4

- a) Write algorithm for 0/1 knapsack using dynamic programming and obtain the (10)  
solution to following 0/1 knapsack problem where:  $n = 4$ , Knapsack Capacity  
 $M = 5$ , Weights  $(W_1, W_2, W_3, W_4) = (2, 3, 4, 5)$  and profits  $(P_1, P_2, P_3, P_4)$   
 $= (3, 4, 5, 6)$ .
- b) Explain with an example how the Travelling Salesman Problem can be solved (10)  
using Branch and Bound method.

