R20

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech III Year I Semester Regular Examinations March-2023
CONTROL SYSTEMS
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	Define Open loop and Closed loop control systems with examples.	CO1	L1	6M
	b	Compare open loop and closed loop control systems based on different aspects?	CO1	L2	6M

OR

2	Find the transfer function of Armature controlled DC Motor.	CO2	L3	12M

UNIT-II

3	A unity feedback control system has an open loop transfer function, $G(s) = 10/S(S+2)$. Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units.	CO3	L4	12M

OR

4	What is the significance of controller? Explain the effect of P, I, and D controllers with block diagrams.	CO4	L1	12M

UNIT-III

5	With the help of Routh's stability criterion determine the stability of the following systems represented by the characteristic equations:	CO5	L2	6M
a	$s^5 + s^4 + 2 s^3 + 2 s^2 + 3s + 5 = 0$			
b	$9s^5 - 20s^4 + 10 s^3 - s^2 - 9s - 10 = 0$	CO5	L3	6M

OR

6	The open loop Transfer function of a unity feedback control system is given by $G(s) = K/(S+2) (S+4) (S^2+6S+25)$ Determine the value of K which will cause sustained oscillations in the closed loop system and what is the corresponding oscillation Frequency.	CO5	L5	12M

UNIT-IV

7	List out the frequency domain specifications and derive the expressions for resonant peak.	CO4	L2	12M

OR

8	Develop the Bode plot for the system having the following transfer function and determine phase margin and gain margin. $G(s) = 75 (1+0.2S) /S (S^2 + 16S + 100)$	CO4	L3	12M

UNIT-V

9	a	Define state, state variable, state equation.	CO2	L1	6M
	b	Derive the expression for the transfer function from the state model. $\dot{X} = Ax + Bu$ and $y = Cx + Du$	CO2	L3	6M

OR

10	Determine the Solution for Homogeneous and Non homogeneous State equations.	CO6	L5	12M

*** END ***

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UNIT-I

1. a. Define Open loop and Closed loop control systems with examples.   CO1   L1   6M
   b. Compare open loop and closed loop control systems based on different aspects?   CO1   L2   6M

OR

2. Find the transfer function of Armature controlled DC Motor.   CO2   L3   12M

UNIT-II

3. A unity feedback control system has an open loop transfer function, $G(s) = \frac{16}{s(s+1.5)}$. Find the rise time, percentage overshoot, peak time and settling time for a step input of 10 units.   CO3   L4   12M

OR

4. What is the significance of controllers? Explain the effect of P, I, and D controllers with block diagram.   CO4   L1   12M

UNIT-III

5. With the help of Routh's stability criterion determine the stability of the following system represented by characteristic equation.   CO5   L2   6M
   a. $s^5 + s^4 + 2s^3 + 2s^2 + 3s + 5 = 0$
   b. $s^6 + 2s^5 + 10s^4 + 20s^3 + 5s^2 + 10s + 1 = 0$ CO6   L2   6M

OR

6. The open loop Transfer function of a unity feedback control system is given by $G(s) = \frac{K(s+2)}{s(s+1)(s+3)(s+25)}$. Determine the value of K which will cause sustained oscillations in the closed loop system and what is the corresponding oscillational frequency.   CO3   L5   12M

UNIT-IV

7. List out the frequency domain specifications and derive the expression for resonant peak.   CO1   L2   12M

OR

8. Develop the Bode plot for the system having the following transfer function and determine phase margin and gain margin.
   $G(s) = \frac{75(1+0.2s)}{s(s^2+16s+100)}$ CO5   L3   12M

UNIT-V

9. a. Define state variable, state equation.   CO1   L1   6M
   b. Derive the expression for the transfer function from the state model?
   $\dot{x} = Ax + Bu$ and $y = Cx + Du$ CO2   L2   6M

OR

10. Determine the Solution for Homogeneous and Non-homogeneous State equations.   CO6   L3   12M

*** END ***