Roll No.											

PRESIDENCY UNIVERSITY

BENGALURU

School of Engineering

Mid - Term Examinations – November 2024

Semester: I | **Date**: 6-11-2024

Course Code: MAT1001 | **Time**: 09:30am – 11:00am

Course Name: CALCULUS AND LINEAR ALGEBRA | **Max Marks**: 50

Program: B.TECH | **Weightage**: 25%

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2 marks. **2Mx5Q=10M**

1	Define Echelon form of a matrix.	2 Marks	L1	CO1
2	Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$.	2 Marks	L1	CO1
3	Find the eigenvalues of the matrices A and A^{-1} where $A = \begin{bmatrix} 1 & -1 & -5 \\ 0 & -8 & -2 \\ 0 & 0 & 2 \end{bmatrix}$.	2 Marks	L1	CO1
4	If -2 and 6 are the two Eigenvalues of $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$. Find the third Eigenvalue of A?	2 Marks	L1	CO1
5	State any two applications of Cayley-Hamilton theorem.	2 Marks	L1	CO1

Part B

Answer ALL Questions. Each question carries 10 marks. **4QX10M=40M**

6	Solve the following system of equations by Gauss elimination method $x + 2y + z = 3,\ 2x + 3y + 3z = 10, 3x - y + 2z = 13$.	10 Marks	L2	CO1
	OR			
7	Solve the following system of equations by Gauss Jordan method $2x + y + 4z = 12,\ 4x + 11y - z = 33, 8x - 3y + 2z = 20$.	10 Marks	L3	CO1

8	Solve the following system of equations by Gauss elimination method $x+y+z=9,\ x-2y+3z=8, 2x+y-z=3.$	10 Marks	L2	CO1

OR

9	Find all the eigenvalues and the corresponding eigenvectors of the matrix $A=\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.	10 Marks	L2	CO1
10	Solve the following system of equations by Gauss Jordan method $2x+5y+7z=52,\ 2x+y-z=0, x+y+z=9.$	10 Marks	L2	CO1

OR

11	Find all the eigenvalues and the corresponding eigenvectors of the matrix $A=\begin{bmatrix} 7 & -2 & 0 \\ -2 & 6 & -2 \\ 0 & -2 & 5 \end{bmatrix}$.	10 Marks	L2	CO1
12	Verify 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}.	10 Marks	L2	CO1

OR

13	Verify Cayley- Hamilton theorem for the matrix $A=\begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & 1 \end{bmatrix}$ and use it to find A^{-1}.	10 Marks	L2	CO1