(#) Matrix Multiplication :-

$$(m \times n) \times (p \times q)$$

$$(3 \times 2) * (2 * 3)$$

if ($n = p$) then multiply.

Result = $m * q$.

$$A \begin{bmatrix} a_{00} & a_{01} & a_{02} \\ a_{10} & a_{11} & a_{12} \\ a_{20} & a_{21} & a_{22} \end{bmatrix} \times B \begin{bmatrix} b_{00} & b_{01} & b_{02} \\ b_{10} & b_{11} & b_{12} \\ b_{20} & b_{21} & b_{22} \end{bmatrix}$$

$$\parallel C$$

$$C_{00} = a_{00} * b_{00} + a_{01} * b_{10} + a_{02} * b_{20}$$

$$C_{01} = a_{00} * b_{01} + a_{01} * b_{11} + a_{02} * b_{21}$$

$$C_{02} = a_{00} * b_{02} + a_{01} * b_{12} + a_{02} * b_{22}$$

$$C[i][j] = C[i][j] + a[i][k] * b[k][j]$$

$$(3 \times 3) * (3 \times 3)$$

```
for( i=0 ; i<m ; i++)
{
    for(j=0 ; j<q ; j++)
    { c[i][j]=0;
      for( k=0 ; k<n ; k++)
      {
          c[i][j]= c[i][j] + a[i][k]
                   * b[k][j];
      }
    }
}
```

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

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