Sem-IV Transducers in Biomedical Instr

15 : 2ndExm.09-AM(b)

Biom 9/12/09

Con. 5308-09. (OLD COURSE) SP-8332

(3 Hours) [Total Marks : 100

N.B.: (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions from the remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.

1. Write short notes on any **four** of the following :— **20**
   (a) Piezoelectric transducers
   (b) ECG, EEG and EMG electrodes
   (c) Fibre optic pressure sensor
   (d) First order system
   (e) Radiation Thermopile
   (f) PO_2 electrode.

2. (a) Explain with suitable diagram the construction and working of LVDT. **10**
   (b) Explain the principle and working of electromagnetic blood flow meter. **10**

3. (a) What is basic principle of strain gauge ? Define gauge factor and derive an expression for gauge factor. **10**
   (b) Draw the block diagram of generalised instrumentation system and explain each block in detail. **10**

4. (a) Define following static characteristics of an instrument with suitable example :— **10**
      (i) Accuracy
      (ii) Resolution
      (iii) Reproducibility
      (iv) Precision
      (v) Sensitivity.
   (b) What is Doppler shift ? With the help of block diagram, explain how ultrasonic transducers are used to measure blood flow. **10**

5. (a) Draw and explain the electrical equivalent circuit of electrode-skin interface. **10**
   (b) Define pH. Describe the transducer system used to measure pH of blood. **10**

6. (a) Explain with neat sketches the laws governing thermocouples. **10**
   (b) What is Fick's principle ? Explain rapid injection indicator dilution method for measuring cardiac output. **10**

7. (a) What is thermistor ? How thermistors are classified on the basis of temperature resistance characteristics ? **5**
   (b) What is half cell potential ? How it is measured ? **5**
   (c) How is capacitive transducer used to measured displacement ? **5**
   (d) Draw and explain working principle of RTD. **5**
