

FACULTY OF ENGINEERING
B.E. 4/4 (Mech/Prod/AE) I-Semester (Main) Examination, Nov. / Dec. 2012

Subject : **Metrology and Instrumentation**

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. Sketch experimental setup for measuring external taper using sine bar and slip gauges.
2. While measuring the straightness of a surface using Auto-collimator, how do you convert the angular deviation into linear deviation.
3. Give some important characteristics of CMM.
4. Measuring the roundness error using a micrometer or a dial indicator is erroneous. Give reasons.
5. What is cold junction compensation in a thermocouple?
6. List various geometric tests for testing machine tools.
7. What is time constant?
8. Explain the working principle of strain gauge load cells.
9. List various devices used for measuring displacement.
10. Distinguish between line and end standards.

PART – B (5x10=50 Marks)

- 11.(a) List different types of micrometers and explain any two. (5)
 (b) Explain with sketch the use of precision polygon. (5)
- 12.(a) What is sampling length? Explain various parameters used for characterizing surface roughness. (5)
 (b) Explain with a sketch the measurement of straightness error using autocollimator. (5)
- 13.(a) Explain the Taylor's theory of gauging. (5)
 (b) Distinguish between basic hole and shaft system. (5)
- 14.(a) Explain the measurement of gear tooth thickness. (5)
 (b) How do you measure force using Piezoelectric load cell? (5)
- 15.(a) List and define various static characteristics of measuring devices. (5)
 (b) What is system response? Explain various system responses. (5)
- 16.(a) How do you measure pressure using Pirani gauge? (5)
 (b) The following table has been prepared from the calibration chart of iron-constant thermocouple, with reference to temperature at 0°C. (5)

Tem.(°C)	15	30	40	180	190	200	208	210
emf (mv)	0.778	1.56	2.11	9.64	10.25	1.074	11.20	11.32

Suppose, the temperature of the hot junction is measured with an iron-constantan thermocouple, with the reference junction temperature at 30 °C., and if the voltage measured is 9.64mV, find the actual temperature of the hot junction.

17. Write short notes on any two of the following: (10)
 - (a) Sine bar
 - (b) Taylsurf
 - (c) Best size wire
 - (d) Types of errors