CBCS Scheme

Third Semester B.E. Degree Examination, June/July 2017
Measurement & Metrology

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. What is metrology? List objectives of metrology.   **(08 Marks)**
   b. Four length bars A, B, C and D each having basic length 125 mm are to be calculated using a calibrated length bar of 500 mm basic length. The 500 mm bar has an actual length of 499.9991 mm. Also it is 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.   **(08 Marks)**

OR

2 a. Describe with neat sketch international prototype meter.   **(08 Marks)**
   b. Build dimension of 78.3665 mm using M112 set slip gauge.   **(08 Marks)**

Module-2

3 a. Discuss hole based and shaft based system of fit.   **(08 Marks)**
   b. Calculate all the relevant dimensions of $35 \dfrac{H_7}{f_8}$ fit, dimension 35 fall in the step of 30-50 mm. Fundamental deviation for 'f' shaft is $-5.5D^{0.41}$. $S^0 = 0.45\sqrt[3]{D} + 0.001D$, IT7 = 16 S°, IT8 = $25S^0$ **(08 Marks)**

OR

4 a. What are limit gauges? Sketch and explain any two types of plain plug gauges.   **(08 Marks)**
   b. Calculate the dimensions of plug and ring gauges to control the production of 50 mm shaft and hole pair of H_7d_8 as per IS specification. The following assumptions may be made : 50 mm lies in diameter step of 30 and 50 mm and upper deviation for 'd' shaft is given by $-16D^{0.44}$ and lower deviation for hole H is zero. Tolerance unit $i = 0.45\sqrt[3]{D} + 0.001D$ and IT6 = 10i and above IT6 grade the tolerance magnitude is multiplied by 10 at each fifth step.   **(08 Marks)**

Module-3

5 a. With neat sketch describe the construction and working of sigma comparator.   **(08 Marks)**
   b. Explain with sketch measurement of unknown angles of heavy components using sine bar.   **(08 Marks)**

OR

6 a. Explain with a schematic diagram, the method of measuring the major diameter of a screw thread using bench micrometer.   **(08 Marks)**
   b. Derive an expression for measurement of effective diameter for 2 wire method of screw thread measurement.   **(08 Marks)**

Module-4

7   a. Discuss with block diagram, generalized measurement system with examples for each stage elements. **(08 Marks)**
    b. Explain with sketches,
        (i) Hysteresis   (ii) Threshold   (iii) Repeatability   (iv) Calibration.   **(08 Marks)**

OR

8   a. What is thermistor? With sketch explain their construction.   **(08 Marks)**
    b. With a sketch, explain piezoelectric transducer.   **(08 Marks)**

Module-5

9   a. Explain with a neat sketch the analytical balance.   **(08 Marks)**
    b. Describe with a neat sketch McLeod vacuum gauge.   **(08 Marks)**

OR

10 a. What is thermocouple? State and explain law of thermocouple.   **(08 Marks)**
    b. Explain with neat sketch calibration of strain gauges.   **(08 Marks)**

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