

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV(NEW) EXAMINATION – WINTER 2022****Subject Code:3140312****Date:16-12-2022****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
Q.1	(a) Enlist Different types of transducers and classify them by their transduction principle.	03
	(b) Enlist different optoelectronic devices and explain any one in detail.	04
	(c) Explain different static and dynamic characteristics of transducer.	07
Q.2	(a) Explain Biomedical Application of Strain Gages.	03
	(b) Enlist different types of temperature transducers and explain the working principle of Resistance Temperature Detector.	04
	(c) Draw and explain working principle of Thermocouple. Also list out different types of thermocouple.	07
OR		
	(c) Give working principle of Thermistor with merits and demerits.	07
Q.3	(a) What is Doppler effect?	03
	(b) Explain application of Potentiometer for displacement measurement.	04
	(c) Draw and explain displacement measurement using different types of capacitive displacement sensors.	07
OR		
Q.3	(a) Explain different types of Flows in physiological System.	03
	(b) Draw and explain Wheatstone Bridge Circuit.	04
	(c) Write a short note on Piezoelectric Sensors for displacement measurement.	07
Q.4	(a) Explain the working principle of orifice for flow measurement.	03
	(b) Explain the working principle of Bourdon tubes for pressure measurement.	04
	(c) Draw and explain Electromagnetic flow meter with neat diagram.	07
OR		
Q.4	(a) Explain the working principle of Rotameter for flow measurement.	03
	(b) Explain the working principle of diaphragm for pressure measurement.	04
	(c) Draw and explain Ultrasound based flow meter with neat diagram.	07
Q.5	(a) Explain any one technique for motion measurement.	03
	(b) Explain the Beer-Lambert law. Give the name of devices that uses this principle.	04
	(c) Draw and explain Indirect measurement of systolic and diastolic blood pressure.	07
OR		
Q.5	(a) Define the terms: Transmission, reflectance and spO ₂ .	03
	(b) Explain any one Electrochemical Gas Sensor.	04
	(c) Draw and explain working principle of pulse oximeter in detail.	07
