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Question Paper Code : 91846

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fourth/Fifth Semester

Mechanical Engineering

ME 6504 : METROLOGY AND MEASUREMENTS

(Common to Materials Science and Engineering/Mechatronics Engineering)

(Regulations 2013)

(Also Common to PTME 6504 – Metrology and Measurements for B.E.

(Part-Time) Fourth Semester – Mechanical Engineering – Regulations 2014)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

(10×2=20 Marks)

1. What are the factors affecting the inherent characteristics of measuring instruments ?
2. Define Line and End standards.
3. Write any two precautions to be followed when using gauge blocks.
4. Why are sine bars used in metrology ?
5. Why laser is used as light source in interferometers ?
6. Name the different stages involved in the machine vision based measurement.
7. How is surface roughness assessed ?
8. What are the causes of roundness errors ?
9. What is meant by reliability of a measuring instrument.
10. Write the working principle of pyrometers.

PART – B

(5×13=65 Marks)

11. a) What are the various elements of metrology ? With examples, explain how these elements influence the accuracy of measurements ?

(OR)

- b) Explain with neat diagrams the method for measurement of straightness of a machine tool guide way using an Autocollimator. Show the tabulation to determine the error in straightness by choosing a reference line passing through the first and last points of the guide way.



12. a) Discuss in detail about the various types of limit gauges with neat diagram.

(OR)

- b) i) Explain the working principle of angle dekker with a neat sketch.
ii) Write its advantages.

13. a) Explain the working of Laser Interferometer.

(OR)

b) Explain different types of CMM and their constructional features.

14. a) Explain how a gear can be checked using Parkinson Gear Tester also mentions its limitations.

(OR)

b) With a neat sketch explain the working principle of Tomlinson Surface finish tester.

15. a) With neat sketches explain the construction and working principle of the following :

- i) Rotameter.
ii) Resistance thermometer.

(OR)

b) With neat diagram explain the construction and working principle of the following :

- i) Pitot tube.
ii) Bi-Metallic strip.

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) Design a workshop type progressive type Go-Not-Go plug gauge suitable for 25 H7, with following information.

- i) 25 mm lies in the diameter step of 18-30 mm.
ii) $i = 0.45 \sqrt[3]{D} + 0.001D$
iii) $IT7 = 16i$.