Reg. No. :

Question Paper Code : X 10700

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
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. Distinguish Precision and Accuracy.
2. Define grass error.
3. Give the various types of linear measuring instruments.
4. Write any four precautions to be followed when using slip gauges.
5. What is meant by alignment test on Machine tools ?
6. Why the laser is used in alignment testing ?
7. What are the applications of toolmakers microscope ?
8. Define Constant Chord.
9. Write the working principle of Orifice meter.
10. List various types of temperature sensors.

PART – B **(5×13=65 Marks)**

11. a) Explain the classification of various measuring methods. **(13)**

(OR)

b) Explain the various systematic and random errors in measurements. **(13)**

12. a) With neat sketch explain the working principle of micro optic auto collimator. **(13)**

(OR)

b) Explain the following with neat sketch.

i) Sine bar ii) Bevel Protractor. **(7+6)**

13. a) Explain the working principle of AC LASER interferometer and how the straightness is measured. **(13)**

(OR)

b) With neat sketch explain the various types of CMM based on its construction. Also write the advantages of computer aided inspection. **(13)**

14. a) Describe a gear tooth Vernier Caliper and explain its use for checking tooth thickness and depth of tooth. **(13)**

(OR)

b) Derive the formula for measuring the effective diameter of thread by 3-wire method with neat sketch. **(13)**

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

i) Pitot Tube ii) Venturi meter **(6+7)**

(OR)

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

i) Thermo couple ii) Bi-Metallic strip. **(7+6)**

PART – C **(1×15=15 Marks)**

16. a) Design general type GO and NO GO gauges for a 40H7/d8 fit. 40 mm lies in the diameter 30 to 50. Show graphically the disposition of gauge tolerance zones relative to tolerance zones. Standard tolerance for IT 7 is 16i and IT8 is 25i, where 'I' is the tolerance unit. The upper deviation for 'd' shaft is-$16D^{0.44}$. **(15)**

(OR)

b) An electronic caliper was used to measure the length of an object. Five measurements were made. The results of the five measurements are : 21.53 mm, 21.51 mm, 20.52 mm, 21.48 mm and 21.42 mm. The workshop temperature during measurement was 21°C. The calibration certificate of the electronic caliper says that the device will read within ± 0.02mm of the correct answer if it is used correctly and when the temperature is within 0 to 40°C. Estimate the expanded uncertainty at a coverage factor of 2 providing coverage probability of approximately 95%. **(15)**