Course Code: 1950203 Roll No: **MLRS- R19**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

III B.Tech I Sem Supply End Examination, December 2022

Control Systems

(ECE)

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

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

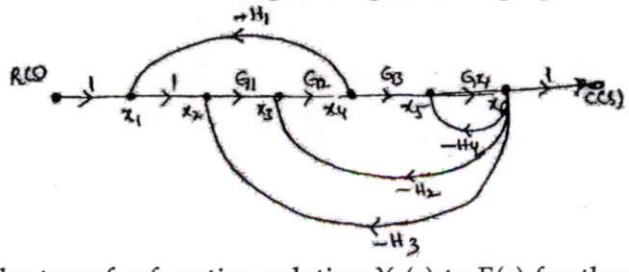
(10*2 Marks = 20 Marks)

1.	a)	Why negative feedback is preferred in control systems?	2M	CO1	U
	b)	Define transfer function.	2M	CO1	R
	c)	What are the applications of root locus?	2M	CO2	R
	d)	Define rise time.	2M	CO2	R
	e)	Define Gain Crossover frequency and Gain Margin.	2M	CO3	R
	f)	What is Nyquist plot?	2M	CO3	U
	g)	What is P and PI controller?	2M	CO4	R
	h)	What is lead compensator?	2M	CO4	R
	i)	Define state and state variable.	2M	CO5	R
	j)	Define Controllability.	2M	CO5	R

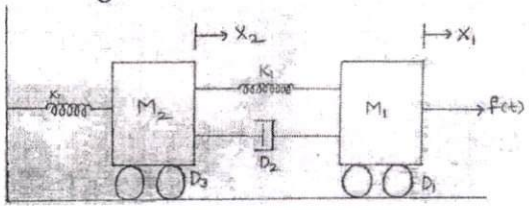
PART- B

(10*5 Marks = 50 Marks)

2	a)	Explain open-loop and closed-loop control systems. List out the advantages and drawbacks for both systems.	5M	CO1	U
	b)	Explain the effect of feedback on sensitivity.	5M	CO1	U
		OR			
3	a)	Find the transfer function of the given signal flow graph shown below.	5M	CO1	Ap



	b)	Determine the transfer function relating $X_1(s)$ to F(s) for the mechanical system shown in the figure below.	5M	CO1	Ap



4	a)	The characteristic equation of a control system is $s^3+2Ks^2+(K+2)s+4=0$. Determine the range of values of K for the system to be stable.	5M	CO2	An
	b)	By means of RH criterion, determine the stability of the system represented by the characteristic equation $s^4+2s^3+8s^2+4s+3=0$.	5M	CO2	An
		OR			
5	a)	Draw the complete root locus for the system described by $G(s)H(s)=\frac{K(s+3)}{s(s^2+s+2)}$.	5M	CO2	Ap
	b)	Find the steady state error to the following inputs for the system $G(s)=\frac{10}{s(s+5)}$ i. r(t)=10 u(t), ii. r(t)=10t u(t)	5M	CO2	Ap
6	a)	Explain the Nyquist criteria for determining the stability of a system.	5M	CO3	An
	b)	Sketch the bode plot for the open lop transfer function of a system is given by $G(s)=\frac{K}{s(1+0.4s)(1+0.04s)}$.	5M	CO3	Ap
		OR			
7	a)	Explain how the Gain margin and phase margin can be determined from the bodeplot.	5M	CO3	An
	b)	Sketch the polar plot for the transfer function $G(s)=\frac{1}{(s+4)(s+8)}$	5M	CO3	Ap
8	a)	Discuss the concept of insensitivity and robustness of control systems.	5M	CO4	U
	b)	Explain how root loci method is used to design feedback controller.	5M	CO4	U
		OR			
9	a)	What do you mean by the design specification in frequency domain?	5M	CO4	U
	b)	What are the different applications of PI and PID controllers?	5M	CO4	U
10	a)	Write short notes on Controllability and Observability.	5M	CO5	U
	b)	Obtain the state model of the transfer function $\frac{Y(s)}{U(s)}=\frac{1}{s^2+6s+5}$	5M	CO5	Ap
		OR			
11	a)	Find state transition matrix using Laplace transformation method for the matrix $A=\begin{bmatrix}0 & 0 & -2\\ 0 & 1 & 0\\ 1 & 0 & 3\end{bmatrix}$	5M	CO5	Ap
	b)	Explain the concept "Diagonalization of state matrix" with an example.	5M	CO5	U

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CO - Course Outcome **BL - Blooms Taxonomy Levels**