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10MEB402

Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Mechanical Measurements and Metrology

Time: 3 hrs. Max. Marks:100

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

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.

PART - A

1 a. Enumerate the characteristics between Line and End Standards. **(06 Marks)**

b. Three 200mm gauges to be calibrated are measured in a level comparator by wringing them together and then comparing them with a 600mm gauge. The 600mm gauge has an actual length of 600.0025mm and the 3 gauges together have a combined length of 600.0035mm. When the 3 gauges are inter compared , it is found that gauge A is larger than gauge B by 0.0020mm but shorter than gauge C by 0.001mm. Determine the length of each gauge. **(08 Marks)**

c. Sketch : i) Imperial standard yard ii) Wringing of slip gauges
iii) Using M112 build 78.3665mm and 92.357mm. **(06 Marks)**

2 a. Compare : i) Interchangeability and selective Assembly ii) Hole Basis and Shaft Basis
iii) Clearance fit and Interference fit. **(06 Marks)**

b. Design a general type of GO and NOGO gauge for components having $30H_7/f_8$ fit, given :
i) $i = 0.45\sqrt[3]{D} + 0.001D$
ii) Upper deviation of 'f' shaft = $- 5.5\ D^{0.41}$.
iii) 30mm falls in diameter steps of 18-30mm
iv) IT7 = 16i v) IT8 = 25 i.
Also Determine the type of fit and give reasons. **(10 Marks)**

c. State Taylor's principle for design of GO and NOGO gauges. **(04 Marks)**

3 a. With a neat sketch, explain i) Sigma Comparator ii) LVDT
iii) Solex pneumatic gauge iv) Sine centre. **(16 Marks)**

b. Explain Angle gauges with a neat sketch and build i) $15^0\ 51'\ 24''$ ii) $57^0\ 34'\ 9''$. **(04 Marks)**

4 a. Sketch and Explain :
i) Optical flats ii) Gear tooth micrometer iii) Tool Makers Microscope. **(12 Marks)**

b. Derive an expression for the effective diameter for Metric thread by 3 – wire method. **(08 Marks)**

PART - B

5 a. With a neat sketch of Bourdon's tube, explain Generalized Measuring System. **(10 Marks)**

b. Explain : i) Active and Passive transducers ii) Errors and Their types
iii) Systems Response. **(10 Marks)**

6 a. Explain the Inherent problems in Mechanical Intermediate modifying systems. **(04 Marks)**

b. Sketch and Explain :
i) Ballast Circuit ii) Telemetry iii) C.R.O iv) Light Beam Oscillograph. **(16 Marks)**

7 Explain with a neat sketch :
   a. Proving Ring.
   b. Prony Brake Dynamometer.
   c. Bridgemann Gauge.
   d. Pirani Gauge. **(20 Marks)**

8 a. State the laws of Thermocouples. **(04 Marks)**
   b. Explain : i) Optical Pyrometer ii) Strain Gauge Materials
   iii) Temperature Compensation in Strain Gauges. **(12 Marks)**
   c. Differentiate between Unbonded and Bonded Strain Gauges. **(04 Marks)**

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