

## Ohm's Law and Electrical Resistance.

Ohm's Law is a fundamental principle in electrical engineering, stating that the current ( $I$ ) flowing through a conductor between two points is directly proportional to the voltage ( $V$ ) across the two points and inversely proportional to the resistance ( $R$ ) of the conductor. It is expressed mathematically as:

$$V=IR.$$

where:

- $V$  is the voltage in volts (V),
- $I$  is the current in amperes (A),
- $R$  is the resistance in ohms ( $\Omega$ ).

The resistance of a material depends on its properties, including its resistivity ( $\rho$ ), length ( $L$ ), and cross-sectional area ( $A$ ).

Ohm's Law is widely used to analyze electrical circuits, determine power consumption, and design components. For instance, if a resistor with a resistance of  $10\Omega$  has a current of  $2A$  flowing through it.

This law is crucial for understanding circuit behavior and designing electrical systems efficiently.