SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year II Semester Supplementary Examinations December-2025
LINEAR CONTROL SYSTEMS
(Electronics & Communications Engineering)

Time: 3 Hours   Max. Marks: 70

PART-A
(Answer all the Questions 10 x 2 = 20 Marks)

	a	What is Control Systems? Define Closed loop control system.	CO1 L1	2M
	b	Write the analogous electrical elements in force-voltage for the elements of mechanical translational systems.	CO1 L1	2M
	c	How the system was classified depending on the value of the damping?	CO2 L1	2M
	d	What is steady state error?	CO2 L1	2M
1	e	Define the Root locus?	CO3 L1	2M
	f	What is the necessary condition for stability in S domain?	CO3 L1	2M
	g	Define gain margin.	CO4 L1	2M
	h	What are the types of compensators?	CO4 L1	2M
	i	Define observability and Controllability.	CO5 L1	2M
	j	What is state diagram?	CO5 L1	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2   Determine the transfer function, $X1(s)/F(s)$ and $X2(s)/F(s)$ for the system shown in fig.   CO1   L5   10M
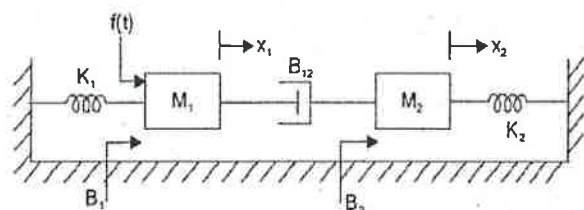
OR

3 a Give the block diagram reduction rules to find the transfer function of the system   CO1   L3   5M

   b Explain control systems with any one example.   CO1   L4   5M

UNIT-II

4   Define steady state error? Derive the static error components for Type 0, Type 1 &Type 2 systems?   CO2   L2   10M

OR

5   Obtain the time response of un-damped second order system for unit step input.   CO2   L3

UNIT-III

6 a Write the differences between open loop and closed loop sytems   CO3   L1

   b What is the stability the of the system. Explain the procedure for Routh Hurwitz stability criterion.   CO3   L2

OR

7   Explain the procedure for constructing root locus.   CO3   L2

UNIT-IV

8   List out the frequency domain specifications and derive the expressions for resonant peak.   CO4   L2

OR

9   Develop the Bode plot for the following transfer function and determine the system gain K for the gain cross over frequency to be 5 rad/sec.
$G(s) = KS^2 / (1 +0.2S) (1+0.02S)$ CO4   L4

UNIT-V

10   Determine the Solution for Homogeneous and Non homogeneous State equations.   CO5   L5

OR

11   Find a state model for the system whose Transfer function is given by
$G(s) H(s) = (7S^2+12S+8) / (S^3+6S^2+11S+9)$ CO5   L2

*** END ***