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

MLRS

III B.Tech I Sem Regular End Examination, January 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)	Define linear system.	2M CO1	L1
	b)	Give advantages and disadvantages of the feedback control systems.	2M CO1	L2
	c)	List out the nature of the system for different values of damping ratios.	2M CO2	L3
	d)	What is meant by time response?	2M CO2	L1
	e)	Mention about frequency domain specifications.	2M CO3	L2
	f)	Define gain margin and phase margin.	2M CO3	L1
	g)	Write transfer function for PD controller.	2M CO4	L3
	h)	Enumerate lag compensation.	2M CO4	L1
	i)	Draw state diagram of a standard state model.	2M CO5	L2
	j)	Explain about observability.	2M CO5	L2

PART- B
                                                    (10*5 Marks = 50 Marks)

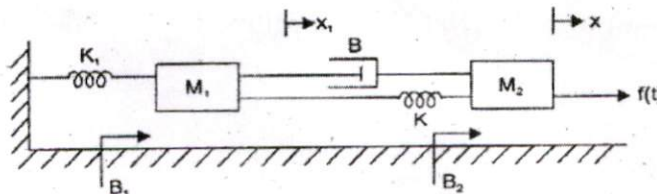|				
2	a)	Write the differential equations governing the Mechanical system shown in fig1. Also determine the transfer function.	5M CO1	L3

Fig.1

	b)	Briefly explain the temperature control using both open loop as well as closed loop control system.	5M CO1	L4

OR

3	a)	Differentiate between open loop control system and closed loop control system.	5M CO1	L2

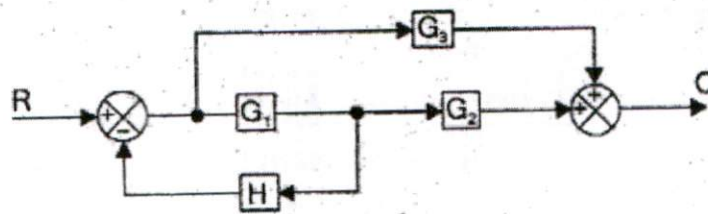b) Find the transfer function for the block diagram shown in fig. 2   5M   CO1   L3

Fig. 2

4 a) The closed loop transfer function of a unity feedback control system   5M   CO2   L4
is given by $C(S)/R(S) = 10/s^2+4s+5$
Determine
  (i)   Damping ratio
  (ii)   Natural undamped resonance frequency
  (iii)   Percentage peak overshoot
  (iv)   Expression for settling time

b) Examine the stability of the above characteristic equation using   5M   CO2   L3
Routh's criterion.

OR

5   Explain the terms: 10M   CO2   L1
  (i) Stability   (ii) Absolute stability (iii) Conditional stability
  (iv) Stable System (v) Damping Ratio.

6 a) Give advantages & limitations of frequency domain analysis.   5M   CO3   L2

  b) Explain the steps followed for the construction of polar plot.   5M   CO3   L2

OR

7   Sketch the Bode plot of   10M   CO3   L4
$$G(s) = \frac{50(1 + 0.1S)}{s(1 + 0.01S)(1 + s)}$$ Also find gain crossover frequency.

8   What is compensation? What are the different types of   10M   CO4   L4
compensators? Explain in detail about each of them.

OR

Design a lead compensator for unity feedback system whose open
loop transfer function is given by $G(S) = K/ S(S+1)(S+5)$ 10M   CO4   L4
9   to satisfy the following specifications.
(i) Velocity error constant $K_v = 50$ (ii) Phase margin= 200.

10 a) State and explain controllability.   3M   CO5   L2

The system is represented by the differential equation
  b) $\ddot{y} + 5\dot{y} + 6y = u$ 7M   CO5   L4
Verify the controllability of the given system.

OR

11   Obtain the state model of the system whose transfer function is   10M   CO5   L4
given by,
$$\frac{Y(s)}{U(s)} = \frac{10}{s^3 + 4s^2 + 2s + 1}$$

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