Hall Ticket Number :										

R-15

Code: 5G244

II B.Tech. II Semester Supplementary Examinations May/June 2024

Linear Control Systems

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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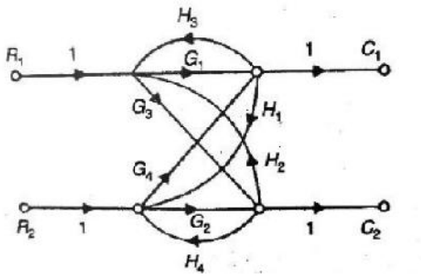
			Marks	CO	BL
		UNIT–I			
1.	a)	Deduce the output C1 in the given signal flow graph using Mason's gain formula 	8M	1	2
	b)	Derive the transfer function of armature-controlled dc motor	6M	1	2
		OR			
2.	a)	Derive an expression for the transfer function of an armature controlled DC servo motor.	9M	1	2
	b)	Distinguish open loop and closed loop control system	5M	1	2
		UNIT–II			
3.	a)	Determine the underdamped response of second order control system subjected to unit step input function	8M	2	2
	b)	Obtain the rise time , peak time, maximum peak overshoot and settling time of the unit step response of a closed loop control system given by $G(s) = 36/(s^2+2s+36)$	6M	2	2
		OR			
4.		Explain static error constants and generalized error coefficients	14M	2	1
		UNIT–III			
5.		The characteristic equation of a servo system is given by a0s 4+a1s 3+a2s 2+a3s+a4=0. Determine the conditions which must be satisfied by the coefficients in the characteristic equations for the system to be stable	14M	3	2
		OR			
6.		Given $G(s) = K/S(S+1)(S+3)$. Sketch the root locus plot and comment on the stability. Also determine the range of K for which the system is stable and the frequency of sustained oscillations.	14M	3	2
		UNIT–IV			
7.		The open loop transfer function of the unity feedback system is $G(s) = K/S(S+2)(S+10)$ By using Nyquist plot a. Find the range of k for stability b. Find the value of k for gain margin be 10 dB c. Find the value of k for phase margin to be 50°	14M	3	2
		OR			
8.		Explain bode plots of basic factors of a transfer function.	14M	3	1
		UNIT–V			
9.		The open loop transfer function of a unity feedback system is $G(s) = K_v/S(S+2)$ Design a suitable lead compensator to meet the following specification : Kv=12S-1 , $\varphi_{pm}=45^o$	14M	4	2
		OR			
10.		Derive the transfer function of Lag, Lead and Lag-Lead compensator using electrical network	14M	4	2

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