

**Total No. of Questions: 09**

**B.Tech. (ME) (2011 Onwards) (Sem. – 5)**  
**MECHANICAL MEASUREMENT AND METROLOGY**

**M Code: 70604**

**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. a) Give the significance of measurements.  
b) What do you mean by transfer function?  
c) Differentiate between 'Line Standard' and 'End Standard' with suitable examples.  
d) Enlist various types of comparators.  
e) What do you mean by Gauge Factor in resistance strain gauges?  
f) State the working principle of dead weight gauge tester.  
g) Draw a schematic view of radiation pyrometer.  
h) What do you understand by randomized block design in Design of Experiments.  
i) A moving coil voltmeter has a uniform scale with 100 divisions, the full scale reading is 200 V and 1/10 of a scale division can be estimated with a fair degree of certainty. Determine the resolution of instrument in volt?  
j) What are interferometers?

### SECTION B

2. What are the basic blocks of a generalized measurement system? Draw the various blocks and explain their functions.
3. The following 10 observations were recorded when measuring a temperature: 41.7, 42.0, 41.8, 42.0, 42.1, 41.9, 42.0, 41.9, 42.5 and 41.8 °C.

Find

- a) the mean
  - b) the standard deviation
  - c) the probable error of one reading
  - d) the probable error of mean
  - e) range.
4. What is clinometer? How it can be used for measuring angles. Illustrate your answer with sketches.
  5. Explain how null deflection type of bridges can be used for measurement of strain.
  6. What are thermistors? Explain their different forms of construction. Draw their resistivity versus temperature characteristics.

### SECTION C

7. Derive an expression for magnitude and phase of a first order system when subjected to a sinusoidal input signal. Describe how a time constant of the system influences the frequency response of a first order system.
8. Describe the principle of working of ionization gauges. Describe how vacuum can be measured by using them. List their advantages and disadvantages.
9. Describe the construction and functioning of pneumatic load cells. Explain their advantages and disadvantages.