22348

11920

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 answers 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.

Marks

1. Attempt any FIVE of the following : **10**

(a) State any two biomedical signals with example.

(b) State any two constraints in design of MIS.

(c) Draw any two types of Bourdon tube with label.

(d) State the principle of thermocouple.

(e) Describe the working principle of Piezoelectric transducers.

(f) State the chemical reaction for PCO_2 electrode.

(g) List any two surface electrodes.

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

(a) Give the classification of transducer with example of each.

(b) Describe with neat sketch construction and working of angular potentiometer.

(c) Describe photomultiplier tube with a labelled diagram.

(d) Explain the flow measurement by indicator dilution method with neat diagram.

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

(a) Differentiate between active transducers and passive transducers.

(b) Describe with a neat diagram working of LVDT for displacement measurement.

(c) State two types of thermistor and describe it.

(d) Draw a neat sketch of pH electrode and describe its working.

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

(a) Draw neat block diagram of Man Instrumentation System and describe each block.

(b) Explain the working principle of capacitive transducer with neat diagram. State its two applications.

(c) Describe the radiation thermometry with neat diagram. Give its applications.

(d) Draw neat diagram of plethysmography and describe its workking.

(e) Suggest an electrode for measurement of ECG signal. Describe construction of any one electrode.

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

(a) Describe measurement of pressure using LVDT with neat experimental setup.

(b) Differentiate between Thermistor and RTD. (any six points)

(c) Suggest proper transducer for following application :

(i) measurement of flow of conducting liquid.

(ii) measurement of % of sugar in blood.

Also explain working principle of each transducer.

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

(a) Describe with neat labelled diagram PCO_2 electrode and state its application.

(b) Describe electrode skin interface with neat diagram and equivalent circuit diagram.

(c) A platinum RTD has a resistance of 110 Ω at 30 °C

(i) Find its resistance at 75 °C. The resistance temperature co-efficient of platinum is 0.00392/°C.

(ii) If the RTD has a resistance of 160 Ω, calculate the temperature.
