Types of Matrices :-

Square Matrix :- A matrix is called Square matrix if it have same number of row & column.

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \qquad \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

Diagonal Matrix

A square matrix all whose element are zero except diagonal element is called diagonal matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

Scalar Matrix :- A diagonal matrix all of whose diagonal element are same is called scalar matrix

$$\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

Identity Matrix :- A scalar matrix all of whose diagonal element is unity (1) called Identity / unit matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Null Matrix or zero matrix

A matrix is called Null matrix if all of its element are zero

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}_{2\times 3} \qquad \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}_{2\times 2}$$

Row matrix

A matrix which have a single row is called row matrix

$$\begin{bmatrix} 1 & 2 & 3 & 4 \end{bmatrix}_{1\times 4}$$

Column matrix

A matrix which have a single column is called column matrix

$$\begin{bmatrix} 2 \\ 3 \\ 5 \end{bmatrix}_{3\times 1}$$

Symmetric matrix

A square matrix A is called Symmetric matrix if :-

$A = A'$ or $a_{ij} = a_{ji}$ $\qquad a_{12} = a_{21}$

e.g.

$$A = \begin{bmatrix} 1 & 3 & 4 \\ 3 & 8 & 6 \\ 4 & 6 & 9 \end{bmatrix} \qquad A' = \begin{bmatrix} 1 & 3 & 4 \\ 3 & 8 & 6 \\ 4 & 6 & 9 \end{bmatrix}$$

Skew Symmetric matrix

A square matrix A is called Skew Symmetric if

$A = -A'$ or $a_{ij} = -a_{ji}$

e.g.

$$A = \begin{bmatrix} 0 & 3 & 4 \\ -3 & 0 & -6 \\ -4 & 6 & 0 \end{bmatrix}$$

$a_{12} = 3$

$a_{21} = -3$

$a_{12} = -a_{21}$