

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2022****Subject Code:3162005****Date:10/06/2022****Subject Name:Electro Mechanical Measurement and Instruments****Time:10:30 AM TO 01:00 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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|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Q.1 | (a) What are the different methods of measurement and explain each briefly. | 03 |
| | (b) List the different standards of measurement and describe each briefly. | 04 |
| | (c) Explain in detail the “Generalized Measurement System” with all its functional blocks with suitable example. | 07 |
| Q.2 | (a) Explain static calibration process with suitable example. | 03 |
| | (b) Explain Input-Output configuration for measuring instrument. | 04 |
| | (c) Explain first order system responses for step, ramp and sinusoidal inputs. | 07 |
| OR | | |
| | (c) Classify the various types of errors in measurement and explain each in detail with suitable example. | 07 |
| Q.3 | (a) Define: (1) Precision (2) Resolution and (3) Fidelity | 03 |
| | (b) With schematic diagram explain optical torsion meter. | 04 |
| | (c) What are the force measuring devices? Explain any one in detail with neat sketch. | 07 |
| OR | | |
| Q.3 | (a) Compare between current transformers (CT) and potential transformers. | 03 |
| | (b) Derive the expression of gauge factor for electrical resistance strain gauge in terms of Poisson’s Ratio. | 04 |
| | (c) What are the different principle of operations of capacitive transducers and prove that differential arrangement of capacitive displacement transducer gives linear response. | 07 |
| Q.4 | (a) Explain that why and when, lead wire resistance compensation is needed in RTD. | 03 |
| | (b) Derive the differential output voltage equation of quarter bridge circuit for electrical resistance strain gauge. | 04 |
| | (c) Prove that Piezo-Electric transducer is not suitable to measure static quantities. | 07 |
| OR | | |
| Q.4 | (a) Explain briefly the working principle of Stroboscope with suitable sketch. | 03 |
| | (b) Using neat sketch explain the hand speed mechanical tachometer. | 04 |
| | (c) List the torque measurement methods. Explain in detail any one with neat sketch. | 07 |

- Q.5 (a)** State the factors affecting the precision measurement of resistance with Wheatstone bridge. **03**
- (b)** Write the various applications of DC potentiometer and explain any one briefly using suitable diagram. **04**
- (c)** List the various telemetry systems and explain any one in detail with suitable diagram. **07**

OR

- Q.5 (a)** Briefly explain the principle of operation of LVDT with its schematic diagram. **03**
- (b)** With neat sketch explain torque measurement using Eddy Current Dynamometer. **04**
- (c)** How acceleration can be measured? Discuss any one approach in detail. **07**
