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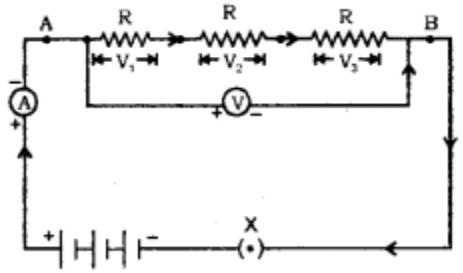
SUBJECT:- PHYSICS CLASS:- XTH DATE:- 18/01/XXII

SUBJECT TEACHER:- MR. NEEL NIRANJAN

## CHAPTER 1. (ELECTRICITY) (BASED ON NCERT PATTERN)

Combination of resistors (Series and Parallel combination), the heating effect of electric current and electric power.
Combination of Resistors
(i) Series combination
(ii) Parallel combination.

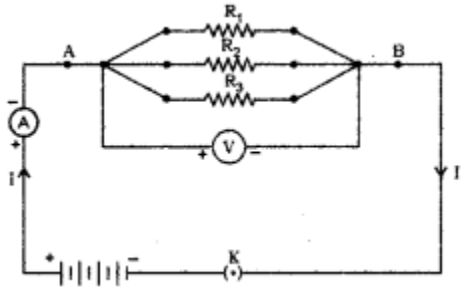
1. **Resistors in Series**: When resistors are joined from end to end, it is called in series. In this case, the total resistance of the system is equal to the sum of the resistance of all the resistors in the system.




Let, three resistors $R_1$, $R_2$, and $R_3$ get connected in series.

Potential difference across A and B = V
Potential difference across $R_1$, $R_2$ and $R_3$ = $V_1$, $V_2$ and $V_3$
Current flowing through the combination = I
We, know that
$V = V_1 + V_2 + V_3$ .... (i)
According to Ohm's Law :
$V_1 = IR_1$, $V_2 = IR_2$ and $V_3 = IR_3$ ..... (ii)
Let, total resistance = Rs
Then, $V = IR_s$ ...(iii)
From equations (i) and (ii) and (iii)
$IR_s = IR_1 + IR_2 + IR_3$
$R_s = R_1 + R_2 + R_3$
When the resistors are connected in series, the current flowing through each resistor is the same and is equal to the total current.

**Resistors in Parallel:** When resistors are joined in parallel, the reciprocal of the total resistance of the system is equal to the sum of reciprocal of the resistance of resistors.




Let three resistors $R_1$, $R_2$ and $R_3$ connected in parallel.
Potential difference across point A and B = V
Total current flowing between point A and B = I

Currents flowing through resistors $R_1$, $R_2$ and $R_3$ = $I_1$, $I_2$ and $I_3$ respectively.
We, know that,
$I = I_1 + I_2 + I_3$ .....(i)
Since, the potential difference across $R_1$, $R_2$, and $R_3$ is the same = V
According to Ohm's Law,

$$I_1 = \frac{V}{R_1}, I_2 \frac{V}{R_2} \text{ and, } I_3 = \frac{V}{R_3} \quad \text{.....(ii)}$$

Let, Total Resistance = $R_p$

$$\text{Thus, } I = \frac{V}{R_p} \quad \text{...(iii)}$$

From equations (*i*), (*ii*) and (*iii*)

$$\frac{V}{R_p} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} \quad \Rightarrow \quad \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \quad \text{...(iv)}$$

In parallel combination, the potential difference across each resistor is the same and is equal to the total potential difference.
The total current through the circuit can be calculated by adding the electric current through individual resistors.