

CBCS SCHEME



18ME46B/18MEB406

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023 Mechanical Measurements and Metrology

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define metrology. State the objectives of metrology. (06 Marks)
- b. Distinguish between line standard and end standard. (06 Marks)
- c. Four length of bars A, B, C, D of approximately 250 mm each are to be calibrated with standard calibrated metre bar which is actually 0.0008 mm less than a metre. It is also found that, bar B is 0.0002 mm longer than bar A, bar C is 0.0004 mm longer than bar A and bar D is 0.0001 mm shorter than bar A. The length of all four bars put together is 0.0003 mm longer than the calibrated standard metre. Determine the actual dimension of each bar. (08 Marks)

OR

- 2 a. Explain the wringing phenomena of slip gauge. (05 Marks)
- b. Explain the working of autocollimator with the help of a neat sketch. (07 Marks)
- c. Select size of the angle gauges required to build the following angles. Also sketch the arrangement: (i) $33^{\circ}16'42''$ (ii) $102^{\circ}8'42''$ (08 Marks)

Module-2

- 3 a. With a general sketch, explain the limits, tolerance, fits, allowances and deviations. (10 Marks)
- b. What is meant by interchangeability? State its advantages. (06 Marks)
- c. Enumerate the classification of plain gauges. (04 Marks)

OR

- 4 a. Define comparator. What is the need of comparator? (04 Marks)
- b. With a neat sketch, explain the working of sigma comparator. (08 Marks)
- c. Sketch and explain the working of LVDT. (08 Marks)

Module-3

- 5 a. Derive the expression for the effective diameter of screw thread using two wire method. (10 Marks)
- b. With a neat sketch, explain the construction and working of tool makers microscope. What are its applications? (10 Marks)

OR

- 6 a. Explain how gear tooth Vernier caliper is used to measure gear tooth thickness. (10 Marks)
- b. With a schematic diagram, explain the working principle of CMM. (10 Marks)

Module-4

- 7 a. Explain the generalized measurement system with the aid of block diagram. (10 Marks)
b. Explain the following terms:
(i) Sensitivity (ii) Repeatability (iii) Linearity
(iv) Threshold (v) Least count (10 Marks)

OR

- 8 a. What is transducer? Sketch and explain working principle of piezo-electric transducers. (10 Marks)
b. With a neat sketch, explain the working of CRT. (10 Marks)

Module-5

- 9 a. With a neat sketch, explain the working of Rope brake dynamometer. (10 Marks)
b. With a neat sketch explain the working of McLeod gauge. (10 Marks)

OR

- 10 a. What is thermocouple? State the laws of thermocouple. (08 Marks)
b. Describe the working and construction of optical pyrometer. (08 Marks)
c. Write short note on gauge factor. (04 Marks)
