Course Code:1940206 **Roll No:** **MLRS- R19**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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II B.Tech II Sem Regular End Examination, August 2021

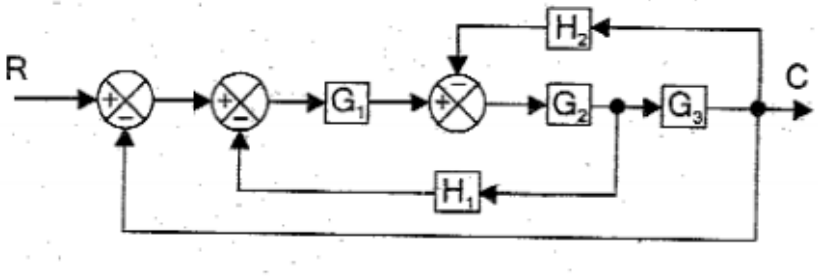
CONTROL SYSTEMS

(EEE)

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

Note: 1. Answer any FIVEquestions.
2. Each question carries 14 marks and may have a, b as sub questions.

1	a)	Explain open loop and closed loop control systems with suitable examples.	7M	CO1	BL2
	b)	Determine the transfer function for the following block diagram.	7M	CO1	BL5



2	a)	Describe the effect of feedback on Gain, Stability, Noise and Sensitivity of a closed loop control system.	7M	CO1	BL2
	b)	List out the various types of control systems with examples.	7M	CO1	BL1
3	a)	Give applications of initial and final value theorem.	4M	CO2	BL2
	b)	Sketch the root locus for the system given by $G(s)H(s)=\frac{K}{s(s+2)(s^2+2s+2)}$. Determine the value of k at imaginary axis crossing point. Give the steps followed for construction of Root locus.	10M	CO2	BL6
4	a)	Consider a sixth order system with the characteristic equation, $S^6+2S^5+8S^4+13S^3+20S^2+16S+16=0$. Using Routh's stability criterion, find whether the system is stable or not, give the reasons?	7M	CO2	BL3
	b)	State the advantages & limitations of frequency domain analysis.	7M	CO2	BL1
5	a)	Sketch the bode plot for a system with unity feedback having the transfer function, and assess its closed-loop stability $G(s)=\frac{50(1+0.1S)}{s(1+0.01S)(1+s)}$	10M	CO3	BL5
	b)	Define gain margin & Phase margin.	4M	CO3	BL1

6	a)	Design a lead compensator using root locus for the system with , $G(S) = \frac{4}{S(S+2)}$ to meet the specifications as a. Damping ratio = 0.5 b. Settling time = 2 sec.	12M	CO4	BL6
	b)	Draw lag compensator.	2M	CO4	BL2
7	a)	Why compensation is necessary in feedback control system and write the procedure for design lag compensator.	7M	CO4	BL2
	b)	Given the system $\dot{x}(t) = A\,x(t) + B\,u(t)$, $Y(t) = C\,x(t)$ Where $A = \begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 1 \\ 0 & 0 & -1 \end{bmatrix}$ $B = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$, $C = [1\ 0\ 1]$ Determine the controllability and observability of the system.	7M	CO5	BL5
8	a)	Explain the Diagonal matrix with suitable example.	7M	CO5	BL4
	b)	Given the state equation $\dot{X} = AX$, where $A = \begin{bmatrix} -3 & 1 & 0 \\ 0 & -3 & 1 \\ 0 & 0 & -2 \end{bmatrix}$. Determine the state transition matrix.	7M	CO5	BL3

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