

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(MID SEMESTER EXAMINATION SP/2023)

CLASS: BTECH  
BRANCH: BT/CHEMICAL

SEMESTER : IV  
SESSION : SP/2023

SUBJECT: EC259 SENSORS AND TANSDUCERS

TIME: 02 Hours

FULL MARKS: 25

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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|---------|---|-----|-----|-----|
| Q.1(a)  | What do you understand by transduction principle? Explain with an example.  | [2] | CO1 | BL1 |
| Q.1(b)  | What is sensitivity? A Wheatstone bridge requires a change of $5\ \Omega$ in the unknown arm of the bridge to produce a change in deflection of 2 mm of the Galvanometer. Determine the sensitivity. Also determine the deflection factor.  | [3] | CO1 | BL1 |
| Q. 2(a) | What are the different criteria to classify transducers?  | [2] | CO1 | BL1 |
| Q. 2(b) | What do you understand by the term "True value"? Using a voltmeter, the measured value is 12.125 V, while its true value is 12 V. What is the relative error of measurement?  | [3] | CO1 | BL1 |
| Q. 3(a) | What is resistive transducer? Explain with an example.  | [2] | CO2 | BL1 |
| Q. 3(b) | A linear resistance potentiometer is 50 mm long and is uniformly wound with a wire having a resistance of 10,000 ohm. Under normal conditions slider is at the centre of the potentiometer. Find the linear displacement when the resistance of the potentiometer as measured by a wheat stone bridge for two cases is (i) 3850 ohm (ii) 7560 ohm. Are the two displacements are in the same direction? | [3] | CO2 | BL2 |
| Q. 4(a) | What is strain gauge? Differentiate between bonded and unbonded strain gauge.   | [2] | CO2 | BL1 |
| Q. 4(b) | A resistance wire strain gauge with a gauge factor 2 is bonded to a steel structural member subjected to a stress of $100\text{MN/m}^2$ . The modulus of elasticity is $200\text{GN/m}^2$ . Calculate the percentage change in the value of the gauge resistance due to the applied stress.   | [3] | CO2 | BL2 |
| Q. 5(a) | What is eddy current transducer? Explain.   | [2] | CO2 | BL1 |
| Q. 5(b) | Describe the operation of LVDT (Linear Variable Differential Transformer) for measuring displacement.   | [3] | CO2 | BL1 |

::::::27/02/2023::::::M