Reg. No.												

Question Paper Code	12677

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Fourth Semester

Mechanical Engineering

20MEPC401 - MEASUREMENT AND CONTROL SYSTEMS

Regulations - 2020

(Use of Semi log and Polar graphs is permitted)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Define error.	2	K1	CO1
2.	What do you mean by curve fitting?	2	K1	CO1
3.	What is control system?	2	K1	CO2
4.	Write the Mason's gain formula.	2	K1	CO2
5.	Define step signal.	2	K1	CO3
6.	List the time domain specifications.	2	K1	CO3
7.	What is polar plot?	2	K1	CO4
8.	What are the types of accelerometers?	2	K1	CO5
9.	Write the principle of magnetostrictive load cell.	2	K1	CO5
10.	Define atmospheric pressure and absolute pressure.	2	K1	CO6

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

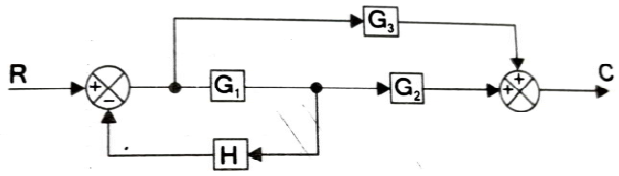
			Marks	K – Level	CO
11.	a)	What are the different types of errors? Explain how to eliminate errors in instruments.	13	K2	CO1
		OR			
	b)	Calculate Fitting straight line (y = a + bx) - Curve fitting using the Least square method.	13	K2	CO1

X	Y
5	1
4	2
3	3
2	4
1	5

12. a) Explain open loop and closed loop systems with examples. *13 K2 CO2*

OR

b) Reduce the block diagram shown in figure and find C/R. *13 K2 CO2*



13. a) Derive the expression and draw the response of the first order system with unit step input. *13 K3 CO3*

OR

b) The response of a servomechanism is c (t) = 1+ 0.2 e^{-60t} - 1.2 e^{-10t} when subject to a unit step input. Obtain an expression for closed loop transfer function. Determine the undamped natural frequency and damping ratio. *13 K3 CO3*

14. a) Sketch the bode plot for following transfer function and determine phase margin and gain margin. G(s) =75(1+0.2s)/[s(s^2+16s+100)]. *13 K3 CO4*

OR

b) The open loop transfer function of a unity feedback system is given by G(S)=1/[s^2(1+s)(1+2s)]. Sketch the polar plot and determine the gain margin and phase margin. *13 K3 CO4*

15. a) Discuss in detail the LVDT for displacement measurement with a neat sketch. *13 K2 CO5*

OR

b) Discuss in detail the pneumatic load cell for force measurement with a neat sketch. *13 K2 CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Discuss the total radiation type pyrometer for temperature measurement with a neat sketch. Write its limitations and advantages. *15 K2 CO6*

OR

b) Discuss in detail the types of manometers with a neat sketch. *15 K2 CO6*