Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V- EXAMINATION – SUMMER 2016

Subject Code: 150302 **Date: 21/05/2016**

Subject Name: Biomedical Transducers

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.**

Q.1	**(a)**	Explain different electrodes that used for bio potential measurements.	**07**
	(b)	Give name of most commonly used temperature transducers with their principle of transduction, material used, temperature range, merits and demerits.	**07**
Q.2	**(a)**	Draw and Explain block diagram of a generalized instrumentation scheme. Enumerate any five important performance characteristics relevant to design of transducers.	**07**
	(b)	Write a short note on Microbial Biosensors.	**07**
		OR	
	(b)	Explain features of smart sensors and compare it with conventional sensor.	**07**
Q.3	**(a)**	Explain the construction and principle of metallic strain gauge and derive equation for its gauge factor.	**07**
	(b)	Explain the construction and working of LVDT with the help of a neat diagram. Draw the input- output characteristics of LVDT. Mention its advantages and limitations.	**07**
		OR	
Q.3	**(a)**	Explain a quarter bridge circuit using a strain gauge to produce an output voltage in response to applied strain. What is the significance of temperature compensation in such measurement and how can this be accomplished?	**07**
	(b)	Explain Piezoelectric effect. Derive expression for output voltage of a piezoelectric crystal in terms of its dimension and applied force. Can we used piezo transducers for measurement of static force and why?	**07**
Q.4	**(a)**	Explain Transient type Ultrasonic blood flow transducer and derive necessary equation for it.	**07**
	(b)	Derive the differential voltage equation for variable separation differential capacitive type displacement transducer.	**07**
		OR	
Q.4	**(a)**	Discuss working principles of Tonometer with necessary schematic diagram.	**07**
	(b)	Draw schematic of Polarographic Clark PO2 sensor & Transcutaneous PO2 sensor and explain it's working.	**07**
Q.5	**(a)**	Explain Nuclear radiation transducers with necessary schematic.	**07**
	(b)	Explain working of Electromagnetic Blood flow meter with schematic diagram.	**07**

OR

Q.5	**(a)**	Explain fiber optic temperature sensor with necessary schematic. Also discuss designing aspects.	**07**
	(b)	Explain Air flow transducer for Fleish pneumotachometer.	**07**

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