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17ME36B

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Mechanical Measurements and Metrology

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a. Define Metrology. What are the objectives of metrology?   (07 Marks)
     b. Explain the classification of standards along with examples.   (07 Marks)
     c. Give brief note on System of Measurements.   (06 Marks)

OR

2   a. Explain slip gauges in detail. What are the various methods available for the selection of slip gauges?   (07 Marks)
     b. What are Autocollimators? Explain with neat sketch.   (07 Marks)
     c. Build up a dimension of 69.2875 mm and 101.345 mm using M112 set slip gauges.   (06 Marks)

Module-2

3   a. Explain he interchangeability and selective assembly.   (10 Marks)
     b. Determine the actual dimension for a hole-shaft pair designated as $28H_7/f_8$ dimensions 28 falls in the range of 18 to 30mm. Fundamental deviation for f shaft is $-5.5D^{0.41}$. IT7 = 16i and IT8 = 25i. Tolerance limit i = $0.45D^{1/3}$ + 0.001D (Microns).   (10 Marks)

OR

4   a. Explain Tayler's principle for the design of limit gauges.   (07 Marks)
     b. Briefly explain the wear allowances on gauges.   (06 Marks)
     c. Determine the types of fit after deciding the fundamental deviations and tolerances in the following :
         Fit $\phi 70H_9\ e_7$, Diameter step (50 − 80)
         Fundamental deviation for e shaft = $-11\ D^{0.41}$
         IT7 = 16i and $H_9 = 40i$, i = $0.45\sqrt[3]{D}$ + 0.001D   (07 Marks)

Module-3

5   a. Sketch and explain Three-wire method of measuring the effective diameter of a screw thread.   (08 Marks)
     b. Explain with neat sketch the working of Tool maker's microscope.   (07 Marks)
     c. Explain Runout and Involute profile of a gear.   (05 Marks)

OR

6   a. Explain any one laser interferometer with neat sketch and their applications.   (10 Marks)
     b. With a neat diagram explain the constructional and working principle of a coordinate measuring machine.   (10 Marks)

Module-4

7 a. Explain with block diagram generalized measuring system.   (08 Marks)
   b. Define the following :
      (i) Calibration   (ii) Threshold   (iii) Sensitivity   (iv) System-Response and time delay
                                                                                 (12 Marks)

OR

8 a. What is photoelectric transducer? Explain with neat sketch.   (07 Marks)
   b. With a neat schematic, explain the basic concept of Ballast circuit.   (07 Marks)
   c. Differentiate between oscillograph and oscilloscope.   (06 Marks)

Module-5

9 a. Explain with neat sketch the Prony-Brake dynamometer.   (10 Marks)
   b. Describe the McLeod gauge with a neat sketch.   (10 Marks)

OR

10 a. What is pyrometer? Explain the working principle of optical pyrometer.   (07 Marks)
   b. Explain the theory of strain gauges and define gauge factor.   (05 Marks)
   c. Explain thermo couple and resistance thermometer with sketches.   (08 Marks)

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