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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

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

LINEAR CONTROL SYSTEMS

(Electronics & Communications Engineering)

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

PART-A

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

1	a	Write the Mason's gain formula.	CO1	L1	2M
	b	Discuss about the feedback.	CO1	L1	2M
	c	What are the different types of controllers?	CO2	L1	2M
	d	List the time domain specifications.	CO2	L1	2M
	e	Define asymptotes. How will you find the angle of asymptotes?	CO3	L1	2M
	f	Describe the characteristic equation.	CO3	L1	2M
	g	What is frequency response?	CO4	L1	2M
	h	What is a Bode plot?	CO4	L1	2M
	i	Write the properties of state transition matrix.	CO5	L1	2M
	j	Write the solution for Homogeneous state equation.	CO5	L1	2M

PART-B

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

UNIT-I

2		Find the overall transfer function of the system whose signal flow graph is shown in fig.	CO1	L4	10M

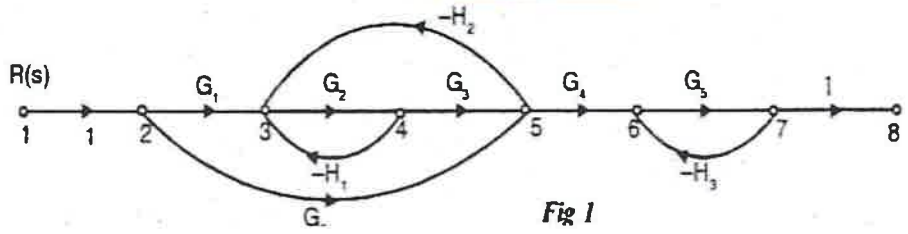

Fig 1

OR

3		Explain the Construction and working principle of a synchro transmitter and receiver pair with neat diagrams.	CO1	L2	10M

UNIT-II

4	a	For a unity feedback control system, the open loop transfer function $G(S) = 1(S+2)/S^2(S+1)$. Determine the position, velocity and acceleration error constants.	CO2	L2	5M
	b	A For servo mechanisms with open loop transfer function given below what type of input signal give rise to a constant steady state error and calculate their values. $G(s)H(s)=20(S+2)/S(S+1)(S+3)$.	CO2	L3	5M

OR

5	a	Explain the effect of P,PI, and PID controllers.	CO2	L4	10M

UNIT-III

6	a	With the help of RH stability criterion find the stability of the systems represented by the characteristic equation $S^4 + 8S^3 + 18 S^2 + 16S + 5 = 0$.	CO3	L3	5M
	b	What is stability and give the limitations of RH criterion.	CO3	L1	5M

OR

7		Develop the root locus of the system whose open loop transfer function is G(s) = $\mathbf{K/(S+2)\,(S+4)}$.	**CO3**	**L4**	**10M**

UNIT-IV

8	**a**	Determine the transfer function of Lead Compensator and draw pole-zero plot.	**CO4**	**L3**	**5M**
	b	Given $\xi = 0.7$ and $\omega n = 10$ rad/sec. Find resonant peak, resonant frequency bandwidth.	**CO4**	**L5**	**5M**

OR

9		Sketch the polar plot for the open loop transfer function of a unity feedback system is given by G(s) = $\mathbf{1/(1+S)\,2}$ Determine Gain Margin & Phase Margin.	**CO4**	**L5**	**10M**

UNIT-V

10	**a**	Explain the properties of STM.	**CO5**	**L2**	**5M**
	b	Define state, state variable, state equation.	**CO5**	**L1**	**5M**

OR

11		Diagonalize the following system matrix A = $\begin{bmatrix} 0 & 6 & -5 \\ 1 & 0 & 2 \\ 3 & 2 & 4 \end{bmatrix}$	**CO5**	**L3**	**10M**

***** END *****