

# 17442

11819

**3 Hours / 100 Marks**

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data, if necessary.
- (5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. a) **Attempt any SIX of the following:** **12**
- (i) Define the term Biometrics.
  - (ii) List different types of bourdon tube.
  - (iii) Draw the neat diagram of suction cup electrode.
  - (iv) Draw the phase sensitive amplifier.
  - (v) List any two chemical transducer.
  - (vi) Define thermocouple.
  - (vii) List any two sources of biomedical signals.
  - (viii) Give the piezoelectric effect.
- b) **Attempt any TWO of the following:** **8**
- (i) List any four static characteristics.
  - (ii) Explain working principle of LVDT with neat diagram.
  - (iii) Describe electrode used to measure hydrogen ion concentration of blood with neat diagram.

P.T.O.

- 2. Attempt any FOUR of the following:** **16**
- a) Draw constructional sketch of RTD and explain it.
  - b) Explain Ion-sensitive field effect transistor (ISFET)
  - c) Draw medical instrumentation system and state the importance of signal conditioning unit.
  - d) Describe working of photomultiplier tube.
  - e) Explain working of bonded strain gauge with neat diagram.
  - f) List any four dynamic characteristics.
- 3. Attempt any FOUR of the following:** **16**
- a) Draw constructional sketch of radiation thermometry.
  - b) Classify the transducer based on :
    - (i) Process used and
    - (ii) Application
  - c) Explain the working of plethysmography with neat diagram.
  - d) Compare RTO and thermistor (any four)
  - e) Draw the bridge amplifier and give it's importance.
  - f) Define polarizable and non-polarizable electrode.
- 4. Attempt any FOUR of the following:** **16**
- a) List basic objective of an instrumentation system.
  - b) Describe working principle of pressure measurement using C-shape bourdon tube.
  - c) List different types of thermocouple and give its material.
  - d) Describe reference electrode with neat diagram.
  - e) Draw circuit diagram of instrumentation amplifier using three op-amp.
  - f) List internal electrode and draw it's construction sketch.

- 5. Attempt any FOUR of the following:** **16**
- a) State the application of blood glucose sensor and draw its neat sketch.
  - b) List any four manufacturing materials used for piezoelectric transducer and bellows.
  - c) Compare  $PO_2$  and  $PCO_2$  electrode with respect to construction diagram and application.
  - d) List the different temperature measurement unit (any four)
  - e) Describe factors that should be considered while designing man instrumentation system (any four)
  - f) Describe ultrasonic flow transducer with neat sketch.
- 6. Attempt any FOUR of the following:** **16**
- a) Explain displacement measurement using linear and angular potentiometer.
  - b) Give the specification of man-instrumentation system.
  - c) Explain with neat diagram fibre optic sensor.
  - d) Explain any two microelectrodes with neat diagram.
  - e) List any two advantages of thermistor and give the materials of PTC type thermistor.
  - f) Describe electrode - electrolyte interface with neat diagram.
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