

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2064)

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B. Tech 4th Semester Examination
Metrology and Interchangeability (O.S.)
ME-4001

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting atleast one question from each section A, B, C & D of the question paper. All sub parts of section E is compulsory. All questions carry equal marks.

SECTION - A

1. (a) Distinguish between 'Precision' and 'Accuracy' with suitable examples.
- (b) Sketch a vernier caliper and name its different parts. Explain how will you measure the thickness of a plate by the vernier caliper?
- (c) Distinguish between Line Standards and End Standards. How are End Standards derived from Line Standards?
(4+8+8)
2. (a) Distinguish between static and dynamic measurements. What are the different sources of errors? Explain.
- (b) Explain principle of compound gearing method for mechanical measurement. (10+10)

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SECTION - B

3. (a) Explain the meaning of the following terms:
- (i) Hole Basis system, stating why it is recommended;
 - (ii) Unilateral and Bilateral limits.
- (b) What is a sine bar? With a neat diagram, explain how this is used?
- (c) State the importance of limits and fits in large scale production. Describe any system of setting limits and fits you know. (4+8+8)
4. (a) Name the various types of comparators used in industry and explain the construction and working of optical comparators.
- (b) Explain the working principle of autocollimator and how the straightness is measured? (10+10)

SECTION - C

5. (a) Explain the use of an optical flat to test the flatness of measuring surfaces.
- (b) Describe the flatness testing using autocollimator method. (10+10)
6. Describe the following:
- (a) Thread caliper gauges
 - (b) Errors in thread. (2x10=20)

SECTION - D

7. (a) Draw the geometry of spur gear and explain the different terminology associated with it.
- (b) With a neat sketch, describe the construction and working of a profilometer. (10+10)

8. (a) Explain the principle of inspecting involute profile of gear tooth.
- (b) What are the different methods used for the measurement of surface finish? Explain the working of the Tomlinson surface meter. (10+10)

SECTION - E

9. (i) Define Line Standard and End Standard.
- (ii) Enumerate any four angular measuring instruments and their accuracies.
- (iii) What is the helix angle of M50 x 2 threads?
- (iv) What is the tooth thickness of gear of module 5 mm and number of teeth 30?
- (v) How does a selective assembly differ from an interchangeable manufacture?
- (vi) What are the considerations for deciding the limits on the limit gauges?
- (vii) Explain the principle of measurement by light-wave interference method.
- (viii) What is meant by roughness and waviness of machined surfaces?
- (ix) What are the various types of pitch errors on thread components and what is the difference between them?
- (x) What is the working principle and applications of an Auto-Collimator? (10×2=20)