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

Total No. of Questions : 09

B.Tech.(AE)   (Sem.–6)
MEASUREMENT AND INSTRUMENTATION
Subject Code : AE-306
Paper ID : [A0721]

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

l. **Write briefly :**

1) Define the mean deviation and standard deviation.

2) Why calibration of instrument is important?

3) What is meant by accuracy and precision of instruments?

4) Explain the difference between systematic and random errors.

5) Distinguish between input and output transducers.

6) Differentiate between photoconductive and photovoltaic transducer.

7) Distinguish between force and torque.

8) Define absolute pressure and vacuum pressure.

9) State the assumptions made in calculation of flow rate for variable head flow meter.

10) What are the advantages of electrical resistance thermometer?

SECTION-B

2. Define "Maximum input hysteresis" and "Maximum output hysteresis". With the help of a neat diagram, explain the phenomenon of "Hysteresis" in measurement systems.

3. Describe the construction and principle of operation of Linear Variable Differential Transformer (LVDT).

4. Explain the construction and working mechanism of McLeod gauge.

5. What is a load cell? Describe the construction and working of Pneumatic Load Cell.

6. A venture tube of throat diameter 60 mm is placed in a water pipe of diameter 100 mm to measure volumetric flow. The volumetric flow rate through the tube is $80 \times 10^{-3} m^3$/sec. Water has a density of 10^3 kg/m^3 and viscocity of 10^{-3}Ns/m^2. Determine

   a) Reynold's number

   b) Given that the coefficient of discharge is 0.99, determine the differential pressure.

SECTION-C

7. a) Describe the different methods used for measurement of the resistance of Electrical Resistance Thermometers?

   b) Calculate the temperature sensitivity of a thermistor at 100°C. Its resistivity at 100°C is 1.1 Ωm. Express the result in Ωm/°K, assuming β = 4120 K at 100°C.

8. Describe the construction and working of a Rotameter. Derive the expression for the volume flow rate in a Rotameter.

9. a) Derive the equations for time response of a first order system when subjected to unit step input.

   b) The following data points are expected to follow a functional relationship $y = ax^b$. Obtain the values of constants a and b from the graphical analysis

   x : 1.21 1.35 2.40 2.75 4.50 5.1 7.1 8.1

   y : 1.20 1.82 5.0 8.80 19.5 32.5 55.0 80.0