2nd & 4th Sem Combined (24.05.21) 1 ~~1~~
Paper: Maths 14.04.2020
Topic: Revision - II (Matrix)

Recap Contd...

Matrix of any dimension can be compactly written as

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} & \cdots & a_{1m} \\ a_{21} & a_{22} & a_{23} & \cdots & a_{2m} \\ a_{31} & a_{32} & a_{33} & \cdots & a_{3m} \\ \vdots & \vdots & \vdots & \cdots & \vdots \\ a_{n1} & a_{n2} & a_{n3} & \cdots & a_{nm} \end{bmatrix}_{(n \times m)}$$

Vector

A matrix which has only one row (R) or only one column (C) - RC - is called Vector. Column Vector is common - a matrix having only one column is column vector. Similarly, a matrix having only one row is known as row vector.

Example:
Let us take a ~~linear~~ system of linear simultaneous equations. (To be explained at a later stage).

$$2x_1 + 3x_2 = 8$$
$$4x_1 + 2x_2 = 9$$

Arranging in three components (to be explained at a later stage) - {which is the core of Matrix Algebra} - in rectangular arrays of numbers symbolizing as A, X and C respectively:

$$AX = C$$

$$A = \begin{bmatrix} 2 & 3 \\ 4 & 2 \end{bmatrix}_{(2 \times 2)} \quad X = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}_{(2 \times 1)} \text{ and } C = \begin{bmatrix} 8 \\ 9 \end{bmatrix}_{(2 \times 1)}$$

x_1 and x_2 are common in the above equations.

$\therefore$ Column Vector $X = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$

(24.08.21) 2

15.04.2020

There are other types of matrices too like Diagonal Matrix, Symmetric Matrix, Triangular Matrix etc. Check yourself.

Let us now deal with MATRIX OPERATIONS. In Arithmetic, traditionally we know four operators— addition, subtraction, multiplication and division. In matrix, we will add 'Equality of Matrices' and 'Scalar Multiplication'. We will not discuss Matrix Division at present.

1. Addition/Subtraction: The formula is ~~and~~ same for Addition & Subtraction $\rightarrow (\pm)$

Dimensions of two matrices to be added/subtracted $(\pm)$ must be of same. Addition/subtraction of matrices A and B will give a resulting third matrix C. The operation is simple. Each element of matrix A is added/subracted $(\pm)$ to its corresponding element of matrix B.

Addition:

Given

$$A = \begin{bmatrix} 5 & 2 \\ -1 & 3 \end{bmatrix}_{(2\times2)} \qquad B = \begin{bmatrix} 1 & 4 \\ 2 & 2 \end{bmatrix}_{(2\times2)}$$

Note that both matrices are square matrices.

$$A + B = C$$

$$\text{or} \quad C = \begin{bmatrix} (5+1) & (2+4) \\ (-1+2) & (3+2) \end{bmatrix}$$

$$\text{or} \quad C = \begin{bmatrix} 6 & 6 \\ 1 & 5 \end{bmatrix}_{(2\times2)}$$

Note that the resulting matrix is also a square matrix of same dimension.

Work out Subtraction:

Given

$$A = \begin{bmatrix} 7 & 3 \\ 2 & 9 \end{bmatrix} \qquad B = \begin{bmatrix} 4 & 2 \\ 3 & 5 \end{bmatrix}$$

Scan and post the answer following the above steps.

To be contd...