U.S.N.										

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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: IV**

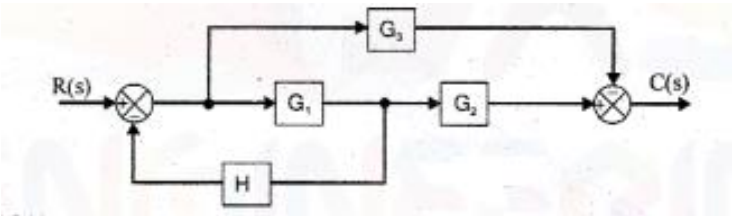
Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**

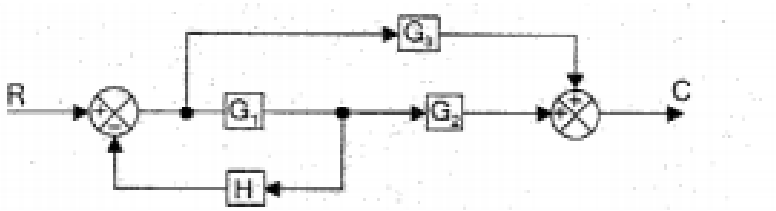
Course Code: 23EE4ESCTH **Max Marks: 100**

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.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		What are open loop systems. Give examples	CO1	PO1	**05**
	b)		Define the following: a. Error (e) b. Controller c. Control Signal (u) d. System e. Disturbances	CO1	PO1	**05**
	c)		Explain the different types of control systems.	CO1	PO1	**10**
			OR			
2	a)		What are closed loop systems. Give examples	CO1	PO1	**05**
	b)		Write a short note on dead-zone and saturation.	CO1	PO1	**05**
	c)		Differentiate between linear and non-linear systems.	CO1	PO1	**10**
			UNIT - II			
3	a)		Write a short note on current-voltage relation of R, L and C.	CO2	PO2	**05**
	b)		Discuss the rules of block diagram reduction.	CO2	PO2	**05**
	c)		Convert the given block diagram Fig(a) to signal flow graph and determine C(s)/R(s)  Fig (a)	CO2	PO2	**10**

			OR			
	4	a)	Write a short note on signal flow graph	*CO2*	*PO2*	**05**
		b)	Discuss on the concept of Lag network, Lead network with a neat circuit	*CO2*	*PO2*	**05**
		c)	Reduce the block diagram shown in Fig(b) and find C/R  Fig(b)	*CO2*	*PO2*	**10**
			UNIT - III			
	5	a)	Write a short note on time response of a system.	*CO2*	*PO2*	**05**
		b)	Write a short note on different steady error constants.	*CO2*	*PO2*	**05**
		c)	The open loop transfer function of a servo system with unity feedback is G(s)=10/s(0.1s+1). Evaluate the static error constants of the system. Obtain the steady state error of the system, when subjected to an input given by the polynomial, $$r(t) = a_0 + a_1 t + \frac{a_2}{2} t^2$$	*CO2*	*PO2*	**10**
			OR			
	6	a)	Explain the step response of first order system.	*CO2*	*PO2*	**05**
		b)	Write a short note on steady state error.	*CO2*	*PO2*	**05**
		c)	A unity feedback system has the forward transfer function $$G(s) = \frac{K_1(2s+1)}{s(5s+1)(1+s)^2}$$ When the input r(t)=1+6t, determine the minimum value of K_1, so that the steady error is less than 0.1.	*CO2*	*PO2*	**10**
			UNIT - IV			
	7	a)	Write a short note on stability with an example.	*CO3*	*PO3*	**05**
		b)	Using RH criterion, determine the stability of the system represented by the characteristics equation, $s^4 + 8s^3 + 18s^2 + 16s + 5 = 0$. Comment on the location of the roots of characteristic equation	*CO3*	*PO3*	**05**
		c)	A unity feedback control system has an open loop transfer function, G(s) = $\frac{K}{s(s^2+4s+13)}$. Sketch the root locus.	*CO3*	*PO3*	**10**

			OR			
	8	a)	Why is RH criterion important?	*CO3*	*PO3*	**05**
		b)	Write a short note on angle of asymptotes and angle of departure	*CO3*	*PO3*	**05**
		c)	Sketch the root locus plot for a open loop system having an transfer function. $$G(s)H(s) = \frac{k}{s(s+2)(s+4)}$$ Find the value of k so that the damping ratio of closed loop system is 0.5.	*CO3*	*PO3*	**10**
			UNIT - V			
	9	a)	Explain in brief the frequency domain specifications.	*CO4*	*PO4*	**05**
		b)	Explain the importance of Phase Margin.	*CO4*	*PO4*	**05**
		c)	Construct Bode magnitude for $$G(s) = \frac{200(s+1)}{(s+10)^2}.$$	*CO4*	*PO4*	**10**
			OR			
	10	a)	Explain the importance of Gain Margin.	*CO4*	*PO4*	**05**
		b)	Write a short note on stability margins	*CO4*	*PO4*	**05**
		c)	Construct the bode magnitude plot of the transfer function $$G(s) = \frac{200(s+2)}{s(s^2+10s+100)}.$$	*CO4*	*PO4*	**10**

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