EXPERIMENT 1

Determining resistance per cm of given wire by plotting a graph of potential difference versus current:

AIM: To determine the resistance per cm of a given wire by plotting a graph of potential difference versus current.

APPARATUS REQUIRED:
Battery, key, rheostat, voltmeter, ammeter, resistance wire (unknown resistance), connecting wires, meter scale, sandpaper.
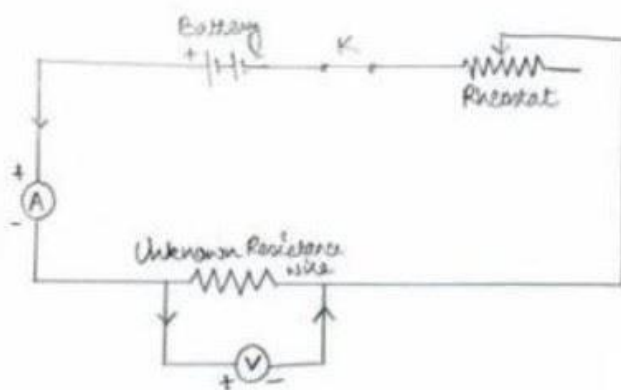
PRINCIPLE:
This Experiment is based on OHM'S LAW
Ohm's Law states that the electric current passing through a conductor is directly proportional to the potential difference applied across its ends.
Mathematically, **V=IR**
The resistance R of the wire depends on the material of the wire and its dimensions.

CIRCUIT DIAGRAM:

PROCEDURE:

1. Draw the circuit diagram as shown in figure above

2. Arrange the apparatus as per the circuit diagram

3. Clean the ends of the connecting wires with sandpaper and make them shiny.

4. Make the connections as per circuit diagram. All connections must be neat and tight. Take care to connect the ammeter and voltmeter with their correct polarity. (+ve to +ve and –ve to –ve)

5. Determine the zero error and least count of the ammeter and voltmeter and record them.

6. Adjust the rheostat to pass a low current.

7. Insert the key K and slide the rheostat contact to see whether the ammeter and voltmeter are showing deflections properly.

8. Adjust the rheostat to get a small deflection in ammeter and voltmeter.

9. Record the readings of the ammeter and voltmeter

10. Take at least six sets of readings by adjusting the rheostat gradually

11. Plot a graph with V along X axis and I along axis.

12. The graph will be a straight line which verifies Ohm's law

13. Determine the slope of the V-I graph. The reciprocal of the slope gives the resistance of the wire.

OBSERVATIONS:

1. Range
   Range of the given Ammeter = 0-500m A
   Range of the given voltmeter = 0-5V

2. Least Count
   Least Count of the given Ammeter = 10Ma
   Least Count of the given voltmeter = 0.1V

3. Zero Error
   Zero Error of the given Ammeter = 0A
   Zero Error of the given voltmeter = 0V

4. Zero Correction
   Zero Correction of the given Ammeter = 0A
   Zero Correction of the given voltmeter = 0V

5. Observation Table for Ammeter and Voltmeter Readings.

S No	Ammeter Observed (A)	Ammeter Corrected (A)	Voltmeter Observed (V)	Voltmeter Corrected (V)	Ratio (V/I) = R (ohm)
1	0.3	0.3	0.1	0.1	0.33
2	0.7	0.7	0.2	0.2	0.28
3	1.1	1.1	0.3	0.3	0.27
4	1.5	1.5	0.4	0.4	0.26
5	1.9	1.9	0.5	0.5	0.26

Graph
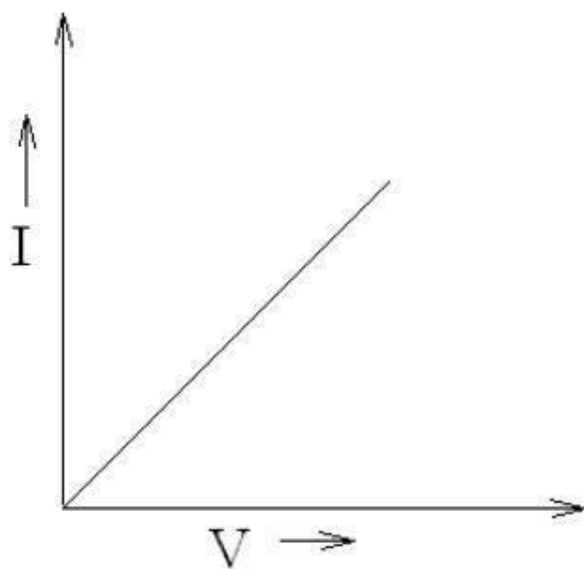
Voltage v/s Current Graph

CALCULATIONS:
Mean Value of V/I from observations, R = 0.28Ω
Length of resistance wire = 40.2cm
Value of slope of VI graph =0.27 Ω
Resistance per unit length = 0.675 Ωm^{-1}

RESULT:

1. Ohm's Law is verified as the I vs V graph is a straight line
2. The resistance of the given wire = 0.28Ω
3. The resistance per cm of given wire is $0.675 \ \Omega \ m^{-1}$.

PRECAUTIONS:

1. All the electrical connections must be neat and tight.
2. Voltmeter and Ammeter must of proper range
3. The key should be inserted only while taking readings.