Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- IVth 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: $\alpha_1 = 1.7 * 10^{-6} / ^\circ C$ $E_1 = 1.5 * 10^{-6}$ kgf/cm^2 $\alpha_2 = 12.5 * 10^{-6} / ^\circ C$ $E_2 = 2.2 * 10^{-6}$ kgf/cm^2	**04**

(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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