Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV • EXAMINATION – SUMMER • 2014

Subject Code: 141901 Date: 20-06-2014

Subject Name: Mechanical Measurement and Metrology

Time: 10:30 am - 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)** Explain objectives of Metrology. **03**

(b) What are the various possible sources of errors in measurement? Define static error and explain any two static errors with example. **07**

(c) Describe with neat sketch "Imperial standard Yard". **04**

Q.2 **(a)** Describe working principle and construction of vernier micrometer with neat sketch. **07**

(b) With the help of neat sketch describe the working principle and construction of an optical comparator with its advantages and limitations. **07**

OR

(b)

I) Write applications and limitations of angle gauges. **03**

II) The following observations were obtained while checking angle of tapered piece on one side with the help of two discs (Rollers), slip gauge and dial indicator. **04**

Diameter of larger disc = 40 mm
Diameter of smaller disc = 24 mm
Slip gauge placed between the discs = 30 mm
The dial indicator shows no variation when traversed along the surface of the piece placed over the discs. Draw the sketch of the set up and find angle of taper.

Q.3 **(a)** Define the following terms for Screw thread: **03**
i) Major Diameter ii) Minor Diameter iii) Pitch
iv) Lead v) Flank angle vi) Helix angle

(b) Explain the measurement of effective diameter for internal screw threads with neat sketch. **04**

(c) Explain three wire method to measure the effective diameter of given screw thread with neat sketch. **07**

OR

Q.3 **(a)** With neat sketch explain the construction and working of bourdon tube pressure gauge and also write merits and demerits of its. **07**

(b) Explain in brief the following with neat sketch **07**
i) Prony brake dynamometer and ii) Rope brake dynamometer

Q.4 **(a)** Explain Parkinson gear tester with neat sketch. **04**

(b) A spur gear of 8 mm module has 50 teeth calculate following proportion: **03**
Pitch circle diameter, Addendum and Dedendum, Tooth working height and base pitch. Assume clearance to be 0.25 module. Spur gear has pressure angle of 20^0.

(c) With neat sketch describe the construction working of Tomlinson surface roughness tester with its advantages and disadvantages. **07**

OR

Q.4	**(a)**	Describe the construction and working of resistance temperature Detector (RTD) with its advantages and disadvantages.	**07**
	(b)	Explain the various modes of measurements with two examples.	**07**
Q.5	**(a)**	Define Flatness and describe a method to find out the flatness of a surface plate.	**07**
	(b)	Define squareness. Explain with neat sketch the following methods or measuring the squareness. i) Indicator method ii) Auto collimator method	**07**

OR

Q.5	**(a)**	Explain surface texture and elements of surface roughness.	**07**
	(b)	Explain with neat sketch the principle, construction and working of Johansson Mikrokator.	**07**

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