PHYSICS - X-PART-9 CLASS 09

Arrangement of Resistors in Circuits

2. Parallel Connection

Effective resistance, $1/R = 1/R_1 + 1/R_2$

$$R = \frac{R_1 \times R_2}{R_1 + R_2}$$

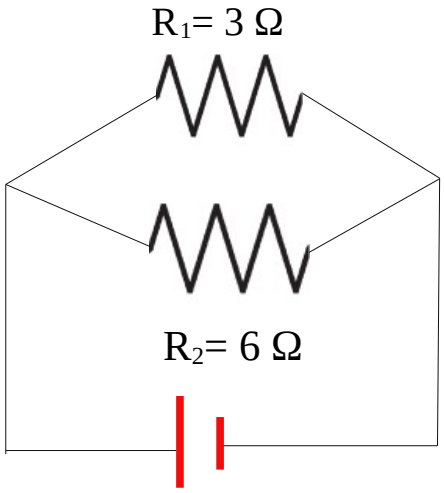

fig1.7

Ex. 1 (Fig.1.7)

$R_1 = 3\ \Omega$

$R_2 = 6\ \Omega$

Effective resistance,

$$R = \frac{R_1 \times R_2}{R_1 + R_2}$$

$$R = \frac{3\ \Omega \times 6\ \Omega}{3\ \Omega + 6\ \Omega}$$

$$R = 2\ \Omega$$

2. If 2 Ω, 4 Ω resistors are connected in parallel. Calculate the effective resistance.

$R_1 = 2\ \Omega$

$R_2 = 4\ \Omega$

Effective resistance,

$$R = \frac{R_1 \times R_2}{R_1 + R_2}$$

$$R = \frac{2\ \Omega \times 4\ \Omega}{2\ \Omega + 4\ \Omega}$$

$$R = 1.33\ \Omega$$

* If resistors of the same value are connected in parallel, the R = r/n
where n is the number of resistors and r is the resistance of one resistor.

Eg. 1. Ten 3 Ω resistors are connected in parallel. What is the effective resistance?

Number of resistors n = 10
The resistance of one resistor, r = 3 Ω
Effective resistance, R = r/n
= 3/10 = 0.3 Ω

When resistors are connected in Parallel,

* The potential difference in each resistors are same.
* Current through each resistors are different.
* The effective resistance decreases.

Assignment

1. If 2 Ω and 4 Ω resistors are connected in parallel. 12 V potential difference is applied. Find current in the circuit.