Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

Third Semester

Electronics and Communication Engineering

EC3351- Control Systems

(Ordinary graph sheet, polar sheet and Semi log sheet can be permitted)

Regulations - 2021

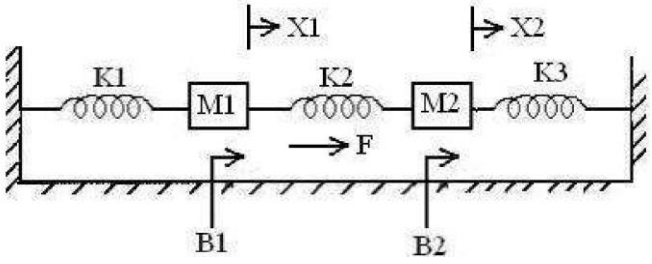
Duration : 3 Hrs *Maximum : 100 Marks*

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

Q.No	*Questions*	*BTL*	*CO*	*Marks*
1.	Define the transfer function of the system.	L1	1	2
2.	What are the properties of signal flow graphs?	L2	1	2
3.	The closed loop transfer function of a second order system is given by 100 / (s^2+40s+100). Find the damping factor.	L2	2	2
4.	Interpret the effect of adding a pole to open loop transfer function of a system.	L2	2	2
5.	What is meant by corner frequency in frequency response analysis?	L1	3	2
6.	What are dominant poles? List its effects.	L1	3	2
7.	Infer the necessary and sufficient condition for stability using Routh-Hurwitz criterion.	L2	4	2
8.	How to compute the centroid and asymptotes of root locus.	L2	4	2
9.	Define state controllability.	L1	5	2
10.	List the properties of state transition matrix.	L2	5	2

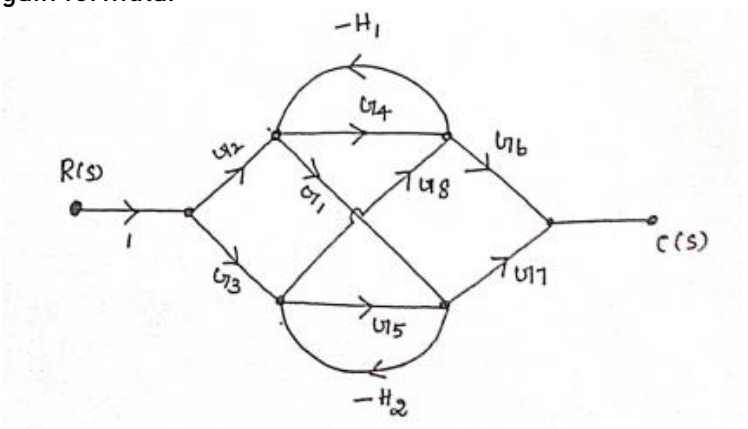
*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Extend the force balance concept and write the differential equations. Translate the set of equilibrium equations to obtain electrical analogous circuits using (i) F-V analogy (ii) F-I analogy.	L3	1	16



Or

	b	Model the transfer function of the following signal flow graph using Mason's gain formula.	L3	1	16



12.	a	A unity feedback control system has an open loop transfer function of G(s)=10/s(s+2). Find the rise time, peak time, percentage of maximum peak overshoot and settling time for a step input of 12 units.	L4	2	16
		Or			
	b	With neat block diagram, analyze P, PI and PID controller in detail.	L4	2	16
13.	a	Develop a suitable lead compensator for the unity feedback control system with open loop transfer function G(s)=K/s(s+8), in order to meet the following specifications. a. Percentage of peak overshoot=9.5% b. Natural frequency of oscillations=12 rad/sec Velocity error constant>=10	L5	3	16
		Or			
	b	Make use of the open loop transfer function of a unity feedback control system: G(s)=1/s(1+s)(1+2s). Measure phase margin and gain margin using polar plot.	L5	3	16
14.	a	A unity feedback control system has an open loop transfer function of: G(s)=K/s(s^2+4s+13). Construct the root locus.	L4	4	16
		Or			
	b	The open loop transfer function of a unity feedback system is given by: G(s)=K(s+3) / s(s+2)(s+7). Solve the value of k for the system to be stable.	L4	4	16
15.	a	A system is characterized by the following transfer function given as: Y(s)/U(s)=2/(s^3+6s^2+11s+6). Predict the controllability and observability of the system.	L6	5	16
		Or			
	b	Develop the step-by-step procedure for building the state space model of field-controlled DC motors with suitable diagrams.	L6	5	16