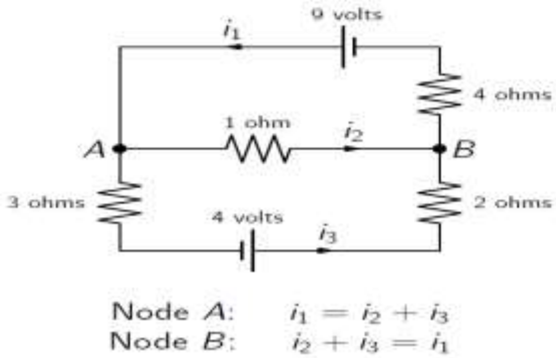
TERM END EXAMINATIONS (TEE) – August - September 2021

Programme	:	**B.Tech. [BAI,BCE, BCG,BHI,MIM]**	**Semester**	:	**Interim 2021-22**
Course Name	:	**Applied Linear Algebra**	**Course Code**	:	**MAT3002**
Faculty Name	:	**Dr. A.Manickam**	**Slot / Class No**	:	**B11 / 0151**
Time	:	**1½ hours**	**Max. Marks**	:	**50**

Answer ALL the Questions

Q. No.		Question Description	Marks	Module No.	RBT Level	CO
		PART - A (30 Marks)				
1	(a)	Decrypt the following Message "GOOD MORNING TO ALL". By using key matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$.	10	**1^{st} Module**	KL4	CO1
		OR				
	(b)	Let $v_1 = \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}, v_2 = \begin{bmatrix} 0 \\ 2 \\ 2 \end{bmatrix}, v_3 = \begin{bmatrix} -3 \\ 4 \\ 7 \end{bmatrix}$ and let $W = span\{v_1, v_2, v_3\}$ Show that v_3 is linear combination of v_1 and v_2. Show that $span\{v_1, v_2\} = W$ Show that v_1 and v_2 are linearly independent.	10	**2^{nd} Module**	KL4	CO2
2	(a)	Suppose the x and y –axes in the plane R^2 are rotated counter clockwise $45°$, so that x' and y' –axes are along the line $y = x$ and $y = -x$ respectively. (a) Find the change of basis matrix P. (b) Find the coordinate of the point $A\ (5,6)$ under the given rotation.	10	**3^{rd} Module**	KL3	CO3
		OR				
	(b)	Define an inner product on $V = C[a,b]$ by $\langle f, g \rangle = \int_a^b f(x)g(x)dx$.Also verify that the set of vectors given below are orthogonal. (1) $\{1, \cos x, \sin x\}$; $a = -\pi$, $b = \pi$. (2) $\left\{1, 2x - 1, -x^2 + x - \frac{1}{6}\right\}$; $a = 0, b = 1$	10	**First half of 4^{th} Module**	KL3	CO4

3	(a)	Find an orthonormal basis for the solution space of the homogenous system of linear Equations $x_1 + x_2 + 7x_4 = 0$ $2x_1 + x_2 + 2x_3 + 6x_4 = 0$	10	**Second half of 4th Module**	KL4	CO4
	OR					
	(b)	Let C be equation $2x^2 - 4xy - y^2 - 4x - 8y + 14 = 0$. Describe the conic section of C.	10	**5th Module**	KL3	CO5
PART - B (20 Marks)						
4		Determine the currents I_1, I_2, I_3 in the following network: 	10	**1st Module**	KL3	CO1
5		Let $A = \begin{bmatrix} 2 & 0 & 4 \\ 0 & 6 & 0 \\ 4 & 0 & 2 \end{bmatrix}$. , find the orthogonal matrix *P* such that $P^{-1}AP$ is a diagonal matrix.	10	**5th Module**	KL4	CO5
⇔⇔⇔						