Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – IV • EXAMINATION – WINTER 2012

Subject code: 141901 **Date: 28/12/2012**

Subject Name: Mechanical Measurement and Metrology

Time: 02.30 pm - 05.00 pm **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	Define the following terms related to surface roughness measurement. 1) CLA & RMS, 2) Lay, 3) 3rd & 4th order of geometrical irregularities.	**07**
	(b)	Briefly explain with neat sketch the Ionization gauge for pressure measurement. State its pressure measuring capability.	**07**
Q.2	**(a)**	Define: 1) Threshold, 2) Sensitivity of manometer 3) Hysteresis , 4) Resolution , 5) Thermometry , 6) Pyrometry.	**07**
	(b)	Explain the procedure to measure the angle with help of sine-bar when 1) Job is bigger than sine bar , 2)Job is smaller than sine bar.	**07**
		OR	
	(b)	Differentiate between "Line standard and End standard"	**07**
Q.3	**(a)**	Explain the procedure to calibrate the bourdon tube pressure gauge with help of dead weight pressure gauge tester. What precautions we have to take during calibration to minimize errors?	**07**
	(b)	Distinguish between "RTD" and " THERMISTOR"	**07**
		OR	
Q.3	**(a)**	Fully describe the surface roughness symbol as per IS-696 showing Ra value, production method, sampling length, direction of lay, machining allowance ,and other roughness values in bracket i.e. roughness width and waviness height.	**07**
	(b)	Describe the three wire method to measure the effective diameter of a given screw thread.	**07**
Q.4	**(a)**	Describe the use of Piezo-electric transducer to measure force, pressure and vibration.	**07**
	(b)	Mercury has it's boiling temperature at 350ºC.Is it possible to design a mercury filled in glass thermometer capable to measure 500 ºC ?-Justify your answer.	**07**
		OR	
Q.4	**(a)**	Explain the method to measure the chordal tooth thickness of given gear by gear tooth vernier caliper. Calculate the chord length and its distance below the tooth tip for a gear of module 3 mm and 20º pressure angle.	**07**
	(b)	Define the following terms: 1) Straightness, 2) Circularity, 3) Perpendicularity , 4) Flatness.	**07**
Q.5	**(a)**	Explain in brief with neat sketch the working of "Tool maker's microscope" .Give it's applications.	**07**
	(b)	Explain with example.: 1) Primary Signal , 2) Secondary signal and 3) Tertiary signal	**07**
		OR	
Q.5	**(a)**	Describe construction, working principle and applications of 1) Vernier micrometer and 2) Vernier caliper.	**07**
	(b)	Briefly explain with example about relative error , random error and systematic error.	**07**

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