INSTRUMENTATION AND PROCESS CONTROL (DIE405)
End-Term Examination-2025
Full Marks- 100

Q1: a) Fill up the blanks. 10 X 1 = (10)

i. The transducer element in a clinical thermometer is _____.
ii. A pointer scale is an example of _____ element.
iii. The output variable of a strain gauge is _____.
iv. The S.I. unit of Pressure is _____.
v. Resistance of a conductor is _____ proportional to its length.
vi. A bimetallic strip can be used to measure _____.
vii. Number of secondary coils in LVDT is _____.
viii. The resistance of a Pt-100 RTD at 0°C is _____ ohms.
ix. The final control element in an automatic water heating system is _____.
x. The principle of operation of a thermocouple is known as _____.

b) State true or false. 5 X 1 = (5)

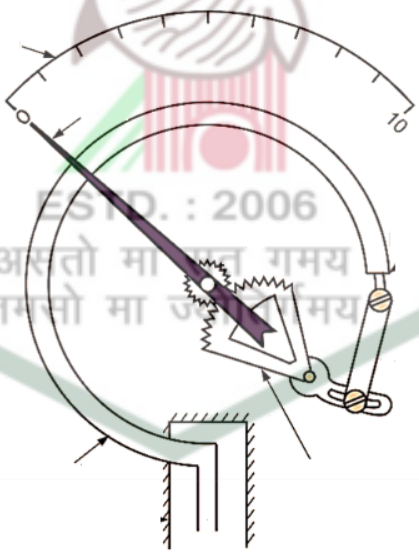
i. RTDs have negative temperature coefficient of resistance.
ii. Bourdon gauge is a null-type instrument.
iii. Thermistor is an active transducer.
iv. Working standards are used for primary calibration procedures.
v. Measuring Lag is a desirable characteristic of a measuring instrument.

c) Define the following terms- 5 X 1 = (5)

i. Static sensitivity ii. Standard iii. Accuracy iv. Range v. Dynamic error

Q2: a) What is an LVDT? Explain its working with the help of a suitable diagram. 2 + 6 = (8)

b) For the diagram given below, answer the following questions-



i. Identify and name the device. (1)
ii. What is it primarily used for? (1)
iii. State the basic functional elements of such instruments. Name the parts as shown by the arrow marks with respect to the basic functional elements and state their individual functions. 2 + 6 = (8)
iv. State the input and output parameters of this device. (2)

Q3: a) What is a transducer? State any three desirable characteristics of transducers. (4)

b) Briefly describe with examples the following types of instruments- 2 X 4 = (8)

i. Dumb and Intelligent types.
ii. Power operated and Self-generating types.

c) Differentiate between PTC and NTC type thermistors. (3)

d) A thermistor used for temperature measurement has β = 3140 K and the resistance at 27°C is 1050 Ω. If the resistance of the thermistor is measured as 2330 Ω, find the temperature. (5)

Q4: a) What is Gauge Factor? Calculate the Gauge Factor of a strain gauge which has a resistance of 250 Ω and undergoes a change of 5 Ω when a strain of 10,000 micro-strain is applied to it. 1 + 4 = (5)

b) What are the factors that affect the capacitance of a parallel plate capacitor. Explain how such capacitor can be used to measure the displacement of an object. 2 + 5 = (7)

c) Define 'error' in measuring instruments. Briefly describe the different types of error. (4)

d) State the input and output variables of the following transducers- 4 X 1 = (4)

i) Piezo-electric device ii) LDR iii) Potentiometer iv) Spring balance

Q 5: a) A certain RTD provides the following data upon measuring various temperatures-

Input	0°C	25°C	50°C	75°C	100°C
Output	110Ω	116.875 Ω	123.7.5 Ω	130.625 Ω	137.5 Ω

i) Determine the sensitivity of the device. (2)
ii) Determine the thermal coefficient of the device. (2)

b) Briefly explain the working principle of any four of the following- 4 X 4 = (16)

i. RTD
ii. Thermistor
iii. Dryers
iv. Evaporators
v. Strain Gauge
vi. Liquid-in-glass thermometer