

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VI (NEW) EXAMINATION – WINTER 2024****Subject Code:3162005****Date:05-12-2024****Subject Name: Electro Mechanical Measurement and Instruments****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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| Q.1 | (a) Define the terms measurement and instrumentation. | 03 |
| | (b) Explain direct and indirect methods of measurement. | 04 |
| | (c) Explain in detail the classification of instruments. | 07 |
| Q.2 | (a) Enlist different standards used for measurements. | 03 |
| | (b) Compare Gross Error, systematic Error, and Random Errors. | 04 |
| | (c) Explain the “Generalized Measurement System” with all its functional blocks with suitable examples. | 07 |
| OR | | |
| | (c) Explain how the hand speed tachometer works with a sketch. | 07 |
| Q.3 | (a) What is tertiary measurement? Explain it with any one example. | 03 |
| | (b) Compare static characteristics with dynamic characteristics for instruments. | 04 |
| | (c) Explain the working of the Piezoelectric Accelerometer with the sketch. | 07 |
| OR | | |
| Q.3 | (a) Discuss the working Principle of LVDT. | 03 |
| | (b) Explain with sketch Hydraulic Dynamometry. | 04 |
| | (c) Explain the following characteristics of a transducer: (i) Sensitivity (ii) Repeatability (iii) Accuracy (iv) Range (v) Precision (vi) Drift (vii) Dead zone | 07 |
| Q.4 | (a) Explain the principle of operation of the current transformer. | 03 |
| | (b) Derive the output voltage expression of the Wheatstone Bridge circuit for strain measurement. | 04 |
| | (c) Discuss the difference between PMMC and PMMI-type instruments. | 07 |
| OR | | |
| Q.4 | (a) Explain the principle of operation of the potential transformer. | 03 |
| | (b) Compare thermocouple, RTD and thermistor. | 04 |
| | (c) Explain different methods for resistance measurements. | 07 |
| Q.5 | (a) Compare eddy current dynamometer with rope brake dynamometer | 03 |
| | (b) What are the selection criterion of transducers for industrial applications? | 04 |
| | (c) Explain Piezoelectric Sensors and loading effects | 07 |
| OR | | |
| Q.5 | (a) Write a short note on Hysteresis. | 03 |
| | (b) Prove that the differential arrangement of the capacitive displacement transducer gives a linear response. | 04 |
| | (c) Explain the working of inductive transducers. | 07 |
