SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution, Affiliated to Anna University)

COIMBATORE – 641 035.

DEPARTMENT OF MATHEMATICS

23MAT101-MATRICES AND CALCULUS

Unit-II

ORTHOGONAL TRANSFORMATION OF A REAL SYMMETRIC MATRIX

PART-B

1. Diagonalize the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ by means of orthogonal transformation.

2. Analyze the matrix A= $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ through Diagonalization by means of orthogonal transformation.

3. Diagonalize the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ by means of orthogonal transformation.

4. Diagonalize the matrix $A = \begin{bmatrix} 1 & 1 \\ 1 & 2 \end{bmatrix}$ by means of orthogonal transformation.

5. Reduce the Quadratic form $x^2+2y^2+z^2-2xy+2yz$ to the canonical form by using orthogonal transformation and hence show that it is positive semi definite. Give also a non-zero set of values (x_1,x_2,x_3) which makes this Quadratic form zero.

6. Apply Orthogonal transformation to reduce the quadratic form $x_1^2 + 5x_2^2 + x_3^2 + 2x_1x_2 + 2x_2x_3 + 6x_3x_1$ into canonical form. Also find the rank, index, signature and nature of the quadratic form.

7. Obtain an orthogonal transformation which will transform the quadratic form $x_1^2 + 2x_2^2 + x_3^2 - 2x_1x_2 + 2x_2x_3$ into sum of squares.

8. Reduce the quadratic form $2x_1^2 + x_2^2 + x_3^2 + 2x_1x_2 - 4x_2x_3 - 2x_1x_3$ to canonical form by orthogonal reduction. Determine its nature, rank, signature, index and also find a set of non-zero value for $x_{1,}\ x_{2,}x_3$ for which the above quadratic form is zero.

9. Reduce the quadratic form $2x_1x_2 - 2x_2x_3 + 2x_1x_3$ to canonical form by orthogonal reduction. Determine its nature, rank, signature and index

10. Reduce the quadratic form $6x^2+3y^2+3z^2-4xy-2yz+4zx$ into canonical form by orthogonal reduction. Find its nature, rank, signature and index.