Time: 3 hours **Max. Marks: 80**

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) Explain asymptotic notations. **(05)**
b) Explain job sequencing with deadline with an example. **(05)**
c) Write the algorithm and derive the complexity of binary search algorithm. **(05)**
d) Definition of P, NP, NP-Hard, NP-Complete. **(05)**

Q. 2

a) Explain 15-puzzle problem using branch and bound strategy. **(10)**
b) Give the pseudo code for the KMP String Matching Algorithm. Use KMP algorithm to find pattern="ababada" in text="badbabababadaab". Show the prefix table and the valid shifts. **(10)**

Q. 3

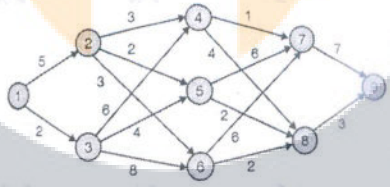
a) Write algorithm for quick sort. Derive its time complexity. **(10)**
b) Write Kruskal's algorithm for finding a minimum spanning tree. Explain its working with an example. Also compute the time complexity for the same. **(10)**

Q. 4

a) Write algorithm for greedy knapsack and obtain the solution to following fractional greedy knapsack problem where n=5, m=100, (p1, p2....p5) = (10,20,30,40,50) and (w1,w2,.....,w5) = (20,30,66,40,60) **(10)**
b) Find Longest Common Subsequence for the following string X=xyzytxy and Y=ytzxyx **(10)**

Q. 5

a) Find minimum cost path from 1 to 9 for following multistage graph using dynamic programming. **(10)**



b) Explain 8-Queen problem using backtracking. **(10)**

Q. 6

a) Write the algorithm for insertion sort. Also sort the following numbers using same algorithm 11,7,17,3,9,29,85,9 and show output after every pass. **(10)**
b) Write the algorithm for 0/1 knapsack using dynamic programming. Also solve the following instance where M=21, n=4, (p1, p2, p3, p4) =(2,5,8,1), (w1,w2,w3,w4)=(10,15,6,9) **(10)**