Experiment 7

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Branch: CSE
Section/Group: 702 A
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Subject Name: DAA Lab
Subject Code: 20-CSP-312

1. Aim/Overview of the practical:

Code to implement 0-1 Knapsack using Dynamic Programming.

2. Task to be done/ Which logistics used:

To write code to implement 0-1 Knapsack using Dynamic Programming.

3. Algorithm/Flowchart (For programming based labs):

4. Steps for experiment/practical/Code:

```
package com.DAA;

public class DAA_exp7 {


    public int maxi(int a1, int a2)
    {
        return Math.max(a1, a2);
    }

    public int maxValueKnapsack(int C, int []w, int[] val, int l)
    {
        int j, wt;
        int [][]dp = new int[l + 1][C + 1];

        for (j = 0; j <= l; j++)
        {
            for (wt = 0; wt <= C; wt++)
            {
                if (j == 0 || wt == 0)
                {

                    dp[j][wt] = 0;
                }
                else if (w[j - 1] <= wt)
                {
                    dp[j][wt] = maxi(val[j - 1] + dp[j - 1][wt - w[j - 1]], dp[j - 1][wt]);
                }
                else
                {
                    dp[j][wt] = dp[j - 1][wt];
                }
            }
        }
        return dp[j - 1][C];
    }
    public static void main(String[] args) {
```

```
        int []values = new int[] { 10, 6, 8, 7 };
        int []weight = new int[] { 7, 9, 3, 8 };
        int C = 18;
        int l = values.length;
        DAA_exp7 knapObj = new DAA_exp7();
        int maxVal = knapObj.maxValueKnapsack(C, weight, values, l);
        System.out.println("The maximum value is: " + maxVal);
    }
}
```

5. Observations/Discussions/ Complexity Analysis:

Time complexity is O(N x sum).

6. Result/Output/Writing Summary:

```
The maximum value is: 25
```

Learning outcomes (What I have learnt):

1. **Learnt about dynamic programming.**
2. **Learnt how to make optimal algorithm.**
3. **Learnt about 0/1 knapsack problem using dynamic programming.**
4. **Learnt about the implementation of dynamic programming.**
5. **Learnt how to implement 0/1 knapsack problem.**

Evaluation Grid (To be created as per the SOP and Assessment guidelines by the faculty):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.			
2.			
3.			