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Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Mechanical Measurements & Metrology

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Define metrology. State and explain the objectives of metrology. (07 Marks)
- b. Define metre in terms of wave length standard and enumerate the advantages of using wavelength standard. (05 Marks)
- c. Four end bars A, B, C and D are to be calibrated using a calibrated length bar of 400 mm whose actual length is 399.9998 mm. The bar B is longer than bar A by 0.0004 mm, bar C is longer than bar A by 0.0003 mm, while bar D is shorter than bar A by -0.0001 mm. The four gauges together have a combination length of 400.0002 mm. Determine the corrected (actual) length of each end bar. (08 Marks)

- 2 a. Write a short notes on: (10 Marks)
 - (i) Interchangeability
 - (ii) Selective assembly
- b. Design the general type Go and NO-Go gauge for components having $20 H_7/f_8$ fit. Given
 - (i) i (micron) = $0.45\sqrt[3]{D} + 0.001D$
 - (ii) Upper deviation of 'f' shaft = $-5.5D^{0.41}$
 - (iii) 20 mm falls in the diameter step of 18 and 30 mm .
 - (iv) $IT_7 = 16i$
 - (v) $IT_8 = 25i$
 - (vi) Wear allowance 10% of gauge tolerance. (10 Marks)

- 3 a. Explain with neat sketch, Zeiss ultra optimizer. (06 Marks)
- b. Explain with sketch, the principle of Back pressure type pneumatic comparator. (06 Marks)
- c. Give the combination of angle gauges to obtain the following angles: (i) $37^\circ 16' 42''$ (04 Marks)
- (ii) $102^\circ 8' 36''$ (04 Marks)
- d. Write a note on clinometers. (04 Marks)

- 4 a. Illustrate the principle of Interferrometry with sketches. (05 Marks)
- b. What is best size wire? Derive an expression for the same. (05 Marks)
- c. With the help of neat sketch, explain the method of determining the chordal thickness of a gear tooth using Vernier gear tooth caliper. (10 Marks)

PART - B

- 5 a. Explain with sketches : (i) Hysteresis (ii) Threshold (iii) Repeatability (iv) Sensitivity (10 Marks)
- b. Mention any five mechanical and five electrical transducer elements. (04 Marks)
- c. With a neat sketch explain electronic transducers. (06 Marks)

- 6 a. Briefly explain Inherent problems (any five) associated with mechanical intermediate modifying system. (10 Marks)
- b. What are X-Y plotters? With a block diagram, explain its working. (10 Marks)

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- 7 a. Explain with a sketch working of proving ring. (06 Marks)
b. Explain hydraulic dynamometer with a neat sketch. (06 Marks)
c. Explain with a neat sketch pirani gauge. (08 Marks)
- 8 a. State the laws of thermocouples with sketch. (06 Marks)
b. Describe the construction and working of optical pyrometer. (08 Marks)
c. Write a note on preparation and mounting of strain gauges. (06 Marks)

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