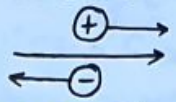


# CURRENT ELECTRICITY MINDMAP

## # Electric Current (I) →

Current Carriers :- Charged particles



conventional current

Electric Current :-  $I = \frac{dq}{dt}$   
Ampere

Slope of q-t graph = I

Area of I-t graph = q

Current in Conductors :-

Drift velocity  $\vec{V}_d = \frac{-e\vec{E}\tau}{m}$

Mean free path =  $10^{-10}$  m

Relaxation time =  $10^{-14}$  sec.

Current  $I = neA\vec{V}_d$ ,

Current density,  $\vec{J} = ne\vec{V}_d$

## # Ohm's Law $I = VR$ or $I \propto V$

$$R = \frac{m\ell}{ne^2 A \tau} = \frac{\rho \ell}{A}$$

Resistance

$$\rho = \frac{m}{ne^2 \tau} \rightarrow \rho = R \text{ if } \ell=1 \text{ and } A=1$$

Resistivity

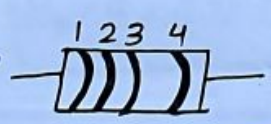
$$\text{Conductivity } (\sigma) = \frac{1}{\rho} \text{ and Conductance } (G) = \frac{1}{R}$$



Ohmic Devices

$$R_t = R_0 (1 + \alpha \Delta t)$$

Colour Coding →



- 1. 1<sup>st</sup> digit
- 2. 2<sup>nd</sup> digit
- 3. multiplier
- 4. tolerance.

## # Meter Bridge →

$$\frac{P}{L} = \frac{Q}{100 - L}$$

## # Grouping Of Resistors →

In Series -  $R_{net} = R_1 + R_2 + R_3 + \dots$

In parallel -  $\frac{1}{R_{net}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$

## # Grouping Of Cells →

In Series -  $E_{net} = E_1 + E_2 + \dots$ ,  $r_{net} = r_1 + r_2 + \dots$

In parallel -  $E_{net} = \frac{E_1 r_2 + E_2 r_1}{r_1 + r_2}$ ,  $r_{net} = \frac{r_1 r_2}{r_1 + r_2}$

## # Heating Effects and Electric Bulb →

$P = VI = I^2 R = \frac{V^2}{R}$  in parallel generally  
in series generally.

$$H = VIt = I^2 Rt = \frac{V^2 t}{R}$$

## → Combination of Appliances:

In parallel →  $P_{net} = P_1 + P_2$

In Series →  $\frac{1}{P_{net}} = \frac{1}{P_1} + \frac{1}{P_2}$

→ For Variable Current :-

$$H = \int_{t_1}^{t_2} I^2 R dt$$

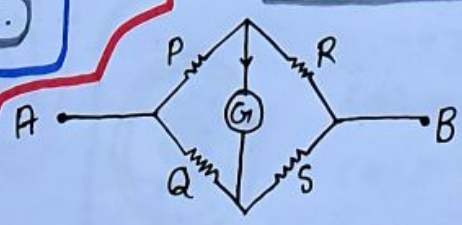
→ For a fuse :-  $i^2 \propto x^3$

## # Kirchhoff's Laws :-

(1) Incoming Current = Outgoing Current.

(2)  $\sum V = 0$  (for closed loop)

## # Wheatstone Bridge :-



$$\text{If } \frac{P}{Q} = \frac{R}{S} \rightarrow I = 0$$



## # Potentiometer →

→ Comparing emf of 2 cells :-

$$\frac{E_1}{E_2} = \frac{l_1}{l_2}$$

→ Internal resistance of a cell :-

$$x = \frac{R(l - l')}{l'}$$

→ Sensitivity :-

$$K = \left[ \frac{E_r}{R + x} \right] \frac{1}{l}$$



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together ❤️🌟