17434

15162

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. a) **Attempt any SIX of the following:** **12**

(i) Classify the temperature measuring transducers.

(ii) Draw the neat labelled block diagram of Instrumentation system.

(iii) List different level measuring methods.

(iv) State Seeback effect and Peltier effect.

(v) Identify active and passive transducers from the following:

1) RTD

2) Strain gauge

3) Thermocouple

4) Piezoelectric transducer

Marks

(vi) Draw neat labelled diagram for pressure measurement using Bourdon tube and LVDT.

(vii) Define Laminar and Turbulent flow on the basis of Reynolds number.

(viii) Define absolute humidity and relative humidity.

b) **Attempt any <u>TWO</u> of the following:** **8**

(i) State selection criterion of transducers.

(ii) Draw and describe working of U-tube manometer.

(iii) Classify thermocouples on the basis of

1) Type

2) Material used

3) Temperature range

4) Sensitivity

2. Attempt any <u>FOUR</u> of the following: **16**

a) List types of temperature scales. Write the ice point and boiling point of pure water in each scale.

b) Draw the construction and explain the working of photoelectric pick-up type speed measuring transducer.

c) Explain working of radiation type level measuring transducer with its constructional diagram.

d) Compare orifice plate and venturi tube with reference to

(i) Working principle

(ii) Cost

(iii) Permanent pressure loss

(iv) Maintenance

e) Define active transducer and passive transducer. Give two examples of each.

f) Define Pressure. Give the detailed classification of pressure measuring devices.

Marks

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

a) Name the gases used in gas filled thermometer. Explain its working with the help of suitable diagram.

b) With the help of suitable diagram, explain how humidity is measured with dry and wet bulb thermometer.

c) Draw the diagram of Rotameter. State its four advantages and disadvantages.

d) Compare between RTD and Thermistor with respect to

(i) Size

(ii) Cost

(iii) Material of construction

(iv) Temperature range

e) Draw the construction of bourdon tube pressure gauge. List the materials used for constructing the bourdon tube. State the types of bourdon tube.

f) List different methods of float type level measurement. Which materials used for float. State the need of level measurement in industries.

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

a) Draw neat labelled diagram of inclined tube and well type manometers. Write two advantages of each manometer.

b) Draw the neat labelled diagram of Electromagnetic flow meter. Write two advantages and two applications of it.

c) With neat labelled diagram, explain working of capacitance type level measurement.

d) Draw the construction and explain the working of hair hygrometer.

e) With neat sketch state the working principle of piezoelectric transducer.

f) A pt-100 type RTD has $\alpha = 0.00392/°C$. Find its output resistance for temperature 25°C and 80°C.

Marks

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

a) What is LVDT? Draw and describe construction of LVDT.

b) State the advantages and disadvantages of photoelectric pick-up type speed measuring transducer.

c) Convert the 40°C temperature into Fahrenheit and Rankine scale.

d) Describe the working principle of ultrasonic method of level measurement with neat sketch. State any two advantages and disadvantages.

e) List different types of flow measuring transducers. Sketch the construction of venturimeter.

f) Draw the neat sketches of the following and state their working principle.
   (i) Bellows
   (ii) Capsule

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

a) Describe the working principle of optical pyrometer with neat diagram.

b) Describe the working principle of RADAR type level measurement with neat diagram.

c) Explain the working principle of Doppler type ultrasonic flow meter. Give its two advantages and disadvantages.

d) Define:
   (i) Absolute pressure.
   (ii) Gauge pressure
   (iii) Atmospheric pressure
   (iv) Vacuum pressure

e) Write two examples of
   (i) Analog transducer
   (ii) Resistive transducer
   (iii) Inductive transducer
   (iv) Digital transducer

f) Draw and explain the calibration procedure of elastic pressure gauges using dead weight tester.