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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.

(8) Use of Steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. Attempt any TEN of the following: **20**

a) Define - Accuracy and Precision.

b) Give difference between Active and Passive transducers. (Any two points.)

c) State the need of multiplexer in data acquisition system.

d) State the working principle of turbine flowmeter.

e) State-Seeback effect.

f) State any four selection criteria of transducer.

Marks

g) Draw a neat circuit diagram for measurement of temperature using RTD.

h) Draw the neat diagram for measurement of temperature using thermocouple.

i) State the working principle of turbine flow meter.

j) List out various methods of speed measurement.

k) List two applications of LVDT.

l) Give any four examples of primary and secondary transducers.

m) Define sensitivity and resolution for transducers.

n) Draw a circuit to indicate speed in analog fashion.

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

a) Draw basic block diagram of instrumentation system and explain functions of various components in it.

b) Draw a D/A converter with binary weighted resistors and an op-Amp and label it.

c) Illustrate with diagram how magnetic pickup sensor measures speed by non-contact method.

d) Describe the construction, principle of working of thermocouple. Describe thermo electric laws and their application.

e) Describe with diagram resistive method for liquid level measurement.

f) Draw constructional diagram of LVDT. State its working principle.

Marks

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

a) Give construction and working principle of RTD.

b) Draw the instrumentation amplifier with op-Amp. Give its mathematical expression for output.

c) Draw an instrumentation system for measurement of temperature using RTD, wheatstone bridge, differential amplifier and display.

d) State the objectives of data acquisition system.

e) Draw the circuit diagram of integrator and V to I converter using op-Amp.

f) What is strain gauge ? State different types of strain gauges.

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

a) Compare RTD thermistor and thermocouple.

b) Explain speed measurement by using photo electric tachometer.

c) Draw a neat diagram of generalized data acquisition system and explain each block in brief.

d) Name the different types of filters. Draw their ideal frequency responses.

e) Explain with neat sketch construction and working principle of displacement measurement by LVDT.

f) Explain the importance of signal conditioning circuit in instrumentation system for industrial application.

Marks

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

a) Differentiate between :-

(i) Repeatability and Reproductivity.

(ii) Sensitivity and Resolution

b) Explain working principle of A/D and D/A converter. List two application of each.

c) Draw construction of thermistor. State its working principle.

d) What do you mean by ratiometric and logarithmic conversion ? Where they are used ?

e) Draw the neat sketch of diaphragm. Explain its construction and working.

f) State and explain four dynamic characteristics of instrument.

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

a) Explain the temperature measurement by using thermocouple.

b) Draw and describe Ratiometric conversion.

c) Explain the liquid level measurement by using capacitive method.

d) List static characteristics. Compare precision and accuracy with example.

e) Explain Ultrasonic level measurement.

f) Derive an expression for unit step response of first order system. Draw its response curve.