# EXPERIMENT - 8

# Aim: To multiply two 2-Dimensional matrices.

## Pseudo code

Procedure MultiplyMatrices(arr1, arr2, product, m, n, p, q)

Initialize product matrix with zeros

For i from 0 to m

For j from 0 to q

For k from 0 to n

product[i][j] += arr1[i][k] \* arr2[k][j]

Procedure Main()

Read m, n (dimensions of the first matrix)

Read arr1[m][n] (elements of the first matrix)

Read p, q (dimensions of the second matrix)

Read arr2[p][q] (elements of the second matrix)

If n is not equal to p

Print "Matrix Multiplication not possible"

Exit

Initialize product[m][q]

Call MultiplyMatrices(arr1, arr2, product, m, n, p, q)

Print "Product matrix is:"

For i from 0 to m

For j from 0 to q

Print product[i][j]

Print a newline

## Source code:

#include<iostream>

using namespace std;

void Productmatrix(int arr1[100][100],int arr2[100][100],int product[100][100],int m,int n,int p,int q){

     for( int i=0;i<m;i++){

        for( int j=0;j<q;j++){

            product[i][j]=0;

            for(int k=0;k<n;k++){

                product[i][j]+=arr1[i][k]\*arr2[k][j];

            }

        }

    }

};

int main(){

    int m,n;

    cout<<"Enter the dimensions of first matrix: ";

    cin>>m>>n;

    int arr1[100][100];

    cout<<"Enter the elements of first matrix: ";

    for(int i=0;i<m;i++){

        for (int j=0;j<n;j++){

            cin>>arr1[i][j];

        }

    }

    cout<<"First Matrix: "<<endl;

    for(int i=0;i<m;i++){

        for (int j=0;j<n;j++){

            cout<<arr1[i][j]<<" ";

        }

        cout<<endl;

    }

     int p,q;

    cout<<"Enter the dimensions of second matrix: ";

    cin>>p>>q;

    int arr2[100][100];

    for(int i=0;i<p;i++){

    for (int j=0;j<q;j++){

            cin>>arr2[i][j];

        }

    }

    cout<<"Second Matrix: "<<endl;

     for(int i=0;i<p;i++){

        for (int j=0;j<q;j++){

            cout<<arr2[i][j]<<" ";

        }

        cout<<endl;

    }

    if (n!=p){

        cout<<"Matrix Multiplication not possible"<<endl;

        return 0;

    }

    int product[100][100];

    Productmatrix(arr1,arr2,product,m,n,p,q);

    cout<<"Product matrix is: "<<endl;

     for(int i=0;i<m;i++){

        for(int j=0;j<q;j++){

            cout<<product[i][j]<<" ";

        }

        cout<<endl;

}

}

## Output:

**Enter the dimensions of first matrix: 2**

**2**

**Enter the elements of first matrix: 1**

**1**

**1**

**1**

**First Matrix:**

**1 1**

**1 1**

**Enter the dimensions of second matrix: 2**

**3**

**2**

**1**

**2**

**2**

**1**

**2**

**Second Matrix:**

**2 1 2**

**2 1 2**

**Product matrix is:**

**4 2 4**

**4 2 4**

## Learning from experiment

* **Matrix Initialization and Multiplication:** The code initializes the product matrix with zeros and performs matrix multiplication using nested loops.
* **Input Validation**: It checks if the dimensions of the matrices allow multiplication and provides an error message if not.