matrices

Dr. Soma Mandal Department of Physics Government girls' general degree college

B. Sc. Physics Honours SEMESTER I CC1

23-12-2021

Syllabus

3. Matrices

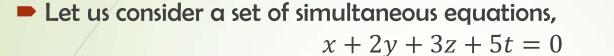
15 Lectures

(a) Addition and Multiplication of Matrices. Null Matrices. Diagonal, Scalar and Unit Matrices. Transpose of a Matrix. Symmetric and Skew-Symmetric Matrices. Conjugate of a Matrix. Hermitian and Skew-Hermitian Matrices. Singular and Non-Singular matrices. Orthogonal and Unitary Matrices. Trace of a Matrix.

(b) Eigen-values and Eigenvectors (Degenerate and non-degenerate). Cayley-Hamiliton Theorem. Diagonalization of Matrices. Solutions of Coupled Linear Ordinary homogeneous Differential Equations. Functions of a Matrix.

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WHAT DO YOU MEAN BY MATRICES?

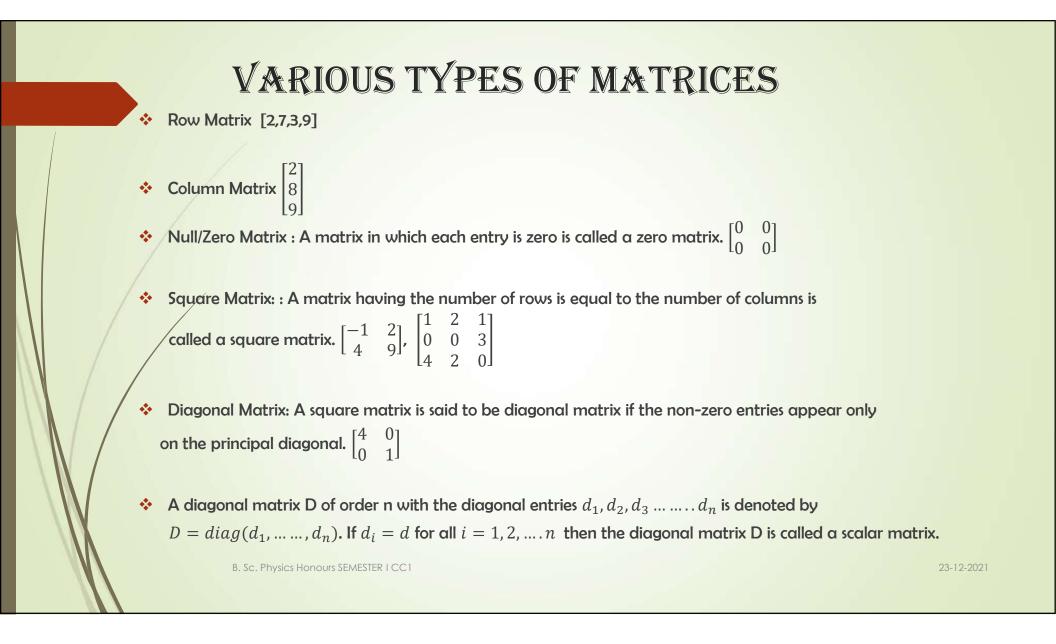


 $\mathbf{A} = \begin{bmatrix} 1 & 2 & 3 & 5 \\ 4 & 2 & 5 & 7 \\ 3 & 4 & 2 & 6 \end{bmatrix}$

 $\begin{array}{l}
 x + 2y + 3z + 3t = 0 \\
 4x + 2y + 5z + 7t = 0 \\
 3x + 4y + 2z + 6t = 0
 \end{array}$



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VARIOUS TYPES OF MATRICES

★ Unit or Identity Matrix: A square matrix $A = \begin{bmatrix} a_{ij} \end{bmatrix}$ with $a_{ij} \begin{cases} 1 & if \ i = j \\ 0 & if \ i \neq j \end{cases}$ is called the identity matrix.
Example: $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ ★ A square matrix is set to be upper triangular if $a_{ij} = 0$ for i > i. Example: $\begin{bmatrix} 1 & 1 & 2 \\ 0 & 4 & 3 \end{bmatrix}$

A square matrix is set to be upper triangular if $a_{ij} = 0$ for i > j. Example: $\begin{bmatrix} 1 & 1 & 2 \\ 0 & 4 & 3 \\ 0 & 0 & 6 \end{bmatrix}$ A square matrix is set to be lower triangular if $a_{ij} = 0$ for i < j. Example: $\begin{bmatrix} 1 & 0 & 0 \\ 1 & 4 & 0 \\ 2 & 3 & 6 \end{bmatrix}$

✤ A square matrix is said to be Triangular Matrix if it is an upper or lower triangular matrix.

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