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

Question Paper Code : 70899

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fifth Semester

Mechanical Engineering

ME 8501 – METROLOGY AND MEASUREMENTS

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How is the standard associated with measuring a work piece decided?

2. Distinguish between line standards and end standards.

3. State Taylor's principle of gauge design.

4. Which angle measuring device is best suitable for probing the V-block?

5. What are the metrological uses of lasers?

6. Suggest a case where machine vision system can be used for identifying the outsiders.

7. Define minor diameter of a screw thread.

8. Write about the type of error that is expected in turning a particular type of steel component that is found to possess varying hardness.

9. What are the advantages of mechanical force measuring devices?

10. The reliability of Components A, B and C connected in series are 0.95, 0.90 and 0.65 respectively. The reliability of the system needs to be improved. What would your suggestion to achieve the same?

PART B — (5 × 13 = 65 marks)

11. (a) Explain how various factors influence the measurement with supporting examples.

Or

(b) (i) Distinguish between 'precision' and 'accuracy'. (6)

(ii) Write detailed notes on the control measures you will take in order to eliminate measurement errors in a metrology laboratory. (7)

12. (a) Explain the concept of interchangeability and Selective assembly applied to a manufacturing company that manufactures shafts.

Or

(b) (i) Explain how a sine bar is used for measuring angles of components. (6)

(ii) Compare and contrast an autocollimator with an alignment telescope. (7)

13. (a) (i) Compare and contrast an AC and DC laser interferometer. (6)

(ii) Suggest a CMM that is best suitable for offline inspection of assemblies and justify your answer. (7)

Or

(b) Explain the constructional details and limitations of probes used in CMMs.

14. (a) Describe the method of checking the straightness of a component with diagrams wherever needed.

Or

(b) Explain the construction and working of a Tomlinson's surface meter.

15. (a) Explain the design and functioning of a flow measurement device of your choice with the aid of a labelled diagram.

Or

(b) Explain the construction, working and limitations of resistance thermometer.

PART C — (1 × 15 = 15 marks)

16. (a) An automobile spare parts manufacturing company has a metrology lab which is concerned with linear and angular measurements. List 10 possible chances of errors that may arise in engineering measurement in such a lab and the ways of fixing them.

Or

(b) What are the possible chances of employing machine vision in a food processing company that manufactures a wide variety of food items and beverages? Also discuss the ways machine vision system could be used at different stages of food processing.

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