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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year II Semester Regular Examinations July/August-2025

CONTROL SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	What is Control Systems? Define Closed loop control system.	CO1	L1	2M
	b	Write the Mason's gain formula.	CO1	L1	2M
	c	List the time domain specifications.	CO2	L1	2M
	d	What is steady state error?	CO2	L1	2M
	e	What is the necessary condition for stability in S domain?	CO3	L1	2M
	f	Define the Root locus.	CO3	L1	2M
	g	What is frequency response?	CO4	L1	2M
	h	What are the types of compensators?	CO4	L1	2M
	i	Write the properties of state transition matrix.	CO5	L2	2M
	j	What is the state model of linear time invariant system?	CO5	L1	2M

PART-B

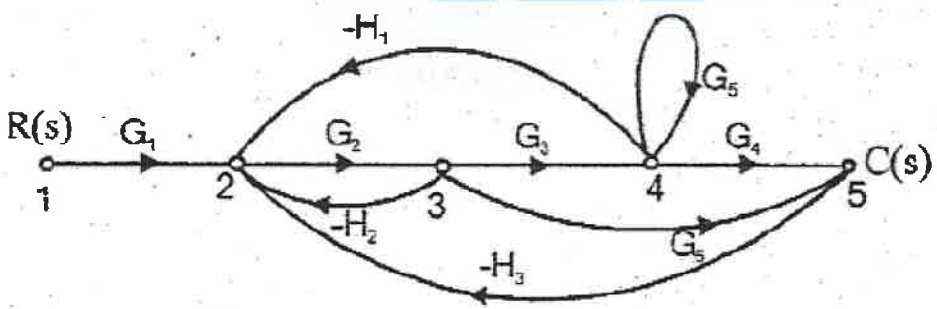
(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2	a	Compare open loop and closed loop control systems based on different aspects.	CO1	L2	5M
	b	Explain control systems with any one example.	CO1	L3	5M

OR

3		Find the overall gain C(s)/R(s) for the signal flow graph sown in fig.	CO1	L3	10M



UNIT-II

4		A unity feedback control system has an open loop transfer function, $G(S) = \frac{10}{S(S+2)}$. Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units.	CO2	L4	10M

OR

5		For a unity feedback control system, the open loop transfer function $G(S) = \frac{10(S+2)}{S^2(S+1)}$ (i) Determine the position, velocity and acceleration error constants. (ii) The steady state error when the input is $R(S) = \frac{3}{S} - \frac{2}{S^2} + \frac{1}{3S^3}$	CO2	L3	10M

UNIT-III

6	With the help of Routh's stability criterion find the stability of the following systems represented by the characteristic equations: i) $S^4 + 8S^3 + 18S^2 + 16S + 5 = 0$. ii) $S^6 + 2S^5 + 8S^4 + 12S^3 + 20S^2 + 16S + 16 = 0$.	CO3	L3	10M

OR

7	Develop the root locus of the system whose open loop transfer function is $G(S) = \frac{K}{S(S+2)(S+4)}$	CO3	L3	10M

UNIT-IV

8	Develop the Bode plot for the following transfer function and determine the system phase and gain cross over frequencies. $$G(S) = \frac{10}{S(1+0.4S)(1+0.1S)}$$	CO4	L4	10M

OR

9	Sketch the polar plot for the open loop transfer function of a unity feedback system is given by $G(S) = \frac{1}{S(1+S)^2}$. Determine Gain Margin & Phase Margin.	CO4	L3	10M

UNIT-V

10	Determine the Solution for Homogeneous and Non homogeneous State equations.	CO5	L2	10M

OR

11	Find a state model for the system whose Transfer function is given by $G(S)H(S) = \frac{(7S^2+12S+8)}{(S^3+6S^2+11S+9)}$	CO5	L3	10M

***** END *****