

CBCS SCHEME

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15MEB406/15ME46B

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022

Mechanical Measurements and Metrology

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define metrology and mention the objectives of metrology. (05 Marks)
- b. With a neat sketch explain the Imperial Standard Yard. (05 Marks)
- c. Using M112 set of slip gauges build up a dimensions of 30.4875mm and 49.3115mm. (06 Marks)

OR

- 2 a. Elaborate the use of Sine Bar for measuring angle of small components and heavy components. (06 Marks)
- b. Explain the principle of Autocollimator. (05 Marks)
- c. Build up following dimensions using angle gauges and show it with neat sketch $57^{\circ} 34' 9''$. (05 Marks)

Module-2

- 3 a. What do you understand by Tolerance accumulation and Geometrical tolerance? (06 Marks)
- b. Explain Hole basis system and Shaft basis system. (04 Marks)
- c. Determine the dimensions of the shaft and Hole for a fit $30H_8/d_{10}$ and sketch the fit, given the following data :
(i) Diameter 30 falls in the dia range 18 – 30, upper deviation for the “d” shaft is $-16D^{0.44}$.
(ii) $i = 0.45D^{1/3} + 0.001D$, Tolerance for IT8 = 25i and IT10 = 64i. (06 Marks)

OR

- 4 a. What are basic requirements of comparators? (04 Marks)
- b. With neat sketch explain Solex pneumatic gauge. (06 Marks)
- c. Explain the working of Reed type mechanical comparator. (06 Marks)

Module-3

- 5 a. Elaborate the process of measurement of minor diameter of Internal thread. (06 Marks)
- b. Derive the expression for Best size of wire. (05 Marks)
- c. Explain with sketch the use of gear tooth vernier caliper for chordal tooth thickness measurement. (05 Marks)

OR

- 6 a. Explain with neat sketch the concept of ordinate measuring machine. (06 Marks)
- b. Mention the applications of Laser beam measurement system. (04 Marks)
- c. Derive the equation for effective diameter using three wire method. (06 Marks)

Module-4

- 7 a. With a block diagram explain Generalized measurement system. (06 Marks)
- b. Describe the working principle of Piezoelectric Transducer. (05 Marks)
- c. Explain primary and secondary transducer taking example of Bourdon tube pressure gauge. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 8 a. What are the inherent problems associated with mechanical systems. (06 Marks)
- b. With neat sketch explain Ballast circuit. (05 Marks)
- c. Explain the working of stylus-type oscillograph. (05 Marks)

Module-5

- 9 a. With neat sketch explain proving ring and mention its applications. (06 Marks)
- b. Describe the working of Hydraulic dynamometer. (05 Marks)
- c. Explain the pirani gauge with temperature compensation. (05 Marks)

OR

- 10 a. Elaborate the preparation and mounting of strain gauges. (05 Marks)
- b. Explain with neat sketch optical pyrometer. (06 Marks)
- c. State laws of thermocouples and mention its applications. (05 Marks)
