Reg. No.												

Question Paper Code	12346

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

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.	Define Standards and Classify Standards.	*2,K1,CO1*
2.	List the factors responsible for selection of a transducer.	*2,K2,CO1*
3.	Define damping ratio.	*2,K1,CO2*
4.	Differentiate time response characteristics from frequency response characteristics.	*2,K2,CO2*
5.	Differentiate stress and strain.	*2,K2,CO3*
6.	Define Poisson's ratio.	*2,K1,CO3*
7.	Define LVDT.	*2,K1,CO4*
8.	State the desirable features of a capacitive transducer.	*2,K1,CO4*
9.	Compare and contrast digital and analog transducers.	*2,K2,CO5*
10.	State the basic principle of hall effect transducers.	*2,K1,CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Explain the functional blocks of a measurement system with a neat diagram.	*13,K2,CO1*
		OR	
	b)	The following values were obtained from the measurements of the value of EMF(in volts) 3.525,3.510,3.531,3.544,3.562,3.570,3.558,3.586,3.591,3.549. Determine (i) Arithmetic mean (ii)Average deviation (iii) Standard deviation (iv) Variance (v) Probable error.	*13,K3,CO1*
12.	a)	Derive the Step response of the Second order system for under damped.	*13,K2,CO2*
		OR	

b) (i) Explain different types of input signals. *6,K2,CO2*
(ii) Derive the Sinusoidal response of the first order system. *7,K2,CO2*

13. a) With a neat diagram explain the principle and construction details of linear and circular potentiometer. *13,K2,CO3*

OR

b) (i) Derive the error equation of potentiometer with load. *6,K2,CO3*
(ii) Derive the Gauge factor of strain gauge. *7,K2,CO3*

14. a) Describe the principle of operation, construction details, and characteristics of LVDT. *13,K2,CO4*

OR

b) (i) Write short notes on EI Pick up. *6,K2,CO4*
(ii) Explain the principle of microsyn. *7,K2,CO4*

15. a) Explain how the displacement of a structural element can be determined using Hall effect sensors. *13,K2,CO5*

OR

b) Explain the construction and working of Fiber optic sensors. *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) (i) An LVDT is employed for measuring the deflection of a bellow.The sensitivity of LVDT is 60 V/mm .The bellow is deflected by 0.15mm by a pressure of $1.2x10^6$N/m. Determine the sensitivity of LVDT in V/ N/m^2 and the pressure when the output voltage is 4.5V. *8,K3,CO4*
(ii) A capacitive transducer has two plates of area 15cm^2 each, separated by an air gap of 2mm thickness. *7,K3,CO4*
Find the displacement sensitivity due to gap change.

OR

b) Describe MEMS technology. Explain different manufacturing processes for MEMS. *15,K2,CO5*