Reg. No.															

Question Paper Code	12857

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

Third Semester

Electronics and Instrumentation Engineering

(Common to Instrumentation and Control Engineering)

20EIPC302 - SENSORS AND TRANSDUCERS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	List three sources of possible errors in instruments.	2	K2	CO1
2.	Define an Inverse transducer. Give an example.	2	K1	CO1
3.	Obtain the steady state error for the first order system when Subjected to unit step input.	2	K2	CO2
4.	List out the standard test inputs in measurement.	2	K2	CO2
5.	Define gauge factor.	2	K2	CO3
6.	Compare Bonded and Unbounded Strain Gauge.	2	K2	CO3
7.	List the advantages and disadvantages of LVDT.	2	K2	CO4
8.	Mention few applications of capacitive transducers.	2	K2	CO4
9.	Name the different types of Magneto elastic transducers.	2	K2	CO5
10.	Mention some of the applications of Piezo electric transducers.	2	K2	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	Classify standards and give examples for each level of standard.	13	K2	CO1
		OR			
	b)	In a test temperature is measured 100 times with variations in apparatus and procedures. After applying the corrections, the results are: Temperature: 397 398 399 400 401 402 403 404 405 Frequency : 1 3 12 23 37 16 4 2 2 Calculate the arithmetic mean, the average deviation, the standard deviation and the probable error.	13	K3	CO1
12.	a)	Derive the Step response of the Second order system for Critically damped system.	13	K2	CO2
		OR			

b)	i)	Explain the different time specifications.	*6*	*K2*	*CO2*
	ii)	Obtain the frequency response of first order system.	*7*	*K2*	*CO2*
13. a)	i)	Discuss the principle of operation and application of piezo resistive transducer.	*8*	*K2*	*CO3*
	ii)	Explain humidity measurement.	*5*	*K2*	*CO3*
		OR			
	b)	Illustrate the construction, working principle, characteristics and applications of thermistor.	*13*	*K2*	*CO3*
14.	a)	Explain the principle of operation and construction of induction type transducers and its applications.	*13*	*K2*	*CO4*
		OR			
	b)	Describe the principle of operation of variable reluctance transducers.	*13*	*K2*	*CO4*
15.	a)	Describe the working principle of Magneto elastic sensor in detail.	*13*	*K2*	*CO5*
		OR			
	b)	Explain two different types of Digital transducers in detail.	*13*	*K2*	*CO5*

PART - C (1 × 15 = 15 Marks)

16. a)	i)	A parallel plate capacitive transducer with air dielectric having an area of 600 sq-mm is separated by a distance of 0.2mm. Calculate the change in capacitance if a linear displacement reduces the distance between the plates to 0.15mm. Assume permittivity of free space to be 8.85×10^{-12} F/m.	*10*	*K3*	*CO4*
	ii)	The output of an LVDT is 10V for a displacement of 12.5mm. Determine the output voltage for a core displacement of 10mm.	*5*	*K3*	*CO4*
		OR			
	b)	Describe the principle of operation, construction details, and characteristics of Piezoelectric transducer and derive an expression for voltage sensitivity.	*15*	*K2*	*CO5*