NAME:	**Darsh Shah**
UID No.	**2021700057**
BRANCH:	**SY CSE DS**
BATCH:	**D4**
SUBJECT	**DAA**
EXPERIMENT No.	**5**
DATE:	**27th March , 2023**

AIM:	**To implement Matrix Chain Multiplication**
Program 1	
PROBLEM STATEMENT :	**To implement Matrix Chain Multiplication and give the desired result**
MATRIX CHAIN MULTL:	**Matrix chain multiplication (or the matrix chain ordering problem[1]) is an optimization problem concerning the most efficient way to multiply a given sequence of matrices. The problem is not actually to perform the multiplications, but merely to decide the sequence of the matrix multiplications involved. The problem may be solved using dynamic programming.**

PROGRAM:	**#include <limits.h>
	#include <stdio.h>
	
	int MatrixChainOrder(int arr[], int n)
	{
	int mat[n][n], len, c, j;
	
	for (int i = 1; i < n; i++) {
	for (int j = 1; j < n; j++) {
	if(i >= j) {
	mat[i][j] = 0;
	}
	}
	}
	
	for (len = 2; len < n; len++) {
	for (int i = 1; i < n - len + 1; i++) {
	j = i + len - 1;
	mat[i][j] = INT_MAX;
	for (int k = i; k <= j - 1; k++) {
	c = mat[i][k] + mat[k + 1][j] + arr[i - 1] * arr[k] * arr[j];
	if (c < mat[i][j]) {
	mat[i][j] = c;
	}**

```
                        }
                    }
                }

                for(int i=1;i<n;i++) {
                    printf("\n");
                    for(int j=1;j<n;j++) {
                        printf("%d\t",mat[i][j]);
                    }
                }

                return mat[1][n - 1];
}



int main()
{
        int n;
        //int arr[] = { 1, 2, 3, 4 };
        //int n = sizeof(arr) / sizeof(arr[0]);
        printf("\nEnter the size of array: ");
        scanf("%d", &n);
        int arr[n];
        for(int i = 0 ; i < n ; i++) {
            printf("\nEnter the %d element of the array: ", i+1);
            scanf("%d", &arr[i]);
        }
        printf("\n\nMinimum number of multiplications: %d ",
            MatrixChainOrder(arr, n));
        return 0;
}
```

OUTPUT

```
Enter the size of array: 4

Enter the 1 element of the array: 3

Enter the 2 element of the array: 5

Enter the 3 element of the array: 1

Enter the 4 element of the array: 2

0       15      21
0       0       10
0       0       0

Minimum number of multiplications: 21
```

CONCLUSION

Successfully studied and performed matrix chain mult