University of Al-Mustaqbal
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Magnetism

the practical aspect

Second Stage

Study of connecting resistors in parallel

Lec 3

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The goal of the experiment :

1-The realization of Ohm's law .

2-Studying the relationship between voltage and current in an electrical circuit .

3-Achieving the law of parallel conduction .

Equipment used in the experiment :

1-D.C power supply.

2-D.C voltmeter.

3-D.C Ammeter.

4-Connecting wires.

The theoretical side :

Although Ohm's Law is considered one of the most important laws in electrical sciences, it cannot be used to analyze complex circuits. Therefore, the scientist Kirchhoff developed his laws that enable us to use Ohm's law to solve complex circuits. In parallel conduction, we find that the current has more than one path through which it passes
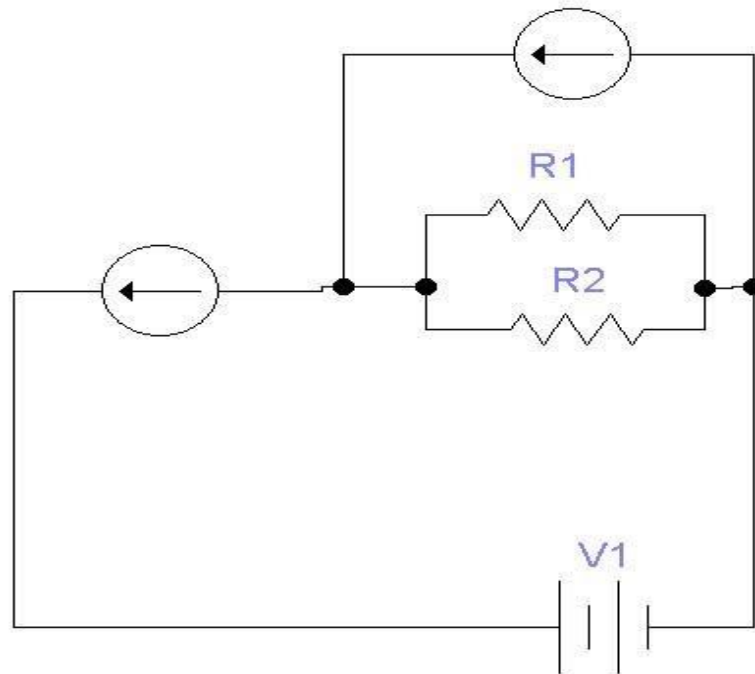
As for the potential difference, it is constant on all resistors, meaning that the potential difference between the two ends of the first resistance is equal to the potential difference between the two ends of the second resistance and equal to the potential difference between the two ends of the third resistance.

We note that they are all connected in parallel with the voltage source as well if the potential difference between the two ends of any resistance is exactly equal to the voltage of the source.

There is a special law for calculating the total value of a group of resistors connected in parallel if all the resistors are equal, as in the circuit shown below, we find that there are two resistors connected in parallel and both have the same value.

Laws used in the experiment :

$$R = \frac{V}{I}$$

I(A)	V(mv)	R(Ω)
0.01	0.16	
0.05	0.45	
0.10	0.95	

Ohm's Law :

R is the unit of measure, ohm.

V represents the potential difference in units of measure V.

I represents current in units of A.

As for the second law used in the experiment, which is called the law of equivalent resistance:

$$1\ Req = \frac{1}{R1} + \frac{1}{R2}$$

Req is the equivalent resistance

R1 is the first resistance

R2 is the second resistance

practical side :

The law of equivalent resistance:

$$R = \frac{V}{I}$$

$\therefore$ R1=10

R2=100

$$\text{The error rate law} = \left| \frac{\text{practical value} - \text{theoretical value}}{\text{Practical value}} \right| \times 100\%$$

Discussion

1. **The main goal of the experiment is to realize :**
   A) Coulomb's Law
   B) Faraday's Law
   C) Ohm's Law
   D) Ampere's Law
   E) Lenz's Law

2. **The experiment studies the relation between :**
   A) Voltage and Resistance
   B) Voltage and Current
   C) Current and Power
   D) Resistance and Time
   E) Charge and Energy

3. **The law of parallel conduction deals with :**
   A) Series circuits
   B) AC circuits
   C) Parallel circuits
   D) Magnetic fields
   E) Transformers

4. **The unit of resistance is :**
   A) Volt
   B) Ampere
   C) Joule
   D) Ohm
   E) Watt

5. **The power supply used is :**
   A) AC power supply
   B) D.C power supply
   C) Battery
   D) Transformer
   E) Solar source

6. **The voltmeter used is :**
   A) AC type
   B) D.C voltmeter
   C) Digital ammeter
   D) Galvanometer
   E) Multimeter

7. **The current in parallel circuits has :**
   A) One path
   B) Two directions
   C) Many paths
   D) Zero paths
   E) Constant value

8. **The potential difference across all resistors in parallel is :**
   A) Different
   B) Inversely proportional
   C) Equal
   D) Zero
   E) Doubled

9. **Ohm's law formula is :**
   A) $R = IV$
   B) $R = V/I$
   C) $V = R/I$
   D) $I = R/V$
   E) $V = I + R$

10. **In Ohm's law, current (I) is measured in :**
    A) Volts
    B) Amperes
    C) Ohms
    D) Joules
    E) Watts

11. In Ohm's law, voltage (V) is measured in :
A) Ampere
B) Joule
C) Ohm
D) Volt
E) Watt

12. Kirchhoff developed his laws to :
A) Replace Ohm's law
B) Solve complex circuits
C) Measure current
D) Calculate magnetic field
E) Produce electricity

13. The equivalent resistance in parallel is found by :
A) $R = R1 + R2$
B) $R = R1 \times R2$
C) $1/Req = 1/R1 + 1/R2$
D) $Req = R1 - R2$
E) $Req = V/I$

14. In a parallel circuit, voltage source equals :
A) The smallest voltage
B) The average voltage
C) Voltage across each resistor
D) Half the total voltage
E) Zero

15. The experiment involves connecting :
A) Resistors in series
B) Coils in series
C) Resistors in parallel
D) Capacitors in parallel
E) Inductors in series