

Current of Electricity & D.C. Circuits

Quantity	Symbol	SI Unit	Formula	Definition
Charge	Q	Coulomb (C)		
Current	I	Ampere (A)	$I = \frac{Q}{t}$	Current is the rate of flow of charge.
Voltage	V			
- Electromotive force (e.m.f.)		Volt (V)	$V = \frac{W}{Q}$	EMF of a source is the work done per unit charge by the source in driving charges around a complete circuit.
- Potential difference (p.d.)				PD across a component in a circuit is the work done per unit charge in driving charges through the component
Resistance	R	Ohm (Ω)	$R = \frac{V}{I}$	Resistance is the ratio of potential difference across a component and the current flowing through the component.

Current

- Conventional current (+ve terminal to -ve terminal) travels opposite in direction to electron flow (-ve terminal to + terminal)

Ammeter

- Connected in series
- Ideal conductor

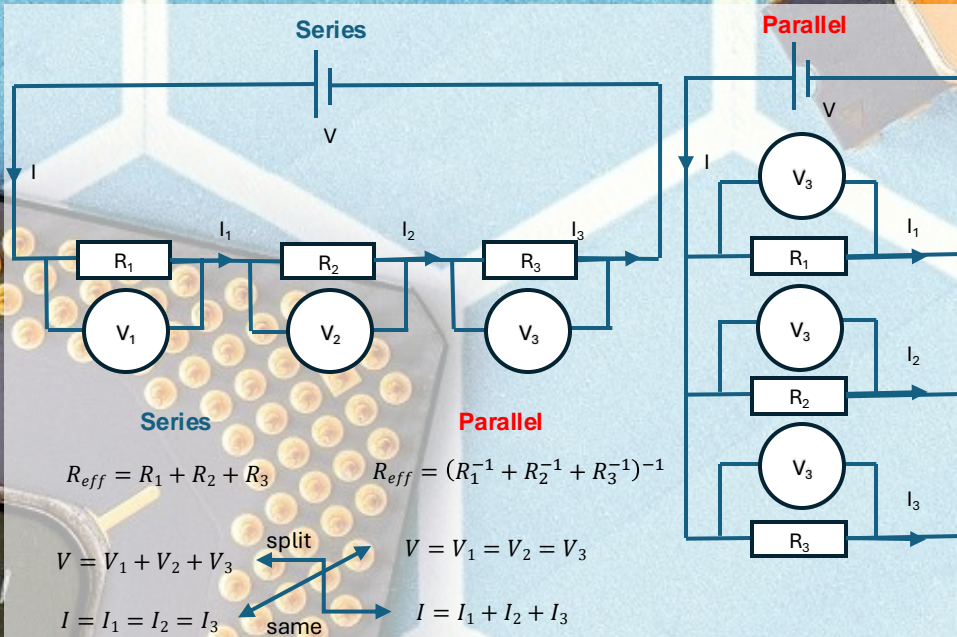
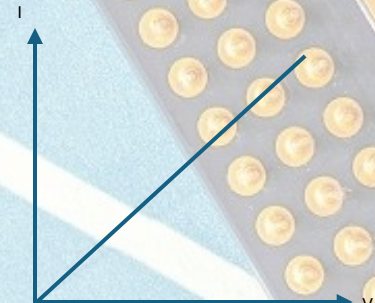
Voltage

Voltmeter

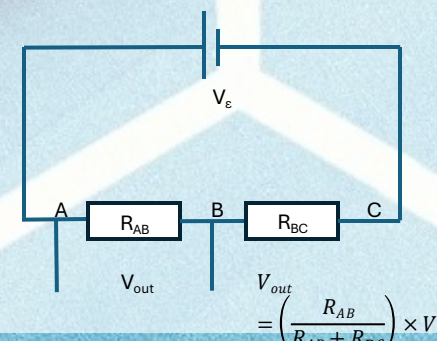
- Connected in parallel
- Ideal resistor

Resistance

- Ohm's Law: Current passing through metallic conductor is directly proportional to potential difference across it.
- Ohmic conductor – obeys Ohm's Law (R is constant)
- Non-ohmic conductor – does not obey Ohm's law (R not constant)



Potential Dividers



Resistivity ρ

$$\left. \begin{array}{l} R \propto \text{length } l \\ R \propto \frac{1}{\text{area } A} \end{array} \right\} R \propto \frac{l}{A} \rightarrow R = \frac{\rho l}{A}$$

Thermistor:

- Temperature increase $\rightarrow R_{TH}$ decrease

Light Dependent Resistor (LDR):

- Light intensity increase $\rightarrow R_{LDR}$ decrease

Diode:

- Allows current to travel in only one direction



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