



Vidyavardhini's College of Engineering and Technology, Vasai (West)

First Year Engineering

Academic Year: 2024-2025

Problem Set 5: Temperature and its measurements

Subject: BSC2023/EP

Date: 17/03/2025

Max Marks: 10

Submission Deadline: 28-03-2025

CO5: To build a foundation for temperature measurements required in the field of technology.

1 Heat and Temperature

Definition: Heat is a form of energy that is transferred between systems or objects with different temperatures. Temperature, on the other hand, is a measure of the thermal energy of a system.

Types of Heat Transfer:

1. **Conduction:** Heat transfer through direct contact. Example: A metal rod heated at one end.
2. **Convection:** Heat transfer through fluid motion. Example: Boiling water.
3. **Radiation:** Heat transfer through electromagnetic waves. Example: Heat from the Sun.

2 Comparison of Thermometers

Feature	Bimetallic	Platinum Resistance (PT-100)
Principle	Thermal expansion	Change in resistance
Accuracy	Moderate	High
Temperature Range	-50°C to 500°C	-200°C to 850°C
Applications	HVAC, Industrial Ovens	Laboratory, Industrial Measurement

Feature	Thermoelectric (Thermocouple)
Principle	Seebeck effect
Accuracy	Moderate to High
Temperature Range	-200°C to 2300°C
Applications	High-temperature applications

3 Calibration of PT-100

PT-100 thermometers are calibrated using the following steps:

1. Place the PT-100 probe in a standard temperature bath.
2. Measure the resistance at known reference temperatures (e.g., 0°C, 100°C).
3. Compare the readings with standard resistance values.
4. Adjust the sensor or apply correction factors to ensure accurate readings.

4 Factors Affecting Thermometer Selection

Temperature Range: The thermometer must operate within the required temperature range. For example, PT-100 is suitable for low to moderate temperatures, while thermocouples are ideal for high temperatures.

Application: The choice of a thermometer depends on its use. For instance:

- Industrial applications may require robust thermocouples.
- Precision laboratory measurements favor platinum resistance thermometers.
- Household and HVAC applications often use bimetallic thermometers.