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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2012

(MECHANICAL ENGINEERING BRANCH)

38

FIFTH SEMESTER

ME375 – ENGINEERING METROLOGY AND MEASUREMENTS

(REGULATIONS 2004)

Time: 3 hours

Max Marks: 100

Answer ALL questions

PART A (10 x 2 = 20 Marks)

1. Differentiate between accuracy and precision.
2. What is meant by linearity of a measuring instrument?
3. What is the difference between unilateral and bilateral tolerance?
4. What is interchangeable system of manufacture?
5. Why are lasers used in measurements?
6. Mention any two materials used in the construction of touch trigger probes in CMMs?
7. What is meant by best size wire in screw thread measurement?
8. What is centre line average?
9. What is reliability?
10. What is the necessity of calibrating measuring instruments?

PART B (5 x 16 = 80 Marks)

11. (a) What are the various elements of metrology? What role do they play in determining the accuracy of measurement? (12 marks)
(b) Define standards? What are the types of length standards which are used? (4 marks)
12. (a) (i) What is fit? What are the 3 different types of fits? Explain with neat diagrams and examples. (12 marks)
(a) (ii) What is the difference between hole basis and shaft basis system? (4 marks)
or
(b) (i) Explain the principle behind the working of Autocollimator. (6 marks)
(b) (ii) With neat diagrams explain the working of Alignment telescope for measuring misalignment in bearings. (10 marks)
13. (a) What are the various configurations available in CMMs? With neat diagrams explain the merits and demerits of the different configurations.
or
(b) (i) What is machine vision? Explain briefly the process of machine vision. (10 marks)
(b) (ii) What are the applications of machine vision in measurements? (6 marks)
14. (a) (i) Derive the expression for tooth thickness of a gear using gear tooth vernier caliper. (8 marks)

(a) (ii) Explain the method of inspection of gears using Parkinson gear tester.
(8 marks)

or

(b) With neat diagram explain the working principle of any one of the following
(i) Tomlinson surface finish measuring machine (ii) roundness measuring machine.

15. (a) (i) Explain the working principle behind differential pressure based flow measuring instruments.
(6 marks)

(a) (ii) With neat sketches explain the working principle of pitot tube and rotameter.
(10 marks)

or

(b) What is thermometric property? With neat sketches write short notes on
(i) thermocouple (ii) bimetallic strip and (iii) electrical resistance thermometer.