Reg.No: | | | | | | | |

SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution, Affiliated to Anna University)
Coimbatore – 641 035.

Internal Assessment- I
AcademicYear2023-2024(Odd)
First Semester
23MAT101-Matrices and Calculus
(REGULATION 2023)
(Common to All Branches)

A

Time:1.30Hours **MaximumMarks:50**

			CO	BLOOMS
		PART – A(5 x 2 = 10 MARKS) **ANSWERALLQUESTIONS**	CO	BLOOMS
1.		Compute the characteristic equation of the matrix $A=\begin{pmatrix}1 & -3\\ 4 & 1\end{pmatrix}$	CO1	(Rem)
2.		State Cayley-Hamilton theorem and give its applications.	CO1	(Rem)
3.		Find the sum and product of the Eigen values of the matrix $\begin{bmatrix}-1 & 1 & 1\\ 1 & -1 & 1\\ 1 & 1 & -1\end{bmatrix}$	CO1	(Und)
4.		Find the nature of the Q.F $=x_1^2+2x_2^2$	CO2	(Und)
5.		Predict the matrix of the Quadratic form $2x^2+8z^2+4xy+10xz-2yz$	CO2	(Rem)
		PART – B (13+13+14= 40 MARKS) **ANSWER ALL QUESTIONS**		
6.	a) i)	Determine the Eigen values and Eigen vectors of the Matrix $\begin{bmatrix}8 & -6 & 2\\ -6 & 7 & -4\\ 2 & -4 & 3\end{bmatrix}$	CO1	(App) (10)
	ii)	Two of the Eigen values of the matrix $A=\begin{bmatrix}6 & -2 & 2\\ -2 & 3 & -1\\ 2 & -1 & 3\end{bmatrix}$ are 2 and 8.Find the Eigen values of A^{-1}.	CO1	(Rem) (3)
		(or)		
	b)	Verify thatthe matrix $A=\begin{pmatrix}1 & 4\\ 2 & 3\end{pmatrix}$ satisfies its characteristic equation and find its inverse. Also express $A^5-4A^4-7A^3+11A^2-A-10I$ as a linear polynomial in A.	CO1	(App) (13)

7.	a)	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.	CO2	(App) (13)
		(or)		
	b)	Analyze the matrix A= $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ through Diagonalization by means of orthogonal transformation.	CO2	(App) (13)
8	a)	Given Leslie model describes the age specified growth. Assuming the oldest age attained by the females in some population be 6 years and dividing the population into 3 age classes of 2 years each. we have L= $\begin{pmatrix} 0 & 2.3 & 0.4 \\ 0.6 & 0 & 0 \\ 0 & 0.3 & 0 \end{pmatrix}$ (i) Evaluate the no. of females in each class after 2, 4 and 6 years if each class initially contains of 500 females. (ii) Construct the initial distribution for the no. of females in each class change by the same proportion and what is the rate of change.	CO1	(App) (14)
		(or)		
	b)	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.	CO2	(App) (14)

Rem/Und: Remember/Understand **App:**Apply **Ana**: Analyze **Eva:**Evaluate **Cre**:Create

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Prepared by **Verified by** **Dean(S&H)**