SARDAR PATEL INSTITUTE OF TECHNOLOGY

Name: Bhagya Bijlaney

2021700010

CSE DS D1

Exp. 5: Matrix Chain Multiplication

AIM: Apply the concept of dynamic programming to solve the problem of finding the minimum cost i.e., multiplications required to perform Matrix Chain Multiplications

THEORY:

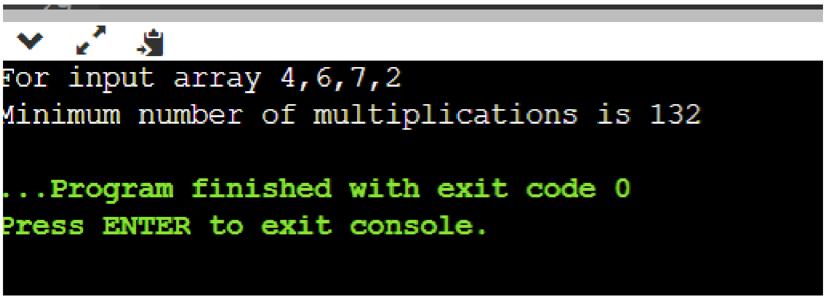
Matrix Chain Multiplication can be solved using dynamic programming.
We can define the minimum number of scalar multiplications needed to iteratively compute the product of a chain of matrices. We start with sub chains of length 1 and then compute the minimum cost for sub chains of increasing length until we have the minimum cost for the entire chain. The time complexity of this algorithm is O(n^3), where n is the number of matrices in the chain.

PROGRAM:

```
#include <limits.h>
#include <stdio.h>


int MatrixChainOrder(int p[], int n)
{
    int m[n][n];

    int i, j, k, L, q;

    for (i = 1; i < n; i++)
        m[i][i] = 0;


    for (L = 2; L < n; L++) {
        for (i = 1; i < n - L + 1; i++) {
            j = i + L - 1;
            m[i][j] = INT_MAX;
            for (k = i; k <= j - 1; k++) {

                q = m[i][k] + m[k + 1][j] + p[i - 1] * p[k] * p[j];
                if (q < m[i][j])
                    m[i][j] = q;
            }
        }
    }

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

int main()
{
    printf("For input array 4,6,7,2\n");
```

```
        int arr[] = { 4,6,7,2 };
        int size = sizeof(arr) / sizeof(arr[0]);

        printf("Minimum number of multiplications is %d ",
                MatrixChainOrder(arr, size));

        return 0;
}
```

RESULT:



```
For input array 4,6,7,2
Minimum number of multiplications is 132

...Program finished with exit code 0
Press ENTER to exit console.
```

CONCLUSION:

In this experiment, I implemented Matrix Chain Multiplication in C and found the best combination to multiply given matrices.