Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

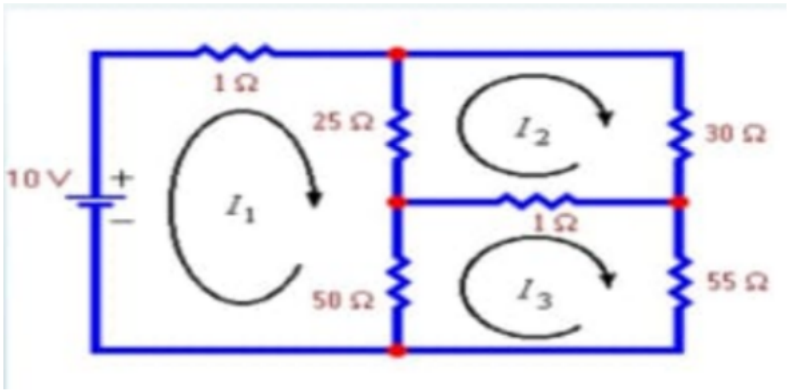
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

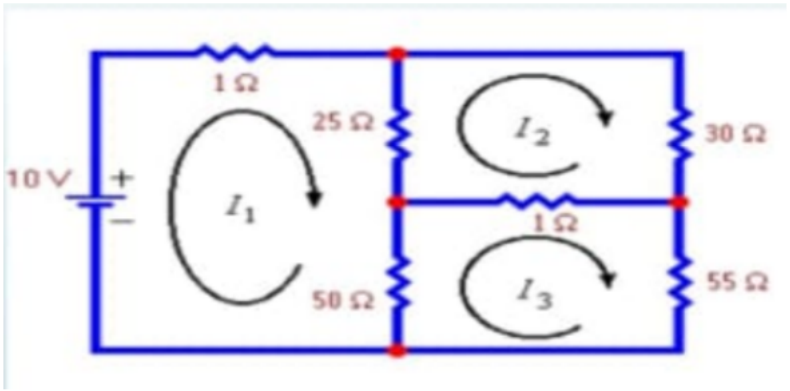
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

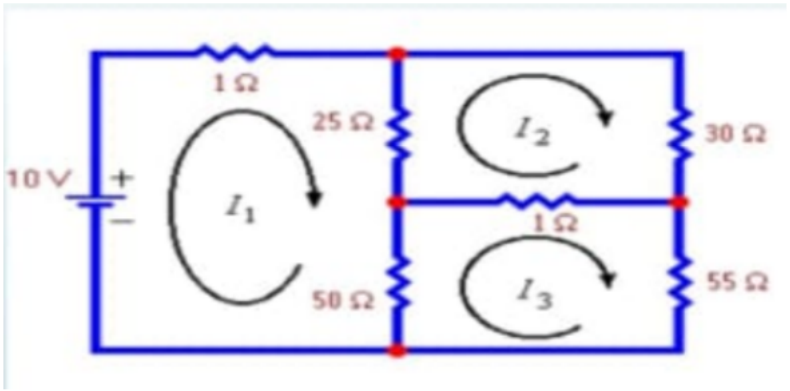
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

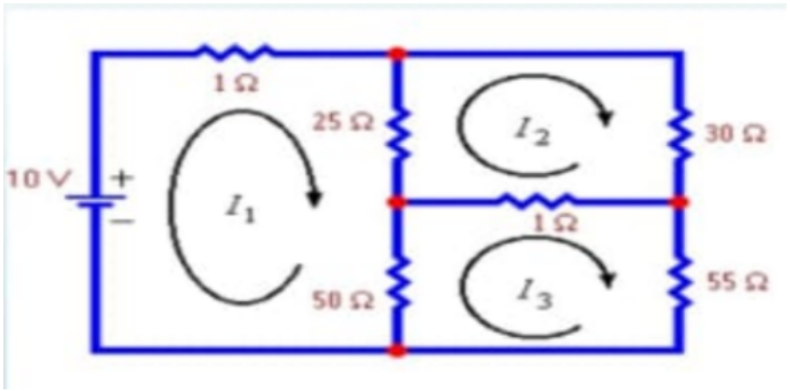
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

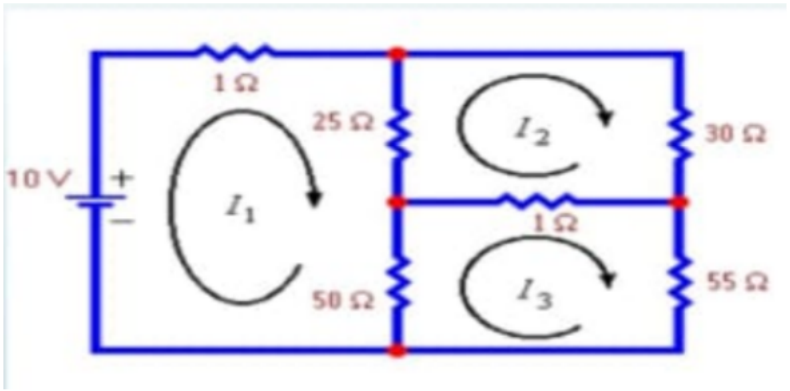
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

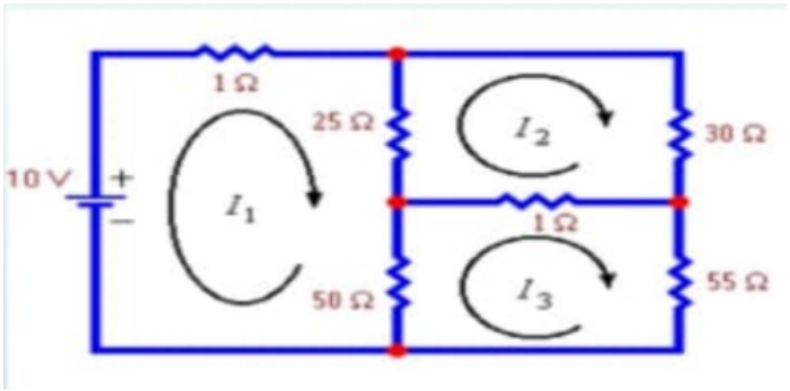
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

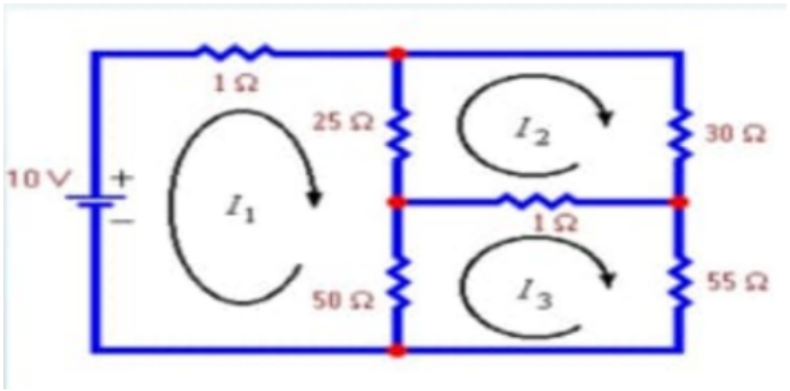
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

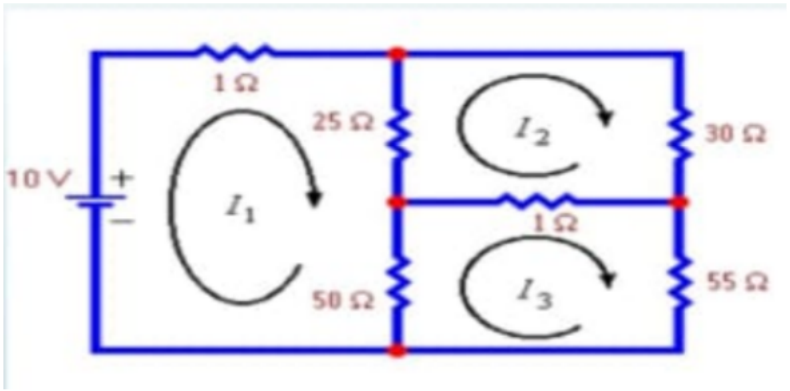
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

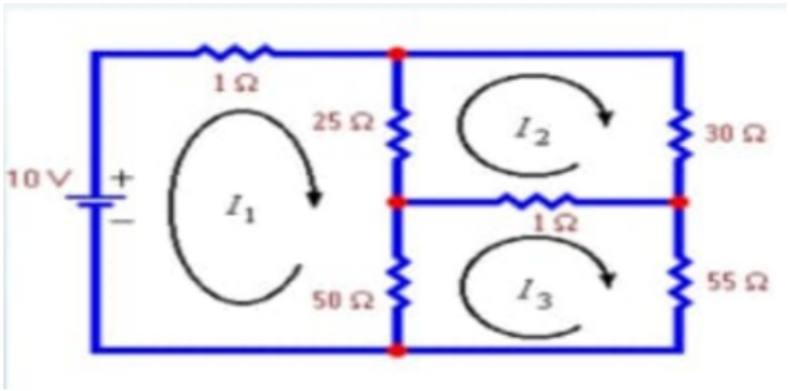
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

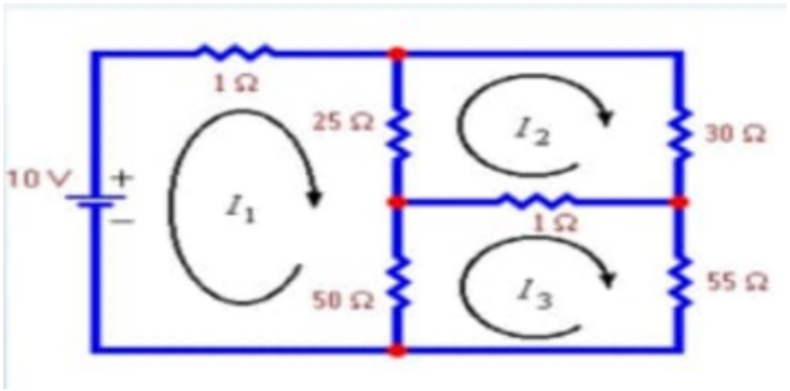
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

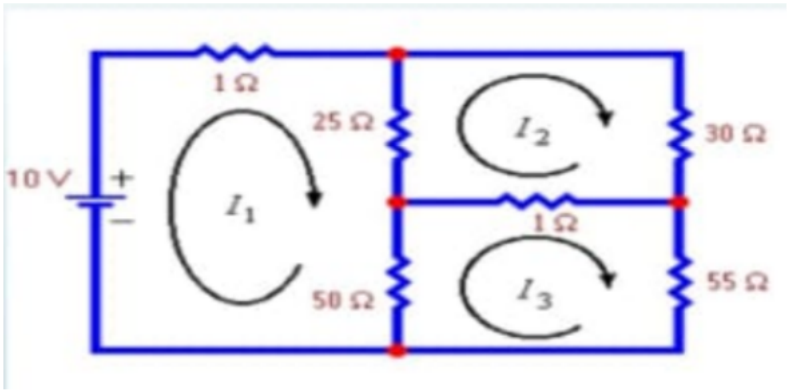
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

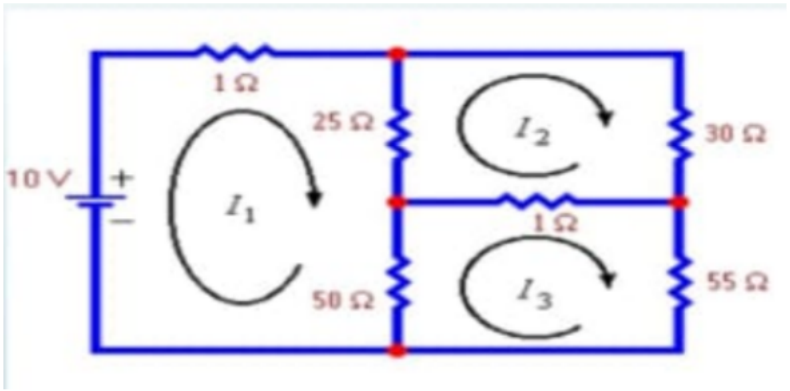
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

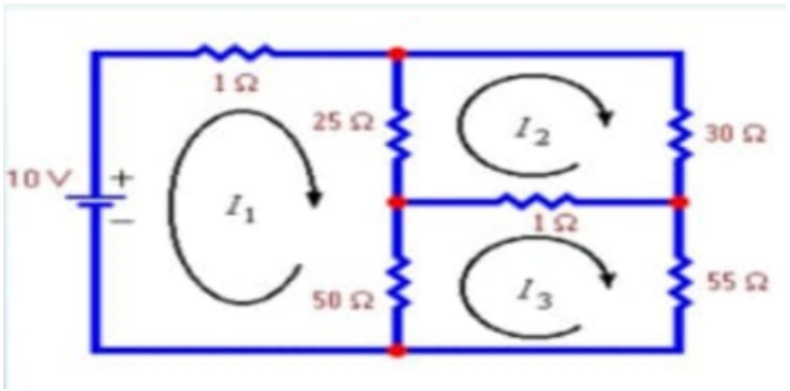
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

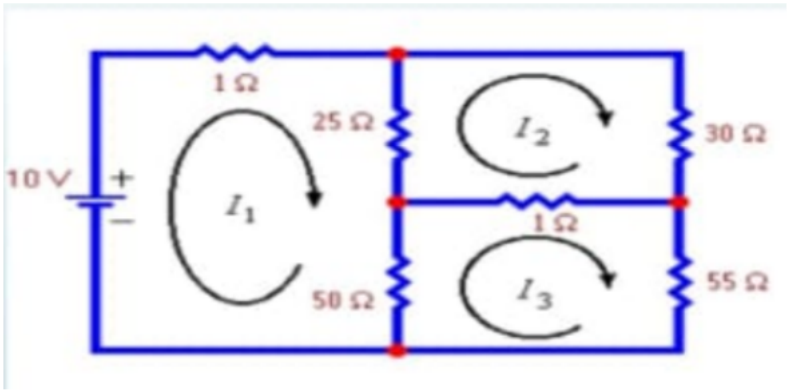
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

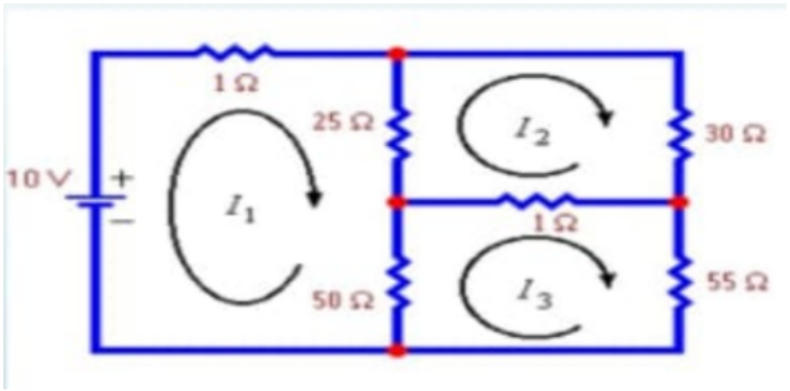
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

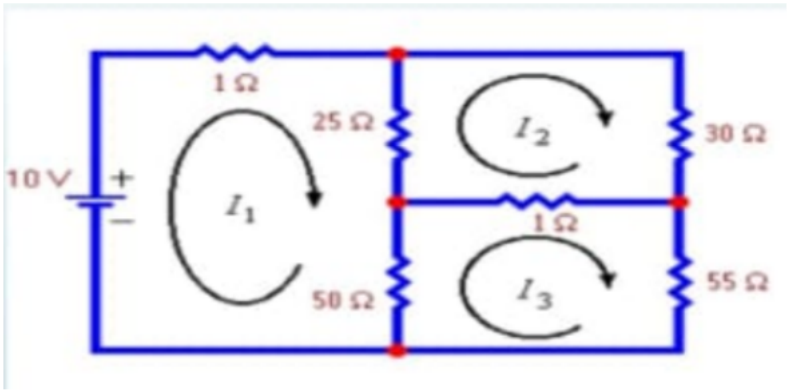
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

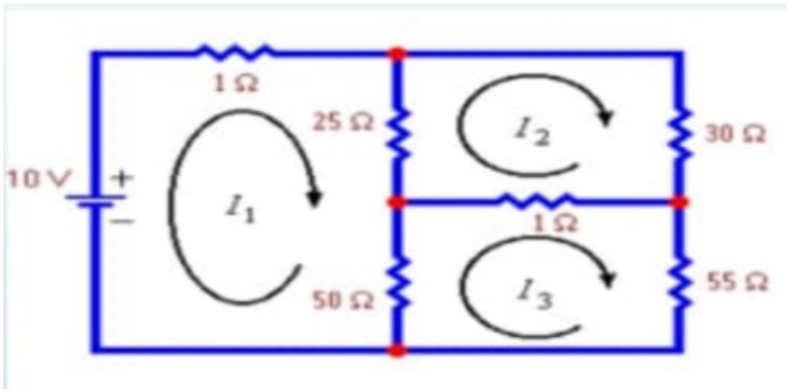
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3

Roll No: | | | | | | | | | | | |

PRESIDENCY UNIVERSITY

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 07/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: MAT2309 **Course Name:** Linear Algebra, Vector Calculus and Statistics

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

CO - Levels	CO1	CO2
Marks	88	92

PART A: Answer Following Questions. 10 M

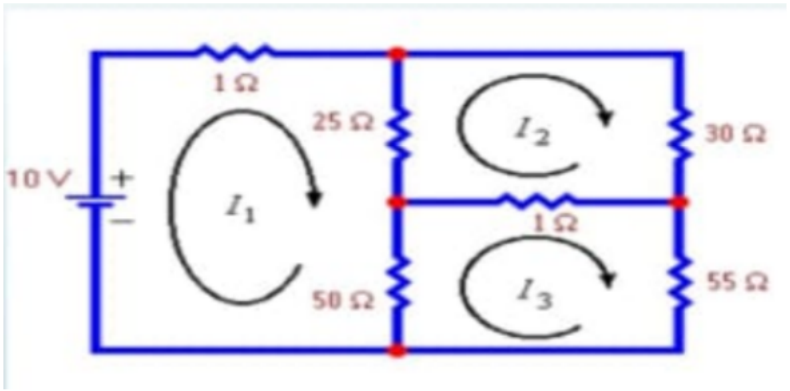
Q.N.	Questions	M	CO	BT
1	Find the inverse of the matrix $A = \begin{bmatrix} 1 & -2 \\ -3 & 8 \end{bmatrix}$.	2	CO1	BT2
2	If $2, -4, 6$ are eigenvalues of the matrix A, then calculate the value of $\|A\|$.	2	CO1	BT2
3	Let u=(3,4) and v=(1,1), determine orthogonal projection of u onto v.	2	CO2	BT2
4	Let $B = \left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ -1 \end{bmatrix}\right\}$, calculate the coordinate vector of $x = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$.	2	CO2	BT2
5	Suppose $x_1(n) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $x_2(n) = \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$. Generate $y(n) = 3x_1(n) - 2x_2(n)$, and determine if they are linearly independent.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Solve the following system of linear equations $2x + y + z = 7; 4x + 3y + 3z = 19; -2x + y + 4z = 8$ using LU decomposition method.	10	CO1	BT3
7	Find eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Solve the system of equations $x + y + z = 6; 2x - y + z = 3; x + 2y - z = 2$, using Cramer's rule.	10	CO1	BT3

9	Find the current flow in each branch of the circuit. 	10	CO1	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	. If $B = \left\{\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}, \begin{bmatrix}0\\0\\2\end{bmatrix}\right\}$, prove that B is and orthogonal basis and also, determine its orthonormal basis.	10	CO2	BT3
11	Consider three signals $\phi_1(t) = 1, \phi_2(t) = 1 + t, \phi_3(t) = t + t^2$. Represent $x(t) = 5 + 7t + 4t^2$ as a linear combination of $\phi_1(t), \phi_2(t)$ and $\phi_3(t)$ and find the coordinate vector of $x(t)$.	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Let $B = \left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}\right\}$ and$C = \left\{\begin{bmatrix}1\\0\\0\end{bmatrix}, \begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$. Given that,$[x]_B = \begin{bmatrix}2\\1\\3\end{bmatrix}$, determine $[x]_C$ by change of basis.	10	CO2	BT3
13	Consider three signals $\phi_1(t) = Sin(t), \phi_2(t) = Cos(t), \phi_3(t) = Sin(t) + Cos(t)$. If $x(t) = 4Sint(t) + 7Cos(t)$, then check whether $\phi_1(t), \phi_2(t), \phi_3(t)$ are linearly independent and find two linear combinations of these signals that generate $x(t)$.	10	CO2	BT3