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Fourth Semester B.E. Degree Examination, December 2011
Mechanical Measurements and Metrology

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1
 - a. Describe the procedure for deriving the end standard from the line standard. (08 Marks)
 - b. Three 100 mm gauges are measured on a level comparator by first wringing them together and then comparing with 300 mm gauge and intercomparing them. The 300 mm gauge actually measures 300.0025 mm and three gauges together have a combination length of 300.0035 mm. Gauge A is 0.0020 mm longer than gauge B but shorter than gauge C by 0.0010 mm. Determine the corrected length of each gauge. (08 Marks)
 - c. Build up a dimension of 128.45 mm and 67.465 mm using two protector slips of 2.5 mm at both sides. Use M – 112 slip gauge set. (04 Marks)

- 2
 - a. With a neat sketch, explain the hole basis system and the shaft basis system of fits. Which system is preferred and why? (10 Marks)
 - b. Design GO and NOGO gauges to control the production of 25 H₇f₈, being given with usual notation $i = 0.45\sqrt{D} + 0.001D$ microns. Fundamental deviation for f shaft is $-5.5D^{0.41}$ microns. 25 mm lies in step of 18 – 30 mm. Multipliers for IT₇ and IT₈ grades are 16i and 25i respectively. (10 Marks)

- 3
 - a. Differentiate measuring instruments, gauges and comparators. (06 Marks)
 - b. Describe the construction and working of a sigma comparator with the help of a neat sketch. Mention its advantages. (10 Marks)
 - c. Build up the following angles : (04 Marks)
 - i) 57° 34'9" ;
 - ii) 31° 49'24"

- 4
 - a. With a neat sketch, explain the working principle of an auto collimator. (06 Marks)
 - b. With the set up, explain how the effective diameter of screw thread is measured using the 3 wire method. (08 Marks)
 - c. Explain with a neat sketch, the gear tooth vernier calliper. (06 Marks)

PART – B

- 5
 - a. Explain the working of generalized measurement system with a block diagram, taking a suitable example. (08 Marks)
 - b. Explain any three system response characteristics. (06 Marks)
 - c. Explain the basic principle of capacitive transducers. With a neat sketch, explain the changing dielectric constant type capacitive transducer. (06 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.

- 6 a. Explain the inherent problems associated with a mechanical intermediate modifying system. (06 Marks)
b. Explain with a neat sketch/circuit diagram, i) Ballast circuit ; ii) Electronic amplifiers. (08 Marks)
c. With a neat sketch, explain the light beam oscillagraph. (06 Marks)
- 7 a. Sketch and explain the working principle of a proving ring. (06 Marks)
b. Explain with a neat sketch the wooden block proney brake dynamometer. (06 Marks)
c. With a neat sketch, explain the Bridgeman gauge, used for pressure measurement. (08 Marks)
- 8 a. State the laws of thermocouple. (06 Marks)
b. With a neat sketch, explain the optical pyrometer. (08 Marks)
c. Write a note on the following, with respect to strain gauges : i) Gauge factor ;
ii) Temperature compensation. (06 Marks)

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