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PRESIDENCY UNIVERSITY

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Bengaluru

Mid Term Examinations - October 2026

Date: 06/10/2026 **Time:** 02:00 PM - 03:30 PM

Course Code: MAT1203 **Course Name:** Linear Algebra and calculus

Semester: First Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2	CO3
Marks	50	84	46

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Compute the rank of the matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$	2	CO1	BT2
2	State the characteristic equation of a 2×2 matrix.	2	CO1	BT1
3	Define a symmetric matrix with an example.	2	CO1	BT1
4	State the condition for the set $S = \{(1, 0, 1), (1, 1, 0), (-1, 0, -1)\}$ to be linearly dependent.	2	CO3	BT1
5	Define the basis of a vector space.	2	CO3	BT1

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Determine the eigenvalues and corresponding eigenvectors of the given matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3
7	Verify that the matrix $A = \begin{bmatrix} 2 & -1 & 2 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ satisfies its characteristic equation, and use it to find A^{-1} and A^4.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Test the consistency of the given system of linear equations and solve it if it is consistent: $x + 2y + 3z = 14$ $4x + 5y + 7z = 35$ $3x + 3y + 4z = 21$	10	CO2	BT3

9	Solve the following system of linear equations using the Gauss elimination method: $2x + 3y - z = 5$ $4x + 4y - 3z = 3$ $2x - 3y + 2z = 2$	10	CO2	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	Solve the following system of linear equations using the Gauss–Jordan method: $2x + y + z = 10$ $3x + 2y + 3z = 18$ $x + 4y + 9z = 16$	10	CO2	BT3
11	Solve the following system of linear equations using the inverse of a matrix obtained by the Gauss–Jordan method, where $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Verify that the set $W = \{(x, y, z) : x + y + z = 0\}$ is a subspace of $\mathbb{R}^3$.	10	CO3	BT3
13	Determine whether the set $S = \{(1, 2, 1), (3, 4, -7), (3, 1, 5)\}$ is a basis of the vector space $\mathbb{R}^3$. If so, express an arbitrary vector (x, y, z) as a linear combination of the vectors in S.	10	CO3	BT3