Q. 01

(a) Three resistors 1 Ω, 2 Ω, and 3 Ω are combined in series. What is the total resistance of the combination?

(b) If the combination is connected to a battery of emf 12 V and negligible internal resistance, obtain the potential drop across each resistor.

Answer

(a) Three resistors of resistances 1 Ω, 2 Ω, and 3 Ω are combined in series. Total resistance of the combination is given by the algebraic sum of individual resistances.

Total resistance = 1 + 2 + 3 = 6 Ω

(b) Current flowing through the circuit = I

Emf of the battery, E = 12 V

Total resistance of the circuit, R = 6 Ω

The relation for current using Ohm's law is,

$$I = \frac{E}{R}$$

$$= \frac{12}{6} = 2 \text{ A}$$

Potential drop across 1 Ω resistor = V_1

From Ohm's law, the value of V_1 can be obtained as

$V_1 = 2 \times 1 = 2$ V ... (i)

Potential drop across 2 Ω resistor = V_2

Again, from Ohm's law, the value of V_2 can be obtained as

$V_2 = 2 \times 2 = 4$ V ... (ii)

Potential drop across 3 Ω resistor = V_3

Again, from Ohm's law, the value of V_3 can be obtained as

$V_3 = 2 \times 3 = 6$ V ... (iii)

Therefore, the potential drop across 1 Ω, 2 Ω, and 3 Ω resistors are 2 V, 4 V, and 6 V respectively.