



CBCS SCHEME

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17AE36

Third Semester B.E. Degree Examination, Jan./Feb.2021 Measurement & Metrology

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Sketch and explain International Prototype Meter and Imperial Standard Yard. (10 Marks)
b. Three 100 mm end bars are measured on a level comparator by first wringing them together and comparing with a calibrated 300 mm bar which has a known error of +40 μm . The three end bars together measure 64 μm less than the 300 mm bar. Bar A is 18 μm longer than bar B and 23 μm longer than bar C. Find the actual length of each bar. (10 Marks)

OR

- 2 a. Explain with the characteristics of Line, end and wave length standards with suitable examples. (10 Marks)
b. Build the dimensions of, (i) 58.975 mm (ii) 49.3115 mm and (iii) 35.4875 mm using two protector slips of 2.5 mm each. By using M112 set of gauges. (10 Marks)

Module-2

- 3 a. Differentiate between hole basis and shaft basis system with neat sketches. Which is preferred and why? (08 Marks)
b. Define the following :
(i) Tolerance
(ii) Limits
(iii) Unilateral and Bilateral tolerance. (04 Marks)
c. Calculate the limits and tolerances for a 25 mm shaft and hole pair designated by H_8d_9 . Take the fundamental deviation for 'd' shaft is $-16D^{0.44}$.
(i) 25 mm lies in steps of 18 mm and 30 mm
(ii) $IT_8 = 25i$ & $IT_9 = 40i$
Use correct units. Also sketch the tolerance zones and allowance. (08 Marks)

OR

- 4 a. With a neat sketch, explain the three types of fit with an example. (10 Marks)
b. What is gauging? With a neat sketch, explain plug gauge, ring gauge and snap gauges. (10 Marks)

Module-3

- 5 a. Define comparator, explain the need and characteristics of comparator. (08 Marks)
b. Describe with a neat sketch construction and working of LVDT. (08 Marks)
c. Select the sizes of angle gauges required to build $35^\circ 32' 36''$ (04 Marks)

OR

- 6 a. How do you measure effective diameter of a screw thread using two-wire method? (08 Marks)
b. Sketch and explain Zeiss ultra optimeter. (08 Marks)
c. Explain with sketch, measurement of unknown angle by using sine bar. (04 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.

Module-4

- 7 a. Discuss with block diagram of generalized measurement system. (06 Marks)
b. Define the following :
(i) Precision and Accuracy
(ii) Repeatability & Reproducibility (08 Marks)
(iii) Sensitivity & Hysteresis. (06 Marks)
c. Define error. Give the detailed classification of errors. (06 Marks)

OR

- 8 a. With an example, sketch and explain primary and secondary transducers. (06 Marks)
b. Explain any two methods of pressure sensitive elements. (08 Marks)
c. With a sketch explain piezoelectric transducer. (06 Marks)

Module-5

- 9 a. Explain the following with neat sketch,
(i) Prony brake dynamometer (10 Marks)
(ii) Hydraulic dynamometer. (10 Marks)
b. Explain with a neat sketch, working and principle of optical pyrometer. (10 Marks)

OR

- 10 a. Describe with a neat sketch of McLeod vacuum gauge for measurement of pressure. (10 Marks)
b. Define thermocouple. Explain the laws of thermocouple and its materials. (10 Marks)

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