U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**

Branch: Electronics and Instrumentation Engineering **Duration: 3 hrs.**

Course Code: 23EI3PCSMT **Max Marks: 100**

Course: Sensors and Measurement Techniques

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			MODULE - I	*CO*	*PO*	Marks
1	a)		Define static error. Discuss the various types of static errors that can occur in a measurement system.	*CO1*	*PO2*	**06**
	b)		A thermometer with a measurement range up to 100°C has a possible error of ±0.5°C. If a temperature reading is 75°C, determine the limited error as a percentage.	*CO2*	*PO3*	**04**
	c)		Discuss the first order and second order systems behavior with appropriate equations.	*CO1*	*PO2*	**10**
			OR			
2	a)		Explain the following dynamic characteristics with examples: • Speed of Response • Lag • Fidelity • Dynamic Error	*CO1*	*PO2*	**06**
	b)		Suppose 1.414 is used as an approximately to $\sqrt{2}$. Find the absolute, relative and percentage errors.	*CO2*	*PO3*	**04**
	c)		Define measurement system and explain its various elements with a neat block diagram.	*CO1*	*PO2*	**10**
			MODULE - II			
3	a)		Explain the working principle of a Hall effect sensor in liquid level sensing applications.	*CO3*	*PO2*	**08**
	b)		Describe the construction and operation of an LVDT sensor. Also, list its advantages.	*CO3*	*PO2*	**08**
	c)		What is the piezoelectric effect? Discuss its applications in detail.	*CO3*	*PO2*	**04**

			OR			
	4	a)	Enumerate and explain any five characteristics of an accelerometer.	*CO3*	*PO2*	**05**
		b)	Explain the Peltier effect and its significance in thermoelectric cooling.	*CO3*	*PO2*	**07**
		c)	Define the Seebeck effect. Explain how the difference in electron energies between two materials leads to a thermoelectric voltage.	*CO4*	*PO2*	**08**
			MODULE - III			
	5	a)	Describe the construction and operation of a fiber-optic microphone. How does it utilize the properties of optical fibers for sound detection?	*CO4*	*PO2*	**10**
		b)	Define the following terms as applied to an air-water vapor mixture: i. Absolute humidity ii. Relative humidity iii. Dewpoint temperature	*CO2*	*PO1*	**03**
		c)	Explain how thermal conductivity of gas is used for measuring humidity.	*CO4*	*PO2*	**07**
			OR			
	6	a)	What are Hygrometers and With a neat diagram, discuss the working principle of optical hygrometers.	*CO3*	*PO2*	**10**
		b)	Explain the working principle of scintillation detectors. How do they detect ionizing radiation?	*CO4*	*PO2*	**10**
			MODULE - IV			
	7	a)	Describe the mechanism of pyroelectricity in crystals. How does a change in temperature lead to the generation of an electric charge?	*CO4*	*PO2*	**10**
		b)	Explain the three main thermoelectric laws. Discuss how each law works and provide examples of their applications in thermoelectric devices and systems.	*CO3*	*PO2*	**10**
			OR			
	8	a)	Discuss how the resistance of a PTC thermistor increases as the temperature rises. What is the physical phenomenon responsible for this characteristic?	*CO4*	*PO2*	**08**
		b)	Discuss the working principle of the following types of optical temperature sensors. i. Fluoroptic Sensor ii. Interferometric Sensor	*CO3*	*PO2*	**12**

			MODULE - V			
	9	a)	List and explain the key factors to consider when selecting a driver for an electronic system.	*CO5*	*PO2*	**06**
		b)	What is four-wire transmission, and how does it differ from two-wire transmission systems? Explain its basic working principle.	*CO5*	*PO2*	**10**
		c)	Write a note on Signal conditioners.	*CO5*	*PO2*	**04**
			OR			
	10	a)	Discuss the different types of excitation circuits used for sensors.	*CO5*	*PO2*	**06**
		b)	Describe various shielding techniques helps in reducing noise in sensor systems and circuits.	*CO5*	*PO2*	**10**
		c)	Write a note on Batteries for Low-Power Sensors.	*CO5*	*PO2*	**04**

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