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Enroll No.....

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LNCT UNIVERSITY  
I MID SEMESTER TEST- (Apr-2024)  
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. Show that the intersection of two vector subspaces of  $V(F)$  is also a vector subspace of  $V(F)$ . (CO1) (5)

OR

Q1. Let  $W = \{(a_1, a_2, a_3) : a_1, a_2, a_3 \in F \text{ and } a_1 + a_2 + a_3 = 0\}$ . Show that  $W$  is a subspace of  $V_3(F)$ . (CO1) (5)

Q2. Examine whether the set of vectors  $(2, 3, -1), (-1, 4, -2), (1, 18, -4)$  is linearly dependent or not in  $V_3(R)$ . (CO1) (5)

OR

Q2. Define  $T : V_3 \rightarrow V_2$  by the rule  $T(x_1, x_2, x_3) = (x_1 - x_2, x_1 + x_3)$  Show that  $T$  is a linear Transformation (CO1) (5)

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

$$x + 5y + z = 14$$

$$2x + y + 3z = 13$$

$$3x + y + 4z = 17$$

OR

Q3. Solve by Cholesky-Decomposition (CO2) (5)

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

$$2x + 8y + 22z = 6$$

$$3x + 22y + 82z = -10$$

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

$$x + 3y - z = 6$$

$$3x - 2y + z = -5$$

$$x + 3y - 2z = 14$$

OR

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

$$A = \begin{bmatrix} 2 & 2 \\ -1 & 1 \end{bmatrix}$$

(CO2) (5)

