

## AIM

To write a C program that multiplies two matrices and displays the resulting matrix.

## ALGORITHM

1. Start
2. Read the number of rows and columns of the first matrix ( $m \times n$ ) and the second matrix ( $n \times p$ ).
  - Note: The number of columns of the first matrix must be equal to the number of rows of the second matrix.
3. Input all the elements of the first matrix (A) and the second matrix (B).
4. Initialize a result matrix (C) with all elements as 0.
5. Perform multiplication using the formula:
6.  $C[i][j] = \sum_{k=0}^{n-1} A[i][k] \times B[k][j]$
7.  $C[i][j] =$
8.  $k=0$
9.  $\sum$
10.  $n-1$
- 11.
12.  $A[i][k] \times B[k][j]$ 
  - Repeat for all  $i$  (rows of A) and  $j$  (columns of B).
13. Display the resulting matrix (C).
14. End

## C PROGRAM

```
#include <stdio.h>

int main() {
    int m, n, p, q, i, j, k;

    // Input size of first matrix
    printf("Enter rows and columns of first matrix: ");
    scanf("%d %d", &m, &n);

    // Input size of second matrix
    printf("Enter rows and columns of second matrix: ");
    scanf("%d %d", &p, &q);

    // Check condition
```

```

if (n != p) {
    printf("Matrix multiplication not possible!\n");
    return 0;
}

int A[m][n], B[p][q], C[m][q];

// Input first matrix
printf("Enter elements of first matrix:\n");
for (i = 0; i < m; i++) {
    for (j = 0; j < n; j++) {
        scanf("%d", &A[i][j]);
    }
}

// Input second matrix
printf("Enter elements of second matrix:\n");
for (i = 0; i < p; i++) {
    for (j = 0; j < q; j++) {
        scanf("%d", &B[i][j]);
    }
}

// Initialize result matrix with 0
for (i = 0; i < m; i++) {
    for (j = 0; j < q; j++) {
        C[i][j] = 0;
    }
}

// Matrix Multiplication
for (i = 0; i < m; i++) {
    for (j = 0; j < q; j++) {
        for (k = 0; k < n; k++) {
            C[i][j] += A[i][k] * B[k][j];
        }
    }
}

// Display Result
printf("Resultant Matrix:\n");

```

```
    for (i = 0; i < m; i++) {  
        for (j = 0; j < q; j++) {  
            printf("%d ", C[i][j]);  
        }  
        printf("\n");  
    }  
  
    return 0;  
}
```

### Input and Output

```
Enter rows and columns of first matrix: 2 3  
Enter rows and columns of second matrix: 3 2  
Enter elements of first matrix:  
1 2 3  
4 5 6  
Enter elements of second matrix:  
7 8  
9 10  
11 12  
Resultant Matrix:  
58 64  
139 154  
  
=== Code Execution Successful ===
```

### Result:

The C program for Matrix Multiplication has been successfully executed