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Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Mechanical Measurement 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 meter as per (i) Material Standard   (ii) Wavelength standard.   **(04 Marks)**
     b. Describe with neat sketches wringing phenomenon of slip gauges.   **(06 Marks)**
     c. Three 100 mm end bars are measured on a level comparator by first wringing them together and comparing with 300mm bar. There was an error of 0.03mm and three bars together have total error of 0.064mm less than the standard bar. Bar A is 0.02 mm layer than bar B and 0.025mm longer than bar C. Determine the actual dimensions of all end bars.   **(10 Marks)**

OR

2   a. Explain the working principle of auto collimator with the aid of a neat sketch. Also write its applications.   **(08 Marks)**
     b. Write the limitations of line standard and end standard.   **(04 Marks)**
     c. Select the size of angle gauges required to build the following angles. Also sketch the arrangement (i) $35° 32' 36''$ (ii) $57° 34' 9''$.   **(08 Marks)**

Module-2

3   a. What is meant by interchangeability? State its advantages.   **(06 Marks)**
     b. Explain hole basis system in detail.   **(06 Marks)**
     c. Explain with neat sketch, working of a dial indicator.   **(08 Marks)**

OR

4   a. Briefly explain GO-Gauge and NO-GO Gauge.   **(06 Marks)**
     b. Define tolerance. Also explain grades of tolerance.   **(06 Marks)**
     c. Determine the dimensions of the shaft and hole for a fit 30 H8 d10, given the following data:
        (i)   Diameter 30 falls in the diameter range 18 - 30.
        (ii) Upper deviation for shaft is $-16D^{0.44}$.
        (iii) $i = 0.45D^{0.33} + 0.001D$
        (iv) Tolerance for IT8 = 25i
        (v)   Tolerance for IT10 = 64i   **(08 Marks)**

Module-3

5   a. Explain with a neat sketch, measurement of effective diameter of a screw thread by 2-wire method.   **(10 Marks)**
     b. With a neat sketch, explain the construction and working of tool maker's microscope what are its applications.   **(10 Marks)**

OR

6   a. With a neat sketch, explain the terminology of spur gear.   **(10 Marks)**
     b. Explain how Gear tooth vernier caliper is used to measure gear tooth thickness.   **(10 Marks)**

Module-4

7 a. Define Measurement. Differentiate between direct method and Indirect method of measurement. Briefly explain generalized measuring system with the aid of a block diagram.

(10 Marks)

b. Classify transducers, giving examples in each category.

(10 Marks)

OR

8 a. Explain the following term :
(i) Sensitivity   (ii) Repeatability   (iii) Linearity   (iv) Threshold   (v) Least count.

(10 Marks)

b. Explain the working of cathode ray oscilloscope.

(10 Marks)

Module-5

9 a. State the laws governing the functioning of thermocouple.

(04 Marks)

b. Explain with a neat sketch, working of a proving ring.

(08 Marks)

c. Explain the working of optical pyrometer.

(08 Marks)

OR

10 a. Classify dynamometers.

(04 Marks)

b. Explain the working of a prony brake.

(08 Marks)

c. Explain the working of McLeod gauge.

(08 Marks)

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