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15ME46B/15MEB406

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

Time: 3 hrs.

Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a.   Define the term Metrology. State and explain the objectives of metrology.   **(06 Marks)**
    b.   Discuss the characteristics of Line standards and End standards.   **(10 Marks)**

OR

2   a.   With a neat sketch, explain the working principle of Sine bar and mention its limitations.   **(08 Marks)**

    b.   Build the angle gauges for the given angles :
         i) 37^0 9' 18"   ii) 35^0 32' 36" by using following table :

Degree	1	3	9	27
Minutes	1	3	9	27
Seconds	3	6	18	30

   (08 Marks)

Module-2

3   a.   Design a general type GO and Not GO gauges for component having 25 H_7/f_8 fit being given with usual notations.
         i)   i (microns) = 0.43 $\sqrt[3]{D}$ + 0.001D (D in mm)
         ii)   Upper deviation for f shaft = -5.5 $D^{0.41}$.
         iii) 25mm falls in the dia step of 18 and 30.
         Take wear allowance as 10% of the gauge tolerance also determine
         i) Type of fit   ii)   Allowance for the above fit.   **(12 Marks)**
    b.   State the Taylor's principle for the design of limit gauge.   **(04 Marks)**

OR

4   a.   List the characteristics of comparators and what are the advantages of mechanical comparators.   **(08 Marks)**
    b.   With a neat sketch, explain principal of optical comparator.   **(08 Marks)**

Module-3

5   a.   Explain with neat sketches, the method of measuring minor diameter of external thread and internal thread.   **(08 Marks)**
    b.   Explain with neat sketches : i)   Three wire method   ii)   Best size wire.   **(08 Marks)**

OR

6   a.   Illustrate the principle of Interferometry.   **(08 Marks)**
    b.   With a neat sketch, explain the Tool maker's microscope. With the applications.   **(08 Marks)**

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Module-4

7 a. Define the following terms : i) Accuracy ii) Precision iii) Threshold
   iv) Calibration v) Sensitivity vi) Repeatability. (06 Marks)
   b. Define Error. How Errors are classified? (04 Marks)
   c. Explain any two mechanical transducers. (06 Marks)

OR

8 a. With a neat sketch, explain the cathode ray oscilloscope. (08 Marks)
   b. What are Piezo – Electric transducers? Explain with neat sketches modes of operation of piezoelectric crystals. (08 Marks)

Module-5

9 a. With the help of neat sketch, explain working principle of proxy brake dynamometer. (08 Marks)
   b. Describe with a neat sketch, Mcleod vaccum gauge. (08 Marks)

OR

10 a. What is Thermocouple? State the laws of thermo couple. (08 Marks)
   b. Explain : i) Bonded resistance strain gauge ii) Piezo resistive strain gauge. (08 Marks)

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