PRN:		Course Code :	P70PC101

First Year M. **Tech** End Semester Examination Winter 2024

LINEAR ALGEBRA AND CALCULUS

Day and Date: Sat 30 NOV 2024 Max Marks: **50** 000434

Time : 10:30AM To 12:30PM Duration: **02** hrs

Instructions: 1) All questions are compulsory.

2) Assume suitable data wherever necessary.

4) Non-programmable calculator is allowed.

			Marks	Bloom's Level	CO
Q.1		**Attempt the following**			
	a)	What is a Multivariate calculus?	02	L1	CO1
	b)	Define the Vector space.	02	L1	CO2
	c)	Define the Linear transformation.	02	L1	CO3
	d)	Define the Inner product space.	02	L1	CO3
	e)	Define the Characteristic polynomial.	02	L1	CO4
Q.2		**Attempt any Two the following**			
	a)	State and Prove Taylor series.	05	L2	CO1
	b)	Prove that the intersection of any two subspace of a vector space V is also a subspace of V.	05	L2	CO2
	c)	Prove that W_1 and W_2 be two subspace of a vector space V , then $W_1 \cap W_2$ is a subset of V iff $W_1 \subseteq W_2$ or $W_2 \subseteq W_1$	05	L3	CO2
Q.3		**Attempt any Two the following**			
	a)	Prove that a linear transformation is an isomorphism iff T is non singular.	05	L2	CO2
	b)	Describe the Gram-Schmidt procedure.	05	L2	CO3
	c)	What is the Gram-Schmidt algorithm used?	05	L2	CO3
Q.4		**Attempt any Two the following**			
	a)	Find the inverse of the matrix $\begin{pmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{pmatrix}$	05	L2	CO4
	b)	Prove that the characteristic root of a triangular matrix are the just the diagonal element of the matrix.	05	L3	CO4

ESE

	c)	Prove that matrix A and A^T have the same eigen value.	05	L3	CO4
Q.5		**Attempt any Two the following**			
	a)	State and prove Cayley- Hamilton theorem.	05	L4	CO5
	b)	Find the eigen value and eigen vector of the matrix $\begin{pmatrix} 0 & 2 \\ -2 & 0 \end{pmatrix}$	05	L4	CO5
	c)	Prove that zero is a characteristic root of matrix if and only if matrix is singular.	05	L4	CO5

*****

ESE