# C. U. SHAH UNIVERSITY
## Winter Examination-2022

**Subject Name : Design and Analysis of Algorithms**

**Subject Code : 4TE05DAA1**                    **Branch: B.Tech (CE)**

**Semester: 5**          **Date: 24/11/2022**          **Time: 02:30 To 05:30**          **Marks: 70**

Instructions:
  (1)  Use of Programmable calculator & any other electronic instrument is prohibited.
  (2)  Instructions written on main answer book are strictly to be obeyed.
  (3)  Draw neat diagrams and figures (if necessary) at right places.
  (4)  Assume suitable data if needed.

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**Q-1        Attempt the following questions:**                                        **(14)**

|     |     |     |
|-----|-----|-----|
| **a)** | Define dynamic programming. | 1 |
| **b)** | Define the divide and conquer method. | 1 |
| **c)** | Define minimum spanning tree. | 1 |
| **d)** | Define sorting. | 1 |
| **e)** | Define Backtracking. | 1 |
| **f)** | Define amortized analysis. | 1 |
| **g)** | What are the rules for writing algorithm? | 1 |
| **h)** | What is a book keeping operation? | 1 |
| **i)** | What is an active operation? | 1 |
| **j)** | What are the different types of internal sorting? | 1 |
| **k)** | What is stable sorting? | 1 |
| **l)** | Define in-place sorting. | 1 |
| **m)** | Does quick sort in-place algorithm? | 1 |
| **n)** | What is the space complexity of merge sort? | 1 |

**Attempt any four questions from Q-2 to Q-8**

**Q-2        Attempt all questions**                                                  **(14)**
A    Find optimal solution for knapsack instance n = 4, W=8,                          **7**
        (V1, V2, V3, V4) = (3, 5, 6, 10)
        (W1, W2, W3, W4) = (2, 3, 4, 5)
B    What is graph? What are the types of graphs? Also explain properties of          **7**
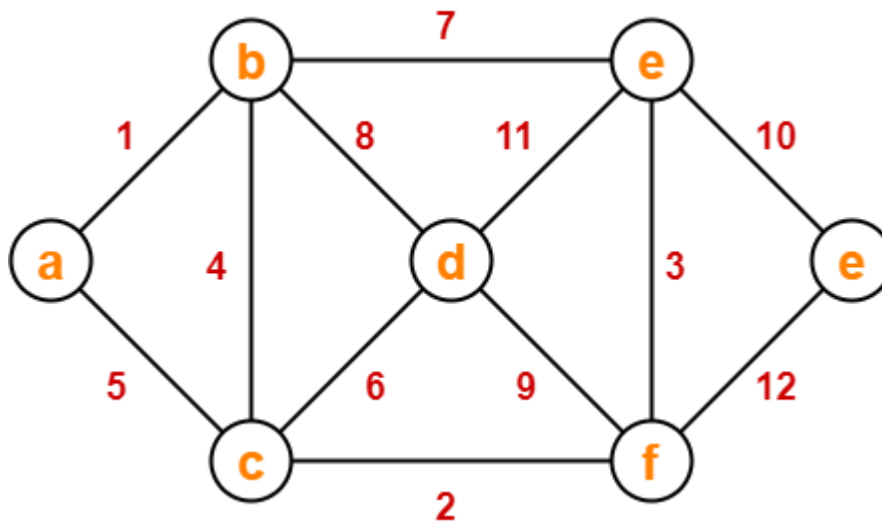     graph.

**Q-3        Attempt all questions**                                                  **(14)**
A    Explain eight queens problem.                                                    **7**
B    Construct the minimum spanning tree (MST) and calculate weight of MST            **7**
     for the given graph using Kruskal's Algorithm
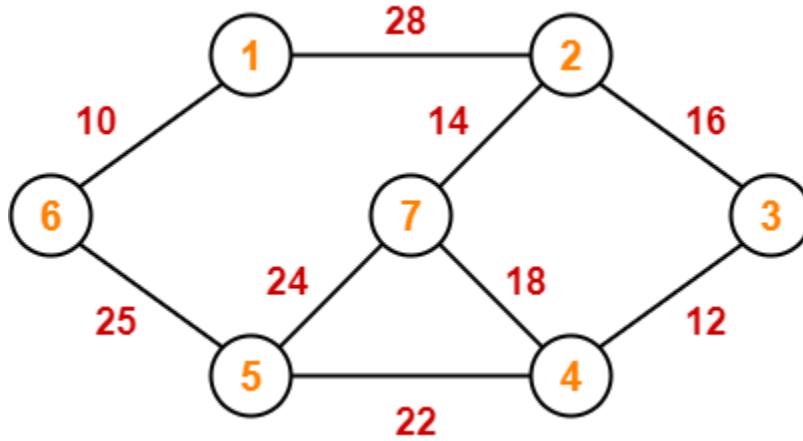
**Q-4**    **Attempt all questions**    **(14)**

A    Construct the minimum spanning tree (MST) and calculate cost for the given graph using prim's Algorithm    **7**



B    Explain general characteristics of greedy algorithms.    **7**

**Q-5**    **Attempt all questions**    **(14)**

A    Determine LCS for (X, Y, Z, Y, T, X, Y) and (Y, T, Z, X, Y, X).    **7**

B    Explain job scheduling problem with example.    **7**

**Q-6**    **Attempt all questions**    **(14)**

A    Implement activity selection problem algorithm for following activities to find compatible activities: A = <A1, A2, A3, A4, A5, A6>    **7**
Their starting times are: S = <1, 2, 3, 4, 5, 6> and
Their finish times are: F = <3, 6, 4, 5, 7, 9> respectively.

B    Explain naïve string matching algorithm with example.    **7**

**Q-7**    **Attempt all questions**    **(14)**

A    Using greedy algorithm find an optimal solution for knapsack instance n=7, w=15.    {p1,p2,p3,p4,p5,p6,p7}    =    {10,    5,    15,7,6,18,3}    and {w1,w2,w3,w4,w5,w6,w7} = {2,3,5,7,1,4,1}    **7**

B    Explain Matrix Chain Multiplication problem with suitable example.    **7**

**Q-8**    **Attempt all questions**    **(14)**

A    Explain P type and NP type of problems.    **7**

B    Explain binary search algorithm.    **7**