SIR CV RAMAN COACHING CENTRE –IDAPPADI,SALEM ,

XLL PHYSICS UNIT – 2 -2025

Date ; 01.01.2025

Lesson – 2

VERY VERY IMPORTANT QUESTIONS

English medium

JUST PASS MATERIAL

PREPARED BY

Dr.G.THIRUMOORTHI, M.Sc, B.Ed, Ph..D , PHYSICS .,,

8610560810, 8883610465,,,

thiruphysics1994@gmail.com

QUESTIONS :

1. Microscopic model of current (or) Describe the microscopic model of current and obtain microscopic form of Ohm's law

2. OHM'S LAW (or) Obtain the macroscopic form of Ohm's law from its microscopic form and discuss its limitation

3. Resistors in series and parallel (or) Explain the equivalent resistance of a series and parallel resistor network

4. Resistors in series and parallel (or) Explain the equivalent resistance of a series and parallel resistor network

5. . Determination of internal resistance (or) Explain the determination of the internal resistance of a cell using voltmeter

6. . Cells in series

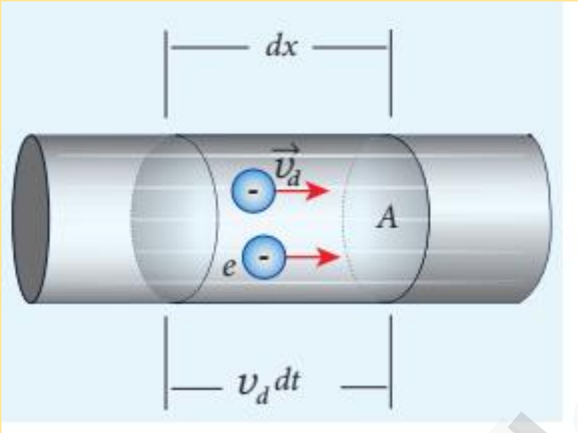
7. . Cells in parallel

8. Wheatstone's bridge (or) Obtain the condition for bridge balance in Wheatstone's bridge

9. Meter bridge (or) Explain the determination of unknown resistance using meter bridge

10. Comparison of emf of two cells with a potentiometer (or) How the emf of two cells are compared using potentiometer

1.**Microscopic model of current (or)** Describe the microscopic model of current and obtain microscopic form of Ohm's law



$$v_d = \frac{dx}{dt}; \quad dx = v_d\, dt$$

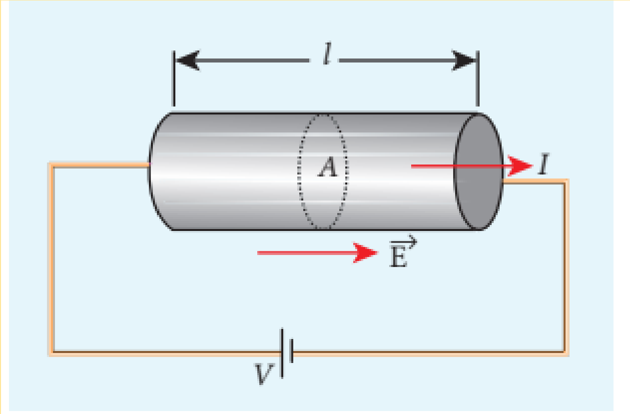
$$J = nev_d$$

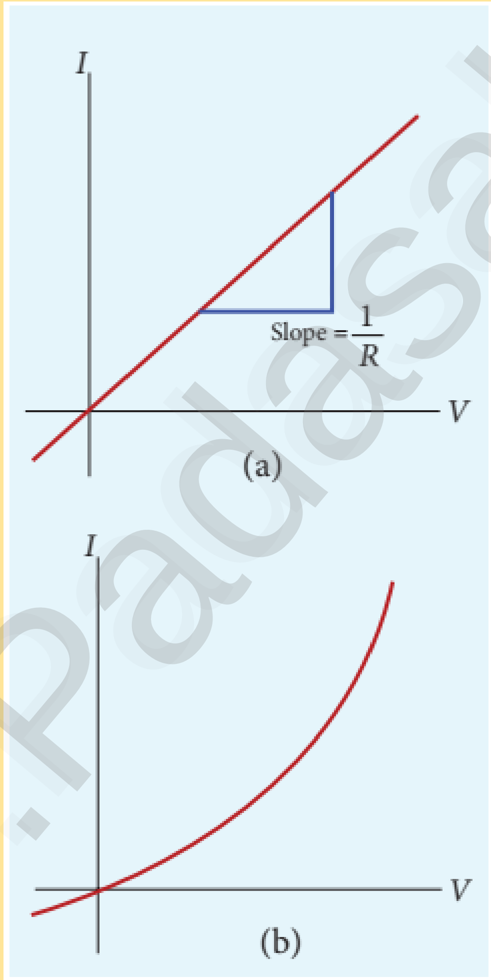
$$I = neAv_d$$

$$\vec{J} = -\sigma \vec{E}$$

$$\rho = \frac{1}{\sigma} = \frac{m}{ne^2\tau}$$

2. **OHM'S LAW (or)** Obtain the macroscopic form of Ohm's law from its microscopic form and discuss its limitation



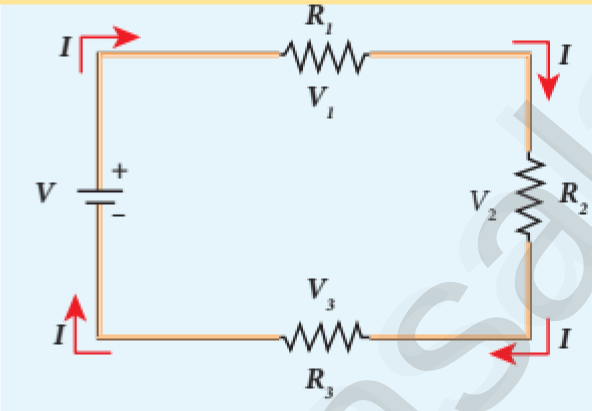


$$J = \sigma E = \sigma \frac{V}{l}$$

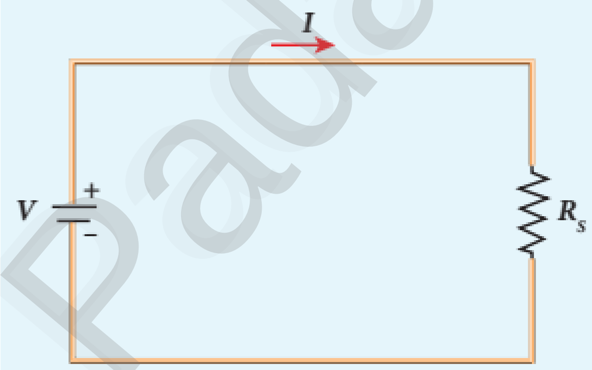
$$V = I\left(\frac{l}{\sigma A}\right)$$

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

3. **Resistors in series and parallel (or)** Explain the equivalent resistance of a series and parallel resistor network.



(a) Three resistors in series



(b) Equivalent resistance (R_S) has the same current

$$V = V_1 + V_2 + V_3 = IR_1 + IR_2 + IR_3$$

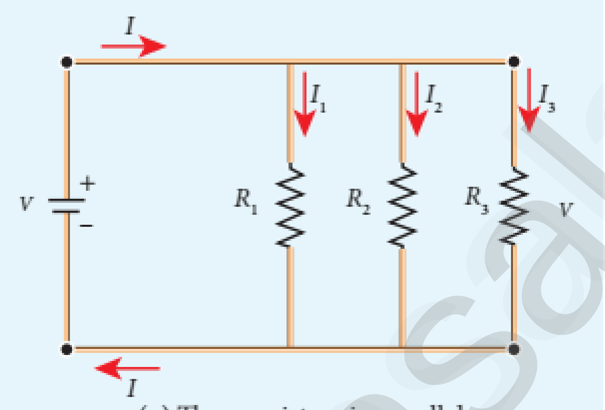
$$V = I(R_1 + R_2 + R_3)$$

$$V = IR_S$$

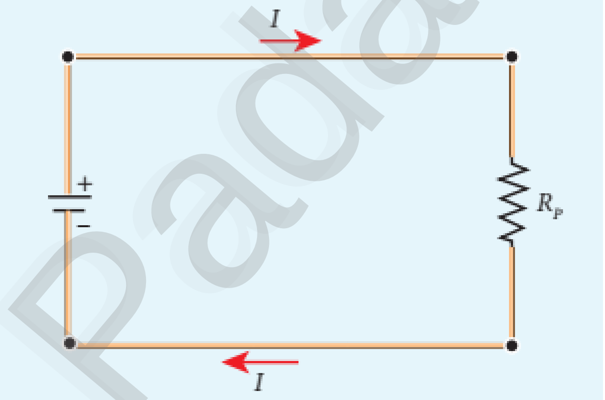
$$R_S = R_1 + R_2 + R_3$$

The value of equivalent resistance in series connection will be greater than each individual resistance

4. Resistors in parallel (or)_ Explain the equivalent resistance of a series and parallel resistor network.



(a) Three resistors in parallel



(b) Equivalent resistance (R_P) has the same current

$$I = I_1 + I_2 + I_3$$

$$I_1 = \frac{V}{R_1}, I_2 = \frac{V}{R_2}, I_3 = \frac{V}{R_3}$$

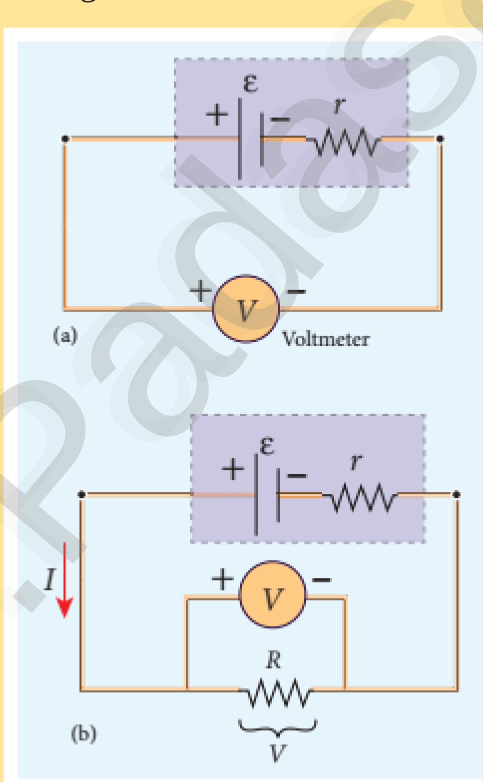
$$I = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} = V\left[\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right]$$

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

$$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

The value of equivalent resistance in parallel connection will be lesser than each individual resistance.

5. Determination of internal resistance (or) Explain the determination of the internal resistance of a cell using voltmeter

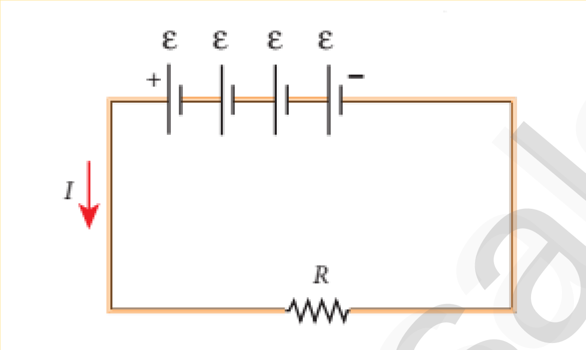


$V = IR$ $Ir = \varepsilon - V$

$$r = \left[\frac{\varepsilon - V}{V}\right] R$$

$$P = I^2 R + I^2 r$$

6. Cells in series



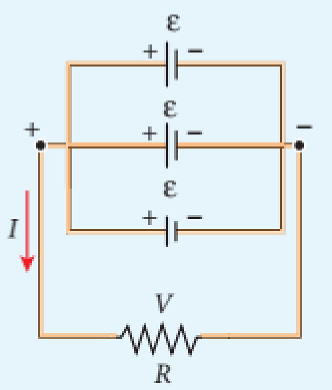
$$I = \frac{n\varepsilon}{R} \approx nI_1$$

$$I = \frac{\text{total emf}}{\text{total resistance}} = \frac{n\varepsilon}{nr + R}$$

$$\left(I_1 = \frac{\varepsilon}{R}\right)$$

$$\text{Case (b) If } r >> R, \ I = \frac{n\varepsilon}{nr} \approx \frac{\varepsilon}{r}$$

7.Cells in parallel



Cells in parallel (circuit diagram)

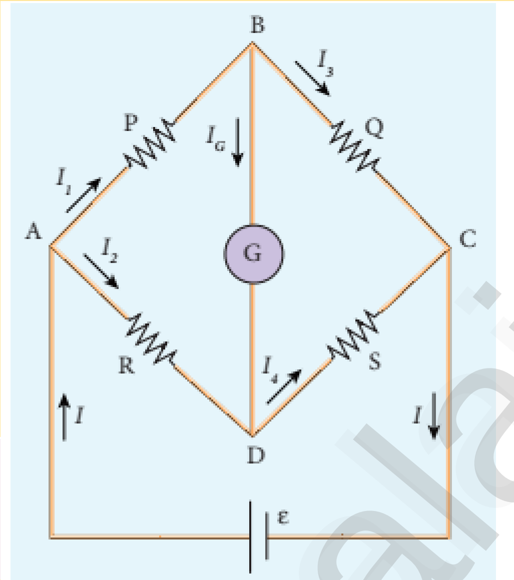
$$I = \frac{\varepsilon}{\frac{r}{n} + R}$$

$$I = \frac{n\varepsilon}{r + nR}$$

Case (a) If $r >> R$, $I = \frac{n\varepsilon}{r} = nI_1$

Case (b) If $r << R$, $I = \frac{\varepsilon}{R}$

8. **Wheatstone's bridge (or)** Obtain the condition for bridge balance in Wheatstone's bridge



$$I_1 - I_G - I_3 = 0$$

$$I_2 + I_G - I_4 = 0$$

$$I_1P + I_GG - I_2R = 0$$

$$I_1P + I_3Q - I_4S - I_2R = 0$$

$$I_1 = I_3$$

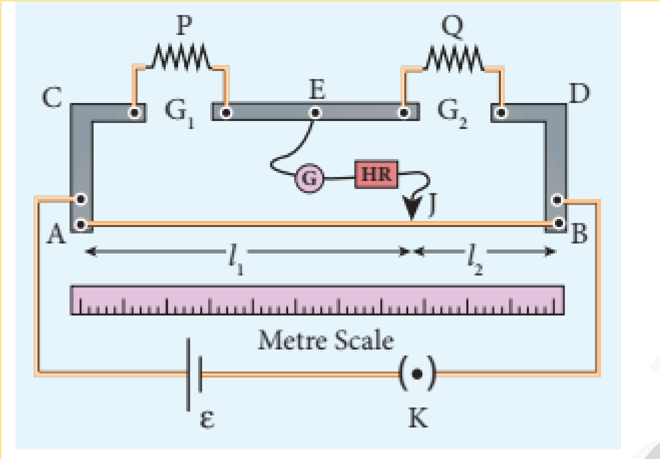
$$I_2 = I_4$$

$$I_1P = I_2R$$

$$I_3Q = I_4S$$

$$\frac{P}{Q} = \frac{R}{S}$$

9. Meter bridge (or) Explain the determination of unknown resistance using meter bridge.



$$\frac{P}{Q} = \frac{R}{S} = \frac{r.AJ}{r.JB}$$

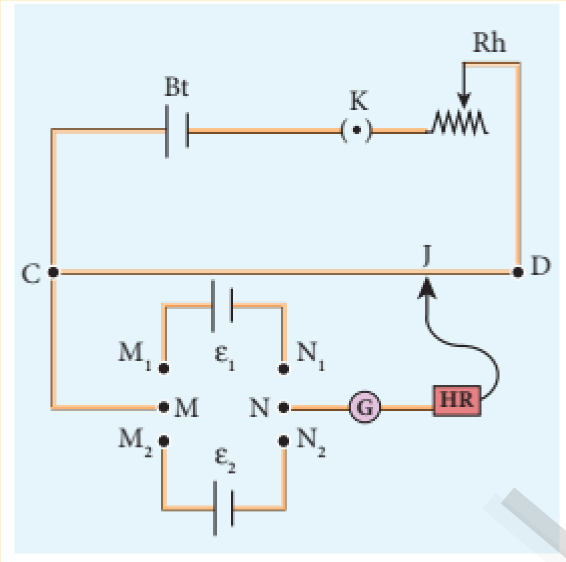
$$\frac{P}{Q} = \frac{AJ}{JB} = \frac{l_1}{l_2}$$

$$\text{Resistance} = \rho\frac{l}{A}$$

$$P = Q\frac{l_1}{l_2}$$

$$\rho = P\frac{\pi a^2}{l}$$

10. Comparison of emf of two cells with a potentiometer (or) How the emf of two cells are compared using potentiometer?



we have $\varepsilon_1 = Irl_1$

$\varepsilon_2 = Irl_2$

$$\frac{\varepsilon_1}{\varepsilon_2} = \frac{l_1}{l_2}$$

PREPARED BY

Dr.G.THIRUMOORTHI,M.Sc,B.Ed,Ph..D ,PHYSICS

8610560810,8883610465,,,

thiruphysics1994@gmail.com