

17442

21718

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) List any 2 sources of biomedical signal.
 - ii) Write 4 constraints in design of medical instrumentation system.
 - iii) Write 2 advantages of thermocouple.
 - iv) Draw characteristics of NTC and PTC thermistor.
 - v) State 2 advantages of RTD.
 - vi) Draw diagram of PCO₂ electrode.
 - vii) State principle of thermal convection
 - viii) List different surface electrodes.
- b) Attempt any TWO of the following: 8
- i) List 4 dynamic characteristics of transducer.
 - ii) Draw and explain LVDT.
 - iii) Describe bridge amplifier with neat diagram.

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- 2. Attempt any FOUR of the following:** **16**
- a) Describe metal micro electrode with neat diagram.
 - b) Write four advantages of optical fibre sensor
 - c) Draw and describe man instrumentation system.
 - d) Draw and explain electromagnetic flow transducer.
 - e) An unbonded strain guage has resi of $5K\Omega$ and guage factor of 3.6, what will be change in resistance due to 3000 micro strain?
 - f) Draw and explain PH electrode.
- 3. Attempt any FOUR of the following:** **16**
- a) Define
 - i) Biomagnetic signal
 - ii) Bio chemical signal
 - iii) Bio mechanical signal
 - iv) Bio acoustic signal
 - b) Draw and explain instrumentation amplifier.
 - c) Describe polarizable and non polarizable electrodes.
 - d) List 4 advantages of thermistor.
 - e) Draw and explain piezoelectric transducer.
 - f) Describe blood glucose sensor with diagram.
- 4. Attempt any FOUR of the following:** **16**
- a) Draw and explain ultrasonic flow transducers.
 - b) Draw C shaped bourdon tube and explain it.
 - c) Describe electrode electrolyte interface with neat diagram.
 - d) Describe radiation thermometry with neat diagram.
 - e) Differentiate between active and passive transducer.
 - f) Draw and explain PO_2 electrode.

5. Attempt any FOUR of the following:**16**

- a) Draw diagram of flat, corrugated, capsule and bellow type diaphragm.
- b) Explain flow measurement by indicator dilution method.
- c) What is seebeck effect. Explain working principle of thermocouple.
- d) Draw and explain phase sensitive amplifier.
- e) Classify transducers on physical or chemical principle used.
- f) Write specifications of MIS.

6. Attempt any FOUR of the following:**16**

- a) Explain the principle of capacitive transducer.
 - b) Draw the construction of RTD and explain it.
 - c) Draw and explain the concept of plethysmography.
 - d) Draw and explain reference electrode.
 - e) Describe internal electrodes with neat diagram.
 - f) Draw and explain photo multiplier tube.
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