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Question Paper Code : 12357

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026

Fifth Semester

Mechanical Engineering

ME3592 – METROLOGY AND MEASUREMENTS

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term metrology as applied to engineering industry.
2. Mention the basic components of a measuring system.
3. Name any four instruments used measuring internal diameters in components.
4. List out the need of angle gauges.
5. What is tolerance analysis in manufacturing?
6. Name a common parameter used to measure surface finish and roughness.
7. State the difference between conventional tolerance and geometric tolerance.
8. What are the factors affecting surface roughness measurement?
9. What is machine vision?
10. State the advantages of Laser.

PART B — (5 × 13 = 65 marks)

11. (a) (i) What are the various elements of metrology? With example, explain how these elements influence the accuracy of measurements. (7)
- (ii) What is the need of calibration? Explain the classifications of various standards. (6)

Or

- (b) Distinguish between and give appropriate examples in each case.
 - (i) Repeatability and Reproducibility. (5)
 - (ii) Systematic and random error. (4)
 - (iii) Static and dynamic response. (4)

12. (a) (i) What is mechanical comparator? Explain its use with an application. (7)
(ii) Explain the working principle of rolling gear. (6)

Or

- (b) Describe the working principle of angle Dekkor with the neat sketch and also write its application.

13. (a) (i) Write notes on design of limit gauges. (6)
(ii) Name difference tolerance analysis and explain each of these with an example. (7)

Or

- (b) (i) Explain the terms selective and interchangeable assembly. (8)
(ii) Distinguish between tolerance and allowance. (5)

14. (a) (i) Explain the different types of geometric tolerances and symbolically represent them. (7)
(ii) Name a instrument which can be used for surface finish, explain its working. (6)

Or

- (b) With a neat sketch, explain the principle and working of Tomlinson surface meter roughness tester for the measurement of surface finish.

15. (a) Explain the construction and working of various types of CMM.

Or

- (b) Describe the working principle of a dual frequency laser interferometer with a neat sketch.

PART C — (1 × 15 = 15 marks)

16. (a) A Machine Vision system recovers useful information about a scene from its two dimensional digitized image. Explain the stages in machine vision process.

Or

- (b) Explain how a gear can be checked using Parkinson gear tester and also mentions its limitations.