Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Measurement 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 Metrology and Measurement. List the objective of metrology.   **(08 Marks)**
    b. Describe with neat sketch, imperial Standard yard.   **(08 Marks)**

OR

2   a. Discuss briefly Indian standards on slip gauges.   **(06 Marks)**
    b. Four length bars A, B, C and D each having a basic length 125mm are to be calibrated using a calibrated length bar of 500mm basic length, the 500 mm bar has an actual length of 499.9991mm. Also it was found that
    $L_B = L_A + 0.0001$mm , $L_C = L_A + 0.0005$mm, $L_D = L_A - 0.0002$mm and
    $L_A + L_B + L_C + L_D = L + 0.0003$mm. Determine L_A, L_B, L_C and L_D.   **(10 Marks)**

Module-2

3   a. Explain with neat sketch the concept of limits of size and tolerance.   **(06 Marks)**
    b. Determine the dimensions of the shaft and hole for a fit 30 H_8/d_{10} and sketch the fit, given the following data.
    i)   Diameter 30 falls in the dia range $18 - 30$, upper deviation for "d" shaft is $-16D^{0.44}$.
    ii) $i = 0.45D^{1/3} + 0.001D$. Tolerance for IT8 = 25i. Tolerance for IT10 = 64i.   **(10 Marks)**

OR

4   a. Explain Taylor's principle for the design of limit gauges.   **(06 Marks)**
    b. Draw neat sketches with all features of :
    i)   Double ended plain plug gauge   ii)   Double ended plain snap gauge.   **(10 Marks)**

Module-3

5   a. Define Comparator. Write difference between a comparator and a measuring instrument.
                                                                                (08 Marks)
    b. With a neat sketch, describe construction and working of sigma comparator.   **(08 Marks)**

OR

6   a. Explain principle of sine bar, highlighting its applications.   **(08 Marks)**
    b. Describe the 3 – wire method of measuring effective diameter of threads.   **(08 Marks)**

Module-4

7   a. Explain the generalized measurement system. Give examples.   **(08 Marks)**
    b. Write a note on Piezoelectric transducer.   **(08 Marks)**

OR

8   a. Define Error. Give detail classification of error.   **(06 Marks)**
    b. With a neat sketch, explain mutual inductance transducer.   **(10 Marks)**

Module-5

9   a.   Explain with neat sketch, Analytical balance.   (08 Marks)
    b.   Write a note on Hydraulic dynamometer.   (08 Marks)

OR

10 a.   Describe the principle of thermocouples and illustrate the application of thermocouples.
                                                                                         (08 Marks)
    b.   Draw neat diagram of a simple resistance bridge arrangement of strain measurement.
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