(3 Hours) [Total Marks : 100

1 Question No. **1** is **compulsory**.
2 Attempt any **four** questions out of remaining **six** questions.
3 Assume **any** data required.
4 **Figures** to the **right** indicate **full** marks.
5 Use **legible** handwriting. Use **blue/black** ink.

1 a What is the working principle of thermocouple? State four laws related to Thermocouple? 5

b What is thermistor? How thermistors are classified on the basis of temperature resistance characteristics? 5

c How is capacitive transducer used to measure displacement? 5

d What are the pressure transducers? How is a diaphragm is used to measure pressure? 5

2 a Differentiate between first order system and second order system with Suitable examples. 10

b What is difference between static and dynamic characteristics of transducers. Define four static characteristics. 10

3 a What is basic principle of strain gauge? Draw suitable diagrams of bounded and un-bounded strain gauges and state their applications. 10

b What is basic principle of Electromagnetic blood flow meter? Draw and label constructional diagram of electromagnetic blood flow meter. 6

c What is piezoelectric effect? State any two applications of ultrasound transducer in biomedical field. 4

Q4 a What is half cell potential? How is it measured? What is overpotential What are the types of overpotential?

b What is polarization of an electrode?What is polarizable and non-polarizable electrodes?Give chemical reactions involved in silver-silver chloride electrode.

Q5 a What are the types of biopotential electrodes?Draw neat labeled diagrams of any four biopotential electrodes.

b What is motion artifact? How is it minimized?

c What is Ph of a solution? Classify the solutions on the basis of Ph value?

Q6 a What is ISFET? What is it's working principle? How it is constructed? What are the applications of ISFET in biomedical field?

b Give constructional details of LVDT ? What is significance of phase sensitive detector in LVDT? Give one biomedical application of LVDT

Q7 a What is Fick's Principle?Explain how rapid injuction dilution method is used for measurement cardiac output.

b What is impedance plythesmoraphy? Give it's applications and explain.