Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – SUMMER 2024

Subject Code: 3151708 Date:21-05-2024

Subject Name: Measurement in industry

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Brief about following term: Hooke's law, Poisson's ratio, Shearing Strain	**03**
	(b)	Brief about electrical and non-electrical strain gauges	**04**
	(c)	What is Gauge factor? Prove that for any metallic strain gauge, Gauge factor will be, G.F. = 1 + 2*Poisson's Ratio	**07**
Q.2	**(a)**	Brief about photo-conductive, photo-emissive and photo-voltaic transducers.	**03**
	(b)	Brief about desired characteristics of transducers.	**04**
	(c)	Brief about Semiconductor strain gauges.	**07**
		OR	
	(c)	Brief about strain gauge measurement circuits.	**07**
Q.3	**(a)**	Give classification of transducer. List out mechanical transducers.Is microphone active or passive transducer?	**03**
	(b)	A 4 cm long linear resistance potentiometer is uniformly wound with a wire having resistance 8000 ohm. Under normal conditions, the slider is positioned at the center of the potentiometer. During operation, the slider moves over the resistance element. The resistance of the potentiometer as measured by a Wheatstone bridge is (i) 3200 ohm (ii) 6000 ohm. Find the linear displacement and comment on the direction of the two Displacements	**04**
	(c)	Describe variable capacitance type transducers.	**07**
		OR	
Q.3	**(a)**	The diaphragms of a pressure measuring transducer are 2 cm^2 area and 2.5 mm apart, and the system has a capacitance of $250*10^{-12}$ farads. When a pressure of 104 N/m^2 is applied to the diaphragm, there results a deflection of 0.25 mm in the diaphragm. Determine the change in the capacitance of the system.	**03**
	(b)	Brief about fiber optic sensor.	**04**
	(c)	Discuss LVDT and RVDT.	**07**
Q.4	**(a)**	Brief about linear and rotary potentiometer.	**03**
	(b)	Define turbidity. Explain any one measurement method for turbidity.	**04**

	(c)	Give classification of inductive transducer. How Eddy current type inductive transducers work?	**07**

OR

Q.4	**(a)**	Brief about any one viscosity measurement method	**03**
	(b)	Define density. Explain any one hydrometer.	**04**
	(c)	Write Nernst's equation for pH electrodes. Brief about reference and measuring electrodes for pH measurement. Also state the effects of temperature measurement on pH.	**07**
Q.5	**(a)**	Brief about any one conductivity measurement method.	**03**
	(b)	Explain Flame Ionization detector used in chromatography.	**04**
	(c)	Draw the block diagram of mass spectrometer. Explain all blocks.	**07**

OR

Q.5	**(a)**	How hygrometer works? List out the different types of hygrometer.	**03**
	(b)	Describe oxygen analysis using deflection type paramagnetic oxygen analyzer.	**04**
	(c)	Draw the set up for gas chromatography and explain how it works.	**07**

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