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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (IE/ME) (Sem.–5th)

MECHANICAL MEASUREMENT AND METROLOGY

Subject Code : ME-307

Paper ID : [A0817]

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 has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a. Differentiate primary, secondary and tertiary standards.
- b. Define threshold and resolution clearly differentiating the meaning of both the terms.
- c. Define average surface roughness. What are various systems of measurement of surface roughness?
- d. Define gauge factor. What is the significance of gauge factor for strain gauges?
- e. What is the function of hot wire anemometer? Explain its principle and main applications.
- f. How internal and external threads are measured? What is the principle on which this measurement is based?
- g. Explain the difference between optical and total radiation pyrometer.
- h. What is the function of proving ring? Write its various industrial applications.

- i. How straightness and flatness is measured?
- j. Explain the function of absorption/transmission and driving type of dynamometers.

SECTION-B

- 2. What are systematic and random errors? How these errors are measured? What are various precautions for minimizing these errors?
- 3. Classify various comparators. Compare any two comparators in terms of at least one advantage and limitation in reference to each other.
- 4. What is temperature compensation? How is it carried out? Explain with the help of neat sketch.
- 5. What is flow visualization? What is its significance in measurement? Briefly explain various flow visualization techniques.
- 6. How is torque on rotating shafts measured? Explain constructional features of the device used for this measurement.

SECTION-C

- 7. What are basic and functional elements of a measurement system? Explain in detail the significance of these elements for a measurement system. Identify various elements for a rudimentary pressure gauge with the help of a block diagram.
- 8. Explain principle, constructional features, and working of an Ultrasonic flow meter with the help of a sketch. How is it different than other flow meters? Explain in detail major advantages and limitations of ultrasonic flow meter relative to other types.
- 9. (a) Make a list of gage for measurement of low pressure. Explain the principle and working of McLeod Gage.
(b) A McLeod gage is available which has a volume of 150 cm^3 and a capillary diameter of 1.5 mm. Calculate the gage reading for a pressure of 40 micrometer of Mercury.