


**DECEMBER 2018: END SEMESTER ASSESSMENT, B.TECH, IV-SEMESTER**
**UE14MA251 – LINEAR ALGEBRA AND ITS APPLICATIONS**

Time: 03 Hours

Answer All Questions

Max Marks: 100

1	a)	Draw the row and column pictures for the given equations. $2x + y = 7$ $3x - y = 3$	5
	b)	Use Gauss Elimination to solve the following system of equations: $a + b + c = 6$ $a + 2b + 2c = 11$ $2a + 3b - 4c = 3$	5
	c)	Which three matrices E, F and G put A into upper triangular form given $A = \begin{bmatrix} 2 & 3 & 1 \\ 4 & 7 & 5 \\ 2 & 4 & 1 \end{bmatrix}$ .	5
	d)	Find the inverse of $A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & 3 & 4 \\ -1 & 1 & 3 \end{bmatrix}$ using Gauss-Jordan method.	5
2	a)	Determine whether the given vectors are linearly independent or not. $x = (1, 3, 2), y = (2, 6, 4)$ .	3
	b)	For every 'c', find 'R' and the special solution to $Ax = 0$ . $A = \begin{bmatrix} 1 & 1 & 2 & 2 \\ 2 & 2 & 4 & 4 \\ 1 & c & 2 & 2 \end{bmatrix}$	7
	c)	Find all the four fundamental subspaces for the given matrix $A = \begin{bmatrix} 1 & 3 & 3 & 2 \\ 2 & 6 & 9 & 7 \\ -1 & -3 & 3 & 4 \end{bmatrix}$	10
3	a)	If S is subspace spanned by $(1, 2, 2, 3)$ and $(1, 3, 3, 2)$ , find two vectors that span $S^\perp$ .	5
	b)	Project the vector $b = (1, 2, 2)$ onto the line through $a = (1, 1, 1)$ . Check that error vector e is orthogonal to a.	5

	c)	Find the best solution $\hat{x}$ and the point of projection given $A = \begin{bmatrix} 1 & -1 \\ 1 & 1 \\ 1 & 2 \end{bmatrix}$ and $b = \begin{bmatrix} 1 \\ 1 \\ 3 \end{bmatrix}$ . Find also the best fitting straight line $b = C + Dt$ .	10
4	a)	Find the eigen values and eigen vectors of $A = \begin{bmatrix} 3 & -2 & 0 \\ -2 & 3 & 0 \\ 0 & 0 & 5 \end{bmatrix}$ .	10
	b)	Find the dominant eigen value of A using power method for 4 iterations. Use (1, 1, 1) as the initial approximation.  $A = \begin{bmatrix} 1 & 2 & 0 \\ -2 & 1 & 2 \\ 1 & 3 & 1 \end{bmatrix}$	10
5	a)	Use graphical method to solve the following LPP. Max. $z = 10x_1 + 15x_2$ s. t. c. $2x_1 + x_2 \leq 26$ $x_1 + 2x_2 \leq 28$ $-x_1 + x_2 \leq 5$ $x_1, x_2 \geq 0$	10
	b)	Using simplex method, solve the following LPP. Max. $z = 5x_1 + 3x_2$ s. t. c. $x_1 + x_2 \leq 2$ $5x_1 + 2x_2 \leq 10$ $3x_1 + 8x_2 \leq 12$ $x_1, x_2 \geq 0$	10