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Code No: R32031 R10

Set No: 1

III B.Tech. II Semester Regular/Supplementary Examinations, May/June -2014

METROLOGY

(Mechanical Engineering)

Time: 3 Hours Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1. a) Write the differences between (i) limits (ii) fits and (iii) tolerances.
 - b) Find the limit sizes and tolerances of hole and shaft pair designated by ϕ 250 H₁₀ n₇. Also estimate the type of fit. Given ϕ 250 lies in the range of 250-280 mm. Fundamental deviation of shaft 'n' = 5 D $^{0.34}$
- 2. a) Give the advantages and disadvantages of unilateral and bilateral system of gauging.
 - b) Explain the principle of operation of Reed type comparator with neat sketch.
- 3. a) Describe the principle of Auto-Collimator with neat sketch.
 - b) Discuss with working principle of laser interferometer with neat sketch.
- 4. a) Write the difference between surface roughness and surface waviness.
 - b) Explain briefly each of the following terms showing its importance in the measurement of surface texture. i) Lay ii) Ra iii) sampling length
- 5. a) Explain the principle of twisted strip mechanical comparator with neat sketch.
 - b) Explain the principle of optical lever comparator with neat sketch.
- 6. How do you measure the i) pitch and ii) tooth thickness of spur gear? Explain the methods with neat sketches.
- 7. How do you measure i) effective diameter and ii) pitch of external screw threads? Explain the methods with neat sketches.
- 8. What are the various alignment tests used for testing a milling machine? Explain with neat sketches.



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METROLOGY

(Mechanical Engineering)

Time: 3 Hours

Answer any FIVE Questions All Questions carry equal marks

- 1. a) Explain the Taylor's principle of limit gauging with neat sketch.
 - b) Calculate the fundamental deviation and tolerances and hence the limits of size for the shaft and hole for the following fit: 60 mm H8 f7. The diameter steps are 50 mm and 80 mm.
- 2. a) Explain with the help of diagram the principle of operation of sine bar.
 - b) Explain the various errors in linear and angular measurements.
- 3. a) Define Interferometry? Explain the principle of Laser Interferometer with diagram.
 - b) Describe the principle of auto collimator with neat sketch.
- 4. a) Explain briefly the different parameters used to measurement of surface texture.
 - b) Briefly discuss the electrical stylus probe instrument with sketch.
- 5. a) Difference and distinguish between the mechanical and optical comparators.
 - b) Explain the principle of twisted strip mechanical comparator with neat sketch.
- 6. How to measure the (i) profile and (ii) tooth thickness of a given spur gear? Explain.
- 7. a) Briefly explain about the measurement of effective diameter in internal thread gauges.
 - b) Explain the various errors in screw thread measurements.
- 8. What are the various acceptance tests used for testing a lathe machine? Explain with neat sketches.



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METROLOGY

(Mechanical Engineering)

Time: 3 Hours Max Marks: 75

Answer any FIVE Questions All Questions carry equal marks

- 1. a) Explain the terms of (i) Interchangeability and (ii) selective assembly.
 - b) Discuss briefly different types of fits with neat sketches.
- 2. a) Explain with the help of diagram the principle of operation of spirit level.
 - b) Explain the different types of plain limit gauges.
- 3. a) Explain principle and working of tool maker's microscope.
 - b) Discuss the working principle of optical projectors with neat sketch.
- 4. a) Explain the different parameters of surface texture and calculation of sampling length.
 - b) How to measure the surface finish by using Tomlinson surface meter? Explain.
- 5. a) Describe the principle of mechanical comparator with neat sketch.
 - b) Discuss with working principle of optical projectors with neat sketch.
- 6. a) With neat sketch, discuss the gear tooth nomenclature with indicate the different parts.
 - b) What are the different instruments used in gear tooth metrology? Explain any two.
- 7. a) Explain the different errors in screw threads in engineering metrology.
 - b) Explain the (i) two wire method (ii) three- wire method with neat sketches.
- 8. Explain the various acceptance tests used for testing drilling machines.



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III B.Tech. II Semester Regular/Supplementary Examinations, May/June -2014

METROLOGY

(Mechanical Engineering)

Time: 3 Hours Max Marks: 75

Answer any FIVE Questions All Questions carry equal marks

- 1. a) Difference between Hole basis and Shaft basis system.
 - b) Give the advantages and disadvantages of unilateral and bilateral system of gauging.
- 2. a) Explain with the help of diagram the principle of operation of angle dekkor.
 - b) With neat sketches discuss the plug gauges and ring gauges with their applications.
- 3. a) Explain the principle of operation and construction of tool maker's microscope.
 - b) Briefly discuss the principle of operation of NPL gauge interferometer.
- 4. Write short notes on the following:
 - (i) CLA (ii) RMS (iii) sampling length and (iv) Talysurf
- 5. a) Describe the principle of sigma comparator with neat sketch.
 - b) What are the advantages and disadvantages of pneumatic comparators?
- 6. a) Describe any one method to measure the tooth thickness of a spur gear.
 - b) How to measure the gear tooth profile on profile projector?
- 7. a) What are the different errors in screw threads in engineering metrology? How to avoid these errors.
 - b) Explain the measurement of the pitch of the screw thread with neat sketch.
- 8. a) Describe the principle and advantages of Coordinate Measuring Machine.
 - b) What are the various alignment tests performed on lathe machines?