SE (Bio med) (Sem. IV) Dec 08 (R)
Transducers in Biomedical Instrumentation

5245-08. 2/12/09

RC-6146

(3 Hours) **[Total Marks : 100**

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

a) With the help of suitable diagram, explain thermocouple and its underlying effects. **5**
b) What is motion artifact ? How it is minimized ? **5**
c) What is piezo electric effect ? State any two applications of ultrasound transducer in biomedical field. **5**
d) How is capacitive transducer used to measure displacement ? **5**

(a) What is the different between static and dynamic characteristics of transducers ? Define four static characteristics. **10**
(b) Explain First order system and Second order system with suitable examples. **10**

(a) What is basic principle of strain gauge ? Draw suitable diagram of bounded and un bounded strain gauges and state their applications. **10**
(b) A four wire unbounded strain gauge system is connected to a wheatstone bridge. Resistance of each of the active arm is 1·5 Ω. If the applied stress has caused 2% change in the gauge length. calculate the bridge output. Given the bridge excitation voltage is 5 V d.c. and gauge factor is 2. **5**
(c) What are the pressure transducers ? How is diaphragm used to measure pressure ? **5**

(a) What is Doppler Shift ? Explain with suitable diagram Transit Time ultrasonic Flow measurement. **10**
(b) What is basic principle of electromagnetic blood flow meter ? Draw and explain electromagnetic blood flow meter. **10**

(a) What is half cell potential ? How it is measured ? What is over potential and what are the types of over potential ? **10**
(b) Explain polarization of electrode ? What is polarizable and non-polarizable electrodes ? Give chemical reactions involved in silver-silver chloride electrode. **10**

(a) How fibre optics work ? Explain how it can be applied for the measurement of pressure. **10**
(b) What is impedance Plythesmography ? Give it's application and explain. **10**

Write short notes on any **four** of the following :– **20**
(a) Microelectrodes
(b) L.V.D.T.
(c) ISFET
(d) ECG, EEG and EMG electrodes
(e) Thermisters.