	Reg. No.:	
	Name :	



Mid-Term Examination, April 2021

Programme	:	B.Tech.	Semester	:	Interim 2021-2022
Course	• •	Applied Linear Algebra	Code	:	MAT3002
Faculty	:	Dr. Md Abu Talhamainuddin Ansary	Slot/Class No.	:	A11/ BL2021225000139
Time	:	1½ hours	Max. Marks	:	50

Answer all the Questions

Q. No. Question Description Marks

1 Check the existence of the solution of the following systems of linear equations and if system is consists, then find the solution using Gauss elimination methods:

$$x_1 + 3x_2 + 3x_3 + 4x_4 = 4,$$

$$2x_1 + 6x_2 + 5x_3 - 4x_4 = 3,$$

$$3x_1 + 7x_2 + 2x_3 + 2x_4 = 12,$$

$$2x_1 + 3x_2 + 5x_3 + 6x_4 = 5.$$

Find the inverse of the matrix $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ by Gauss Jordan method.

3 Examine whether

10

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- (i) the set of all differentiable functions in [0,1] forms a subspace of C[0,1] or not where C[0,1] is the set of all continuous functions from [0,1] to R.
- (ii) the solutions of the system of equations

$$Ax=0$$

where $A = A_{n \times n}$ forms a subspace of R^n .

- 4 (a) Show that the set of 2×2 symmetric matrices forms a subspace of $M_{2\times 2}$, where $M_{2\times 2}$ is the set of 2×2 matrices.
- 8

- (b) Find a basis for this subspace.
- (c) What is the dimension of this subspace?

6

Extend $S=\{(1, 2, 1), (2, 1, 1)\}$ to a basis of R^3 .

Find the coordinate of (5, 3, 2) with respect to this basis.

6 (a) Show that the mapping $T: \mathbb{R}^3 \to \mathbb{R}^3$ defined by 10

$$T(x, y, z) = (x + 2y - z, y + z, y - 2z)$$

is a linear transformation from R^3 to R^3 .

(b) Find a basis for range of T and null-space of T.

 $\Leftrightarrow \Leftrightarrow \Leftrightarrow$