Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(New) • EXAMINATION – WINTER 2016

Subject Code:2140306 **Date:22/11/2016**

Subject Name:Biosensors & 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.**

MARKS

Q.1 Short Questions. 14

1 A strain gauge is a passive transducer and is employed for converting

A Mechanical displacement into a change of resistance
B Pressure into a change of resistance
C Force into a displacement
D Pressure into displacement

2 Photo conductive cell consists of a thin film of

A Quartz
B Lithium sulphate
C Barium titanate
D Selenium

3 Resolution of a transducer depends on

A Material of wire
B Length of wire
C Diameter of wire
D Excitation voltage

4 Piezo-electric transducers are

A Passive transducers
B Inverse transducers
C Digital transducers
D Pulse transducers

5 _____ is the example of photo emissive cell

A LDR
B Photo diode
C Photo transistor
D Photo multiplier

6 Bubbles in blood pressure transducer line and incorrect placement of transducer are type of

A Insertion error
B Application error
C Dynamic error
D Response time error

7 pH value of venous blood is

A 7.30
B 7.40
C 7.35
D 7.45

8 Which of the following are piezo electric substances?

1. Barium titanate
2. Lead titanate
3. Lead Zirconate
4. Cadmium and sulphate

A 1,2 and 4
B 1,3 and 4
C 1,2 and 3
D 2,3 and 4

9 Bonded wire strain gauges are

A Exclusively used for construction of transducers
B Exclusively used for stress analysis
C Used for both stress analysis and construction of transducer
D Pressure measurement

10 The capacitance microphone is used for the detection of

A Heart rate
B Blood flow
C Heart sound
D Foot pressure

11 Fiber optic sensor can be used to sense _____

A Displacement B Power

C Current D Resistance

12 Venturi is associated with

A Venous blood pressure B Digital plethysmography

C Dialysate flow in artificial kidney D Blood flow in heart lung machine

13 Which of the following is not an application of LVDT?

A displacement measurement B load cells

C pneumatic servo follower D liquid level measurement

14 SAW transducer is

A Sound Atomic Wave B Surface Acoustic Wave

C Strain Absolute Wavelength D Stress Audio Wavelength

Q.2	**(a)**	List the applications of thermistors.	**03**
	(b)	Enlist the different applications of Capacitive Transducers.	**04**
	(c)	Write a brief note on photomultiplier cell.	**07**
		OR	
	(c)	Explain the properties of Piezoelectric material.	**07**
Q.3	**(a)**	List the strain gauge materials with its gauge factor.	**03**
	(b)	Enlist Dynamic Characteristics of transducers.	**04**
	(c)	Write a technical note on electromagnetic flow meter.	**07**
		OR	
Q.3	**(a)**	How is the resolution of a linear resistive potentiometer determined?	**03**
	(b)	Summaries the applications of scintillation detector.	**04**
	(c)	Describe the application of ultrasonic transducer for flow measurements.	**07**
Q.4	**(a)**	Draw the characteristics of various RTD material.	**03**
	(b)	Classify Variable Inductance Transducers.	**04**
	(c)	Illustrate the construction of Glass pH electrodes with appropriate figures.	**07**
		OR	
Q.4	**(a)**	What is RTD? List the general requirements of RTD.	**03**
	(b)	Illustrate the performance characteristics of thermistor.	**04**
	(c)	Explain the transducer used for measurement of pCO2 with necessary diagrams.	**07**
Q.5	**(a)**	State the applications of SAW transducer.	**03**
	(b)	List and briefly describe the transducers for liquid level measurement.	**04**
	(c)	Explain the sensor required for measurement of intracranial pressure.	**07**
		OR	
Q.5	**(a)**	List the modes of operation of piezoelectric crystals.	**03**
	(b)	What are the advantages of semiconductor strain gauge?	**04**
	(c)	Explain the compensations of primary sensor characteristics of smart sensors.	**07**

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