

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5802

J

Unique Paper Code : 2512041202

Name of the Paper : Sensors and Actuators

Name of the Course : **B.Sc. (H) Instrumentation (CORE)**

Semester : II

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. 1 is compulsory.
3. Attempt Five questions in all.
4. All Questions carry equal marks.

Q.1 (a) Explain the working principle of a piezoelectric transducer. (3)

(b) Explain the principle of operation of a thermocouple. (3)

(c) Differentiate between active and passive transducers with examples. (3)

(d) Differentiate between absolute and gauge pressure with examples and applications in instrumentation. (3)

Q.2 (a) Explain the working principle of a photovoltaic sensor. (6)

(b) Discuss the role of RTD in temperature measurement and its advantages over a thermocouple. (6)

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- Q3. (a) Discuss the applications of stepper motors in automation systems. (6)
- (b) A copper wire strain gauge has a gauge factor of 2.1. If an applied strain is 400×10^{-6} . Calculate the percentage change in resistance. (6)
- Q4. (a) Explain the advantages of silicon as a sensor material. What is chemical vapor deposition, and how is it used in sensor fabrication? (6)
- (b) What is a capacitive pressure sensor? A capacitive pressure sensor has an initial capacitance of 40 pF at 1 atm. When the pressure increases, the capacitance changes to 55 pF. Determine the percentage increase in capacitance. (6)
- Q5. (a) Explain the working of Biosensor and Flow sensors. (6)
- (b) Define sensitivity, resolution, and accuracy in the context of sensors. (6)
A stepper motor has 200 steps per revolution. Calculate the step angle.
- Q6. (a) How does an LVDT measure displacement? Discuss its advantages. (6)
- (b) Discuss photolithography and its applications in microfabrication. (6)
- Q7. (a) Write a short note on any two (6+6)
- Optical Transducers
- Resistive Transducers
- Mechanical Sensors