

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (Sem-5)
MECHANICAL MEASUREMENT AND METROLOGY

Subject Code : BTME-503

M.Code : 70604

Date of Examination : 08-06-2023

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) Differentiate between first order and second order system.
- b) What do you know about calibration and why is this done in measurement system?
- c) Distinguish between systematic and random error.
- d) What is clinometer and give its applications?
- e) What is the difference between bounded and unbounded type of strain gauges?
- f) Draw a neat sketch of McLeod Gauge for the measurement of vacuum.
- g) List the various methods of flow measurement.
- h) What is a proving ring and how is it used to measure force?
- i) List any five physical properties of matter which are used to measure temperature.
- j) Draw a neat and clean sketch of pneumatic load cell.

SECTION-B

2. Write the classification of measurement and instruments.
3. Explain the causes of interference errors giving at least two examples of instrument interference and also give two examples of environment interference.
4. Explain the working of a vernier caliper used for internal and external length measurements by using neat sketch. What arrangement is provided therein to measure the depth of a vessel?
5. Define gauge factor for a strain gauge. How temperature compensation is done in strain gauges to measure axial load. Explain with neat sketch.
6. Explain the working of Bourden gauge by drawing a neat sketch. How the sensitivity of this gauge is increased

SECTION-C

7. A single-column manometer is using mercury of specific gravity 13.6 as the manometric liquid. To what height will the mercury rise in the narrow limb if a differential pressure of 75 kN/m^2 is applied. -The wide and the narrow limb diameters are 160 mm and 6 mm respectively.
8. Explain the working of a hydraulic load cell for the measurement of force.
9. A thermopile arrangement of copper constantan thermocouples consists of three junction pairs, and has the reference junction at 200°C . If the output voltage is 3.3 mV, determine the temperature of the measuring junction. Assume the following temperature emf values which are based on reference junction at 0°C :

Temp, $^\circ\text{C}$	=	100	200	250
Voltage, mV	=	4.22	9.23	11.95

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.