Report: Experiment 2

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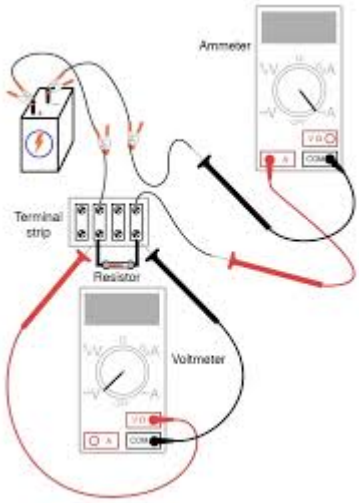
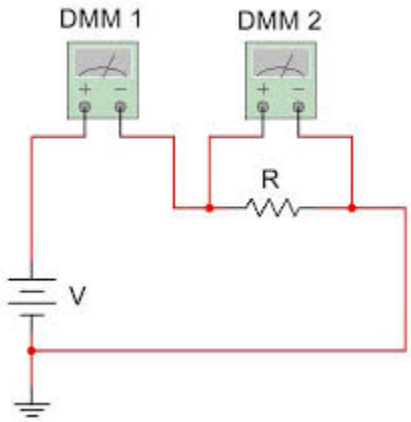
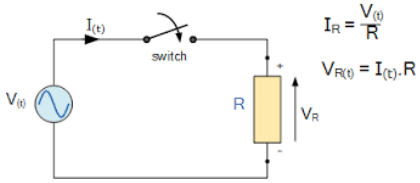
Title of Experiment: Familiarization with DC and AC sources

Brief Description: This experiment involves characterizing DC and AC sources using different resistors. V-I characteristics for each resistor are plotted for both DC and AC sources using data from exp-1.xlsx. LTspice simulations are performed for the same setups. The experiment also covers resistor color codes, calculation of resistance, and the concept of non-ohmic behavior.

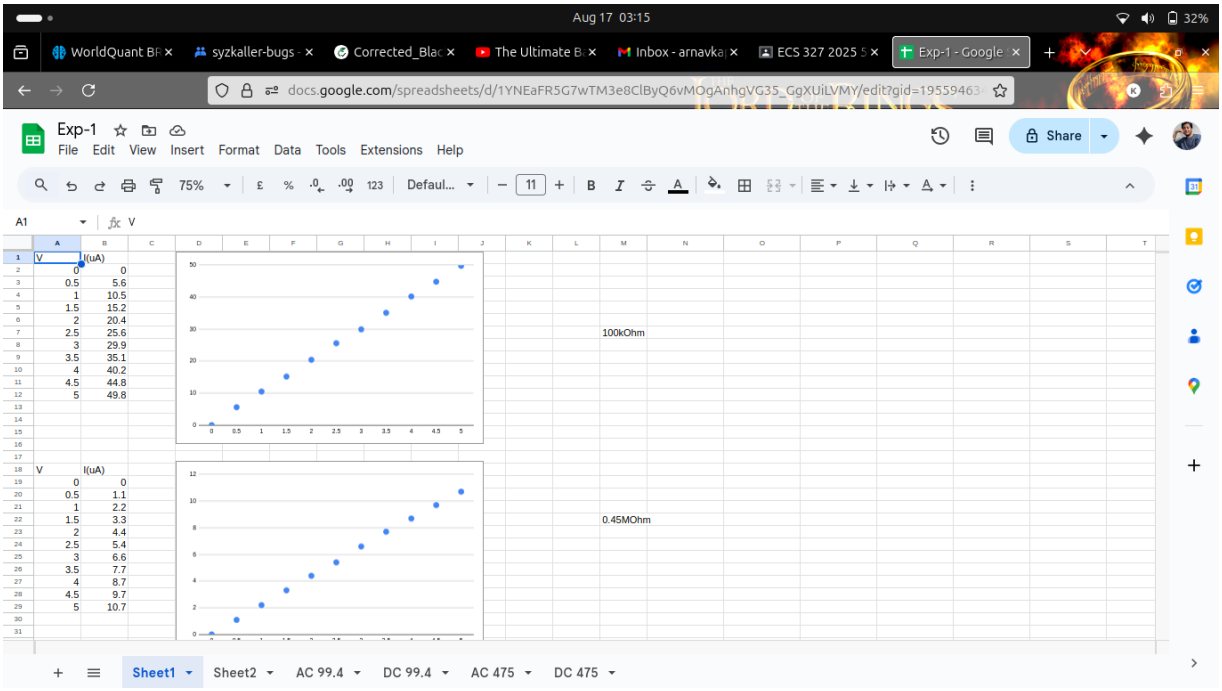
Schematic Diagram: Source (DC/AC) → Resistor → Measurement Points (For AC, use a function generator; for DC, use a DC supply.)



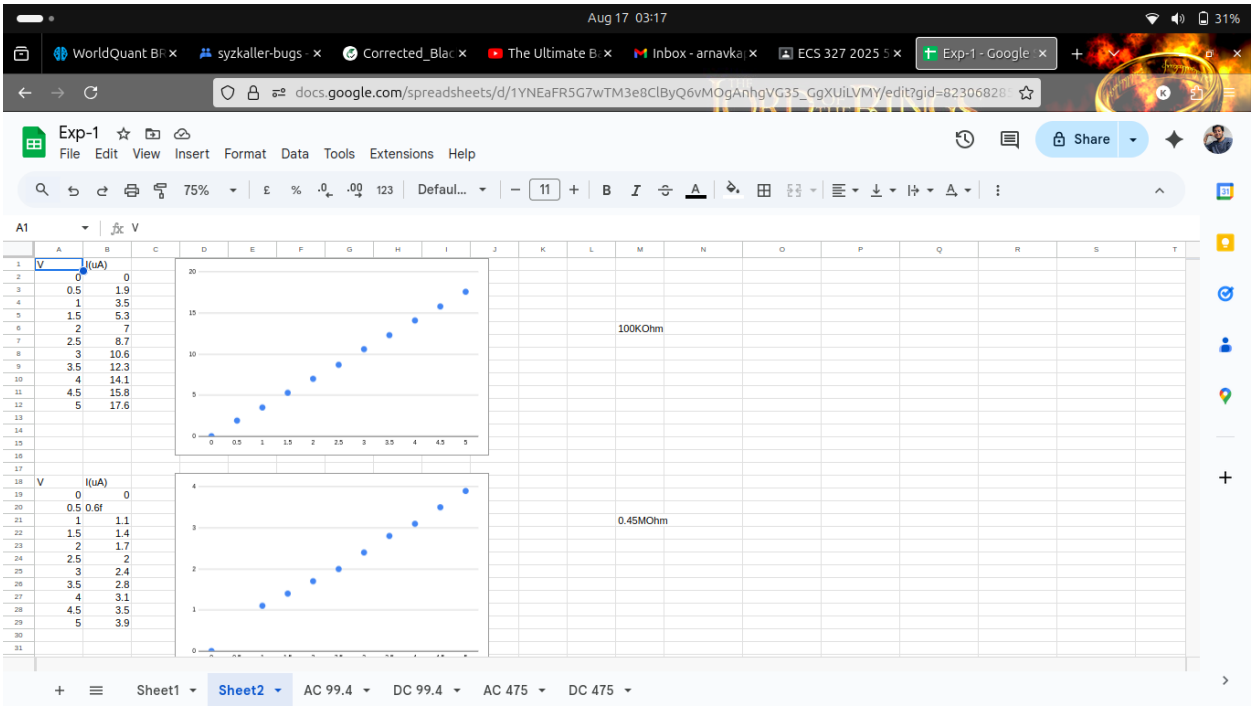




Results: - DC V-I Characteristics: For each resistor, plot voltage (V) vs. current (I) using measured data from exp-1.xlsx. The slope of the V-I curve gives the resistance value. (See attached plots from exp-1.xlsx)



DC Setup giving R1 = 100kOhm and R2 = 0.45MOhm



AC Setup giving R1 = 100kOhm and R2 = 0.45MOhm

Discussion: -

1. Calculate the slopes and justify your results.

The slope of the V-I curve (delta V/delta I) for each resistor should match its resistance value.

- DC Setup giving R1 = 100kOhm and R2 = 0.45MOhm

- AC Setup giving R1 = 100kOhm and R2 = 0.45MOhm

For ohmic resistors, the relationship is linear, confirming Ohm's Law (V = IR). Any deviation may be due to measurement error or non-ideal behavior.

2. Explain the color code of a given resistor and calculate your resistance code (with tolerance and units).

- 100 kΩ example:
A resistor with bands Brown, Black, Yellow, Gold has a value of 1 (Brown), 0 (Black), 4 zeros (Yellow) = 100,000 Ω (100 kΩ) with ±5% tolerance (Gold) → range 95,000–105,000 Ω.

- 0.45 MΩ example:
A resistor with bands Yellow, Green, Yellow, Gold has a value of 4 (Yellow), 5 (Green), 4 zeros (Yellow) = 450,000 Ω (0.45 MΩ) with ±5% tolerance (Gold) → range 427,500–472,500 Ω.

3. Explain the relation between Vab, Vcd and Vef: Vab = Vcd - Vef = 2Vxyz

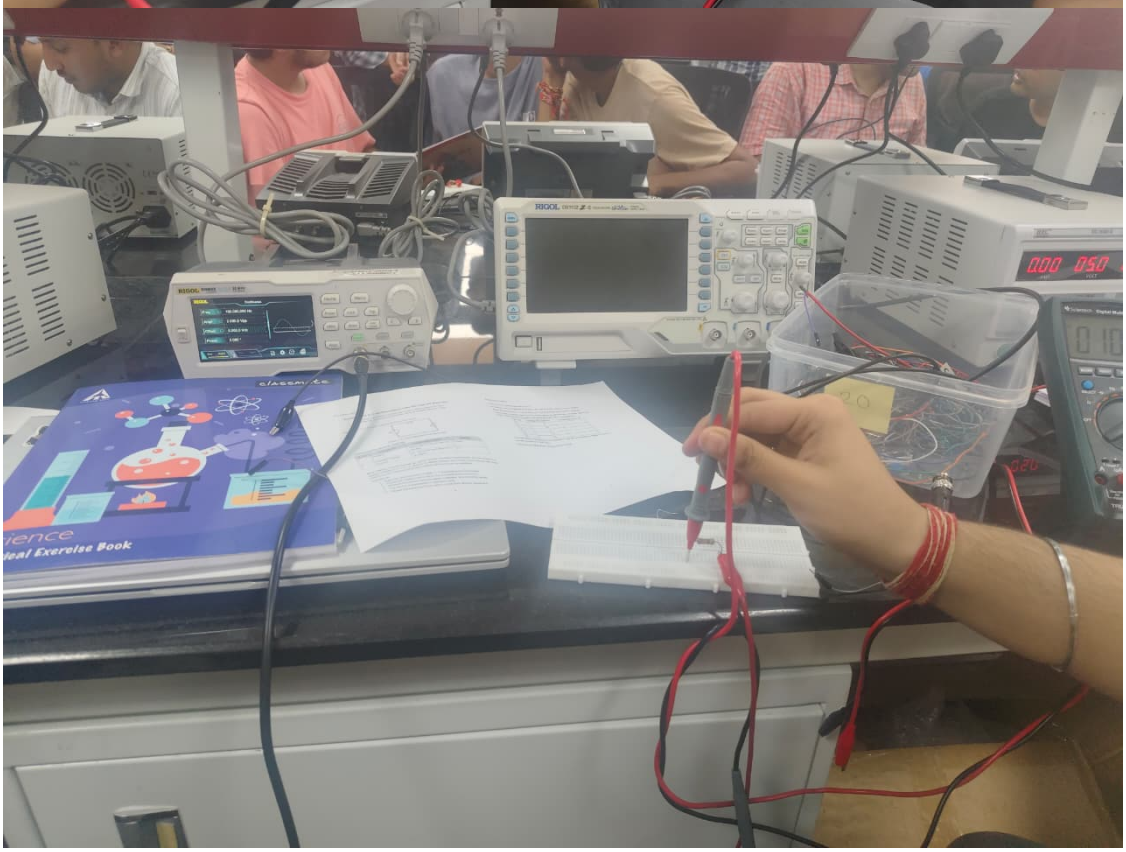
This equation relates the measured voltages at different points in the circuit, showing how the total voltage is distributed across components.

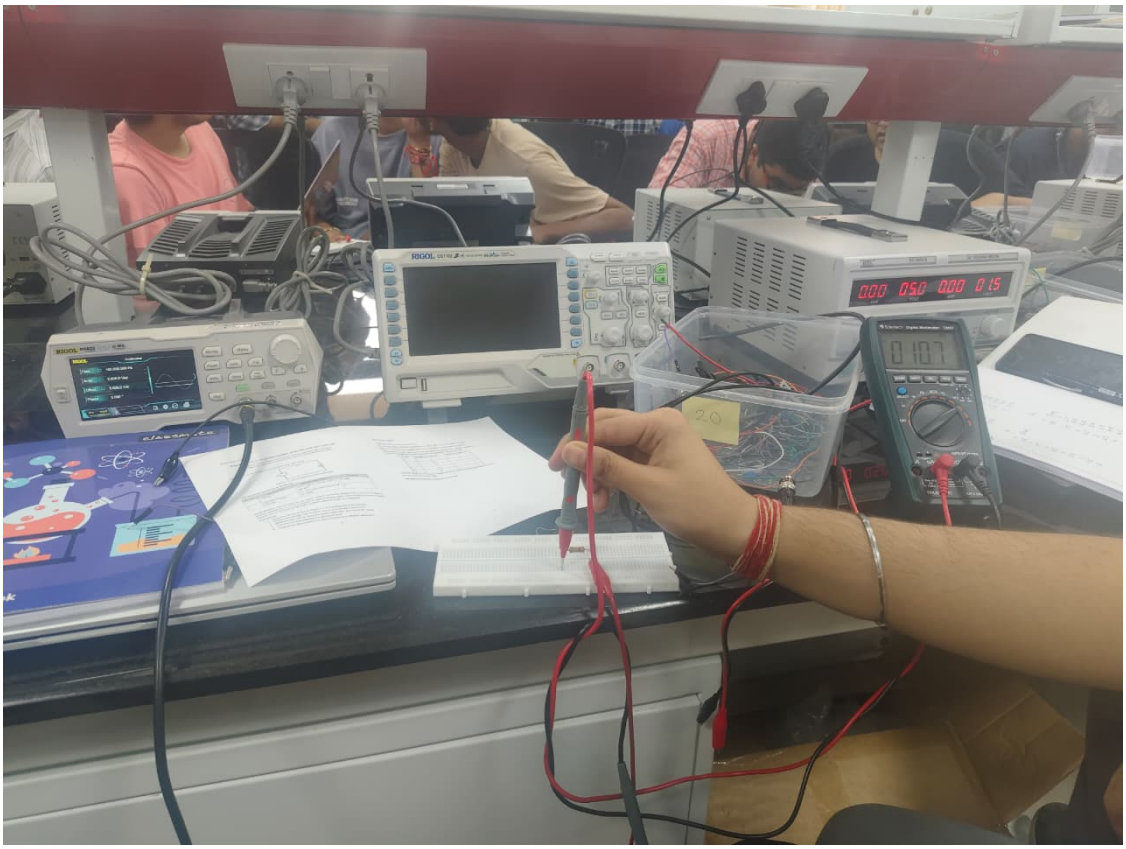
4. What is "non-ohmic" behavior? Mention any non-ohmic device and explain shortly

Non-ohmic behavior refers to devices whose V-I relationship is not linear (does not follow Ohm's Law). Example: A diode is non-ohmic; its current increases exponentially with voltage after a threshold, not linearly.

Experimental Setup:


RIGOL
0.15
0.15
003.1


RIGOL
050
Ideal Exercise Book


RIGOL
0.107