Ex: No : 6	Characterisation and Calibration of Thermistors
Date:	

Aim:

To verify the following hypotheses:

1. As the temperature increases, the resistance of the thermistor decreases (for an NTC thermistor).
2. To calibrate the thermistor using simple linear regression.

Theory:

A thermistor is a type of resistor whose resistance varies significantly with temperature. Thermistors are classified into two types:

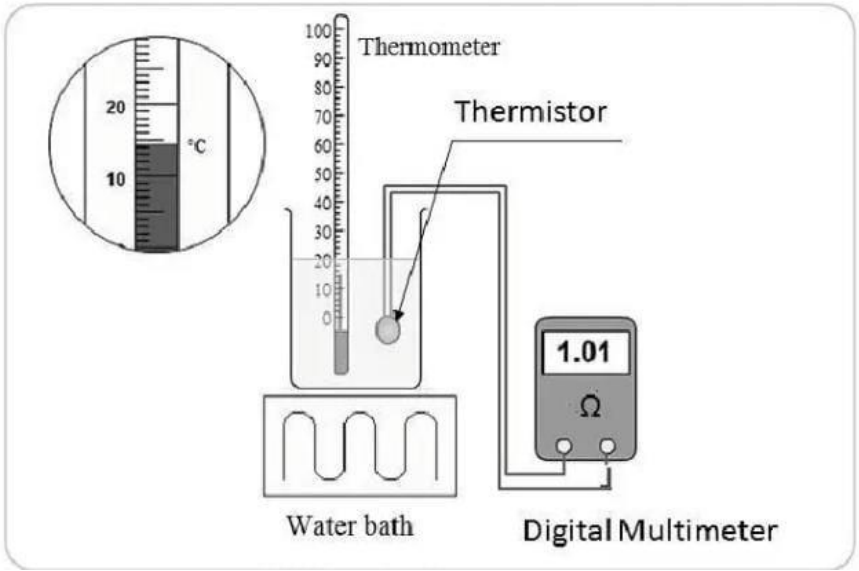
- Negative Temperature Coefficient (NTC) Thermistors: Resistance decreases with an increase in temperature.
- Positive Temperature Coefficient (PTC) Thermistors: Resistance increases with an increase in temperature.

Apparatus Required:

S.No	Description	Quantity
1	Thermistor	1
2	Thermometer	1
3	Multimeter	1
4	Hot Water	required
5	Wires	2

Circuit Diagram:

Experiment setup:



Procedure :

i. **Setup the Experiment:** Fill a beaker with hot water and place the thermometer and thermistor inside. Connect the thermistor to a multimeter and stir the water gently for uniform temperature distribution.
ii. **Measure Initial Values:** Record the initial temperature of the hot water using the thermometer and measure the thermistor's resistance using the multimeter.
iii. **Collect Data:** Allow the water to cool gradually and take resistance readings at different temperature intervals (e.g., every 10°C drop) until it reaches room temperature.
iv. **Analyze Data:** Tabulate the collected data and use linear regression to determine the resistance-temperature relationship. Derive the characteristic equation:

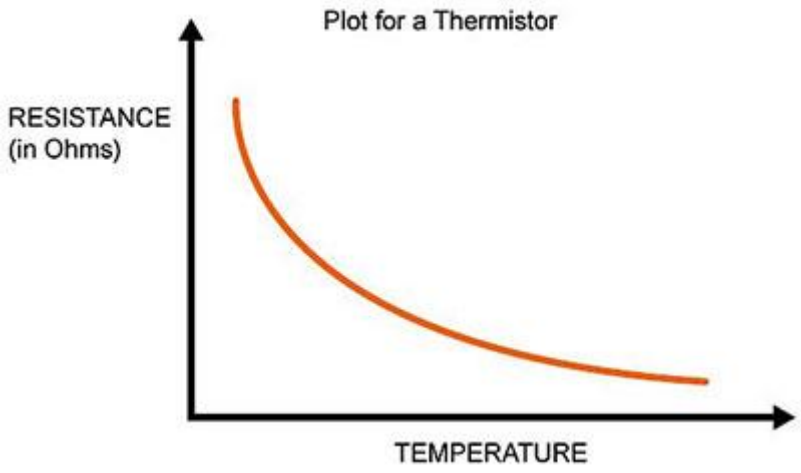
$$Temperature = M * Resistance + B$$

where **M** and **B** are constants obtained from regression analysis.
v. Plot and Verify: Plot a graph of Resistance vs. Temperature to observe the trend. Verify that resistance decreases with increasing temperature for an NTC thermistor or increases for a PTC thermistor.

Tabulation:

No	Reading 1		Reading 2		Reading 3	
	Temperature	**Resistance**	**Temperature**	**Resistance**	**Temperature**	**Resistance**
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
	M=	**B=**	**M=**	**B=**	**M=**	**B=**

Model graph:



Calculation:

Inference:

Result:

Thus, the hypothesis had been tested, and the thermistor had been characterized and calibrated using simple linear regression.