



CBCS SCHEME

17AE36

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020 Measurement 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 term metrology, state and explain the objectives of metrology. (08 Marks)
b. Explain the following standards :
i) Primary standard
ii) Secondary standard
iii) Working standard. (12 Marks)

OR

- 2 a. Discuss the procedure for the calibration of end bar. (10 Marks)
b. Build up a length of 58.975mm using M12 set using two protector slips. (10 Marks)

Module-2

- 3 a. Explain with neat sketch plug gauge. (08 Marks)
b. Determine the type of fit after deciding the fundamental deviations and tolerances in the following :
Fit $\phi 70H_9e_7$ diameter step (50 -80)
Fundamental deviation for e shaft = $-11D^{0.41}$
IT 7 = 16i IT 9 = 40i
 $i = 0.45\sqrt[3]{D} + 0.001D$ (12 Marks)

OR

- 4 a. State and explain Taylor's principle of gauge design. (08 Marks)
b. Calculate dimensions of plug and ring gauges to control the production of 50mm shaft and hole pair of H_7d_8 as per IS specification.
The following assumption may be made : 50mm lies in diameter step of 30 and 50mm and the upper deviation for 'd' shaft is given by $-16D^{0.44}$ and lower deviation for hole H is zero tolerance limit (microns) = $0.45\sqrt[3]{D} + 0.001D$ and IT6 = 10i and above IT6 grade the tolerance magnitude is multiplied by 10 at each fifth step. (12 Marks)

Module-3

- 5 a. Define comparator. Give the difference between comparator and measuring instruments. (10 Marks)
b. Explain with neat sketch Pneumatic comparator. (10 Marks)

OR

- 6 a. Derive an expression for best wire size for 3 wire method of screw thread measurement. (12 Marks)
b. Explain gear tooth measurement using gear tooth vernier caliper. (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.

Module-4

- 7 a. Discuss with block diagram generalized measurement system with example. For each stage element. (08 Marks)
- b. Explain following :
- i) Sensitivity
 - ii) Accuracy and precession
 - iii) Hysteresis
 - iv) Load effect. (12 Marks)

OR

- 8 a. Define transducer. Mention any five mechanical and five electrical transducers. (08 Marks)
- b. Explain following :
- i) Spiral spring
 - ii) Bellows
 - iii) Bourdon tube
 - iv) Torsion bar. (12 Marks)

Module-5

- 9 a. Define following terms:
- i) Absolute pressure
 - ii) Atmospheric pressure
 - iii) Gauge pressure
 - iv) Vacuum (12 Marks)
- b. Write difference between hydraulic and mechanical brakes. (08 Marks)

OR

- 10 a. Write a short note on the construction of resistance thermometer. (10 Marks)
- b. Describe the construction and working of Electrical strain gauge. (10 Marks)
