Chapter 2

MATRICES

2.1 Basic Review of Matrices

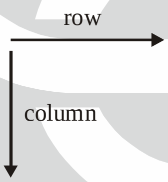
■ **Definition:**

A square or rectangular array of numbers or functions is known as matrices. Individual numbers or functions are known as elements of the matrix.

Example: $\begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix}, \begin{bmatrix} 1-i & 2+i \\ 4+2i & x+iy \\ 2+4i & 3-2i \end{bmatrix}, \begin{bmatrix} a & b & c \\ p & q & r \\ x & y & z \end{bmatrix}$

■ **Order of a matrix:**

A matrix of order $m \times n$ has 'm' number of rows and 'n' number of columns.



Every element of matrix is characterised by a row index and a column index:

a_{ij} : 'i' $\rightarrow$ row index , 'j' $\rightarrow$ column index, so, a_{ij} is the element of i^{th} row and j^{th} column

If a matrix A contains m rows and n columns, then it is written as $A = \left[a_{ij}\right]_{m \times n}$

■ **Basic Review of matrix operation:**

(i) Two matrices A and B are said to be equal if they are of the same order and each element of one is equal to corresponding element of the other matrix i.e. $a_{ij} = b_{ij}$ for all values of 'i' and 'j'.

(ii) Two matrices A and B are said to be conformable for addition/substraction if they have same order.

(iii) If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then $\lambda A = \begin{pmatrix} \lambda a & \lambda b \\ \lambda c & \lambda d \end{pmatrix}$

(iv) Two matrices A and B are said to be conformable for multiplication if number of columns in A is equal to number of rows in B. Say, A matrix is of order '$m \times n$' and B matrix is of order '$p \times q$', then AB is possible only if $n = p$.

■ **Various Type of Matrices:**

(1) Square matrix: Matrix having number of rows equal to the number of columns i.e. $m = n$