Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – SUMMER 2013

Subject Code: 150302 **Date: 16-05-2013**

Subject Name: Biomedical Transducer

Time: 10.30 am - 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.**

Q.1	**(a)**	Draw & explain generalized block-diagram of medical instrumentation system.	**07**
	(b)	Explain electro-magnetic blood flow transducer with its working.	**07**
Q.2	**(a)**	Give classification of transducers with their transduction principles & related examples.	**07**
	(b)	Explain piezoelectric transducer with its modes of operation. Enlist its merits & demerits.	**07**
		OR	
	(b)	Explain polarographic clark & transcutaneous pO2 sensor with its constructional diagram.	**07**
Q.3	**(a)**	Explain construction of LVDT with its merits and demerits.	**07**
	(b)	Explain ultrasonic blood flow transducer & derive equation for blood velocity measurement.	**07**
		OR	
Q.3	**(a)**	Explain different types of microbial biosensors.	**07**
	(b)	Explain the working principle of enzyme based glucose sensor. Draw neat diagram of polarographic glucose biosensor electrode and explain it in detail.	**07**
Q.4	**(a)**	Explain the thermocouple temperature transducer in detail with its merits and demerits.	**07**
	(b)	1) Explain different techniques used for temperature compensation in strain gauge.	**04**
		2) Find the change in resistance produced by a strain of 160um/m in (A) metal wire strain gauge, GF=-3.1 (B) Semiconductor strain gauge, GF= -170. Nominal strain gauge resistance of both is 350 ohm.	**03**
		OR	
Q.4	**(a)**	Explain general methods for use of electrodes.	**07**
Q.4	**(b)**	Explain non-contact type infrared thermometry.	**07**
Q.5	**(a)**	Explain any two transducers used for measurement of nuclear radiation.	**07**
	(b)	Define following terms: 1) Precision 2) Threshold 3) Drift 4) Hysteresis 5) In vivo measurement 6) Transducer 7) Half cell potential	**07**
		OR	
Q.5	**(a)**	Explain electrode-electrolyte interface & electrode- skin interface.	**07**
	(b)	Give the classification of electrodes & explain in detail with their application.	**07**

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