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Enroll No..... **Class Roll No.....**

LNCT UNIVERSITY
I MID SEMESTER TEST- (May-2025)
B.Tech. (Second Semester)
Subject: Linear Algebra and Optimization (CS-202)
CS/AIML, DS

TIME: 1.30 Hrs **M.M:20**

NOTE: 1.All Questions are compulsory.
2. All Questions carry equal marks.

Q1. Let V(F) be a vector space over the field F and W be a vector subspace of V then prove that W be a vector subspace of V iff $a\alpha + b\beta \in W$. (CO1) (5)

OR

Q1. Let R be the field of real numbers, prove that $W_1 = \{(x, 2y, 3z) : x, y, z \in R\}$ and $W_2 = \{(x, x, x) : x \in R\}$ are subspaces of $V_3(R)$ (CO1) (5)

Q2. Examine whether the set of vectors (1, 2, 1), (3, 1. 5), (3,-4, 7) are linearly independent or not in $V_3(R)$. (CO1) (5)

OR

Q2. Define $f : V_3(F) \rightarrow V_2(F)$ by the rule $f(x, y, z) = (y, z)$ Show that f is a linear Transformation (CO1) (5)

Q3. Solve by LU-Decomposition: (CO2) (5)

$$3x + 2y + 7z = 4$$
$$2x + 3y + z = 5$$
$$3x + 4y + z = 7$$

OR

Q3. Solve by Cholesky-Decomposition:

$$x + 2y + 3z = 5$$
$$2x + 8y + 22z = 6$$
$$3x + 22y + 82z = -10$$

(CO2) (5)

Q4. Solve by Cramer's Rule: (CO2) (5)

$$x + y + z = 6$$
$$5x - 6y + 8z = 17$$
$$2x + 3y - z = 5$$

OR

Q4. Find the Singular Value Decomposition for the given matrix A

$$A = \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$$

(CO2) (5)

Rahul yadav

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