17414

11718

3 Hours / 100 Marks Seat No. | | | | | | | | |

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) Sensitivity and

ii) Resolution.

b) State the static and dynamic characteristics of instruments.

c) Define linearity of instrument and draw linearity curve.

d) Differentiate between zero drift and sensitivity drift (Any two points).

e) Define dynamic error and settling time.

f) Draw the calibration chain.

g) Define stress and strain.

h) State the working principle of thermistors.

i) Define gauge pressure and differential pressure.

Marks

j) Give any two advantages of platinum resistance thermometer.

k) Define :

i) Input offset voltage

ii) Differential input resistance.

l) Draw the circuit diagram of unity gain amplifier and state its use.

2. Attempt **any four** of the following : **16**

a) Draw a neat block diagram of generalized instrumentation system and state function of each block.

b) Compare between accuracy and precision (any four points).

c) Explain in brief the working principle of strain gauge. Define gauge factor and list out types of strain gauges.

d) State the working principle and specifications of LVDT.

e) Draw and explain the Op-amp based subtracter.

f) Draw the circuit diagrams of inverting and non-inverting amplifiers and write their voltage gain equations.

3. Attempt **any four** of the following : **16**

a) Draw and explain the response of first-order and second-order instruments to the step input.

b) State the Seeback and Peltier effect of thermocouples.

c) Differentiate between mass flow rate and volumetric flow rate (Any four points).

d) State Hall effect. Explain in brief operation of Hall effect transducer with its suitable applications.

e) Draw and explain the circuit diagram of differentiator.

f) List any six criteria for selecting a proper transducer for an application.

Marks

4. Attempt **any four** of the following : **16**

a) Draw and explain the operation of pressure transducer having diaphragm as a primary sensor and four strain gauges as secondary sensors.

b) Draw and explain the working principle of turbine type flow meter. Mention its application area.

c) Draw the circuit diagram for instrumentation amplifier using three op-amps. State its advantages and applications.

d) Draw and explain neat labelled block diagram of generalized Data Acquisition System (DAS).

e) List the different techniques used for signal conditioning in DAS. Explain in brief any one signal conditioning technique.

f) Draw and explain the force or weight measurement using load cell.

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

a) State the working principles of RTD. List RTD fabrication materials. Draw either three-wire or four-wire RTD measurement configurations.

b) Draw and explain the operation of ultrasonic level measurement.

c) Draw and explain the working of Schmitt trigger.

d) List the types of ADCs. Explain working principle of any one type of ADC.

e) Draw and explain the displacement measurement system using LVDT.

f) Compare between RTDs and thermistors (any four points).

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

a) What is encoder ? Draw and explain a optical encoder operation for rotary motion measurement.

Marks

b) Draw and explain in brief speed measurement using non-contact type transducer.

c) With the help of neat circuit diagram, explain the working principle of Digital to Analog Converters (DACs).

d) Draw and explain the measurement of torque using torque cell.

e) Draw and explain in brief liquid level measurement using resistive sensor.

f) Explain in brief AC current RMS indication using Hall effect transducer.
