

22348

22232

3 Hours / 70 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.

Marks

1. Attempt any FIVE of the following :

10

- (a) List biomedical signals (any four).
- (b) Define :
 - (i) Active transducer
 - (ii) Passive transducerwith one example each.
- (c) Draw neat diagram of LVDT transducer.
- (d) List one medical application of each :
 - (i) Strain gauge transducer
 - (ii) Capacitive transducer
- (e) Draw the Characteristics of NTC & PTC Thermistor.
- (f) Give any four examples of chemical transducer.
- (g) Classify briefly bio-potential electrodes.



2. Attempt any THREE of the following : 12

- (a) Give the factors to be consider while designing MIS.
- (b) With the help of net diagram give working of bonded strain-gauge.
- (c) Compare RTD & thermocouple on the basis of
 - (i) Constructional dia.
 - (ii) Working principle
 - (iii) Material used
 - (iv) Temp. range
- (d) With the help of neat diagram give working of ultrasonic flow transducer.

3. Attempt any THREE of the following : 12

- (a) Give brief classification of transducers.
- (b) Draw capacitive transducer & give it's working.
- (c) For diagnosing purpose of breast cancer which technique of temperature measurement is used ? Name it & give it's working.
- (d) With neat diagram given working of PO₂ electrode.

4. Attempt any THREE of the following : 12

- (a) Draw labelled diagram of man-instrumentation system.
- (b) List types of pressure transducer and give application of each type.
- (c) Name the temperature sensor used to measure body temp. (any one) & give it's working.
- (d) Give significance of plethysmography.

- (e) Draw & label :
- (i) Metal plate electrode
 - (ii) Metal disc electrode
 - (iii) Needle electrode
 - (iv) Micro electrode

5. Attempt any TWO of the following :

12

- (a) Define gauge factor for strain gauge. Give mathematical expression. Find gauge factor of a strain gauge if :
- (i) Incremental change in resistance due to stress is $1 \text{ K}\Omega$.
 - (ii) Resist of unstretched wire is 500Ω .
 - (iii) Change in length is 2 mm .
 - (iv) Unstretched wire length is 10 mm .
- (b) Draw & explain working of photomultiplier tube.
- (c) Suggest one chemical sensor used to find out sugar level of the body. Draw neat diagram of same & give its working.

6. Attempt any TWO of the following :

12

- (a) A platinum RTD has a resistance of 100Ω at 25°C . Find :
- (i) Its resistance at 75°C . The resistance temp. co-efficient of platinum is $0.00392/^\circ\text{C}$.
 - (ii) If the RTD has a resistance of 150Ω , calculate the temperature.
- (b) With the help of neat diagram give working of flow measurement by indicator dilution method.
- (c) (i) Give concept of electrode electrolyte interference.
- (ii) Give functions of gelly applied to attach electrode to the body.
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