313327

12526

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answer with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any <u>FIVE</u> of the following: **10**

a) Define passive transducers with example.

b) List any two sources of generation of biomedical signal.

c) State the working principle of Diaphragm.

d) Give the names of any two sensors used for biochemical measurement.

e) State any one flow measurement technique.

f) Write any two applications of chemical transducers.

g) List any two functions of signal conditioning circuits.

P.T.O.

Marks

2. Attempt any THREE of the following: **12**

a) Describe the working of suction electrode with diagram.

b) Draw and state the biomedical applications for spiral and bourdon (twisted) tube.

c) Explain the working of blood glucose sensor.

d) Define signal conditioning. List the various techniques used in signal conditioning.

3. Attempt any THREE of the following: **12**

a) Give the impact of any four constraints while designing the MIS.

b) Explain Piezoelectric transducer with its sketch.

c) State and explain the need of bio-amplifier.

d) Describe the working of rotameter with neat diagram.

4. Attempt any THREE of the following: **12**

a) With neat sketch, give the constructional details of following:–

i) Metal disc electrode

ii) Disposable electrode.

b) Compare thermistor and thermocouple.

c) Draw and explain working principle of PO_2 biochemical sensor.

d) Suggest the appropriate transducer for blood flow measurement and justify.

e) Describe the functions of filters and impedance matching circuits in signal conditioning.

Marks

5. Attempt any TWO of the following: **12**

a) i) Compare polarisable and non-polarisable electrodes. (Any four points)

ii) Identify the type of electrode used in ECG and EMG.

b) Explain pH measurement of blood and urine using ISFET.

c) A thermistor has a resistance of 10kΩ at 25°C and 100Ω at 100°C. Calculate the voltage drop across the thermistor (Vout) for 25°C and 100°C when connected in series with a 1 kΩ resistor across a 12 V power supply.

6. Attempt any TWO of the following: **12**

a) Explain action potential and resting potential with neat diagram.

b) With reference to LVDT :–

i) State its working principle

ii) State its advantages

iii) State its applications.

c) Categories following transducers into active/passive and primary/ secondary.

i) Thermocouple

ii) Bourdon gauge

iii) LVDT

iv) PCO_2 sensor

v) Plethysmography

vi) Blood Glucose sensor.