



17414

11819

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.*
 - (5) *Assume suitable data, if **necessary**.*
 - (6) *Use of Non-programmable Electronic Pocket Calculator is **permissible**.*
 - (7) *Mobile Phone, Pager and any other Electronic Communication devices are **not** permissible in Examination Hall.*

Marks

1. Attempt **any ten** of the following :

20

- a) Define :
 - i) Range
 - ii) Span of instruments
- b) Define :
 - i) Sensitivity
 - ii) Linearity
- c) Define the terms :
 - i) Calibration
 - ii) Traceability
- d) Difference between repeatability and reproducibility (any two points).
- e) Define the static characteristics :
 - i) Resolution
 - ii) Drift.
- f) State the effect of dead zone on instruments.
- g) Define transducers. Give their two examples.
- h) Differentiate between active transducers and passive transducers (any two points).
 - i) Define :
 - i) Strain gauge
 - ii) Gauge factor
- j) List two advantages of platinum resistance thermometer.
- k) Define :
 - i) CMMR
 - ii) Slew rate.
- l) Draw the pin diagram of IC741 OpAmp.

P.T.O.



2. Attempt **any four** of the following : 16
- a) Explain in brief generalized instrumentation system operation with its block diagram.
 - b) Define :
 - i) Accuracy
 - ii) Precision
 - iii) Measurement uncertainty
 - iv) Tolerance.
 - c) Draw and explain the working principle of LVDT. List its applications.
 - d) Draw and explain Hall effect transducer.
 - e) Draw the Op-Amp based circuit diagram of Adder and explain its operation.
 - f) Compare between inverting and non-inverting-closed loop op-amp ckts.
3. Attempt **any four** of the following : 16
- a) Draw and explain the responses of first order instruments to step and ramp inputs.
 - b) Explain in brief self-heating effect and list the electrical transducers in which this effect is occurred.
 - c) Draw and explain the operation of four resistance strain gauges, based diaphragm type pressure transducer.
 - d) Draw and explain the temperature resistance characteristics of NTC-type and PTC-type thermistors.
 - e) With the help of circuit diagram, explain the working of Op-amp based integrator. State its output voltage equation.
 - f) Explain in brief the selection criteria of transducers for particular application (any four points).
4. Attempt **any four** of the following : 16
- a) Draw and explain 'C' type Bourdon tube.
 - b) Draw and explain the working principle of electromagnetic flow meter and state its applications.
 - c) Draw the circuit diagram of instrumentation amplifier (using 3 op-amps). State its two advantages over conventional amplifier.
 - d) Draw and explain the block diagram of generalized Data Acquisition System (DAS).
 - e) Compare between single-channel DAS and multi-channel DAS.
 - f) Draw and explain the either circuit diagram or block diagram of instrumentation system used for force measurement using load cell.



5. Attempt **any four** of the following :

16

- a) State the seeback and peltier effects.
- b) Draw and explain the working of liquid measurement process using capacitive type level transducer.
- c) Compare between active and passive filters (any four points).
- d) Draw and explain the working principle of Digital to Analog Converter (DAC).
- e) Draw the three-wire and four-wire configurations of RTDs.
- f) Draw and explain the working of turbine flow meter.

6. Attempt **any four** of the following :

16

- a) Draw and explain the thermocouples laws of intermediates metals and temperature.
 - b) State the advantages and disadvantages of LVDT (2 points each).
 - c) Draw and explain the operation of any technique of Analog to Digital Converters (ADCs).
 - d) List the types of load cells. Explain any one type with neat diagram.
 - e) Draw and explain the operation of speed measurement using non-contact type transducer.
 - f) Draw and explain the instrumentation system used measurement of liquid level using resistive sensor.
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