

**GANPAT UNIVERSITY**  
**B. TECH SEM-IV (COMPUTER SCIENCE AND BUSINESS SYSTEM)**  
**FIRST INTERNAL EXAMINATION – FEBRUARY-MARCH 2023**  
**2CSBS4102: Design and Analysis of Algorithms**

**TIME: 1 Hour****TOTAL MARKS: 20**

- Instructions:**
- 1) Figures to the right indicate full marks.
  - 2) Be precise and to the point in your answer.
  - 3) The text just below marks indicates the Course Outcomes Numbers, (CO) followed by the Bloom's taxonomy level of the question, i.e., R: Remembering, U: Understanding, A: Applying, N: Analyzing, E: Evaluating, C: Creating.

**Q.1** Define space and time complexity. Calculate space and time complexity of following function. **[4]**

```
function Sum(a[], n, m)
{
    for(i=0; i<n; i++)
        for(j=0; j<m; j++)
            s = s + a[i][j];
    return s;
}
```

**3A**

**Q.2** Solve the recurrence  $T(n) = 5T(n-1) - 6T(n-2)$  with initial condition  $T(0) = 0$  and  $T(1) = 1$ . **[4]**

**4A**

**Q.3** Check whether following statements are true or false. Also prove it. **[2]**

**3U**

1.  $f(n) = 10n^2 + 7 = \Theta(n^3)$

2.  $f(n) = 5n^3 + 9n^2 + 15 \neq \Omega(n^4)$

**Q.4** Define the Backtracking with the help of 8X8 Queen Problem. Also write down the Advantages and Disadvantages of Backtracking. **[3]**

**5R**

**Q.5** Write down the Algorithm of Greedy Knapsack and its Time complexity. Find the optimal solution for the fractional knapsack problem making the use of greedy approach. Consider **[3]**

**5A**

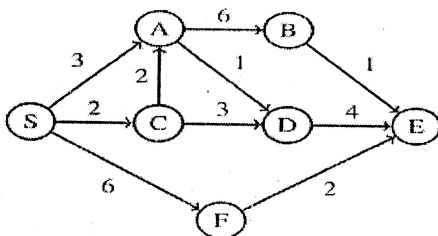
Number of Objects(N) = 7

Capacity of Knapsack(W)= 15

Weights: (W1,W2,W3,W4,W5,W6,W7)=(1,3,5,4,1,3,2)

Values: (V1,V2,V3,V4,V5,V6,V7)=( 10,15,7,8,9,4,6)

**Q.6** Applying the Dijkstra's Algorithm to find out the single shortest path in the given graph from vertex S. **[4]**

**5A**

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