Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–IV EXAMINATION – WINTER 2025

Subject Code:3141901 Date:13-11-2025

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.**

			MARKS
Q.1	**(a)**	Define metrology and list the objectives of metrology.	**03**
	(b)	Briefly explain about wavelength standard.	**04**
	(c)	Draw block diagram of a generalized measurement system and explain various elements in detail.	**07**
Q.2	**(a)**	Define tolerance and write a difference between unilateral and bilateral tolerance.	**03**
	(b)	Differentiate between line standards and end standards.	**04**
	(c)	Explain construction and working of tool makers microscope with neat sketch. List its application.	**07**
		OR	
	(c)	Discuss about construction and working of rope brake dynamometer. List its advantages and limitations.	**07**
Q.3	**(a)**	Briefly explain accuracy and precision with suitable example.	**03**
	(b)	Compare hole basis system and shaft basis system.	**04**
	(c)	Describe about Auto collimator and list its application.	**07**
		OR	
Q.3	**(a)**	List the applications of comparators.	**03**
	(b)	Define fit and explain its types.	**04**
	(c)	Explain three wire methods for measuring effective diameter of screw thread with neat sketch.	**07**
Q.4	**(a)**	How to measure angle of heavy component using sine bar?	**03**
	(b)	Briefly explain about plug gauge and ring gauge.	**04**
	(c)	List the characteristics of good comparators. Describe about Johnson Mikrokator.	**07**

OR

Q.4	**(a)**	Explain about addendum and dedendum of gear.	**03**
	(b)	How to measure temperature using optical pyrometer?	**04**
	(c)	Briefly discuss about wringing and manufacturing process of slip gauges. Also write down uses of slip gauges.	**07**
Q.5	**(a)**	Compare systematic and random errors.	**03**
	(b)	List advantages and application of Coordinate Measuring Machines.	**04**
	(c)	How to measure chordal thickness using gear tooth vernier caliper? Explain in detail.	**07**

OR

Q.5	**(a)**	Wear allowance is provided on the GO gauges only. Justify the statement.	**03**
	(b)	Explain about construction and application bourdon tube pressure gauge.	**04**
	(c)	Explain about construction and working of optical pyrometer. List its applications.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–IV (NEW) EXAMINATION – WINTER 2024

Subject Code:3141901 Date:19-11-2024

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)**	Define Metrology. Explain clearly difference between primary, secondary and working standards	**03**
	(b)	Draw a block diagram of a generalized measurement system (GMS) and explain the various elements of it in detail.	**04**
	(c)	Explain the construction and working of a Vernier height gauge with the help of a neat sketch.	**07**
Q.2	**(a)**	Discuss the elements of screw thread with neat sketch.	**03**
	(b)	Explain following gear errors : 1. Profile error, 2. Pitch error, 3. Errors in pressure angel, 4. Tooth thickness error	**04**
	(c)	Write short note on Parkinson Gear tester.	**07**
		OR	
	(c)	Draw the neat sketch of "Taly surf" and its working principle.	**07**
Q.3	**(a)**	Define unilateral and bilateral tolerances. Give examples for each.	**03**
	(b)	Explain hole base vs shaft base system.	**04**
	(c)	Explain types of fit with neat sketch.	**07**
		OR	
Q.3	**(a)**	Describe construction, working principle of Vernier Micrometer with neat sketch.	**03**
	(b)	Define and Explain following terms (i) Sensitivity (ii) Hysteresis (iii) Range and span (v) Accuracy and precision	**04**
	(c)	Explain the gear tooth thickness measurement by gear tooth Vernier calliper.	**07**
Q.4	**(a)**	Explain working principle of bimetallic strip.	**03**
	(b)	What is thermocouple? Explain application of series and parallel connection in thermocouple.	**04**
	(c)	Describe the construction and working of resistance temperature detector (RTD).	**07**
		OR	
Q.4	**(a)**	What are the difference between systematic error and random error?	**03**
	(b)	Explain liquid in glass thermometer.	**04**
	(c)	Describe the construction and working of optical pyrometer.	**07**
Q.5	**(a)**	Explain rope brake dynamometer	**03**
	(b)	Explain the principle of electrical Strain gauges	**04**
	(c)	Explain three wire method for measuring effective diameter of a thread.	**07**
		OR	
Q.5	**(a)**	Briefly Explain comparators.	**03**
	(b)	Write short note on proving ring type load cell.	**04**
	(c)	Explain working of McLeod gauge for pressure measurement.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – WINTER 2023

Subject Code:3141901 Date:11-01-2024

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 accuracy, repeatability, resolution.	**03**
	(b)	Differentiate line standard and end standard.	**04**
	(c)	List types of errors. Discuss in brief systematic errors.	**07**
Q.2	**(a)**	Write classification of threads.	**03**
	(b)	Explain Dial indicator.	**04**
	(c)	Explain generalized measurement system with example.	**07**
		OR	
	(c)	Explain the use of sine bar with a neat sketch. Mention it's advantages and limitations.	**07**
Q.3	**(a)**	Classify instruments for pressure measurement.	**03**
	(b)	Explain the principle of thermocouple.	**04**
	(c)	Write a short note on rope brake dynamometer,	**07**
		OR	
Q.3	**(a)**	Explain hydraulic load cell.	**03**
	(b)	A platinum resistance thermometer has a resistance of 100 Ω at 25°C. Find it's resistance at 65°C if the temperature co-efficient of platinum is 0.0039 C^{-1}. If the thermometer has a resistance of 150 Ω, calculate the temperature.	**04**
	(c)	Explain McLeod gauge with a diagram.	**07**
Q.4	**(a)**	Explain the need for tolerance.	**03**
	(b)	Explain Parkinson gear tester with neat sketch.	**04**
	(c)	Derive the expression for the best-size wire in a two-wire method.	**07**
		OR	
Q.4	**(a)**	List the primary reasons for surface irregularities.	**03**
	(b)	Derive an expression for gear tooth thickness using chordal thickness method.	**04**
	(c)	Define fit. Describe various types of fits.	**07**
Q.5	**(a)**	Explain optical amplifier.	**03**
	(b)	Describe LVDT.	**04**
	(c)	Discuss various configuration of CMM.	**07**
		OR	
Q.5	**(a)**	Mention any three advantages of electrical intermediate modifying devices.	**03**
	(b)	Explain the principle of electrical Strain gauges.	**04**
	(c)	Explain with neat sketch working of any one interferometer.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(NEW) EXAMINATION – WINTER 2022

Subject Code:3141901 Date:13-12-2022

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)**	State difference between measuring and gauging.	**03**
	(b)	Classify types of fit and explain any one of them with neat sketch.	**04**
	(c)	Explain construction and working of Autocollimator.	**07**
Q.2	**(a)**	Define Joe Blocks and state material used for its fabrication & its application.	**03**
	(b)	Define Error and Explain systematic error with remedies to avoid it in measurement.	**04**
	(c)	Name the various methods used for measurement of tooth thickness and explain any one of them.	**07**
		OR	
	(c)	Explain with neat sketch the working of any one type of interferometers.	**07**
Q.3	**(a)**	State operating principle of pressure gauge & pressure transducer.	**03**
	(b)	Define the following term i) Base Circle ii) Pitch Diameter iii) Module iv) Diametral pitch	**04**
	(c)	Discuss the construction and working of thermocouple with neat sketch.	**07**
		OR	
Q.3	**(a)**	Describe briefly most commonly used forms of gear tooth.	**03**
	(b)	Explain working of optical comparators with neat sketch.	**04**
	(c)	Explain with neat sketch construction and working of the Zeiss Ultra optimeter.	**07**
Q.4	**(a)**	State Desirable characteristics of strain gauge.	**03**
	(b)	State basic requirements of sine bar to get good accuracy & limitation of it.	**04**
	(c)	Draw a block diagram representation of a generalized measurement system. Identify the various elements and point out the functions performed by each element.	**07**
		OR	
Q.4	**(a)**	List out desirable features of a comparator.	**03**
	(b)	List type of strain gauge and explain working of any one with neat sketch.	**04**
	(c)	What is CMM? List types of CMM and explain how the linear distance can be read out with great accuracy using CMM.	**07**
Q.5	**(a)**	Compare primary, secondary, tertiary and working standards.	**03**
	(b)	Define transducer. State advantage and disadvantages of electronic transducer.	**04**

	(c)	Compare one wire, two wire and three wire methods of measuring effective diameter.	**07**

OR

Q.5	**(a)**	Give comparison of Line standard vs End standards.	**03**
	(b)	Explain working of eddy current dynamometer with neat sketch,	**04**
	(c)	Explain working of rope brake dynamometer and justify its advantages over limitation.	**07**

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