

SENSORS, TRANSDUCERS & SIGNAL CONDITIONING CIRCUITS

(Electronics and Instrumentation Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Define Accuracy and Precision.
 - List various types of Sensors.
 - Describe the principle of working of LDR.
 - Describe Hall effect.
 - Define Transducer.
 - What is Negative temperature coefficient?
 - State the balance condition of Wheatstone bridge.
 - Draw the circuit diagram of Differential amplifier.
 - Brief about LVDT.
 - Define Off-Set and drift in Op-Amps.

PART – B
(Answer all five units, 5 X 10 = 50 Marks)**UNIT – I**

- 2 (a) State the following static characteristics of the measuring system. Explain in brief:
(i) Linearity. (ii) Sensitivity. (iii) Hysteresis. (iv) Calibration.
(b) With an example explain zero order system.

OR

- 3 Derive the transfer function of first order system for an electrical system and obtain the step response of the system.

UNIT – II

- 4 (a) Define Piezoresistive effect. Derive the relationship between gauge factor, Poisson's ratio and strain.
(b) What are thermistors? Draw their resistance versus temperature characteristics and compare it with RTD.

OR

- 5 (a) A strain gauge is bonded to a beam 0.1 m long and has a cross-sectional area 4 cm². Young's modulus for steel is 207 GN/m². The strain gauge has an unstrained resistance of 240 Ω and a gauge factor of 2.2. When a load is applied, the resistance of gauge changes by 0.01 Ω. Calculate the change in length of the steel beam.
(b) Demonstrate the principle of magnetoresistance with an example.

UNIT – III

- 6 With neat diagram explain the construction and principle of operation of RTD probe.

OR

- 7 Describe in detail the working principle of pressure transmitter and explain about its calibration process.

UNIT – IV

- 8 (a) Discuss the bridges used for measurement of medium resistance and derive the balance equation.
(b) Discuss briefly about Isolation amplifier.

OR

- 9 (a) Derive the Bridge sensitivity equation for wheat stone bridge.
(b) In detail explain Instrumentation amplifier with neat diagram.

UNIT – V

- 10 (a) Discuss about the precautions should be taken to make the work area less prone to ESD.
(b) Briefly discuss about Chopper amplifier.

OR

- 11 The Schering bridge balance under the following conditions: $R_1 = 10 \text{ k}\Omega$, $R_2 = 10 \text{ k}\Omega$, $C_1 = 0.5 \text{ }\mu\text{F}$ and $C_2 = 0.3 \text{ }\mu\text{F}$, the bridge is driven by a 10 kHz source. Find the unknown values of capacitance and resistance.
