Roll No. ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚   **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(ME) (2011 Onwards)   (Sem.–5)
# MECHANICAL MEASUREMENT AND METROLOGY
Subject Code : BTME-503
Paper ID : [A2130]

Time : 3 Hrs.   **Max. Marks : 60**

INSTRUCTIONS 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. **Write briefly :**

   a) What are primary and secondary standards?

   b) Differentiate between accuracy and precision.

   c) What is the importance of calibration of instruments in the act measurement?

   d) How are systematic errors different than the random errors?

   e) List the instruments that can be used for angular measurements.

   f) Write the working principle of a resistance strain gauge.

   g) What is the purpose of a hot wire anemometer?

   h) What is a pyrometer?

   i) Differentiate between absorption and transmission dynamometer.

   j) List two advantages of electronic instruments over mechanical instruments.

SECTION-B

2. Analyze the bourdon tube pressure gauge as the generalized measurement system. Identify the various elements and point out the function performed by each element.

3. What do you understand by errors in measurements? Discuss the various sources of errors.

4. List the gauges used for vacuum pressure measurement. Explain the working of any one such gauge with the help of a neat sketch.

5. Discuss the working principle of a thermo couple. Write in brief the method used to measure the output from a thermocouple.

6. What is a proving ring? For what purpose is it used? Explain its working with a diagram.

SECTION-C

7. What is a transducer? Discuss the different types of transducers and state the various quantities which can be measured using them.

8. A single resistance strain gauge of resistance 120 Ω and having a gauge factor of 2 is bonded to steel having an elastic limit stress of 400 MPa and modulus of elasticity as 200 GPa. Calculate change in resistance :

   a) Due to change in stress equal to 1/10 of elastic range

   b) Due to change of temperature of 20°C,if the material of gauge is an advance alloy for which resistance temperature coefficient is 20×10^{-6}/°C.

9. Write short notes on the following :

   a) Measurement of surface roughness.

   b) Line, end and wavelength standards.