

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2024****Subject Code:2170913****Date:24-05-2024****Subject Name:Industrial Instrumentation****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

**MARKS**

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|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Q.1</b> | <b>(a)</b> Explain working the principle of strain gauge.                                                                                                              | <b>03</b> |
|            | <b>(b)</b> Define the following<br>1) Sensitivity 2) Drift 3) Accuracy 4) Dead Zone                                                                                    | <b>04</b> |
|            | <b>(c)</b> Define transducer & classify transducers on different basis.                                                                                                | <b>07</b> |
| <b>Q.2</b> | <b>(a)</b> What is load cell explain in brief.                                                                                                                         | <b>03</b> |
|            | <b>(b)</b> Explain working of Proving ring load cell.                                                                                                                  | <b>04</b> |
|            | <b>(c)</b> What is piezoresistive effect? Explain the term gauge factor with respect to resistance strain gauge and obtain its expression in terms of poisson's ratio. | <b>07</b> |
|            | <b>OR</b>                                                                                                                                                              |           |
|            | <b>(c)</b> Explain temperature compensation techniques used in strain gauge bridge circuit.                                                                            | <b>07</b> |
| <b>Q.3</b> | <b>(a)</b> Describe the working principle of thermocouples                                                                                                             | <b>03</b> |
|            | <b>(b)</b> Explain various principle of operation of capacitive transducer.                                                                                            | <b>04</b> |
|            | <b>(c)</b> Describe with neat sketches, the construction and working of LVDT with advantages and disadvantages                                                         | <b>07</b> |
|            | <b>OR</b>                                                                                                                                                              |           |
| <b>Q.3</b> | <b>(a)</b> Explain construction and working of Thermistor .                                                                                                            | <b>03</b> |
|            | <b>(b)</b> Discuss construction and working of a resistance potentiometer.                                                                                             | <b>04</b> |
|            | <b>(c)</b> Write a short note on Hall effect transducer.                                                                                                               | <b>07</b> |
| <b>Q.4</b> | <b>(a)</b> Define following terms.<br>a) Gauge pressure<br>b) Absolute pressure<br>c) Differential pressure                                                            | <b>03</b> |
|            | <b>(b)</b> With neat sketch, explain the working of Rotameter.                                                                                                         | <b>04</b> |
|            | <b>(c)</b> Explain how McLeod gauge measure the vacuum pressure.                                                                                                       | <b>07</b> |
|            | <b>OR</b>                                                                                                                                                              |           |
| <b>Q.4</b> | <b>(a)</b> Enlist pressure sensitive primary devices.                                                                                                                  | <b>03</b> |
|            | <b>(b)</b> Explain working of Ultrasonic flow meter.                                                                                                                   | <b>04</b> |
|            | <b>(c)</b> Write a short note on Pirani gauge for vacuum measurement                                                                                                   | <b>07</b> |

- Q.5 (a)** Draw a generalized diagram of Digital data acquisition system and explain each component briefly. **03**
- (b)** How Ultrasonic level detector is used for measurement of liquid level. **04**
- (c)** Explain construction and working of optical pyrometer. **07**
- OR**
- Q.5 (a)** Explain the construction and working of x-y Recorder **03**
- (b)** Explain the resistive methods used for level measurement. **04**
- (c)** Explain construction, principle and operation of R.T.D. with its merits and demerits. **07**

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