```
// CREATE IDENTITY MATRIX AND PRINT MATRIX

#include<stdio.h>
int   main()
    {
        int  a[10][10] , i , j , m , n ;

        printf(" ENTER ROW AND COL \n " );
        scanf("%d%d" , &m , &n);

        for(  i = 0 ; i < m ; i++ )     // ROWS
        {
            for(  j = 0 ; j < n ; j++ )   // COLS
            {
                if( i == j )
                     a[i][j]=1;
  else
                     a[i][j]=0;
            }
        }
        printf(" IDENTITY MATRIX   \n");
        for(  i = 0 ; i < m ; i++)
         {
                for(  j = 0 ; j < n ; j++)
                {
                        printf("%4d",a[i][j]);
                }
                printf("\n");
         }
    }
```

```
// TO CHEK GIVEN  MATRIX IS IDENTITY OR NOT

#include<stdio.h>
int   main()
    {

         int  a[10][10] ,b[10][10], i , j , m , n ,t;
    printf(" ENTER ROW AND COL \n " );
    scanf("%d%d" , &m , &n);

    printf(" ENTER MATRIX  ELEMENTS \n ");
    for( i = 0 ; i < m ; i++ )     // ROWS
      {
            for(  j = 0 ; j < n ; j++ )   // COLS
            {        scanf("%d", &a[i][j]);
            }
      } // INPUT MATRIX
for(  i = 0 ; i < m ; i++ )     // ROWS
{
      for(  j = 0 ; j < n ; j++ )   // COLS
      {
            if( i == j )
                    b[i][j]=1;
           else
                     b[i][j]=0;
      }
}
```

```
t=0;         for( i = 0 ; i < m ;
i++)
{
for(  j = 0 ; j < n ; j++)
{                    if( a[i][j] == b[i][j] )
t++;
}
}
  if( t == m*n)
       printf("IDENTITY MATRIX");
 else
       printf("NOT IDENTITY MATRIX"); }
```

// TO CHEK GIVEN MATRIX IS SYMMERTY OR NOT

```
#include<stdio.h>
int     main()
       {
               int  a[10][10] ,b[10][10], i , j , m , n ,t;
```

```
    printf(" ENTER ROW AND COL \n " );
    scanf("%d%d" , &m , &n);

printf(" ENTER MATRIX  ELEMENTS \n ");
    for( i = 0 ; i < m ; i++ )     // ROWS
               {
                        for( j = 0 ; j < n ; j++ )   // COLS
                        {
                                     scanf("%d", &a[i][j]);
                        }
               } // INPUT MATRIX

             for(  i = 0 ; i < n ; i++ )     // ROWS
               {
                        for(  j = 0 ; j < m ; j++ )   // COLS
                         {    b[i][j]=a[j][i];
                        }
               }
              t = 0;
              for( i = 0 ; i < m ; i++)
```

```
            {
                for( j = 0 ; j < n ; j++)
                {
                        if(  a[i][j]  ==  b[i][j] )
                            t++;
                }
            }

            if( t == m*n)
                    printf("SYMMETRY MATRIX");

            else
                    printf("NOT SYMMETRY MATRIX");
      }
```

----

trace :-

A	B	C
m * n	p * q	m * q

2 * 3   3 * 4   2 * 4

n == p

```
----------------------------------------------------------------- /*
MULTIPLICATION  OF TWO  MATRIXES  */

#include<stdio.h>
int     main()
 {      int  a[10][10] , b[10][10] , c[10][10] , m,n,p,q,i,j,k;

        printf(" ENTER ROW AND COL OF MATRIX a \n ");

        scanf("%d%d", &m ,&n);

        printf(" ENTER ROW AND COL OF MATRIX b \n " );

        scanf("%d%d", &p ,&q);

        if( n != p )
        {          printf(" MULTIPLICATION IS NOT POSSIBLE
\n ");
```

```
  }     else
{        printf(" ENTER MATRIX A \n");
        for( i = 0 ; i < m ; i++ )
         {
              for( j = 0 ; j < n ; j++ )
              {         scanf("%d" , &a[i][j]);
              }
         }
         printf(" ENTER MATRIX B \n ");
       for(  i = 0 ; i < p ; i++ )
         {
              for(  j = 0 ; j < q ; j++ )
               {    scanf("%d" , &b[i][j]);
              }
         }

        for( i = 0 ; i < m ; i++ )    // ROW
        {
               for(  j = 0 ; j < q ; j++ )  // COLS
```

```
                {       c[i][j] = 0 ;

                        for( k = 0 ; k < n ; k++)
                        {
                          c[i][j] = c[i][j] + a[i][k] * b[k][j];
                        }  // k
                } // j
      } // i
     printf(" MULTIPLICATION OF TWO MATRIX \n" );
      for( i = 0 ; i < m ; i++ )
           {
                for(  j = 0 ; j < q ; j++ )
                {    printf("%4d" , c[i][j]);
                }
                printf("\n");
           }
      } // else  // imp
}
```

$$\begin{matrix} A_{00} & A_{01} & A_{02} \\ A_{10} & A_{11} & A_{12} \\ A_{20} & A_{21} & A_{22} \end{matrix} \quad X \quad \begin{matrix} B_{00} & B_{01} & B_{02} \\ B_{10} & B_{11} & B_{12} \\ B_{20} & B_{21} & B_{22} \end{matrix}$$

c[0][0] = a[0][0] * b[0][0] + a[0][1] * b[1][0] + a[0][2] * b[2][0]

c[0][1] = a[0][0]*b[0][1] + a[0][1]*b[1][1] + a[0][2]*b[2][1]

c[i][j] = c[i][j] + a[i] [k] * b[k] [j]

i = 0 j = 1

m = 3 , n = 3 , p = 3 , q = 3
i = 0 , j = 0 , c[0][0] = 0 ; k = 0 to 2

```
        c[i][j]    = c[i][j]  + a[i][k] * b[k][j];
```

k = 0 c[0][0] = 0 + a[0][0] * b[0][0]

k = 1 c[0][0] = a[0][0]*b[0][0] + a[0][1]*b[1][0]

k = 2 c[0][0] = a[0][0]*b[0][0]+ a[0][1]*b[1][0] + a[0][2]*b[2][0] ----- -- i = 0 , j = 1 , c[0][1] = 0 , k = 0 to 2

k = 0 c[0][1] = 0 + a[0][0] * b[0][1]

k = 1 c[0][1] = a[0][0]*b[0][1] + a[0][1]*b[1][1]

k = 2 c[0][1] = a[0][0]*b[0][1] + a[0][1]*b[1][1] + a[0][2]*b[2][1] ---- --- i = 0 j = 2 , c[0][2] = 0 , k = 0 to 2

k = 0 c[0][2] = 0 + a[0][0] * b[0][2] k = 1
c[0][1] = a[0][0]*b[0][2] + a[0][1]*b[1][2]
k = 2 c[0][1] = a[0][0]*b[0][2] + a[0][1]*b[1][2] + a[0][2]*b[2][2] ------ ---

ORTHOGONAL MATRIX

A x A’ = I

A x B

C   = D

```
/*  TO CHEK GIVEN  MATRIX IS ORTHOGONAL OR NOT  */
#include<stdio.h>
int   main()
 {        int  m , n , i , j , k
,t ;

          int  a[10][10],b[10][10],c[10][10], d[10][10];

          printf(" ENTER ROW AND COL OF MATRIX a \n ");

          scanf("%d%d", &m ,&n);

       printf(" ENTER MATRIX A \n ");
       for( i = 0 ; i < m ; i++ )
       {            for(  j = 0 ; j < n
; j++ )
```

```
         {    scanf("%d" , &a[i][j]);
         }
     }
     for( i = 0 ; i < n ; i++ )
     {    for( j = 0 ; j < m;j++ )
          {
          b[i][j] = a[j][i];
         }
}for( i = 0 ; i < m; i++ )
    { for( j = 0 ; j < n ; j++ )
          {
          c[i][j] = 0 ;
           for( k = 0 ; k < n ; k++)
           {  c[i][j] = c[i][j] + a[i][k] * b[k][j];
           }  // k
         } // j
  } // i
for( i = 0 ; i < m ; i++ )
   {
for( j = 0 ; j < n ; j++ )
      {
```

```
               if(i == j )
                       d[i][j] = 1;
          else
                       d[i][j] = 0;
        }
}      t = 0;
        for( i = 0 ; i < m ; i++)
        {
        for( j = 0 ; j < n ; j++)
           {
        if( a[i][j]==b[i][j])
        t++;
           }
    }
if( t == m*n )
         printf("ORTHOGONAL MATRIX");
else
         printf("NOT ORTHOGONAL MATRIX");

  }
```