

CBCS SCHEME

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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 $L_B = L_A + 0.0001\text{mm}$, $L_C = L_A + 0.0005\text{mm}$, $L_D = L_A - 0.0002\text{mm}$ and $L_A + L_B + L_C + L_D = L + 0.0003\text{mm}$. 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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