U.S.N.										

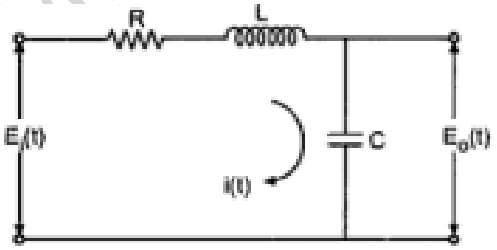
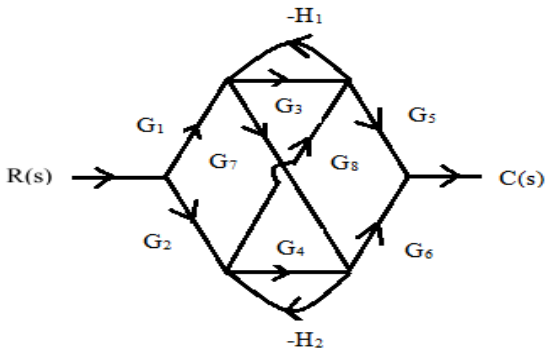
B.M.S. College of Engineering, Bengaluru-560019

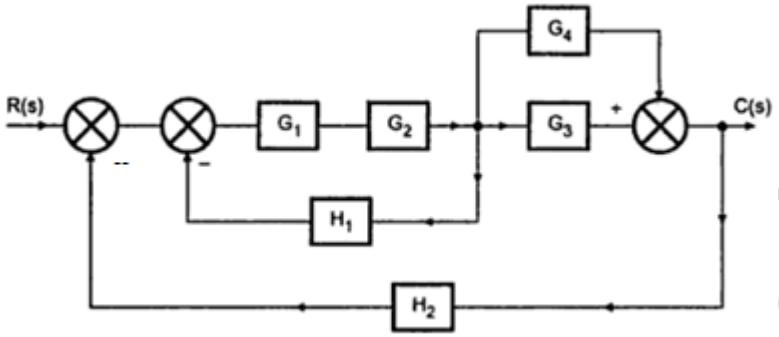
Autonomous Institute Affiliated to VTU

October 2024 Supplementary Examinations

Programme: B.E. **Semester: IV**
Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**
Course Code: 23EE4ESCTH **Max Marks: 100**
Course: Control Theory

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

		UNIT - I	CO	PO	Marks
1	a)	Define the following: (i) System (ii) Control System (iii) Controller (iv) Disturbances (v) Reference input and Control output	CO1	-	**05**
	b)	Compare open loop and closed loop control systems	CO1	-	**05**
	c)	Explain any five applications of linear control systems	CO1	-	**10**
		UNIT - II			
2	a)	What are the advantages of transfer System?	CO2	PO1	**05**
	b)	Find out the transfer function of network given in Fig.1  Fig.1	CO2	PO2	**05**
	c)	Using Mason's gain formula, obtain the transfer function for the given Fig.2(c)  Fig.2(c)	CO2	PO2	**10**

			OR			
	3	a)	What are the procedures to determine the transfer function of a control system?	*CO2*	*PO1*	**05**
		b)	What are the properties of signal flow graph	*CO2*	*PO1*	**05**
		c)	Reduce the given block diagram (as shown in Fig.3) to its canonical (simple) form and obtain the equivalent transfer function $\frac{C(s)}{R(s)}$  Fig.3	*CO2*	*PO2*	**10**
			UNIT - III			
	4	a)	Define the following (i) Time constant (ii) Rise time (iii) Settling time (iv) Natural Frequency (v) Damping ratio	*CO2*	*PO2*	**05**
		b)	Explain steady state error and give the error constant values for different standard inputs.	*CO2*	*PO2*	**05**
		c)	A unity feedback control system is characterized by an open loop transfer function $G(s)H(s) = \frac{K}{s(s+10)}$. Determine the system gain K so that the system will have the damping ratio of 0.5	*CO2*	*PO2*	**10**
			OR			
	5	a)	Find the step response *c(t)* for a system described by *G(s)*= $\frac{4}{S+4}$. Also find the time constant, rise time and settling time	*CO2*	*PO2*	**05**
		b)	Discuss the effect of Proportional Controller (P-Controller) in modifying the error signal and to achieve better control system.	*CO2*	*PO2*	**05**
		c)	Explain the underdamped case of second order systems.	*CO2*	*PO2*	**10**
			UNIT - IV			
	6	a)	Describe the significance of RH criterion	*CO3*	*PO4*	**05**
		b)	Investigate the stability of a closed-loop system whose characteristic equation is given by, $s^5 + s^4 + 2s^3 + 2s^2 + 3s + 5 = 0$	*CO3*	*PO4*	**05**

		c)	Sketch the root locus plot for a closed loop system having an open-loop transfer function, $$G(s)H(s) = \frac{k(s+2)}{s(s+1)}$$ for all values of k from 0 to ∞. Comment on the stability of the system. Also, show that a part of the root locus is a circle.	*CO3*	*PO4*	**10**
			UNIT - V			
	7	a)	Explain in brief the frequency domain specifications.	*CO3*	*PO4*	**05**
		b)	Explain the importance of Gain Margin.	*CO3*	*PO4*	**05**
		c)	Construct Bode magnitude and phase diagrams for $GH(s) = \frac{100(0.1s+1)}{s(s+1)^2(0.01s+1)}$. Comment on the closed-loop stability of the system	*CO3*	*PO4*	**10**

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