Reg. No.																

Question Paper Code	14775

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Fourth Semester

Mechanical Engineering

20MEPC401 - MEASUREMENT AND CONTROL SYSTEMS

Regulations - 2020

(Use of Polar Graph is permitted)

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	Accuracy of an instrument refers to a) Closeness to true value b) Closeness to true value c) Speed of response d) Repeatability only	1	K1	CO1
2.	Sensitivity of a measuring instrument is defined as a) Ratio of output change to input change b) Maximum measurable value c) Error in measurement d) Time required for response	1	K1	CO1
3.	Hysteresis error occurs due to a) Different outputs for increasing and decreasing inputs b) Calibration fault c) Human error d) Random fluctuations	1	K2	CO1
4.	In an open loop control system a) Output is independent of control input b) Output is dependent on control input c) Only system parameters have effect on the control output d) Feedback control is present	1	K1	CO2
5.	The capacitance, in force-current analogy, is analogous to a) momentum b) velocity c) displacement d) Mass	1	K2	CO2
6.	Mass, in force-voltage analogy, is analogous to a) charge b) current c) inductance d) Resistance	1	K2	CO2
7.	The time taken by a system response to reach and remain within a specified percentage of the final value is called: a) Rise time b) Settling time c) Peak time d) delay time	1	K1	CO3
8.	For a Type-1 system, the steady-state error for a unit step input is a) Infinity b) Oscillatory c) zero d) Unity	1	K2	CO3
9.	Static error co-efficients are used as a measure of the effectiveness of closed loop systems for specified _____ input signal. a) acceleration b) velocity c) position d) all of the above	1	K1	CO3

10.	Frequency response of a system is the response to		1	K2	CO4
	a) Step input	b) Ramp input			
	c) Sinusoidal input	d) Impulse input			
11.	A Bode plot consists of		1	K1	CO4
	a) Magnitude and phase plots	b) Time and frequency plots			
	c) Gain and error plots	d) Root locus plots			
12.	A polar plot represents		1	K1	CO4
	a) Magnitude versus time	b) Frequency response in polar coordinates			
	c) Phase versus time	d) Gain versus frequency			
13.	Which of the following can be measured by the use of a tacho-generator ?		1	K1	CO5
	a) Acceleration	b) Speed			
	c) Speed and acceleration	d) displacement			
14.	A potentiometer used for displacement measurement works on the principle of		1	K1	CO5
	a) Electromagnetic induction	b)Variable resistance			
	c) Piezoelectric effect	d) Hall effect			
15.	--------directly converts temperature into voltage.		1	K2	CO6
	a) Thermocouple	b) Potentiometer			
	c) Gear train	d) LVDT			
16.	Pressure error can be measured by		1	K1	CO6
	a) Differential bellows and strain gauge	b) Thermometer			
	c) Strain gauge	d) Strain gauge and potentiometer			

PART – A (ii) (Short Answer Questions)
(6 × 3 = 18 Marks)
Answer ALL Questions

17.	Distinguish between repeatability and reproducibility.	3	K3	CO1
18.	Write the Mason's Gain Formula.	3	K2	CO2
19.	Make use of example explain the types of damping.	3	K3	CO3
20.	Explain about Polar plot.	3	K2	CO4
21.	Explain the applications of strain gauge.	3	K2	CO5
22.	Identify the different types of Pressure and explain.	3	K3	CO6

PART - B (Descriptive Answer Questions)
(6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Make use of diagram explain the functional blocks of a measurement system.	11	K3	CO1
		OR			
	b)	Discuss about the desirable static and Dynamic characteristics of a measuring system.	11	K3	CO1
24.	a)	Develop the Transfer Function of the given Mechanical System as shown in figure 1	11	K3	CO2

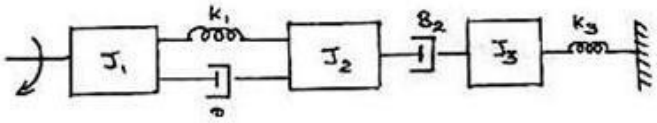

Figure 1

OR

	b)	Make use of neat sketch explain the working of AC and DC Servo motors.	*11*	*K3*	*CO2*
25.	a)	Derive the expression and draw the response of second order system for any case with unit step input.	*11*	*K3*	*CO3*
		OR			
	b)	The open loop transfer function of a unity feedback system is given by G(s)= K/s(sT+1), where K and T are positive constants. By what factor should the amplifier gain K be reduced, so that the peak over shoot of unit step response of the system is reduced from 75% to 25%.	*11*	*K3*	*CO3*
26.	a)	Derive the expressions for frequency domain specifications with unit step input.	*11*	*K3*	*CO4*
		OR			
	b)	Sketch the bode plot for the unity feedback control system with transfer function G(S)=K/S(S+4)(S+10).	*11*	*K3*	*CO4*
27.	a)	Describe the principle of operation, construction details and characteristics of LVDT used for displacement measurement.	*11*	*K3*	*CO5*
		OR			
	b)	Describe how the torque is measured by strain gauge and relative angular twist.	*11*	*K3*	*CO5*
28.	a)	Apply the concept of pyrometer and explain the working principle of total radiation pyrometer with neat sketch.	*11*	*K3*	*CO6*
		OR			
	b)	Make use of neat sketch, briefly Explain about Elastic Diaphragm Gauge and bellow gauges used for measurement of pressure.	*11*	*K3*	*CO6*