SNS COLLEGE OF TECHNOLOGY

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COIMBATORE-641 035, TAMIL NADU

DEPARTMENT OF MATHEMATICS

23MAT101 – MATRICES AND CALCULUS

UNIT II – ORTHOGONAL TRANSFORMATION OF A REAL SYMMETRIC MATRIX

PART A QUESTIONS

1. Write down the quadratic form corresponding to the matrix $A = \begin{pmatrix} 0 & 5 & -1 \\ 5 & 1 & 6 \\ -1 & 6 & 2 \end{pmatrix}$

2. $x_1^2 + 2x_2^2 + 3x_3^2 + 4x_1x_2 + x_2x_3$
Find the matrix of the quadratic form

3. Determine the nature of the Quadratic form $f(x_1, x_2, x_3) = x_1^2 + 2x_2^2$

4. Find the Eigen Vector corresponding to the Eigen Value '1' of matrix $\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$

5. Find the Eigen Value of $\begin{pmatrix} 2 & 3 \\ 0 & 3 \end{pmatrix}$ corresponding to the Eigen Vector $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$

6. Can $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ be diagonalized? why?

7. Check whether the matrix A is orthogonal ? Justify $A = \begin{pmatrix} \cos\theta & \sin\theta & 0 \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{pmatrix}$