QP CODE: D4BAM2401	(Pages: 2)	Reg. No	: ....
		Name	: ....

FOURTH SEMESTER FYUGP EXAMINATION, APRIL 2026

Discipline Specific Core (DSC) Courses - Major

AMA4CJ203 : LINEAR ALGEBRA

(Credits: 4)

Time: 2 Hours	Maximum Marks: 70

Section A

Answer the following questions. Each carries 3 marks (Ceiling: 24 marks)

1.	What do you mean by trivial solution of a homogeneous system? Explain.	BL1	CO1
2.	Solve: $\begin{aligned} x + 2y &= 3 \\ 2x + 4y &= 6 \end{aligned}$	BL3	CO1, CO2, CO3
3.	Use linear system to show that the straight lines $2x - 4y = 1$ and $4x - 8y = 2$ are parallel.	BL1	CO1
4.	What specific condition must a square matrix meet to be classified as "elementary"?	BL1	CO1, CO2
5.	Give an example of a linear system in 2 unknowns having no solution.	BL3	CO1, CO2
6.	Define symmetric matrix and give an example.	BL1	CO1, CO2
7.	If $A = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$ then calculate $det\ AB$.	BL3	CO2, CO3
8.	Show that the set $X = \{(x, y) \in \mathbb{R}^2 : y = 0\}$ is a subspace of $\mathbb{R}^2$.	BL2	CO1, CO4
9.	Calculate the determinant of $\begin{bmatrix} k+1 & k-1 & 0 \\ 2 & k-3 & 0 \\ 5 & k+1 & k \end{bmatrix}$.	BL3	CO2, CO3
10.	Define dimension of a vector space.	BL1	CO4

Section B

Answer the following questions. Each carries 6 marks (Ceiling: 36 Marks)

11.	Reduce the matrix $\begin{bmatrix} 1 & 2 & -1 & 3 \\ 2 & 2 & 1 & 1 \\ -1 & 0 & -2 & 2 \\ 3 & 4 & 0 & 4 \end{bmatrix}$ to reduced row echelon form.	BL2	CO1, CO2 **(PTO)**

12.	Reduce the matrix $A = \begin{bmatrix} 2 & 2 & 4 & 0 \\ 2 & -1 & 1 & 3 \\ 3 & 1 & 4 & 2 \\ 4 & 3 & 7 & 1 \end{bmatrix}$ to reduced row echelon form.	BL3	CO1, CO2, CO3
13.	Find all 3×3 diagonal matrices A that satisfy $A^2 - 3A - 4I = 0$.	BL3	CO1, CO2
14.	Find the standard matrix corresponding to the linear transformation $T : \mathbb{R}^2 \longrightarrow \mathbb{R}^3$ defind by $T(x_1, x_2) = (2x_1 + x_2, 3x_1 - x_2, x_1 + x_2)$.	BL1	CO3, CO4
15.	Use row reduction to evaluate the determinant of $A = \begin{bmatrix} 2 & 2 & 3 & 1 \\ 1 & 0 & 1 & 1 \\ 0 & 2 & 1 & 0 \\ 0 & 1 & 2 & 3 \end{bmatrix}$.	BL3	CO1, CO2, CO3
16.	Prove that the set of all 2×2 symmetric matrices is a subspace of M_{22}.	BL2	CO2, CO4
17.	Use matrices and row reduction to determine whether the vectors$\mathbf{v}_1 = (1, 2, 2, -1)$, $\mathbf{v}_2 = (4, 9, 9, -4)$, $\mathbf{v}_3 = (5, 8, 9, -5)$in $\mathbb{R}^4$ are linearly dependent or linearly independent.	BL3	CO1, CO2, CO4
18.	Prove that $\{\mathbf{e}_1, \mathbf{e}_2\}$ is a basis of $\mathbb{R}^2$, where $\mathbf{e}_1 = (1, 0), \mathbf{e}_2 = (0, 1)$.	BL3	CO1, CO4
	Section C		
	Answer any one question. Each carries 10 marks (1 x 10 = 10 Marks)		
19.	a) Find the inverse of the matrix: $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 3 \\ 1 & 1 & -2 \end{bmatrix}$ b) Solve the following nonhomogeneous system: $x + 2y + z = 8$ $2x - y + 3z = 7$ $x + y - 2z = 3$	BL3	CO1, CO2
20.	Let $\mathbf{v}_1 = (3, 1 - 4), \mathbf{v}_2 = (2, 5, 6), \mathbf{v}_3 = (1, 4, 8)$ and $S = \{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$. Prove that S is a basis of $\mathbb{R}^3$. Find the coordinate vector of $\mathbf{v} = (6, 10, 10)$ relative to the basis S.	BL3	CO4
	CO : Course Outcome **BL : Bloom's Taxonomy Levels** (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)		