

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-IV (NEW) EXAMINATION – WINTER 2020

Subject Code: 3141901

Date: 09/02/2021

Subject Name: Mechanical Measurement and Metrology

Time: 02:30 PM TO 04:30 PM

Total Marks: 56

Instructions:

1. Attempt any **FOUR** questions out of **EIGHT** questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

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|------------|---|-----------|
| Q.1 | (a) What do you understand by measurement? | 03 |
| | (b) What is the difference between Line standard and End standard? | 04 |
| | (c) State various sources of errors. What are the difference between systematic error and random error? | 07 |
| Q.2 | (a) Explain the term range and sensitivity. | 03 |
| | (b) What is tolerance? Why tolerance are specified? | 04 |
| | (c) Define fit. Describe various types of fits. | 07 |
| Q.3 | (a) Give the classification of comparators. | 03 |
| | (b) Explain Dial indicator. | 04 |
| | (c) Explain with neat diagram, working principle and application of Sigma comparator. | 07 |
| Q.4 | (a) Give the classification of threads. | 03 |
| | (b) Explain various forms of gear teeth. | 04 |
| | (c) Describe the construction and working of Tool maker's microscope. | 07 |
| Q.5 | (a) Differentiate: Precision and accuracy. | 03 |
| | (b) Explain the term hysteresis and repeatability. | 04 |
| | (c) Explain the two-wire method of measuring the effective diameter of a screw thread. | 07 |
| Q.6 | (a) Write the advantages of lasers. | 03 |
| | (b) Describe LVDT giving its advantages, limitations & field of applications. | 04 |
| | (c) Write a short note on Cathode ray Oscillographs. | 07 |
| Q.7 | (a) Explain slip gauges. | 03 |
| | (b) Explain rope brake dynamometer. | 04 |
| | (c) Explain McLeod gauge with a diagram. | 07 |
| Q.8 | (a) Give the classification of instruments for pressure measurement. | 03 |
| | (b) Explain the principle of electrical Strain gauges | 04 |
| | (c) Explain the principles of thermocouples stating an illustrations. | 07 |

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2021****Subject Code:3141901****Date:05/01/2022****Subject Name:Mechanical Measurement and Metrology****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 |
|------------|--|--------------|
| Q.1 | (a) Define the terms: (i) Threshold (ii) Linearity (iii) Sensitivity | 03 |
| | (b) Differentiate following terms: - 1) Systematic and random errors, 2) Reproducibility and Repeatability | 04 |
| | (c) What is coordinate measuring machine? Discuss various configuration of CMM. | 07 |
| Q.2 | (a) Explain the working principle of a laser transducer system. | 03 |
| | (b) What is the basic difference between sine bars, sine plates, and sine tables? | 04 |
| | (c) Explain vernier micrometer Screw with neat sketch. How least count of vernier micrometer can be calculated? | 07 |
| | OR | |
| | (c) Explain with neat sketch how conical work pieces are inspected on a sine centre. | 07 |
| Q.3 | (a) Give comparison between involute and cycloidal gears. | 03 |
| | (b) Explain Parkinson gear tester with neat sketch. | 04 |
| | (c) Derive the depth of gear using constant chord method | 07 |
| | OR | |
| Q.3 | (a) How is Taylor's principle applicable to thread gauging? | 03 |
| | (b) Derive the expression for the best-size wire in a two-wire method. | 04 |
| | (c) Derive the diameter over wire(Maximum) H for thread measurement using three wire method | 07 |
| Q.4 | (a) Explain the characteristics of good comparator. | 03 |
| | (b) What are the primary reasons for surface irregularities? | 04 |
| | (c) Explain with neat sketch construction and working of sigma comparator. | 07 |
| | OR | |
| Q.4 | (a) Give a detailed classification of fits. | 03 |

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|-----------|-----|--|----|
| | (b) | Differentiate between hole basis and shaft basis systems. | 04 |
| | (c) | Describe with neat sketch “Linear Variable Differential Transformer”. Comment on its application. | 07 |
| Q.5 | (a) | Explain the principle and types of thermocouple. | 03 |
| | (b) | Explain briefly the methods of force measurement. | 04 |
| | (c) | Write a short note on rope brake dynamometer, | 07 |
| OR | | | |
| Q.5 | (a) | Classification of instruments for pressure measurement. | 03 |
| | (b) | What is gauge factor? Explain its importance. | 04 |
| | (c) | Sketch and explain McLeod Gauge used for low pressure measurement. | 07 |

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- IV EXAMINATION – SUMMER 2020****Subject Code: 3141901****Date: 26/10/2020****Subject Name: Mechanical Measurement and Metrology****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.

- Q.1** (a) Define terms: (i) Metrology (ii) Accuracy (iii) Precision **03**
(b) Define the following characteristics of measurement system: **04**
(i) Dead zone, (ii) Drift, (iii) Calibration, (iv) Hysteresis
(c) Explain generalized measurement system using suitable example. **07**
- Q.2** (a) What do you understand by systematic errors and random errors? **03**
(b) Why sine bar is not preferred for angles greater than 45°? Explain. **04**
(c) Enlist methods of measurements. Explain Slip gauges with wringing process. **07**
- OR**
- (c) Describe with neat sketch the construction and working of a micrometer. **07**
- Q.3** (a) Define following terms related to screw thread measurement: **03**
(i) Lead, (ii) Pitch, (iii) Crest
(b) Explain line and end standards with examples. **04**
(c) Explain three wire method for measuring effective diameter of a thread. **07**
- OR**
- Q.3** (a) Write the advantages of coordinate measuring machines **03**
(b) Explain Parkinson gear tester with a neat sketch. **04**
(c) Describe with neat sketch the construction and use of gear tooth vernier caliper. **07**
- Q.4** (a) Define fit and with the help of neat sketches, explain the different types of fits. **03**
(b) Write short note on proving ring type load cell. **04**
(c) Describe the working and construction of LVDT with neat sketch. **07**
- OR**
- Q.4** (a) Explain light wave length standard. **03**
(b) Explain the working principal of pneumatic comparators with neat sketch. **04**
(c) Explain working of McLeod gauge for pressure measurement. **07**
- Q.5** (a) Define unilateral and bilateral tolerances. Give examples for each. **03**
(b) Explain the terms interchangeable manufacture and interchangeable assembly. **04**
(c) Explain optical pyrometer for measurement of temperature. **07**
- OR**
- Q.5** (a) How are temperatures measuring instruments classified? **03**
(b) Explain in brief the principle of thermocouple stating illustrations. **04**
(c) Describe the construction and working of resistance temperature detector (RTD) with neat sketch. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – SUMMER 2021****Subject Code:3141901****Date:03/09/2021****Subject Name:Mechanical Measurement and Metrology****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.

- Q.1** (a) Discuss the elements of screw thread with a neat sketch. **03**
(b) Explain Accuracy and Precision with an example. **04**
(c) Define absorption dynamometer. With a neat sketch explain the working of Rope Brake dynamometer. **07**

- Q.2** (a) What are the various possible sources of error in measurements? **03**
(b) Briefly explain the following terms (i) Calibration (ii) Hysteresis (iii) Over-shoot and (iv) Dead Zone. **04**
(c) Explain the use of sine bar with a neat sketch, also write advantages and limitations of sine bar. **07**

OR

- (c) Write a short note on Coordinate Measuring Machines. **07**

- Q.3** (a) Differentiate between line and end standards. **03**
(b) Define fit and with the help of neat sketches, explain the different types of fits. **04**
(c) Describe the construction and working of a sigma comparator. Discuss its advantages and disadvantages. **07**

OR

- Q.3** (a) Explain why hole basis system is generally preferred. **03**
(b) Define unilateral and bilateral tolerances. Give examples for each. **04**
(c) What is an LVDT? Explain its working principle with a neat sketch. **07**

- Q.4** (a) Define (i) Circular Pitch (ii) Module and (iii) Pressure Angle. **03**
(b) Explain Parkinson gear tester with a neat sketch. **04**
(c) Explain three wire method for measuring effective diameter of a thread. State its advantages over two wire method. **07**

OR

- Q.4** (a) What is a comparator? Give its classification. **03**
(b) Derive the expression for best wire size for the measurement of effective diameter of a screw thread. **04**
(c) With the help of a neat sketch derive an equation for measuring gear tooth thickness using constant chord method. State its advantages. **07**

- Q.5** (a) Explain the principle of thermocouple. **03**
(b) Classify resistance strain gauge and explain any two. **04**
(c) With a neat sketch explain the construction and working of bourdon tube pressure gauge. **07**

OR

- Q.5** (a) How are temperature measuring instruments classified? **03**
(b) Explain the working principle of Proving Ring. **04**
(c) Explain the construction and working principle of optical pyrometer along with its advantages and disadvantages. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – SUMMER 2022****Subject Code:3141901****Date:23-06-2022****Subject Name:Mechanical Measurement and Metrology****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

- Q.1** (a) Discuss the factors relating the selection of instruments. **03**
 (b) Differentiate (1) Accuracy and Precision **04**
 (2) Reproducibility and Repeatability
 (c) Define Transducer and Transfer efficiency. Classify the Transducer in Details. **07**
- Q.2** (a) Explain the Source of errors in Micrometer. **03**
 (b) Differentiate between following Instruments : **04**
 (1) Sine bar (2) Sine center
 (c) Describe Hole Basis System and Shaft Basis System. **07**
- OR**
- (c) State different types of Fits and Explain it with neat sketch. **07**
- Q.3** (a) Explain Strain gauge sensitivity factor with its significance. **03**
 (b) Explain Maximum Material Condition and Least Material Condition with suitable example. **04**
 (c) Write a short note on Surface roughness symbols. **07**
- OR**
- Q.3** (a) Define Surface texture with necessary sketch. **03**
 (b) Explain sigma comparator **04**
 (c) Explain the 3 wire method for Screw thread Measurement. **07**
- Q.4** (a) Explain the International Temperature Scale with all the important standard points. **03**
 (b) State the full form of LASER. Explain the principles of LASER Based Interferometer. **04**
 (c) Explain the generalized measurement system with neat sketch. **07**
- OR**
- Q.4** (a) Define the Temperature compensation. Explain the Temperature Compensation in Liquid filled Thermometer. **03**
 (b) Write a Short note on Angle dekkor. **04**
 (c) What unit is used to measure Vacuum? Explain any one instruments used to measure vacuum. **07**
- Q.5** (a) State the full name of LVDT. Explain the Principle of LVDT with neat sketch. **03**
 (b) Write a short note on RTD. **04**
 (c) State vernier Principle. Explain the vernier caliper with construction, Least count, and methods of measurement. **07**

OR

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|------------|------------|---|-----------|
| Q.5 | (a) | Explain any three Elements of Screw threads. | 03 |
| | (b) | Write a short note on Prony Brake Dynamo meter | 04 |
| | (c) | How Gear tooth is measured by using Gear tooth vernier caliper? | 07 |
