

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2023****Subject Code:3140312****Date: 06-02-2024****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.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
<b>Q.1</b>	(a) Explain following terms relevant to performance characteristics: <ul style="list-style-type: none"> <li>• Dead Zone,</li> <li>• Random errors,</li> <li>• Drift</li> </ul>	<b>03</b>
	(b) Explain difference between Sensor, Transducer and Actuator with example.	<b>04</b>
	(c) Explain the functional elements of measurement systems with example.	<b>07</b>
<b>Q.2</b>	(a) Explain thermistor linearization circuit.	<b>03</b>
	(b) Explain working principle of Radiant Temperature Sensors with necessary schematic. Also mention its applications.	<b>04</b>
	(c) Enlist the type of thermocouples. Explain Cold or reference Junction Temperature Compensation method.	<b>07</b>
<b>OR</b>		
	(c) Explain working principle, advantages, and disadvantages of Resistance temperature detector. Also explain necessary circuit used to convert thermal change to analog signal.	<b>07</b>
<b>Q.3</b>	(a) What is piezoelectric effect? Give limitation of Piezo sensor.	<b>03</b>
	(b) Explain the working of Phototransistors and Photothyristors.	<b>04</b>
	(c) Discuss all the technical aspects of Joint angle measurement with the help of potentiometer.	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) Give advantages and disadvantages of Capacitive displacement transducer.	<b>03</b>
	(b) What is the need of Optoisolator? Explain its working.	<b>04</b>
	(c) Discuss all the technical aspects on any biomedical application of Strain Gages.	<b>07</b>
<b>Q.4</b>	(a) Explain various types of flows in physiological System with its measurement importance.	<b>03</b>
	(b) Explain role of Doppler effect in velocity measurement.	<b>04</b>
	(c) Explain working of rotameter with its advantages and disadvantages.	<b>07</b>
<b>OR</b>		
<b>Q.4</b>	(a) What is the purpose of a capnography? Enlist its diagnostic usage.	<b>03</b>
	(b) Explain schematic of any angular velocity transducer.	<b>04</b>
	(c) Explain working of electromagnetic flow transducer with its advantages and disadvantages.	<b>07</b>

- Q.5** (a) Compare Direct and Indirect measurement of blood pressure. **03**  
(b) Explain measurement technique for Intraocular Pressure. **04**  
(c) Write a short note on Impedimetric Sensors. **07**

**OR**

- Q.5** (a) Explain working and construction of Bourdon tubes. **03**  
(b) Explain functioning of pulse oximetry. **04**  
(c) Enlist motion transducers. Explain working of anyone with necessary schematic. **07**

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