CBCS SCHEME

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17AU35

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. Explain the generalized measurement system with the help of a block diagram. **(08 Marks)**

b. Define the following terms :
i) Accuracy ii) Precision iii) Sensitivity iv) Calibration v) Hysteresis vi) Linearity. **(06 Marks)**

c. Describe the various sources of errors in measurement. **(06 Marks)**

OR

2 a. Define metrology. What are the objectives as metrology? **(06 Marks)**

b. Explain the following with suitable sketches
i) International prototype metre
ii) Imperial standard Yard. **(08 Marks)**

c. 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 500mm 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. **(06 Marks)**

Module-2

3 a. Explain the mechanism of sigma comparator with a neat sketch. **(08 Marks)**

b. What are the advantages and disadvantages of electrical and electronic comparators? **(06 Marks)**

c. Describe the construction and working principle of solex pneumatic gauge with a neat sketch. **(06 Marks)**

OR

4 a. Describe the construction and working principle of Linear Variable Differential Transformer (LVDT) with a neat sketch. **(08 Marks)**

b. Explain how the sine bars are used for measuring known and unknown angles. **(06 Marks)**

c. Describe the use of sine centre with a neat sketch. **(06 Marks)**

Module-3

5 a. Describe the various mechanical detector transducer elements in brief. **(08 Marks)**

b. What are the advantages of electrical transducers? **(06 Marks)**

c. Explain the construction and working principle of capacitance transducers with neat sketches. **(06 Marks)**

OR

6 a. Describe hydraulic and magnetic transmission of signals with help of schematic diagrams. **(08 Marks)**

b. Explain voltage and current telemetering systems with the help of circuit diagrams. **(06 Marks)**

c. Describe the principle of operation of autocollimator with a neat sketch. **(06 Marks)**

Module-4

7 a. Describe the platform balance scale for the measurement of force. **(08 Marks)**

b. Explain the construction and working principle of proving ring with a neat sketch **(06 Marks)**

c. Describe the construction and working principle of hydraulic dynamometer with a neat sketch. **(06 Marks)**

OR

8 a. Differentiate between analog and digital indicators. **(06 Marks)**

b. Explain the construction and working principle of cathode ray oscilloscope with the help of a circuit diagram. **(10 Marks)**

c. Write a short note on X-Y plotters. **(04 Marks)**

Module-5

9 a. Write a note on the following :
i) Interchangeability ii) Selective Assembly **(06 Marks)**

b. Explain the different types of fits with neat sketches. **(06 Marks)**

c. Describe hole basis system of fits with a neat sketch. **(08 Marks)**

OR

10 a. Explain the principle of operation of a unbounded strain gauges with a neat sketch. **(06 Marks)**

b. With a neat sketch, explain the method of pressure measurement by thermocouple vacuum gauge. **(06 Marks)**

c. With a neat sketch, explain the method of temperature measurement by optical pyrometers. **(08 Marks)**

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