

Roll No.

Total No. of Questions : 09]

[Total No. of Pages : 02

B. Tech. (Sem. – 5th)
MECHANICAL MEASUREMENT AND METROLOGY

SUBJECT CODE : ME – 307

Paper ID : [A0817]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **four** questions from section - B.
- 3) Attempt any **two** questions from section - C.

Section - A

Q1) **(10 × 2 = 20)**

- a) Name the various functional elements of a Bourdon tube with the help of block diagram.
- b) Differentiate between Threshold and Resolution of a measuring instrument.
- c) The arithmetic mean of a set of observed values represents the best value. Comment.
- d) Give an account of indirect methods to measure pressure. Also give examples under each method.
- e) Briefly explain measurement of flatness using interferometry.
- f) How will you achieve temperature compensation using strain gauges in a wheatstone bridge.
- g) Explain briefly the principle of Hot wire anemometer.
- h) Differentiate between RTDs and Thermistors.
- i) What is the advantage of using inclined tube manometer as compared to U-tube manometer.
- j) Briefly explain the significance of comparators from the measurement point of view.

Section – B

(4 × 5 = 20)

Q2) Define the term standard. Discuss its classification in detail by giving suitable examples. Write two necessary conditions to be fulfilled for the eligibility of a standard.

- Q3)** Discuss in detail the different types of errors which can occur during the process of measurement. Discuss the methods to reduce/ remove such errors.
- Q4)** Discuss with examples first and second order measurement systems along with their responses.
- Q5)** Describe the law of intermediate temperatures and law of intermediate materials used in thermocouples along with their physical significance.
- Q6)** Enlist some important characteristics and features of the LVDT Transformer. Discuss the principle working of LVDT Transformer in detail.

Section – C **(2 × 10 = 20)**

- Q7)** (a) Explain the working and constructional features of Taylor-Hobson Talysurf for surface roughness measurement.
- (b) Draw labeled diagram of a vernier caliper. Also explain its principle of working and indicate the measuring ranges in it are available.
- Q8)** (a) Explain the different methods of measuring force. Explain the working of Proving ring and Mechanical Load cell in brief.
- (b) A cu-constantan was found to have linear calibration between 0°C and 400°C with the emf at maximum temperature equal to 20.68m V. Determine:
- i) the correction which must be made to the indicated emf if the cold junction temperature is 25°C,
- ii) If the indicated emf is 8.92m V. Determine the temperature of hot junction.
- Q9)** Write short notes on the followings:
- (a) Ionization Gauge
- (b) Transmission Dynamometers
- (c) Optical Pyrometers
- (d) Ultrasonic Flow meter
