SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

COIMBATORE-35

DEPARTMENT OF MATHEMATICS

23MAT101/ MATRICES AND CALCULUS

UNIT 1 MATRIX EIGENVALUE PROBLEM

Part B

1. Find the Eigen values and Eigen vectors of $\begin{pmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -3 & -2 & 0 \end{pmatrix}$.
2. Find the Eigen values and Eigen vectors of $\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$.
3. Find the Eigen values and Eigen vectors of $\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$.
4. Verify Cayley Hamilton theorem for the matrix $\begin{pmatrix} 1 & -2 & 3 \\ 2 & 4 & -2 \\ -1 & 1 & 2 \end{pmatrix}$.
5. Show that the matrix $\begin{pmatrix} 1 & -1 & 1 \\ 0 & 1 & 0 \\ 2 & 0 & 3 \end{pmatrix}$ satisfies its own characteristic equation. Find the inverse matrix.
6. Using Cayley – Hamilton Theorem find $A^{-1}, if\ A = \begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{pmatrix}$.
7. Verify Cayley Hamilton theorem and find $A^{-1}\ and\ A^4$ if $A = \begin{pmatrix} 2 & 0 & -1 \\ 0 & 2 & 0 \\ -1 & 0 & 2 \end{pmatrix}$.
8. Use Cayley Hamilton theorem to find the value of the matrix $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$ if $A = \begin{pmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{pmatrix}$.
9. The Eigen vectors of a 3×3 real symmetric matrix A corresponding to the Eigen values 2,3,6 are $(1,0,-1)^T, (1,1,1)^T, (-1,2,-1)^T$ respectively. Find the matrix A.
10. Let the oldest age attained by the females in some population be 6 years. Divide the population into 3 age classes of 2 years each. Let the Leslie matrix be $L = \begin{pmatrix} 0 & 2.3 & 0.4 \\ 0.6 & 0 & 0 \\ 0 & 0.3 & 0 \end{pmatrix}$.

a) What is the number of females in each class after 2,4,6 years if each class initially consists of 500 females?
b) For what initial distribution will the number of females in each class change by same proportion? What is the rate of change?