BRAINWARE UNIVERSITY
Class Test 2 (04th Semester) – May, 2025
Program Name – Bachelor of Computer Applications (HONOURS)
BCA47111 – Design and Analysis of Algorithm
Time - 60 minutes **Full Marks: 20**

(Multiple Choice Type Question)

1. Choose the correct alternative from the following: - [8 x 1= 8]

i) Choose the key advantage of the Knuth-Morris-Pratt (KMP) string matching algorithm over the naive approach.

a) It uses brute force searching b) It preprocesses the pattern to avoid unnecessary comparisons c) It searches in O(n log n) time d) It works only for binary strings

ii) Calculate the total number of edges in a complete graph with 6 vertices.

a) 12 b) 20 c) 18 d) 15

iii) What is the time complexity of the Floyd-Warshall algorithm?

a) O(V log V) b) O(VE) c) $O(V^3)$ d) O(E log V)

iv) Interpret the effect on the performance of Dijkstra's algorithm when all edge weights in a graph are set to 1.

a) Same as original b) Becomes $O(V^2)$ c) Equivalent to BFS d) Fails to work

v) Estimate the worst-case time complexity of DFS for a graph with V vertices and E edges.

a) O(V log V) b) O(V + E) c) O(VE) d) $O(V^2)$

vi) Choose the worst-case time complexity of the naive string matching algorithm:

a) O(m + n) b) O(m log n) c) O(mn) d) $O(n^2)$

vii) Choose the number of solutions for the 8-Queens problem:

a) 64 b) 92 c) 100 d) 60

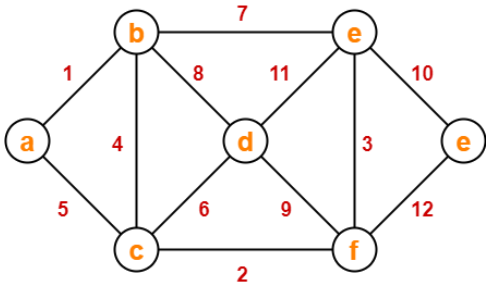
viii) Choose the time complexity of solving the 0/1 Knapsack problem using dynamic programming:

a) O(n log n) b) O(nW) c) $O(2^n)$ d) $O(n^2)$

(Short Answer Type Question)

Answer all questions of the following :- **[6 x 2 = 12]**

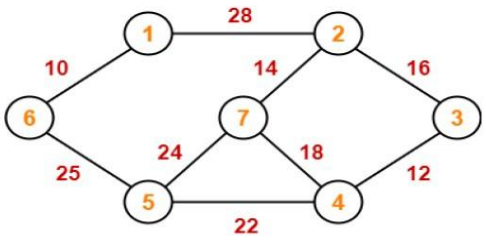
2. Write down the steps of Prim's algorithm to find a minimum spanning tree of the graph shown in the figure:



3. Prepare at least three feasible solutions, including the optimal one, for the 0/1 Knapsack Problem, given the weight vector (2, 3, 5, 7, 1, 4, 1), the profit vector (10, 5, 15, 7, 6, 18, 3), and a knapsack of capacity 15.

4. Determine the optimal parenthesization of Matrix Chain Multiplication problem for the sequence of dimensions (5, 10, 3, 12, 5, 50, 6).

5. Using Kruskal's algorithm, illustrate the minimum spanning tree (MST) for the given graph.



6. Solve the problem using job sequencing with a deadline.

Job Number	J1	J2	J3	J4	J5	J6
Deadline	5	2	4	3	3	1
Profit	20	40	5	15	10	8

7. Examine the role of backtracking in solving the N-Queens problem.