

22348

21819

3 Hours / 70 Marks

Seat No.

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- 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.

Marks

1. Attempt any FIVE of the following :

10

- (a) Describe any two dynamic characteristics of instrument.
- (b) Define transducer & give one example of it.
- (c) State any two applications of inductive transducer.
- (d) State any two applications of piezoelectric transducer.
- (e) State Peltier effect.
- (f) State the chemical equation for PCO_2 electrode.
- (g) State any two functions of electrode jelly used to place an electrode on the patient's body.

2. Attempt any THREE of the following :

12

- (a) Explain the concept of primary & secondary transducer with the help of suitable examples & diagram.

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P.T.O.

- (b) Draw a neat sketch of piezoelectric transducer & explain its working.
- (c) Compare RTD & thermocouple on the basis of working principle, material used & temperature range.
- (d) Draw a diagram of metal plate electrode & describe its working.

3. Attempt any THREE of the following : 12

- (a) Draw the block diagram of Man Instrumentation System (MIS) & explain any two blocks.
- (b) Draw the diagram of LVDT and explain its working.
- (c) Describe the working of fibre optic temperature sensor with neat sketch.
- (d) Describe PO₂ electrode with suitable diagram.

4. Attempt any THREE of the following : 12

- (a) Identify different sources of biomedical signals with respect to heart, brain, muscle & describe it.
- (b) Draw bonded & unbonded strain gauge & describe working of it.
- (c) Draw neat sketch of radiation thermometry. Write its two advantages & two applications.
- (d) Describe the concept of plethysmography.
- (e) Describe the needle electrode with neat diagram.

5. Attempt any TWO of the following : 12

- (a) An unbonded strain gauge has a resistance of 6000 Ω and gauge factor of 5.6, what will be the change in resistance due to 2000 micro strain ?

- (b) With the help of a neat labelled diagram, give constructional details of photomultiplier tube and describe its working.
- (c) Suggest an instrument used to measure blood flow in human body. Describe its construction and working along with a neat sketch.

6. Attempt any TWO of the following :

12

- (a) State any four units of temperature. A platinum RTD has a resistance of 100Ω at 25°C .
 - (i) Find its resistance at 85°C . The resistance temperature co-efficient of platinum is 0.00392 per degree Celsius.
 - (ii) If the RTD has a resistance of 150Ω , calculate the temperature.
 - (b) Describe the concept of blood glucose sensor in detail.
 - (c) Describe three types of microelectrodes with their suitable diagrams.
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