



## UNIT 2- Orthogonal Transformation Of Real Symmetric Matrix

### Topic-Diagonalization Of Areal Symmetric Matrix

⇒ Diagonalisation of a matrix :-

The process of finding a matrix  $N$  such that  $D = N^T A N$  is called the diagonalisation of a matrix  $A$ , where  $N$  is the normalized modal matrix and  $D$  is the diagonal matrix whose diagonal elements are Eigen values of a matrix  $A$ .

Note :-

Diagonalisation by orthogonal transformation is possible only for a real symmetric matrix

Steps :-

\* steps to find the diagonalisation of matrix :-

Step 1, Find the characteristic equation, Eigen values and Eigen vectors

Step 2, Eigen vectors should be pair wise orthogonal.

Step 3, Find the normalized eigen vector  
↳  $x = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} \begin{pmatrix} l(x) \\ l(x) \\ l(x) \end{pmatrix}$  where  $l(x) = \frac{1}{\sqrt{x_1^2 + x_2^2 + x_3^2}}$

Step 4, Form the normalized modal matrix using normalized eigen vector.

Step 5,  $N$  should be orthogonal.

Step 6,  $D = N^T A N$

Problems :-