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**B. Tech 4th Semester Examination**  
**Metrology and Interchangeability (NS)**

**ME-221**

**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 one question from each section A, B, C and D. The section E is compulsory with short answer type and all parts of this section are to be attempted. Missing data, if any, can be assumed suitably.

**SECTION - A**

1. (a) What are the standards of measurements? Explain the classifications of various standards. (10)
- (b) Explain the subdivision of standards. (10)
2. Explain the principles of optical and electrical measuring instruments. (20)

**SECTION - B**

3. (a) Explain the concept of interchangeability. (10)
- (b) Explain the various types of fits. (10)
4. (a) What is sine bar? Discuss the various types of sine bars and their uses. Also discuss the precautions in use of sine bars. (20)

**SECTION - C**

5. (a) Define the flatness. Discuss any two methods of flatness measurement. (10)

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- (b) What is the straightness? Discuss it and explain the autocollimator method for measuring it. (10)
6. Explain with neat and clean diagram various screw thread gauges. (20)

**SECTION - D**

7. Explain the Gear tooth vernier and constant chord method for measuring the thickness of tooth at pitch line and depth from top of tooth. (20)
8. (a) Explain the measurement of surface finish and various surface textures. (10)
- (b) Explain with neat and clean diagram the construction and working of Tomlinson tester. (10)

**SECTION - E**

9. (a) Convert the one meter and one yard into the wavelengths.
- (b) What are the various types of error?
- (c) What is sine center?
- (d) Brief the ISO system of limits and fits.
- (e) Draw different type of straight edges.
- (f) Define the squareness.
- (g) Define the error in screw thread.
- (h) Show the various tolerances for major and minor diameters.
- (i) What do you mean by alignment of bearing?
- (j) What are the composite elements? (2×10=20)