

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-IV(New) EXAMINATION – SUMMER 2016

Subject Code:2140306**Date:03/06/2016****Subject Name:Biosensors & 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.

Q.1**Short Questions.****MARKS****14**

- 1 The LVDT is

A Linear variable differential transducer	B Linear variable drift transducer
C Linear variable differential transformer	D Linear variable drift transformer
- 2 Which transducer converts the heat radiation into corresponding current value?

A Quartz resonator	B Pyroelectric transducer
C thermocouple	D fluoroptic transducer
- 3 Thermistors have _____ resistance-temperature characteristics.

A Linear	B Non-linear
C Recursive	D Bilinear
- 4 In capacitive displacement transducer, by reducing the separation distance of movable plates the sensitivity will

A Increase	B Decrease
C No change	D become Zero
- 5 Which type of sensor is used for tissue temperature measurement?

A thermocouple	B fluoroptic transducer
C RTD	D thermistor
- 6 If the transmitted wave frequency is of 8 MHz, then the Doppler shift at the opening of the artery is found in range of

A 500 to 1.2 KHz	B below 100 Hz
C 200 to 500 Hz	D above 3 kHz
- 7 The connection between lead wire and electrode can be insulated by

A Magnesium sulphate	B Polyvinylchloride
C Silver chloride	D boron dioxide
- 8 Ultrasonic waves reflected from moving scatters are shifted in frequency by an amount proportional to the _____ of the scattering objects.

A Density	B Area
C Velocity	D Mass
- 9 PO₂ range for a normal adult human is

A 40-75 mmHg	B 110-120 mmHg
C 150-220 mmHg	D 80-104 mmHg
- 10 Which temperature sensing technique will give greatest accuracy?

A RTD	B Thermistor
C Thermocouple	D Pyroelectric transducer
- 11 Which temperature sensing technique will give greatest sensitivity?

- | | |
|--|--|
| <p>A RTD</p> <p>C Thermocouple</p> | <p>B Thermistor</p> <p>D Pyroelectric transducer</p> |
|--|--|
- 12** Which of the following measurement application cannot performed by Doppler shift flow meters?
- | | |
|--------------------------|---------------------------|
| A Blood flow velocity | B Blood flow direction |
| C Blood flow profile | D None of the above |
- 13** Which technique is not applicable for blood flow measurement?
- | | |
|--------------------------------|---------------------------|
| A Electromagnetic technique | B Ultrasonic Technique |
| C NMR technique | D None of the above |
- 14** Which temperature sensing technique will give fastest response?
- | | |
|-------------------|------------------------------|
| A RTD | B Thermistor |
| C Thermocouple | D Pyroelectric transducer |
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- Q.2** (a) Explain working principal of Hall effect transducer. **03**
- (b) Write a short note on Cantilever Beam. **04**
- (c) Draw and explain the Opto-Digital encoders in detail. **07**
- OR**
- (c) Explain the measurement of blood pressure using sphygmomanometer. **07**
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- Q.3** (a) Explain the characteristics of photoconductive cells. **03**
- (b) List out biomedical applications of liquid level detector. **04**
- (c) Write a technical note on scintillation detector. **07**
- OR**
- Q.3** (a) Explain biomedical applications of goniometer. **03**
- (b) Describe the properties and applications of load cell. **04**
- (c) Explain the design and construction of hot wire anemometer. **07**
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- Q.4** (a) Define baroreceptors and describe their functions in human body. **03**
- (b) Discuss the design problems of LVDT. **04**
- (c) Explain various types of transducers for liquid level measurement. **07**
- OR**
- Q.4** (a) Describe the applications of SAW transducer. **03**
- (b) Explain the design of Strain Gage Bridge for measurement of pressure. **04**
- (c) Describe the ISFET for glucose measurement. **07**
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- Q.5** (a) Illustrate the method of Impedance Pneumograph. **03**
- (b) Write a brief note on G M counter. **04**
- (c) Explain the construction of glass electrode for pH measurement. **07**
- OR**
- Q.5** (a) List transducers for blood flow measurement. **03**
- (b) Write a brief note on proportional counter. **04**
- (c) Explain the ion exchange membrane electrodes with neat diagrams. **07**
