Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - IV EXAMINATION - SUMMER 2025

Subject Code: 3140312 **Date: 17-05-2025**

Subject Name: Biomedical Sensors & Transducers

Time:10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions

1. Attempt all questions.

2. Make suitable assumptions wherever necessary.

3. Figures to the right indicate full marks.

			Marks
Q.1	**(a)**	Explain the following terms: 1) Signal 2) Measurement 3) Measurand 4) Noise 5) Artifact 6) Flow	**03**
	(b)	Explain static characteristics of measuring instruments.	**04**
	(c)	Draw and explain the general structure of a measurement system.	**07**
Q.2	**(a)**	What is error? Explain it with its types.	**03**
	(b)	List and explain classification of transducers.	**04**
	(c)	Explain different factors to consider while selecting a transducer.	**07**
		OR	
	(c)	Explain the Photoresistor with its working principle, construction and applications.	**07**
Q.3	**(a)**	Which factors affect the operation of Optoisolator and how?	**03**
	(b)	Explain the Phototransistor with its working principle, construction and applications.	**04**
	(c)	Draw and explain basic construction of Optoisolator. Explain working principle. Enlist applications.	**07**
		OR	
	(a)	Enlist and explain types of thermocouple.	**03**
	(b)	What is optical pyrometer? Explain with its basic constructional diagram.	**04**
	(c)	Explain resistance temperature detector (RTD) with its working principle and construction.	**07**
Q.4	**(a)**	What is strain gauge? State its applications.	**03**
	(b)	What is wheatstone bridge? Draw circuit for the measurement of resistance. Derive the equation for equilibrium of bridge.	**04**
	(c)	Draw and explain construction and circuit diagram of linear variable differential transformer.	**07**
		OR	
	(a)	Enlist and explain biomedical applications of strain gauge.	**03**

	(b)	Explain advantages and disadvantages of piezo-electric transducer.	**04**
	(c)	Explain piezo-electric transducer. Derive the equation for output voltage and sensitivity.	**07**
Q.5	**(a)**	Explain Newtonian and Non-Newtonian fluid with its properties and examples.	**03**
	(b)	What is velocity transducer? Explain it with working principle.	**04**
	(c)	Explain Ultrasonic (Doppler shift) linear velocity transducer. Derive equation for flow velocity.	**07**

OR

	(a)	Write down a note on coordinate system used to describe motion.	**03**
	(b)	Draw and explain construction of capacitive type pressure sensor.	**04**
	(c)	Write a note on intraocular pressure monitoring.	**07**

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