

Types of Matrices

(1) Row Matrix: - A matrix which has only one row is called a row matrix. For example,

$$(i) A = [2, 3, 0]_{1 \times 3} \quad (ii) B = [a_{11} \ a_{12} \ \dots \ a_{1n}]_{1 \times n}$$

(2) Column Matrix: - A matrix which has only one column is called a column matrix. For example,

$$(i) A = \begin{bmatrix} 1 \\ 3 \\ 5 \end{bmatrix}_{3 \times 1} \quad (ii) B = \begin{bmatrix} -4 \\ 1 \end{bmatrix}_{2 \times 1}$$

(3) Null (or Zero) Matrix: - A matrix of any order whose all elements are zero, is called a null matrix (or a zero matrix) and is denoted by  $O$ . For example,

$$(i) A = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}_{2 \times 2} \quad (ii) B = \begin{bmatrix} 0 & 0 & 0 \end{bmatrix}_{1 \times 3}$$

(4) Equality of two Matrices: - Two matrices  $A$  and  $B$  are said to be equal if and only if,

(i)  $A$  and  $B$  have the same order

(ii) each element of  $A$  is equal to the corresponding element of  $B$ . For example,

$$(i) A = \begin{bmatrix} 2^2 & 3^2 \\ 3^2 & 4^2 \end{bmatrix}_{2 \times 2} \quad \text{and} \quad B = \begin{bmatrix} 4 & 9 \\ 9 & 16 \end{bmatrix}_{2 \times 2}$$

(5) Sub-Matrices: - By excluding a few rows and columns of a main matrix (say A matrix), we obtain some new matrices, which are called sub-matrices of the original matrix. It is noteworthy that main matrix is also a sub-matrix of itself. For example,

$$(i) A = \begin{bmatrix} 2 & -4 \\ -1 & 3 \end{bmatrix}_{2 \times 2}$$

The sub-matrices are:

$$(a) \begin{bmatrix} 2 & -4 \\ -1 & 3 \end{bmatrix}$$

$$(b) \begin{bmatrix} 2 \\ -1 \end{bmatrix}$$

$$(c) \begin{bmatrix} -4 \\ 3 \end{bmatrix}$$

$$(d) \begin{bmatrix} 2 & -4 \end{bmatrix}$$

$$(e) \begin{bmatrix} -1 & 3 \end{bmatrix}$$

(6) Rectangular Matrix: - When the number of rows is greater than that of columns of a matrix and vice-versa, called rectangular matrix. For example,

$$(i) A = \begin{bmatrix} 2 & -6 \\ 3 & 5 \\ 0 & 7 \end{bmatrix}_{3 \times 2}$$

$$(ii) B = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix}_{2 \times 3}$$