

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## GUJARAT TECHNOLOGICAL UNIVERSITY

BE- IV<sup>th</sup> SEMESTER-EXAMINATION – MAY/JUNE- 2012

Subject code: 141901

Date: 25/05/2012

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) What are the various possible sources of errors in measurements? What do you understand by systematic errors and random errors? **07**
- (b) Differentiate between “Precision” and “Accuracy” with suitable example. **04**
- (c) What are the advantages of wavelength standard? **03**
- Q.2** (a) What do you understand by line and end measurement? Discuss their relative characteristics. **07**
- (b) Describe construction, working principle and application of Vernier Micrometer with neat sketch. **07**
- OR**
- (b) What are the precautions to be taken while using a micrometer? State the possible sources of error in micrometers. **07**
- Q.3** (a) Draw a neat sketch to illustrate the use of sine bar for measurement of taper plug gauge and explain it briefly. **07**
- (b) Name the various methods used for measurement of tooth thickness and explain any one of them. **07**
- OR**
- Q.3** (a) Explain with a sketch the three wire method of measuring the effective diameter of a screw thread. **07**
- (b) What is the best size wire? Derive the expression for the same in terms of pitch and angle of the thread. **07**
- Q.4** (a) Explain the terms “Primary texture” and “Secondary texture”. **04**
- (b) State the factors affecting surface texture. **03**
- (c) Name the various alignment tests to be performed on Milling Machine and describe any three in detail. **07**
- OR**
- Q.4** (a) What is a ‘Peltier effect’? **03**
- (b) A bimetal strip is constructed of strips of nickel chrome iron alloy and invar bonded together at 25°C. The strips are 50 mm long and each material has a thickness of 1 mm. Calculate the radius of curvature produced when the strip is subjected to a temperature of 200°C
- Assume the following data:
- $$\alpha_1 = 1.7 * 10^{-6} / ^\circ\text{C} \quad E_1 = 1.5 * 10^{-6} \text{ kgf/cm}^2$$
- $$\alpha_2 = 12.5 * 10^{-6} / ^\circ\text{C} \quad E_2 = 2.2 * 10^{-6} \text{ kgf/cm}^2$$

- (c) Explain briefly the construction and working of a resistance thermometer, stating its advantages and disadvantages. **07**
- Q.5** (a) Explain the following terms in mechanical measurement. **04**
- (i) Threshold
  - (ii) Overshoot
  - (iii) Range
  - (iv) Span
- (b) Explain any one method used for force measurement. **03**
- (c) Describe strain gauge. Define gauge factor of strain gauge. What are Rosette gauges explain with advantages, limitations & application? **07**
- OR**
- Q.5** (a) Describe with sketch the construction, working and application of bellow gauge and diaphragm gauge used for pressure measurement. **07**
- (b) Explain with neat sketch ring balance manometer with comment on its field of application. **07**

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