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   **(10)**
   find pattern="ababada" in text="badbabababadaab". Show the prefix table and the valid shifts.

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   **(10)**
      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)
   b) Find Longest Common Subsequence for the following string   **(10)**
      X=xyzytxy and Y=ytzxyx

Q. 5

   a) Find minimum cost path from 1 to 9 for following multistage graph using dynamic
   programming.   **(10)**
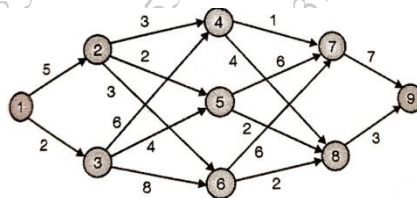
   b) Explain 8-Queen problem using backtracking.   **(10)**

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