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Fourth Semester B.E. Degree Examination, June/July 2011
Mechanical Measurement and Metrology

Time: 3 hrs.

Max. Marks:100

- Note:1. Answer FIVE full questions, selecting atleast TWO questions each from Part – A and Part - B.**
2. Draw neat sketches, wherever necessary.

PART – A

- 1 a. Define the term metrology as applied to engineering industry. State and explain the objectives of metrology. (06 Marks)
- b. Describe with sketch i) Imperial Standard Yard ii) International Prototype Meter. (10 Marks)
- c. Write the slip gauge combination to build the following dimensions using M112 slip gauge set :
i) 32.456 ii) 87.102. (04 Marks)
- 2 a. Design the general type GO and NO – GO gauge for components having 20H7 f8 fit. Given
i) $i(\text{micron}) = 0.45(D)^{1/3} + 0.001 D$ ii) Upper deviation of 'f' shaft = $-5.5 D^{0.41}$
iii) 20mm falls in the diameter step of 18mm to 30mm iv) IT7 = 16 i
v) IT8 = 25 I vi) Wear allowance 10% of gauge tolerance. (12 Marks)
- b. Explain, with sketch, measurement of unknown angles of heavy components using SINE BAR. (08 Marks)
- 3 a. Explain with a neat sketch, the working of SIGMA comparator. (08 Marks)
- b. Explain with a neat sketch, the construction and working of LVDT. (08 Marks)
- c. Show the arrangement of angle gauges, with a neat sketch by selecting minimum number of gauges for an angle $33^{\circ} 9' 15''$. (04 Marks)
- 4 a. What is the best size wire? Derive the expression for the same in terms of the pitch and angle of the thread. (08 Marks)
- b. What are the various characteristics that you would measure in a screw thread? Also list the instruments / apparatus that are required for measuring these characteristics. (06 Marks)
- c. Explain 3 – Wire method of measuring effective diameter of screw thread. (06 Marks)

PART – B

- 5 a. With a neat block diagram, explain the generalized measurement system with an example. (08 Marks)
- b. Distinguish between i) Primary and Secondary transducers ii) Active and Passive transducers. (06 Marks)
- c. Define the following terms with reference to measurement system :
i) Calibration ii) Sensitivity iii) Hysteresis. (06 Marks)
- 6 a. With a neat sketch, explain the working principle of a CRO. (08 Marks)
- b. State the advantages of electrical signal conditioning elements. (04 Marks)
- c. Explain with a neat sketch, Ballast Circuit diagram. (08 Marks)
- 7 a. With a neat sketch, describe the Bridgeman gauge used for pressure measurement. (08 Marks)
- b. With a neat sketch, explain the working principle of Proving Ring. (06 Marks)
- c. Explain with suitable diagram, the working of Hydraulic Dynamometer. (06 Marks)
- 8 a. Sketch and explain the working principle of optical pyrometer. (08 Marks)
- b. Describe the steps to be taken for the preparation of specimen and mounting of strain gauges. (08 Marks)
- c. What is a Thermo couple? State the laws of thermo couple. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

