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Question Paper Code : 60857

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth Semester

Mechanical Engineering

ME 2304/ME 54/ME 1304/080120044/10122 ME 505 – ENGINEERING
METROLOGY AND MEASUREMENTS

(Common to Production Engineering and Automobile Engineering)

(Regulations 2008/2010)

(Common to PTME 2304/10122 ME 505 – Engineering Metrology and
Measurements for B.E. (Part-Time) Fourth Semester – Mechanical Engineering –
Regulations 2009/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give two examples of direct and indirect measurements.
2. Sketch the symbol for flatness and cylindricity.
3. Name two types of outside calipers.
4. Why is it generally desirable to use a longer sine bar for measuring a given angle?
5. Define the term “straightness”.
6. State the instruments used to find the base tangent thickness of gear teeth.
7. State any two sources of error in coordinate measuring machine.
8. What is the advantage of using laser beam in interferometry?
9. What is a proving ring?
10. Why is a rotameter called variable area flow meter?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the following terms with reference to measuring instruments.
- (1) Uncertainty,
 - (2) Sources of errors,
 - (3) Dynamic response and
 - (4) Calibration. (10)
- (ii) Differentiate between primary, secondary and tertiary type of measurements. Give examples. (6)

Or

- (b) (i) Explain with a neat sketch the three stages of a generalized measurement system. (8)
- (ii) Discuss the various systematic and random errors in measurements. (8)
12. (a) (i) Describe with the help of sketches the method of wringing slip gauges. (5)
- (ii) Explain the good practices to be followed on the care and use of slip gauges. (5)
- (iii) State briefly the optical principle of an angle dekkor. State its applications. (6)

Or

- (b) (i) Describe the construction and working of a toolmaker's microscope. How it can be used to measure screw thread? Explain. (12)
- (ii) What is meant by the term 'magnification' as applied to a mechanical comparator? What are the basic methods of magnification used in comparators? (4)
13. (a) (i) When measuring the effective diameter of an external screw thread gauge of 3.5 mm pitch a 30.500 mm diameter cylindrical standard and 2.000 mm wires were used. The micrometer readings over the standard and wires and gauge and cylinders were 13.3768 and 12.2428 respectively. Calculate the effective diameter of the thread gauge. (6)
- (ii) Why is it not possible to detect roundness error in some form of lobed cylinder by means of a diameter measuring machine? Describe the equipment by which this type of roundness error can be detected. (10)

Or

- (b) (i) Explain the principle and operation of a rolling gear tester. State the errors in a spur gear that can be detected by the rolling gear tester. (10)
- (ii) Discuss the relative merits and demerits of the M (mean line) and the E (envelope) system of measurement of surface finish. (6)
14. (a) (i) Explain with the help of a neat sketch the operation of a Laser interferometer. State its advantages. (12)
- (ii) State the merits and limitations of computer aided inspection. (4)

Or

- (b) (i) Describe the construction and working of a bridge type CMM. (10)
- (ii) Discuss the applications of laser in machine tool metrology. (6)
15. (a) (i) Discuss the working principle of measurement of shaft torque with the help of strain gauge torsion meter. (8)
- (ii) Describe a method to measure temperature of a molten metal. (8)

Or

- (b) (i) Explain the construction and working of a magnetic flow meter. (8)
- (ii) Describe any one method used to measure low pressure. (8)