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.**

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 lazers.	**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**

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Seat No.: _____ Enrolment No._____

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**

	(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**

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Seat No.: _____ Enrolment No._____

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: (i) Dead zone, (ii) Drift, (iii) Calibration, (iv) Hysteresis	**04**
	(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: (i) Lead, (ii) Pitch, (iii) Crest	**03**
	(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**

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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**

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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 (2) Reproducibility and Repeatability	**04**
	(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 : (1) Sine bar (2) Sine center	**04**
	(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	

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**

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