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. **07**
1) CLA & RMS, 2) Lay, 3) 3rd & 4th order of geometrical irregularities.
(b) Briefly explain with neat sketch the Ionization gauge for pressure measurement. **07** State its pressure measuring capability.

Q.2 **(a)** Define: **07**
1) Threshold, 2) Sensitivity of manometer 3) Hysteresis , 4) Resolution , 5) Thermometry , 6) Pyrometry.
(b) Explain the procedure to measure the angle with help of sine-bar when **07**
1) Job is bigger than sine bar , 2)Job is smaller than sine bar.
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 **07** dead weight pressure gauge tester. What precautions we have to take during calibration to minimize errors?
(b) Distinguish between "RTD" and " THERMISTOR" **07**
OR
Q.3 **(a)** Fully describe the surface roughness symbol as per IS-696 showing Ra value, **07** production method, sampling length, direction of lay, machining allowance ,and other roughness values in bracket i.e. roughness width and waviness height.
(b) Describe the three wire method to measure the effective diameter of a given **07** screw thread.

Q.4 **(a)** Describe the use of Piezo-electric transducer to measure force, pressure and **07** vibration.
(b) Mercury has it's boiling temperature at 350ºC.Is it possible to design a mercury **07** filled in glass thermometer capable to measure 500 ºC ?-Justify your answer.
OR
Q.4 **(a)** Explain the method to measure the chordal tooth thickness of given gear by gear **07** 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.
(b) Define the following terms: **07**
1) Straightness, 2) Circularity, 3) Perpendicularity , 4) Flatness.

Q.5 **(a)** Explain in brief with neat sketch the working of "Tool maker's microscope" **07** .Give it's applications.
(b) Explain with example.: **07**
1) Primary Signal , 2) Secondary signal and 3) Tertiary signal
OR
Q.5 **(a)** Describe construction, working principle and applications of 1) Vernier **07** micrometer and 2) Vernier caliper.
(b) Briefly explain with example about relative error , random error and systematic **07** error.

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