

**MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR**  
**SEMESTER END THEORY EXAMINATION, B.Tech. (Dairy Technology)**

Semester : 5<sup>th</sup> (V Dean)  
Course No. : DE-511

Academic Year : 2024-2025  
Course Title : **Instrumentation and Process Control**

Credits : 2+1=3  
Day & Date : Friday; 02/05/2025

Total Marks : 50  
Time : 2.00 hrs.

- Note :**
- 1) All questions from **Section 'A'** are compulsory.
  - 2) Solve **Any Three** questions from **Section 'B'**.
  - 3) Draw neat and well labeled diagram wherever necessary.

**SECTION - 'A'**

- Q. 1 A) Define the following. (05)
- i) Precision
  - ii) Accuracy
  - iii) Sensitivity
  - iv) Fidelity
  - v) Drift
- B) Expand the following. (05)
- i) CRO
  - ii) PLC
  - iii) SCADA
  - iv) LVDT
  - v) RTD
- Q. 2 A) State whether True or False. If false, rewrite the statement after making necessary corrections in the underlined word. (05)
- i) Vibrometer measures torque.
  - ii) Pitot tube is used to measure force.
  - iii) Fidelity is a dynamic characteristic of a measuring system.
  - iv) In thermocouple, both the wires should be of same metal.
  - v) Analog meter uses pointer with scale to indicate a quantity.
- B) Choose the most appropriate answer from the options given below. (05)
- i) Which of the following thermocouples is incapable of measuring sub-zero (i.e.,  $< 0^{\circ}\text{C}$ ) temperature?
    - a) Chromel-alumel
    - b) Iron-constantan
    - c) Copper-constantan
    - d) None of these
  - ii) An emf of the order of mV is generated when two solutions of different hydrogen ion concentration are separated by a thin glass wall. This is the working principle of a .....
    - a) pH meter
    - b) Polarimeter
    - c) Chromatograph
    - d) Polarograph
  - iii) Very low pressure is expressed in Torr, which is equal to ..... mm of Hg column (absolute) at  $0^{\circ}\text{C}$ .
    - a) 0.0001
    - b) 1
    - c) 0.01
    - d) 10

**(P.T.O.)**

- iv) Mcleod gauge is used to measure the .....
  - a) Point velocity
  - b) Flow rate
  - c) Vacuum
  - d) Temperature
- v) Universal Bevel Protractors are used to measure .....
  - a) Length
  - b) Angle
  - c) Area
  - d) Volume

**SECTION - 'B'**

- Q. 3 A) Define measure and explain functional elements of an instrument with block diagram. (05)  
B) Define different static and dynamic characteristics of measurement system. (05)
- Q. 4 A) Compare a sensor with a transducer. Describe different types of sensors and transducers. (05)  
B) Enlist different flow meters and explain any one in detail. (05)
- Q. 5 A) What is a thermocouple and how does it works? (03)  
B) Enlist properties of piezoelectric material. How does it help in measurement of pressure? (03)  
C) How does a magnetic flow meter sensor measure flow in a pipe? Explain it with diagram. (04)
- Q. 6 A) Enlist advantages of digital meter over analog meters. (03)  
B) Why smart sensors are preferred than the normal sensors? (03)  
C) Describe different levels of automation hierarchy in brief. (04)
- Q. 7 Describe an automatic process control system with block diagram indicating different elements. Also state the function of each element. (10)

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