Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN											Course Code	2	1	E	C	4	2

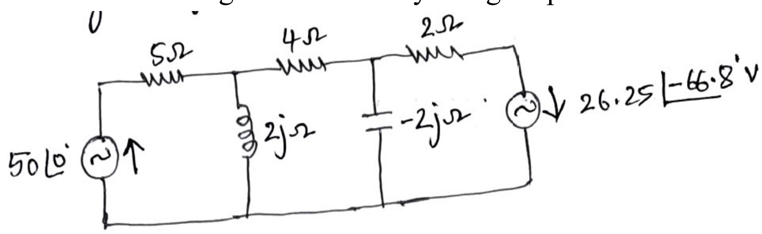
Fourth Semester B.E. Degree Examinations, October/November 2023

NETWORK THEORY CONTROL SYSTEMS

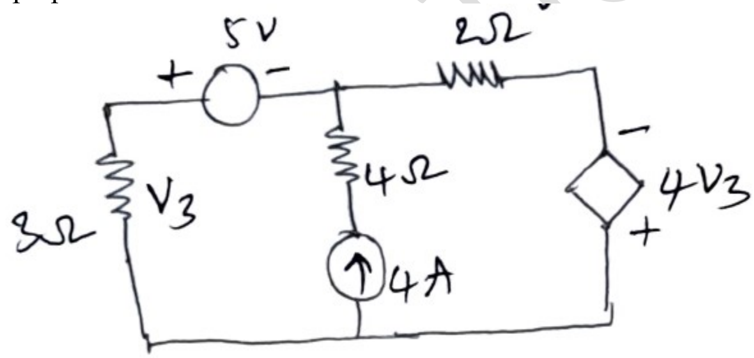
Duration: 3 hrs **Max. Marks: 100**

Note: ***1. Answer any* FIVE *full questions, choosing* ONE *full question from each module.***
2. Missing data, if any, may be suitably assumed

Q. No		Question	Marks	(RBTL:CO: PI)
		MODULE – 1		
1.	**a.**	Find the current through 4Ω resistor by using loop current method	**10**	(1.4.1)

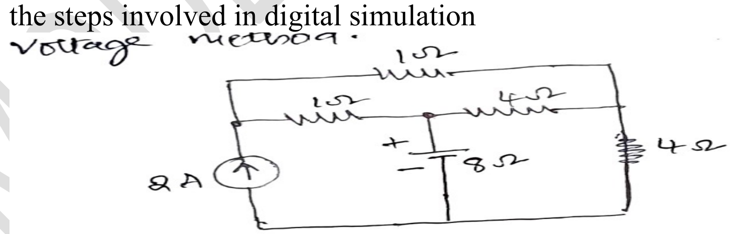


	b.	Determine the current through 2 Ω resistor of the network shown in fig using superposition theorem	**10**	(1.3.1)

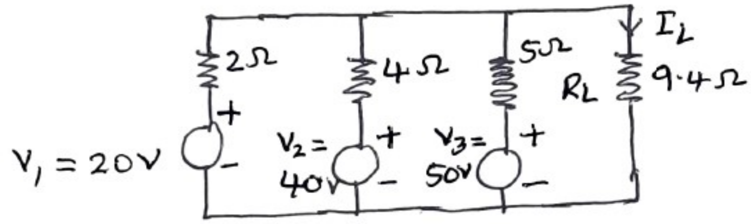


OR

2.	**a.**	Find the current in all the resistors by node voltage method. and also write the steps involved in digital simulation	**10**	(5.2.2)



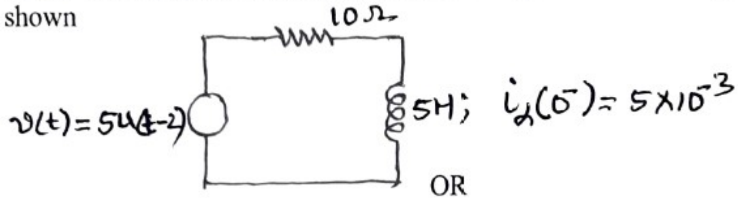
	b.	Using Milliman's Theorem **find** I_L for the network shown in the figure.	**10**	(2.3.1)



MODULE – 2

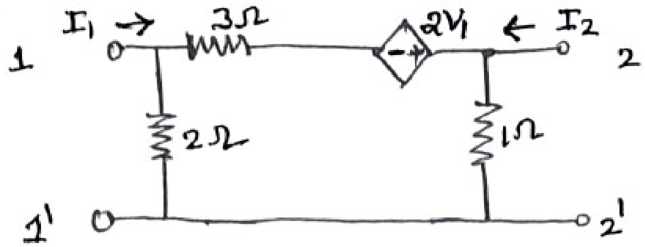
Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

3. **a.** **Apply** the Laplace Transform to obtain the response of current i(t) in the circuit shown — **10** — (2.2.3)



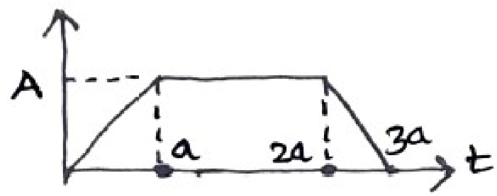
OR

b. **Determine** Y-Parameters for the network shown in the figure — **10** — (2.2.1)



OR

4. **a.** **Find** the laplace transform of the following waveform — **10** — (2.4.1)



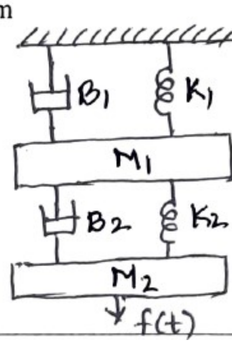
OR

b. **Derieve** the expression for Z-parameters in terms of
i) Y-paramertes ii) H-parameters iii) Tramission Parameters — **10** — (2.3.1)

MODULE – 3

5. **a.** **Define** control system and compare open loop and closed loop control system — **10** — (1.3.1)

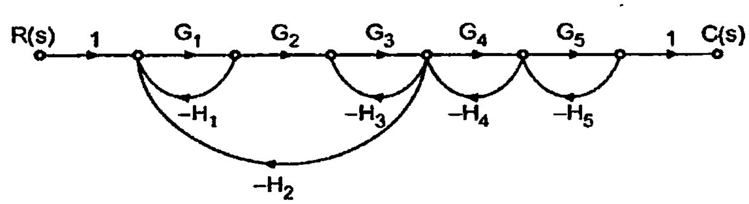
b. For the given mechanical system perform the following — **10** — (2.4.1)
i) **Construct** equivalent mechanical system
ii) **Write** the equilibrium equations



OR

6. **a.** Define transfer function. Derive an expression for the transfer function of a closed loop negative feedback system — **10** — (2.3.1)

b. — **10** — (2.2.1)



MODULE – 4

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

7.	**a.**	A system has 30% overshoot and settling time 5sec for a unit step input. Determine (i) Transfer Function(ii) Peak time (iii) output response	**10**	(2 :2.1)
	b.	Use RH criterion and determine (i) Number of roots in LHS of s-plane (ii) Number of roots in RHS of s-plane (iii) Number of roots on imaginary axis $S^4+2S^2+1=0$	**10**	(2.3.1)

OR

8.	**a.**	A system is given by differential equation $d^2y/dt^2+4dy/dt+8y=8x$ where y is output and x is input. Determine all time domain specifications for unit step input.	**10**	(2.4.1)
	b.	For a system with characteristic equation $F(S)=s^6+3s^5+4s^4+6s^3+5s^2+3s+2=0$ Examine stability	**10**	(2.3.2)

MODULE – 5

9.	**a.**	Obtain the state model for the system represented by the differential equation $\frac{d^3y(t)}{dt^3}+6\frac{d^2y(t)}{dt^2}+11\frac{dy(t)}{dt}+10y(t)=3u(t).$	**10**	(2.4.1)
	b.	A unity feedback system has $G(S) = \frac{K}{s(s+2)(s+10)}$. Draw the Bode plot.	**10**	(2.3.2)

OR

10.	**a.**	Obtain the state transition matrix for $A=\begin{bmatrix} 0 & -1 \\ 2 & -3 \end{bmatrix}$	**10**	(2.4.2)
	b.	Sketch the root locus for open loop transfer function $G(S)H(S)=k/s(s+3)(s+5)$	**10**	(2.3.2)

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Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**