



CBCS SCHEME

18ME46B/18MEB406

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Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024

Mechanical Measurements and Metrology

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define Metrology. What are the objectives of metrology? (08 Marks)
b. Define material standard and wave length standard. Explain subdivision standards. (06 Marks)
c. List and draw the slip gauges to be wrong together to produce an overall dimension of:
i) 92.3565 ii) 62.306. Using M112 slip gauge set. (06 Marks)

OR

- 2 a. With a neat sketch, explain the working principle of sine bar. (06 Marks)
b. With a neat sketch, explain the working of autocollimator. (06 Marks)
c. Four length bars A, B, C, D of approximately 250mm each are to be calibrated with a calibrated standard meter bar which is 0.0008mm less than a meter. It is also found that, bar B is 0.0002mm longer than bar A, bar C is 0.0004mm longer than A, and bar D is 0.0001mm shorter than bar A the length of all four bars put together is 0.0003mm longer than the calibrated standard meter. Determine the actual dimensions of each bar. (08 Marks)

Module-2

- 3 a. Describe in detail the need of hole basis system and shaft basis system with sketches. (10 Marks)
b. Determine the dimensions of the shaft and hole for a $28H_{8}g_6$ and sketch the fit. Diameter 28 falls in the diameter range of 18-30mm. Fundamental deviation for 'd' shaft is $-2.5D^{0.34}$, $IT_8 = 25i$, $IT_6 = 10i$, $I = 0.45\sqrt[3]{D} + 0.001D$ microns. (10 Marks)

OR

- 4 a. Give classification of comparators and explain with neat sketch Johansson Mikrokaktor. (10 Marks)
b. With a neat sketch, explain the construction and principle of solex pneumatic comparator. (10 Marks)

Module-3

- 5 a. With a neat sketch, explain the various terms used in the screw thread. (10 Marks)
b. With the help of neat sketch, explain the method of determining the chordal thickness of a gear tooth using gear tooth vernier calliper. (10 Marks)

OR

- 6 a. Derive an expression to find the effective diameter of screwthread using two-wire method. (10 Marks)
b. Sketch and explain composite error testing of spur gears. (10 Marks)

Module-4

- 7 a. Describe the generalized measurement system with a block diagram. (10 Marks)
b. Distinguish between :
i) Primary and Secondary transducer
ii) Active and Passive transducer. (10 Marks)

OR

- 8 a. Sketch and explain any one type of electrical transducer. Give advantages of electrical transducers. (10 Marks)
b. Describe the Cathode ray oscilloscope with a neat sketch. (10 Marks)

Module-5

- 9 a. With a neat sketch, explain the working principle of Prony brake dynamometer. What are its limitations? (10 Marks)
b. Sketch and explain the working of Pirani thermal conductivity gauge. Give advantages of Pirani thermal conductivity gauges. (10 Marks)

OR

- 10 a. Define strain gauge. With a neat sketch, explain wheat stone bridge circuit. (10 Marks)
b. Explain the construction and working principle of optical pyrometer. (10 Marks)
