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10ME42B/10AU42B

Fourth Semester B.E. Degree Examination, June/July 2015
Mechanical Measurements and Metrology

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. Give the definition and objectives of metrology. (06 Marks)
 b. Explain line standard and end standard with examples. (06 Marks)
 c. The slip gauge set M38 consists of the following :

Range (mm)	Steps (mm)	Pieces
1.005	-	1
1.01 - 1.09	0.01	9
1.1 - 1.9	0.1	9
1.0 - 9.0	1.0	9
10.0 - 100.0	10.0	10

List the slip gauges to build the following : i) 29.875mm ii) 15.09mm iii) 101.345mm. (08 Marks)

- 2 a. What are Limit, Fit and tolerance? (06 Marks)
 b. Explain hole basis system and shaft basis system. (06 Marks)
 c. Determine the dimensions of the shaft and hole for a fit $30H_8d_{10}$ and sketch the fit, given the following data :
 i) Diameter 30 falls in the ϕ_a range 18 - 30, upper deviation for "d" shaft is $-16D^{0.44}$.
 ii) $i = 0.45D^{1/3} + 0.001$, Tolerance for IT8 = $25i$, Tolerance for IT10 = $64i$. (08 Marks)
- 3 a. Sketch and explain sigma comparator. (08 Marks)
 b. Explain with a neat sketch the construction and working principle of solex pneumatic comparator. (06 Marks)
 c. Give the systematic way of building angle gauges to set an angle of $33^\circ, 16', 42''$, using a standard set of 13 pieces. Also sketch the combination of angle gauges used. (06 Marks)
- 4 a. Explain the principle of interferometry with the aid of sketch. (06 Marks)
 b. How do you find effective diameter of a screw thread using two - wire method? (06 Marks)
 c. With a sketch, explain the construction of a tool maker's microscope. What are its applications? (08 Marks)

PART - B

- 5 a. Explain with examples various stages of a generalized measurement system. (08 Marks)
 b. Define : Sensitivity, Hysteresis, Repeatability. (06 Marks)
 c. Give advantages and disadvantages of Electrical transducers. (06 Marks)
- 6 a. With a block diagram, explain telemetry. (06 Marks)
 b. With a neat sketch, explain the working principle of a CRO. (08 Marks)
 c. What are X - Y plotters? With a block diagram, explain its working. (06 Marks)

- 7 a. With a neat sketch, describe the Pirani gauge used for pressure measurement. (08 Marks)
b. With a neat sketch, explain the working principle of prony brake dynamometer. (06 Marks)
c. Describe with a neat sketch, the analytical balance. (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. (06 Marks)
c. What is a Thermocouple? State the laws of thermocouple. (06 Marks)
