[Total No. of Questions - 8] [Total No. of Printed Pages - 2]
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M. Tech 3rd Semester Examination

Metrology and Industrial Inspection

PEE-E21

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 out of eight questions. Each question carries equal marks.

1. (a) Differentiate between primary, secondary and working standards. Explain giving examples. How can end standards be derived from line standards?

   (b) Define and classify limits, fits and tolerances. Discuss their significance.

   (c) Discuss the entire procedure for the measurement (i) using a sine bar. (ii) slip gauges. (6+6+8=20)

2. (a) Explain (i) Roughness (ii) Waviness (iii) Sampling length

   (b) State the possible causes of each of the various types of irregularities found in surface texture.

   (c) Explain the working of stylus type surface texture measuring instruments. (6+6+8=20)

3. (a) Explain how optical comparators work and briefly enumerate the advantages of them over electrical and electronic comparators.

   (b) Define calibration. Explain in detail (i) calibration of gauges by interference (ii) obliquity correction. (10+10=20)

4. (a) What are the main dimensions of gear and screw threads? Discuss measuring methods for runout, pitch, profile, backlash, tooth thickness.

   (b) Provide details of screw thread terminology. Describe the application of thread gauges with neat sketches. (10+10=20)

5. (a) Discuss the applications and procedure of (i) one wire method (ii) three wire measurement method.

   (b) Discuss various elements of spur gear and explain constant chord method. (12+8=20)

6. (a) Explain the principle and application of optical flats.

   (b) Explain the advantages of using wavelength standards.

   (c) Explain measurement of straightness using autocollimators (6+6+8=20)

7. (a) Explain the purpose of calibration and discuss how calibration of end gauges in sets and standard scales is done?

   (b) Explain with neat sketches (i) imperial standard yard (ii) plastic replica techniques for measuring surface finish and roughness (10+10=20)

8. Write short notes on the following (any two) :

   (a) Interchangeability and its significance.

   (b) Electrical and Electronic comparators.

   (c) Procedure for numerical assessment of roundness. (10×2=20)