

17414

21819

3 Hours / 100 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.

Marks

1. Attempt any TEN of the following :

20

- (a) Define :
 - (i) Accuracy
 - (ii) Precision
- (b) List out any 4 dynamic characteristics.
- (c) State the principle of calibration.
- (d) Define :
 - (i) Repeatability
 - (ii) Reproducibility
- (e) Give two examples of Active and Passive transducer.
- (f) Define Gauge factor.
- (g) State seeback effect.

- (h) Define :
 - (i) Stress
 - (ii) Strain
- (i) Draw neat labelled pin diagram for IC 741
- (j) Define :
 - (i) CMRR
 - (ii) Slew Rate
- (k) State the necessity of signal conditioning.
- (l) Draw pin diagram of IC LF398.

2. Attempt any FOUR of the following :

16

- (a) Derive an expression for unit step response of first order system. Draw its response curve.
- (b) Define :
 - (i) Speed of response
 - (ii) Fidelity
 - (iii) Dynamic error
 - (iv) Settling time
- (c) Define transducer. Give the classification of transducer with one example each.
- (d) Define strain gauge. State different types of strain gauge.
- (e) Draw the circuit diagram of integrator and differentiator using Op-Amp.
- (f) Define thermocouple. State its working.

- 3. Attempt any FOUR of the following :** **16**
- (a) Draw the block diagram of instrumentation system and state the function of each block.
 - (b) Distinguish between sensitivity and resolution.
 - (c) Draw the diagram of RTD and state its working principle.
 - (d) Describe working of an electromagnetic flow meter with neat diagram.
 - (e) Draw constitutional diagram of LVDT. State its working principle.
 - (f) State the four applications of instrumentation amplifier.
- 4. Attempt any FOUR of the following :** **16**
- (a) Compare between primary transducer and secondary transducer.
 - (b) List the two materials each for core of LVDT, strain gauge, diaphragm and thermistor.
 - (c) Compare open loop and closed loop configuration of Op-Amp.
 - (d) Compare RTD and thermistor.
 - (e) Define DAS. Draw diagram for single channel DAS.
 - (f) Draw instrumentation amplifier in three Op-Amp.
- 5. Attempt any FOUR of the following :** **16**
- (a) Draw and explain ratio metric conversion in DAS.
 - (b) Draw and explain the working of successive approximation type analog to digit converter.
 - (c) Differentiate between single channel DAS and multichannel DAS.
 - (d) Draw and explain force measurement using load cell.
 - (e) Draw and explain rotary motion encoder using optical rotary encoder.
 - (f) Differentiate between volumetric flow rate and mass flow rate.

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

- (a) Draw and explain working of photoelectric transducer.
 - (b) Draw and explain the working of turbine flow meter.
 - (c) List any six criteria for selecting a proper transducer for an application.
 - (d) Explain how level can be measured using capacitive method.
 - (e) Draw and explain working of pressure measurement using diaphragm type transducer.
 - (f) Describe the resistive method for liquid level measurement. Write its two advantages.
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