Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026

Third Semester

Electronics and Communication Engineering

UECT24303 - CONTROL SYSTEMS

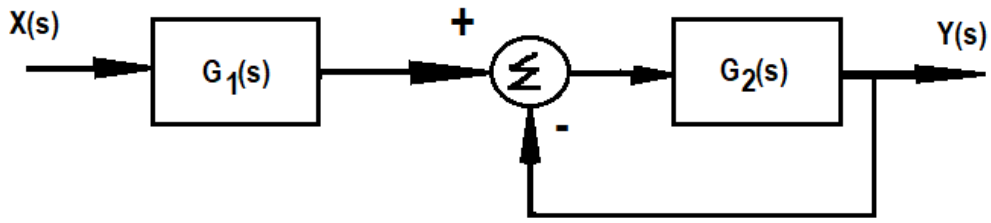
(Semi log Graph, Polar Graph, Ordinary Graph Can be Permitted)

Regulations - 2024

Duration : 3 Hrs ***Maximum : 100 Marks***

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

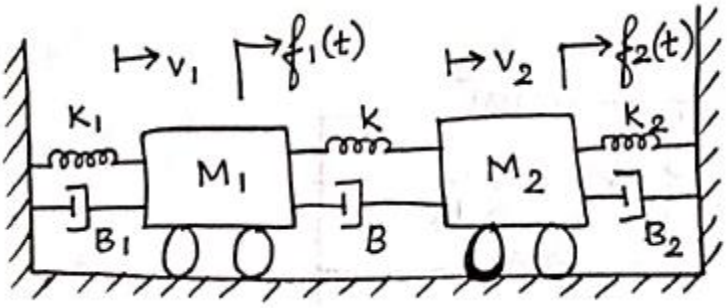
Q.No	*Questions*	*BTL*	*CO*	*Marks*
1.	List the advantages of closed loop system over open loop system.	L2	1	2
2.	Find Y(s)/X(s)	L2	1	2



3.	The damping ratio and undamped natural frequency of second order system are 0.5 and 5 respectively. What can you say about the damped frequency?	L2	2	2
4.	How would you compare transient and steady state response?	L2	2	2
5.	Can you list the frequency domain specifications?	L1	3	2
6.	What is gain margin?	L1	3	2
7.	What is BIBO stability?	L1	4	2
8.	The characteristic equation of a control system is given by $s(s+4)(s^2+2s+s)+ k(s+1) = 0$. What can you say about the angles of the asymptotes for the root loci?	L2	4	2
9.	Can you list the properties of State transition matrix?	L1	5	2
10.	What is Controllability?	L1	5	2

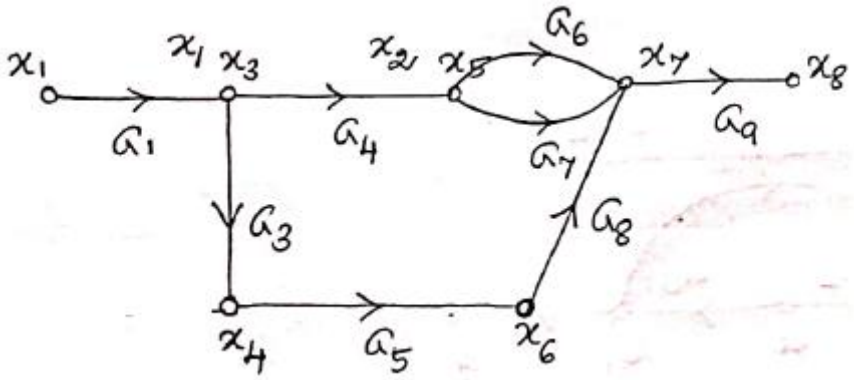
PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	How would you use the differential equations governing the mechanical system shown in the below figure to draw the force-voltage and force-current electrical analogous circuits?	L3	1	16



Or

	b	How would you solve the given signal flow graph of a feedback control system shown in figure using what you've learned to determine the closed loop transfer function C(s)/R(s).	L3	1	16



12.	a	How would you summarize the unit step response of a second order critically damped system and over damped system?	L2	2	16
		Or			
	b	What is the main idea of interpreting the PID controller design with realization circuits?	L2	2	16
13.	a	What inference can you make with the value of gain and phase cross over frequencies for the transfer function G(s) = 100(1+0.1s)/ s(1+0.2s)(1+0.5s) using bode plot.	L4	3	16
		Or			
	b	What conclusions can you draw from the phase & gain margins of the polar plot of the open loop transfer function, G(s) =1/(1+5s)^2 of a unity feedback system?	L4	3	16
14.	a	How would you solve a unity feedback control system having an open loop transfer function, G(s) = K/[s(s+4)(s^2+4s+20)] using what you've learned to model the root locus.	L3	4	16
		Or			
	b	The characteristic equation of a system is given by s^6 + 3s^5+ 5s^4+ 9s^3 + 8s^2 + 6s + 4 = 0. Can you make use of the facts to identify the location of roots on s-plane and hence the stability of the system.	L3	4	16
15.	a	How would you summarize 'e^{At},' if $A_1 = \begin{bmatrix}\sigma & 0\\ 0 & \sigma\end{bmatrix}$; $A_2 = \begin{bmatrix}0 & \omega\\ -\omega & 0\end{bmatrix}$; $A = \begin{bmatrix}\sigma & \omega\\ -\omega & \sigma\end{bmatrix}$?	L2	5	16
		Or			
	b	The state model in the matrix form is given by $\begin{bmatrix}X_1\\X_2\\X_3\end{bmatrix} = \begin{bmatrix}0 & 1 & 0\\0 & 0 & 1\\-1 & -2 & -3\end{bmatrix}\begin{bmatrix}X_1\\X_2\\X_3\end{bmatrix} + \begin{bmatrix}0\\0\\4\end{bmatrix}$ U, $Y = \begin{bmatrix}2 & -4 & 0\end{bmatrix}\begin{bmatrix}X_1\\X_2\\X_3\end{bmatrix}$ What can you say about whether the system is controllable and/or observable using the state model?	L2	5	16

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