

B.Tech. V Sem. (Main/Back) Exam., 2014

Mechanical Engineering

5ME3A Measurement & Metrology (Common with PI)

Time : 3 Hours

Total Marks : 80

Min. Passing Marks : 24

Instructions to Candidates :

Attempt any five questions selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

UNIT - I

1. (a) Explain the terms Interchangeability, precision, reproducibility and accuracy as applied to the method of measurements, with examples? (8)
- (b) How accuracy and sensitivity of a measuring instrument is distinguish, elaborate with an example? Compare systematic error with random error. (8)

OR

1. Explain various type of error in measurement, and important ways to eliminate them. (16)

UNIT - II

2. (a) Define comparators and elaborate its various types. (8)
- (b) Explain the principle of sine bar and comment on its accuracy. (8)

OR

2. (a) Explain the method of using vernier calliper and micrometer in linear measurement with examples/ diagrams. (8)
- (b) Compute the slip gauge block combination necessary to check 'GO' & 'NO GO' dimensions of a limit gauge $38_{-0.064}^{-0.025}$ mm, using M87 special set as per IS:2984. (8)

UNIT - III

3. (a) While measuring the effective diameter of an external screw thread; gauge of 3.5 mm, pitch, 30.500 mm diameter cylindrical standard and 2.000 mm wire were used. The micrometer reading over the standard & wires, and gauge & cylinders were 13.3768 and 12.2428 mm respectively. Calculate the thread gauge effective diameter. (8)
- (b) In the measurement of surface roughness, height of 20 successive peaks and troughs were measured from a reference datum. These were : 35, 25, 40, 22, 35, 18, 42, 25, 35, 22, 36, 18, 42, 22, 32, 21, 37, 18, 35, 20 microns. If these measurements were obtained over a length of 20 mm. determine the CLA and RMS value of a rough surface. (8)

OR

3. (a) Why assessment of the surface texture is important? Describe two method used for obtaining a numerical value of the texture from a given graphical record. (8)
- (b) Elaborate various gear error and comment on the problems of gear measurement. (8)

UNIT - IV

4. Write short note on (any two) : (16)
- (a) Laser interferometry
- (b) Alignment test on lathe
- (c) Scanning laser gauge

OR

4. (a) Distinguish 'alignment test' from 'performance test' of machine tools with example. (8)
- (b) Explain various geometrical checks on machine tools and explain acceptance test for surface grinder. (8)

UNIT - V

5. Write short note on (any one) : (16)
- (a) Measurement of force
- (b) Measurement of power

OR

5. Write short note on (any one) : (16)
- (a) Measurement of flow
- (b) Measurement of temperature