UDAAN

2025

ELECTRICITY

PHYSICS | Lecture - 03

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Topics to be covered

1. OHM'S LAW
2. RESISTANCE
3. VERIFICATION OF OHM'S LAW
4. FACTORS AFFECTING RESISTANCE
5. DIFFERENCE BETWEEN
6. RESISTIVITY OF ELECTRICAL SUBSTANCES

* Pichli Kakshao Ka Nichod

① Charge (Q)

↳ SI unit → Coulomb (C)

↓

Attraction / Repulsion

↳ Quantization

$1e^- = 1.6 \times 10^{-19}\ C$

$Q = ne$

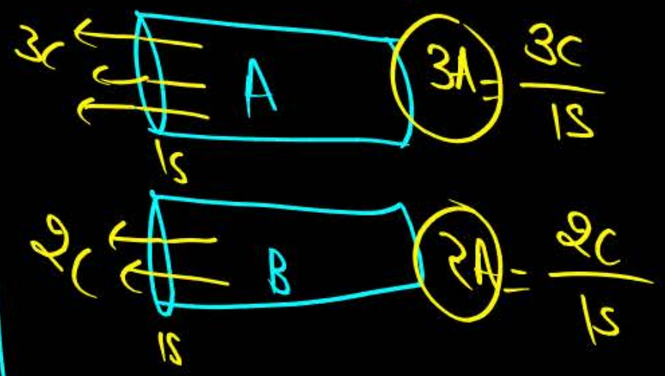
Net charge, no. of electrons

10A → $\frac{10C}{1s}$

② Current = $\frac{\text{charge}}{\text{time}}$

$I = \frac{Q}{t}$

$A = \frac{C}{s}$



③ Voltage (Pot. diff.) = $\frac{\text{Workdone}}{\text{Charge}}$

$V = 0$, $I = 0$

$V = 2V = \frac{2J}{1C}$

$V = 100V = \frac{100J}{1C}$

ELECTRICAL CIRCUIT

Plug in → ON
Plug out → OFF

Que. What is an Electric Circuit ?

Ans. A continuous and closed path made up of wires on which an electric current runs is called an electric circuit. An electric circuit consists of electric devices, a source of energy and wires that are connected with the help of a switch.

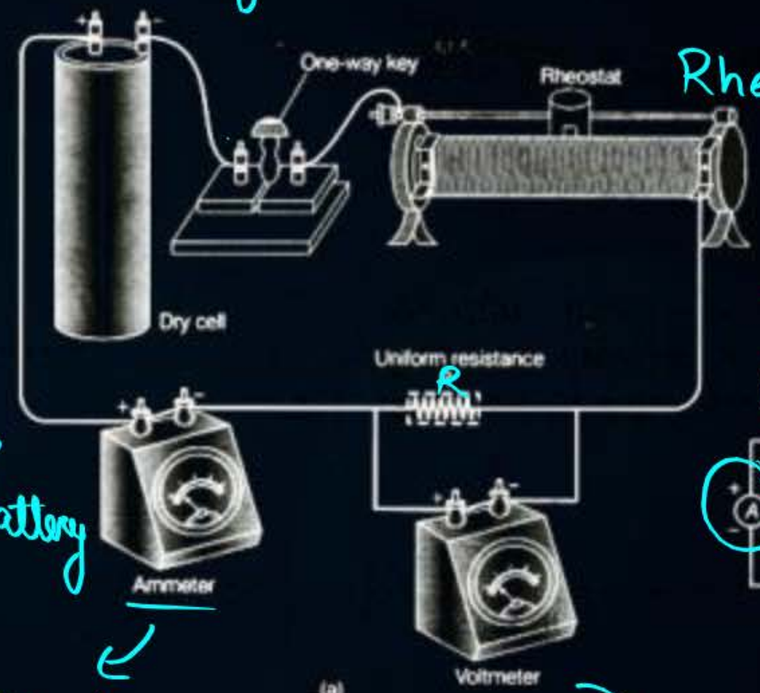


Fig.1 (a) Arrangement diagram (b) Circuit diagram

Rheostat

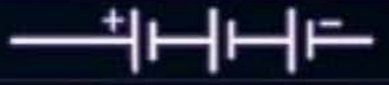
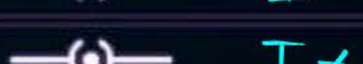
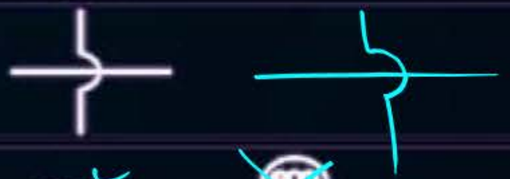
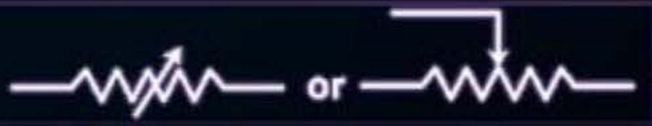
Battery

Current measuring device

Voltage measuring device

1) Ammeter
2) Voltmeter
3) Battery
4) Rheostat
5) Key
6) Resistance

CIRCUIT ELEMENTS

S. No.	Components	Symbols
1	An electric cell	
2	A battery or a combination of cells	
3	Plug key or switch (open) Plug out	 $I = 0$ `OFF'
4	Plug key or switch (closed) Plug in	 $I \neq 0$ `ON'
5	A wire joint	
6	Wires crossing without joining	
7	Electric bulb 	 or
8	A resistor of resistance R	
9	Variable resistance or rheostat	 or
10	Ammeter	
11	Voltmeter	

Cell

Combination of cells or Battery

CIRCUIT ELEMENTS

"Voltage"

BATTERY ELIMINATORS

RESISTANCE BOX

VOLTMETER

AMMETER

PLUG KEY

RHEOSTAT (Baad Mein)

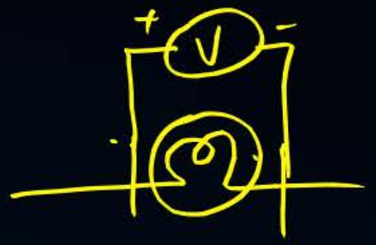
CONNECTING WIRE

AMMETER, VOLTMETER

→ Current measuring device

→ Always connect in series with the device

→ Ideal Ammeter ($R \approx 0$)



→ Voltage measuring device

→ Always connected accross parallel with the device

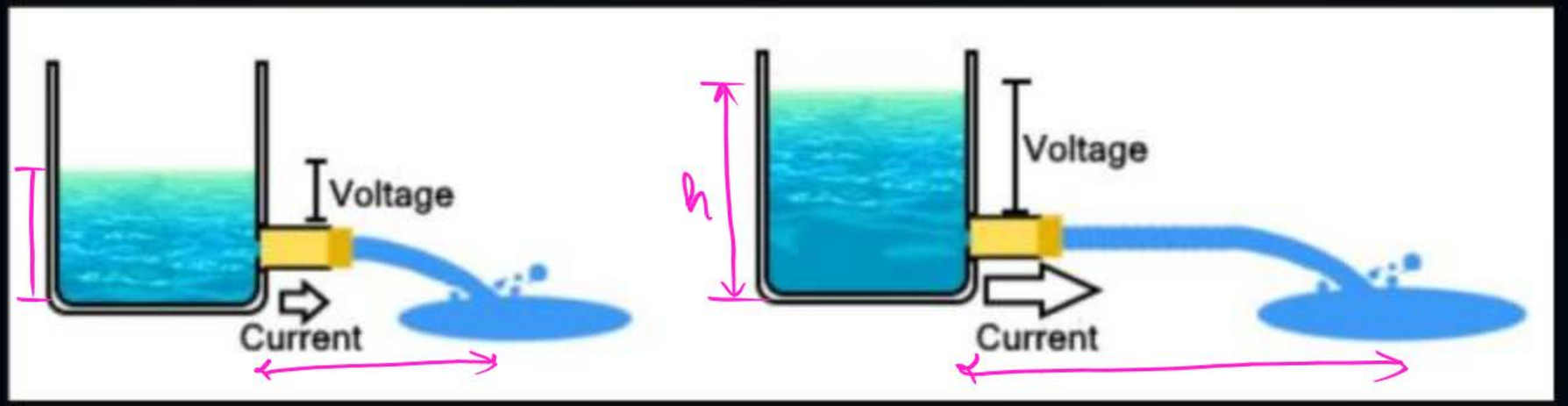
→ Ideal Voltmeter ($R \approx \infty$)

OHM'S LAW

$V = 0$
$I = 0$

Voltage ↓ Current ↓

Voltage ↑ Current ↑



I

flow less — level low

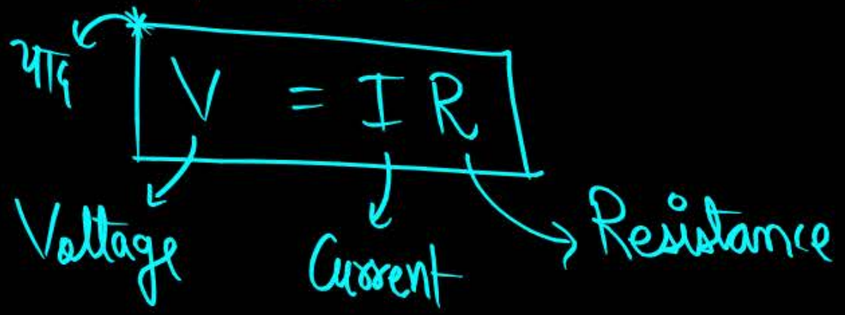
II

flow high — level high

Ohm's law states that, "Current flowing in a (1) conductor is directly proportional to the amount of potential difference applied across the ends of the conductor, at a (2) constant temperature".

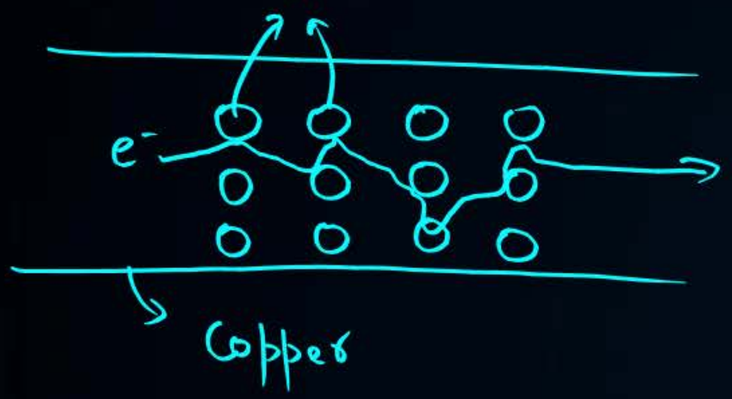
$$\text{Voltage} \propto \text{Current}$$

$$V \propto I$$



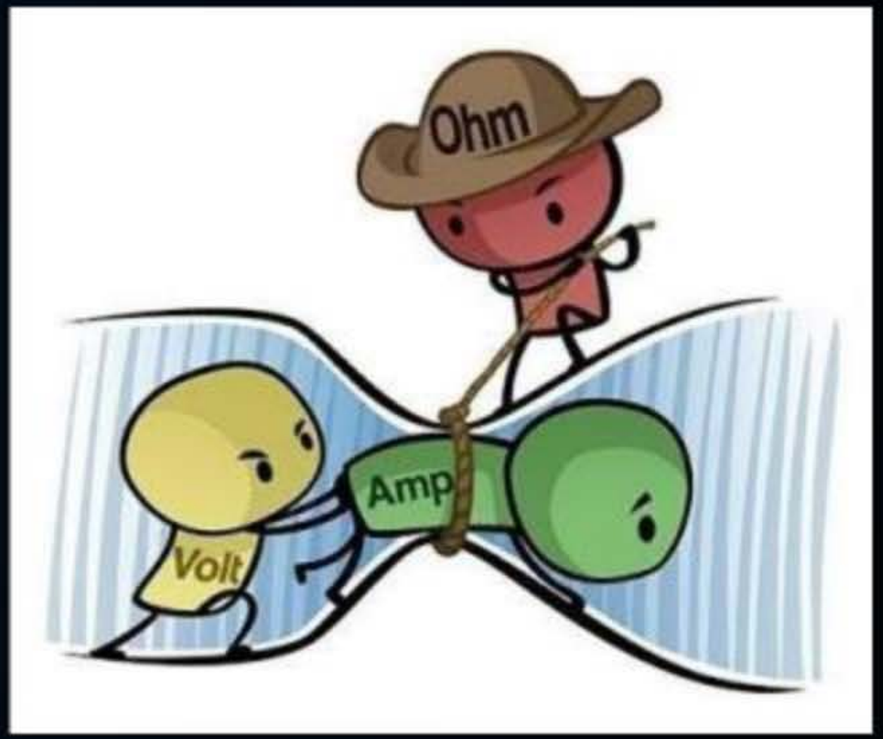
RESISTANCE → 'Rukawat'

Define- The opposition offered by the atoms of the conductor in the path of moving electron.



Denote → 'R'

SI Unit → 'Ohm' (Ω)



QUESTION

How much current will an electric bulb draw from a 220 V source, if the resistance of the bulb filament is 1200 Ω?

$V = 220\ V$

$R = 1200\ \Omega$

$I = ?$

$V = IR$

$220 = I \times 1200$

$$I = \frac{220}{1200} = \frac{11}{60}$$

$$I = \frac{11}{60}\ A$$

THANK YOU