

CBCS SCHEME

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18MR36

Third Semester B.E. Degree Examination, June/July 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? (06 Marks)
b. Explain with the neat sketch, Imperial Standard Yard and International prototype meter. (10 Marks)
c. Using a set of M112 slip gauges, build the following dimensions: (04 Marks)
i) 49.3115 ii) 87.3215

OR

- 2 a. Explain the principle of autocollimator with the help of a neat sketch, with its applications. (08 Marks)
b. Write the limitations of line standard and end standard. (04 Marks)
c. Three 100 mm end bars are measured on a level comparator by first wringing them together and comparing with a 300 mm bar. The 300 mm bar has a known error of $+40\mu\text{m}$ and the three bars together measure $64\mu\text{m}$ less than the 300 mm bar. Bar A is $18\mu\text{m}$ longer than bar B and $23\mu\text{m}$ longer than bar C. Find the actual length of each bar. (08 Marks)

Module-2

- 3 a. With neat sketches, explain the hole based and shaft based system of limits and fits. (08 Marks)
b. Explain with a neat sketch, the construction and working of LVDT. List its advantages and disadvantages. (12 Marks)

OR

- 4 a. Determine the type of fit after deciding the fundamental deviations and tolerances in the following :
Fit $\phi 70 H_9 e_7$
diameter step (50-80)
fundamental deviation for e shaft $= -11D^{0.41}$
 $IT_7 = 16i$
 $IT_9 = 40i$
 $i = 0.45 \sqrt[3]{D} + 0.001 D$ (08 Marks)
b. Explain with the neat sketch, the principle and working of a Solex pressure gauge. List the need of a comparator. (12 Marks)

Module-3

- 5 a. Explain with a neat sketch, measurement of effective diameter of a screw thread by 2-wire and 3-wire method. (12 Marks)
b. With a neat sketch explain the terminology of a spur gear. (08 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

- 6 a. Explain any one method of gear tooth thickness measurement with sketch. (10 Marks)
 b. With a neat sketch, explain the construction and working of tool maker's microscope. List its applications. (10 Marks)

Module-4

- 7 a. Explain the concept of generalized measurement system with block diagram with bourdon pressure gauge as an example (08 Marks)
 b. Define the following terms:
 i) Hysteresis
 ii) Threshold (04 Marks)
 iii) Calibration (08 Marks)
 iv) Precision
 c. With a neat sketch explain cathode ray oscilloscope.

OR

- 8 a. With a circuit diagram, explain ballast circuit. (08 Marks)
 b. What is photoelectric transducer? Explain with a neat sketch. (07 Marks)
 c. With a neat sketch, explain a general telemetering system. (05 Marks)

Module-5

- 9 a. What is pyrometer? Explain the working principle of optical pyrometer. (08 Marks)
 b. With a neat sketch explain working of proxy brake dynamometer. What are its limitations? (12 Marks)

OR

- 10 a. Describe the McLeod gauge with a neat sketch. (10 Marks)
 b. What is a Thermocouple? State and explain the two laws of thermocouples with a neat sketch (10 Marks)
