Reg. No.																

Question Paper Code	14093

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Third Semester

Mechanical and Automation Engineering

24MUPW302 – SENSORS IN AUTOMATION WITH LABORATORY

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The difference between indicated value and the true value of a quantity is (a) Gross Error (b) Absolute Error (c) Dynamic Error (d) Relative Error	1	K1	CO1
2.	Which of the following is defined as the difference between the largest and smallest reading of an instrument? (a) Span (b) Range (c) Dead space (d) Resolution	1	K1	CO1
3.	Which of the following is used to transmit positional data electrically from one location to another? (a) Synchros (b) Microsyn (c) POT (d) PIR	1	K1	CO2
4.	The layers present in the Bluetooth technology are named as.. (a) Application layer (b) Middleware layer (c) Data link layer (d) All of the mentioned	1	K1	CO2
5.	Piezoelectric crystals produce _____ (a) no voltage (b) low voltage (c) high voltage (d) very high voltage	1	K1	CO3
6.	A _____ is a measurement device that uses gravity to measure theinclination of an object. (a) Strain guage (b) Inclinometer (c) Gyroscope (d) Magentoresistance	1	K1	CO3
7.	Among the following _____ pressure sensor is commonly used in liquid level detection in a tank. (a) Absolute pressure sensors (b) Gauge pressure sensors (c) Differential pressure sensors (d) None of the mentioned	1	K1	CO4
8.	RTD has _____ characteristics over a wide range of temperatures. (a) Non-linear (b) Linear (c) Exponential (d) Logarithmic	1	K1	CO4
9.	Which of the following is not correct for fibre optic sensors? (a) Immune to electromagnetic interference (b) Immune to radiation hazard (c) Can be used in harsh environments (d) None of the mentioned	1	K1	CO5
10.	What is a common challenge associated with multi-channel data acquisition systems? (a) Limited sensor compatibility (b) Increased data complexity and processing requirements (c) Lower accuracy compared to single-channel systems (d) Simplicity of setup	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Draw the functional block diagram of a measurement system.	2	K1	CO1
12.	Define an Inverse transducer. Give an example.	2	K1	CO1
13.	Show the difference between inductive and capacitive sensors.	2	K1	CO2
14.	What are the major components of motion sensor?	2	K1	CO2
15.	List the factors to be considered for bonded strain gauge.	2	K1	CO3
16.	What is heading sensor?	2	K1	CO3

17.	Mention the materials used for thermistors.	2	K1	CO4
18.	Define piezo electric effect.	2	K1	CO4
19.	What is photo emissive cell?	2	K1	CO5
20.	Summarize the advantages of MEMS.	2	K1	CO5
21.	What are the types of data acquisition system?	2	K1	CO6
22.	List the sensors used and applications in home appliance systems.	2	K1	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a) (i)	Explain transfer characteristics of the transducer.	4	K2	CO1
	(ii)	A circuit was tuned for resonance by eight different students and the values of resonant frequency in kHz were recorded as 532,548,543,535,546,531,543 and 536. Calculate (a) the arithmetic mean (b) deviations from mean (c) the average deviation and (d) the standard deviation.	7	K2	CO1
		OR			
	b)	Describe in detail about calibration technique and draw the calibration curve in general.	11	K2	CO1
24.	a)	Illustrate the construction and working principle of LVDT. Explain how the magnitude and direction of the displacement of core of LVDT is detected.	11	K2	CO2
		OR			
	b)	Explain Ultrasonic sensor with neat schematic and state its advantages and disadvantages.	11	K2	CO2
25.	a)	How to measure a strain of a cantilever beam when subjected to load at the end point with the help of Wheatstone bridge.	11	K2	CO3
		OR			
	b)	Describe the basic principle of hall effect sensor and show how can it be used as a magnetic field sensor.	11	K2	CO3
26.	a)	With neat sketch explain the construction, principle, working of thermistor and state its advantages and disadvantages.	11	K2	CO4
		OR			
	b)	Explain the working principle and construction of a Piezoelectric Sensor with a neat diagram.	11	K2	CO4
27.	a)	Enumerate the construction and working of photo voltaic with neat sketch.	11	K2	CO5
		OR			
	b)	How is optical fibre used for stress sensing? Describe any micro bend sensor and discuss its operation.	11	K2	CO5
28.	a)	Apply the concept of data acquisition to design suitable block diagrams for Single and Multi-Channel Systems and explain their working.	11	K3	CO6
		OR			
	b)	Demonstrate the importance, performance and applications of various sensors in Automobile industries.	11	K3	CO6