Sample Test Paper-I

Course Name : **Diploma in Medical Electronics**

Course Code : **MU**

Semester **: Fourth**

Subject Title : **Biosensors**

17442

Marks **: 25**   Time: 1 hour

Instructions:

1. All questions are compulsory

2. Illustrate your answers with neat sketches wherever necessary

3. Figures to the right indicate full marks

4. Assume suitable data if necessary

5. Preferably, write the answers in sequential order

Q.1 Attempt any THREE   **9 Marks**

a) Differentiate between active and passive transducer (any three points).

b) Draw diagrams of flat, corrugated and capsule type diaphragm.

c) Define biometrics. Differentiate between NTC & PTC type of thermistor with respect to

following points

      I.   Characteristics,

      II. Relation between resistance and temperature

d) State the working principle of thermocouple .

Q.2 Attempt any TWO   **8 Marks**

a) List general constraints in design of Man Instrumentation System. (8 points.)

b) Draw the constructional sketch of LVDT & describe its working principal

c) Draw the constructional diagram of RTD. Also draw and describe characteristics of

  RTD.

Q.3 Attempt any TWO   **8 Marks**

a) List and define four dynamic characteristics of transducer.

b) Describe working of piezoelectric transducer for pressure measurement with a neat

  labeled diagram.

c) Describe radiation thermometry with a neat labeled diagram.

Sample Test Paper-II

Course Name : Diploma in Medical Electronics

Course Code : MU

Semester   : Fourth

Subject Title : Biosensors

Marks   : 25

17442

Time: 1 hour

Instructions:

1. All questions are compulsory

2. Illustrate your answers with neat sketches wherever necessary

3. Figures to the right indicate full marks

4. Assume suitable data if necessary

5. Preferably, write the answers in sequential order

Q1. Attempt any THREE   **9 Marks**

a. State the basic requirements of a bioamplifier (Any six)

b. Give classification of electrodes used to measure bioelectric events. Give application of each electrode.

c. Draw a neat labeled sketch of PO_2 electrode.

d. Describe the principle of electromagnetic blood flow meter with the help of Faraday's law of electromagnetic induction.

Q2. Attempt any TWO   **8 Marks**

a. Describe metal microelectrode with a neat labeled diagram.

b. Draw a neat labeled sketch of PCO_2 electrode describe its working.

c. Describe the principle of thermal convection. How is it used for blood flow measurement?

Q3. Attempt any TWO   **8 Marks**

a. Draw diagram of Instrumentation amplifier. List four applications.

b. Describe blood glucose sensor with neat diagram.

c. Describe electrolyte electrode interface with neat diagram. `

Sample Question Paper

Course Name : Diploma in Medical Electronics

Course Code : MU

Semester   : Fourth

17442

Subject Title : Biosensors

Marks   : 100   Time: 3 hour

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Preferably, write the answers in sequential order

Q.1 A) Attempt any SIX   **12Marks**

   a) Define Biometrics. List any two biosensors.

   b) Give four objectives of Man instrumentation system.

   c) State Faraday's law of electromagnetic induction.

   d) List two types of thermocouples. Also give materials used for each type.

   e) Draw a labeled diagram of PCO_2 electrode.

   f) State function of electrode gelly.

   g) State Seebeck effect.

   h) Draw a neat diagram of radiation thermometry.

Q.1B) Attempt any TWO   **8Marks**

   a) Give classification of transducers based on process used, physical or chemical principle

      used and applications.

   b) Describe working of capacitive pressure transducer.

   c) State the basic requirements of a bioamplifier (any eight points)

Q.2 Attempt any FOUR   **16Marks**

   a. Give classification of electrodes used to measure bioelectric event. Give application of each electrode.

   b. Draw the constructional diagram of RTD. State any two materials used for construction of RTD.

   c. Describe any four factors that should be considered while designing any Man instrumentation system.

   d. Describe Indicator dilution method of flow measurement.

   e. An unbounded strain gauge has a resistance of 4000 Ω and gauge factor of 3.6, what will be the change in resistance due to 2000 microstrain?

   f. Describe Blood glucose sensor with a neat labeled diagram.

Q.3 Attempt any FOUR   **16 Marks**

   a) Define Bioacoustics signals, Biomechanical signals, Biochemical signals, Bio-magnetic signals.

   b) Draw a Bridge amplifier. State its importance.

   c) Describe electrode skin interface with a neat labeled diagram.

   d) List four advantages of thermistor and over RTD each

   e) Describe how pressure can be measured using LVDT with a suitable diagram.

   f) Describe electrode used to measure partial oxygen pressure in the blood with a suitable diagram.

Q.4 Attempt any FOUR   **16Marks**

   a) What is Plethysmography? Describe how it is useful to record blood volume.

   b) Why output voltage is not zero at null displacement in characteristics of LVDT justify.

   c) Describe internal electrodes used for measurement of bio-potential with the help of diagram.

   d) Describe working of photomultiplier tube with a neat diagram.

   e) Distinguish between Active and Passive transducer.

   f) Describe importance of measuring electrode and reference electrode.

Q.5 Attempt any FOUR   **16Marks**

   a) Draw a labeled diagram of C shape Bourdon tube and bellows used for pressure measurement.

   b) Describe flow measurement by thermal convection.

   c) With help of a neat labeled diagram give constructional details of the GaAS semiconductor temperature probe.

   d) Describe how instrumentation amplifier can be used to reduce noise present in an ECG signal.

   e) Define linearity, accuracy, sensitivity and hysteresis with respect to measurement system.

   f) Draw block diagram of Man Instrumentation System. State the role of transducer in that diagram.

Q.6 Attempt any FOUR   **16Marks**

   a) Describe how potentiometer can be used for the measurement of linear and angular displacement with suitable diagrams.

   b) A platinum RDT has a resistance of 100 Ω at 25°C.

      i) Find its resistance at 65°C. The resistance temperature coefficient of platinum is 0.00392 Ω/Ω °C.

      ii) If the RTD has resistance of 150 Ω, calculate the temperature.

   c) Describe ultrasonic flow meter with a neat labeled diagram.

   d) Describe pH meter with a neat labeled diagram.

   e) What are motion artifacts? How it can be reduced?

   f) Describe how wheatstone's bridge can be used for temperature measurement with a suitable diagram.