

**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) 3<sup>rd</sup> & 4<sup>th</sup> 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 350°C. Is it possible to design a mercury **07**  
filled in glass thermometer capable to measure 500 °C ?-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 20° 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.