



SCHOOL OF ELECTRONICS ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT: A2

- b) Elaborate the working principle of a pyroelectric sensor with a neat schematic and explain how it differs from a piezoelectric sensor? 5
3. Design a potentiometer-based system to monitor the liquid level in an overhead tank, including equations for output voltage vs. liquid height. 10 2 3
4. (a) Propose a sensor-based automatic lighting control for street lamps that switches ON at night and OFF during the day, using an LDR in a potential divider circuit. Justify the choice of threshold voltage. 5 2 3
- (b) Identify a suitable sensor for measuring carrier concentration and doping type in semiconductor wafers. Explain its operating principle with relevant equations. 5
5. (a) A strain gauge of $220\ \Omega$ and gauge factor 2.2 is bonded to a 12 cm steel beam. Upon loading, resistance changes by $0.015\ \Omega$. Calculate the beam's change in length and comment on whether such a change is detectable in practical applications. 5 2 3
- (b) A piezoelectric crystal ($6\text{ mm} \times 6\text{ mm} \times 1.8\text{ mm}$) is used to measure an applied force of 45 N. If voltage sensitivity is 0.055 V m/N , calculate the output voltage and discuss whether it requires amplification for digital processing. 5



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Programme Name & Branch : B.Tech ECE
Course Code and Course Name : Sensors Technology (BECE409E)
Faculty Name(s) : Prof. Zachariah C Alex, Prof. Debashis Maji
Class Number(s) : VL2025260100434, VL2025260103519
Date of Examination : 17-08-2025
Exam Duration : 90 minutes Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes
CO1: Understand the sensors, sensor materials and sensor technologies.
CO2: Utilize various RLC and self-generating sensors for measuring physical quantities

Q. No	Question	M	CO	BL
1.	a) A resistive humidity sensor exhibits the following output resistances when relative humidity (RH) is gradually increased and then decreased. Calculate the maximum hysteresis and overall sensitivity.	5	1	1

RH (%)	Resistance (Ω) - Increasing RH	Resistance (Ω) - decreasing RH
42	48,300	48,344
54	35,015	30,850
65	29,171	23,070
75	22,595	18,170
92	7,732	7,732

- b) In a Bourdon tube pressure gauge system as shown in figure 1, identify the primary and secondary transducers and explain the role of each. 5

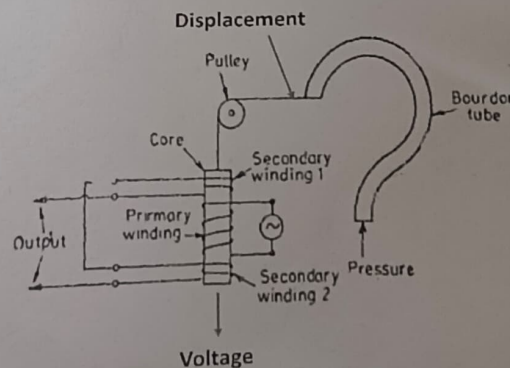


Figure 1 - Bourdon tube-based pressure gauge system

2. a) Explain how a capacitor can be used as an angle sensor. Discuss which parameter variation—plate area, separation, or dielectric constant—offers the highest sensitivity and why? 5 1 2