Reg. No.:

Name :

VIT BHOPAL

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Mid-Term Examinations – March 2022

Programme	:	**B.Tech. [BCE, MIP,MIM]**	Semester	:	**Winter 2021-22**
Course	:	**Applied Linear Algebra**	Code	:	**MAT3002**
Faculty	:	**Dr.A.Manickam**	Slot/ Class No.	:	**A21+A22/ 0626**
Time	:	**1 ½ hours**	Max. Marks	:	**50**

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks

1 The upward velocity of a rocket is given at three different times on the following table. Velocity vs. time data for a rocket

Time, t	Velocity, v
(s)	(m/s)
4	100
6	150
10	200

The velocity data is approximated by a polynomial as

$v(t) = at^2 + bt + c$, $4 \le t \le 10$.

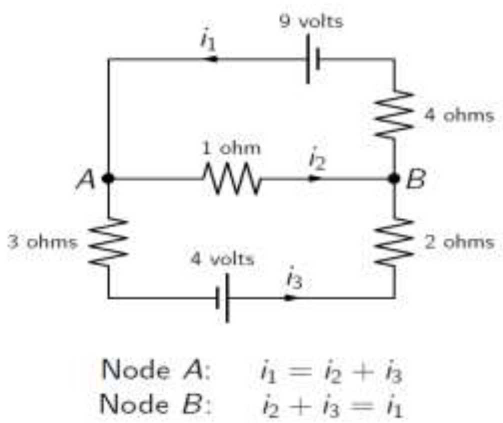
Set up the equations in matrix form and find the coefficients a, b, c of the velocity profile by LDU Factorization method. **10**

2 (a) Computing the A^{-1} by using Gauss Jordan Elimination

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$$

5

(b) Determine the currents I_1, I_2, I_3 in the following network: **5**



3 Determine whether $(1,1,1,1), (1,2,3,2), (2,5,6,4), (2,6,8,5)$ form a basis of $\mathbb{R}^4$. If not, find the dimension of the subspace they span. **10**

4	Let $B = \{u_1, u_2\} = \left\{\begin{bmatrix}-1\\2\end{bmatrix}, \begin{bmatrix}2\\-1\end{bmatrix}\right\}$ and $C = \{v_1, v_2\} = \left\{\begin{bmatrix}1\\0\end{bmatrix}, \begin{bmatrix}1\\1\end{bmatrix}\right\}$ are bases of $\mathbb{R}^2$. Using these bases, find $[x]_C$, given that $[x]_B = [1,4]^T$.	**10**
5	a)Show that the function $T(v_1, v_2) = (v_1 - v_2, v_1 + 2v_2)$ is a linear transformation from R^2 into R^2. (b)For any vector $\mathbf{v} = (v_1, v_2)$ in R^2, and let T: $R^2 \to R^2$ be defined by $T(v_1, v_2) = (6v_1 - v_2, 8v_1 + 2v_2)$ Find the image of $\mathbf{v} = (-1, 1)$ also Find the preimage of $\mathbf{w} = (-2, 14)$	**10**

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