Reg. No. : | | | | | | | | | | | |

R 3461

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Fifth Semester

(Regulation 2004)

Mechanical Engineering

ME 1304 — ENGINEERING METROLOGY AND MEASUREMENTS

(Common to Automobile Engineering)

(Common to B.E. (Part -Time) Fourth Semester Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A (10 × 2 = 20 marks)

1. What is the relationship between sensitivity and range?

2. Distinguish between relative error and random error.

3. What will happen if the gauge blocks are just simply placed over one another and measurements made?

4. A 200 mm sine bar is to be set to an angle of 32° 5' 6". Find the height of the gauge blocks required using any appropriate set of gauge blocks.

5. What are the corrections applied in the measurement of effective diameter by the method of wires?

6. State the precautions that must be taken in the method of measuring diameters of a taper plug gauge by rollers, slip gauges and micrometer?

7. State any two applications of laser in machine tool metrology.

8. Give two uses of computers in the field of metrology.

9. What is the principle of therm couple?

10. State any two principles of force measurement.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the following terms with suitable examples :

(1) Readability, (2) Repeatability, (3) Calibration and (4) Dynamic response. (10)

(ii) How are end standards derived from line standards? Explain. (6)

Or

(b) (i) Describe various elements and its functions of a generalised measurement systems. (10)

(ii) Discuss the different types of errors and how they can be eliminated? (6)

12. (a) (i) How is a Vernier height gauge specified? Describe briefly the constructional requirements of different parts of a vernier height gauge? (10)

(ii) Discuss the operation of a pneumatic comparator. (6)

Or

(b) (i) Describe a method of determining an absolute length of slip gauges using interferometer. (8)

(ii) With the help of a neat sketch explain the working of an autocollimator. (8)

13. (a) (i) Describe the instrument 'Gear tooth vernier caliper'. Calculate the gear tooth caliper settings to measure the chordal tooth thickness of a gear of 45 teeth having a module of 4. (10)

(ii) How is the straightness of straight edge measured? (6)

Or

(b) (i) Define R_a, R_t, R_z and t_p% with respect to surface roughness. (6)

(ii) Discuss the various types of screw pitch errors. (5)

(iii) Explain in detail the roundness testing machine. (5)

14. (a) (i) Describe the construction and working of a laser micrometer. (12)

(ii) Discuss the different types of laser light sources. (4)

Or

(b) (i) Explain the procedure to be used in measurement of various dimensions of a typical component using a cantilever type CMM. (8)

(ii) Describe the principle and working of AC laser interferometer. (8)

15. (a) (i) Explain briefly any one method of torque measurement. (6)

(ii) Describe any two types of flow measurement equipment. (10)

Or

(b) (i) Explain the working of bimetallic strip type temperature measurement system. (8)

(ii) Describe any power measurement equipment. (8)

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