

Board – ICSE

Class- 9th

TOPIC – CURRENT ELECTRICITY

1. A conductor carries a current of 0.2 A

(a) Find the amount of charge that will pass through the cross section of conductor in 30 s

(b) How many electrons will flow in this time interval if charge on one electron is 1.6×10^{-19} C?

Ans. Given: $I = 0.2$ A, $t = 30$ s

(a) Charge = Current \times time

or $Q = I \times t = 0.2 \times 30 = 6$ C

(b) If n electrons flow and e is the charge on one electron, then total charge passed $Q = ne$

Therefore, $n = Q/e = 6 / (1.6 \times 10^{-19}) = 3.75 \times 10^{19}$.

2. A charge 0.5 C passes through a cross section of a conductor in 5 s. Find the current.

Ans. Current (I) = Charge (q)/time (t)

Or, $I = 0.5 / 5 = 0.1$ A

3. A current of 1.5 A flows through a conductor for 2.0 s. What amount of charge passes through the conductor.

Ans. Charge (q) = Current (I) \times time (t)

Or, $q = 1.5 \times 2 = 3$ C

4. When the starter motor of a car is switched on for 0.8 s, a charge 24 C passes through the coil of the motor, calculate the current in the coil.

Ans. Current (I) = Charge (q)/time (t)

Or, $I = 24 / 0.8 = 30$ A

5. What amount of work is needed in moving 2C charge through a potential difference of 8 V?

Ans. Potential difference, $V = 8$ V

Charge = 2 C

$V = W/Q$

$W = V \times Q$

$W = 8 \times 2$

$W = 16$ J

Hence, the work done in moving a charge of 2 C across the two points having a potential difference is 8 V is 16 J.

6. Calculate the current flowing through a wire of resistance 7.5 ohms connected to a battery of potential difference 1.5 V.

Ans. According to Ohm's law,

$V = IR$

Here $V = 1.5$ V

$$R = 7.5 \text{ ohm}$$

$$\therefore I = V/R$$

$$I = 1.5/7.5$$

$$I = 0.2 \text{ A}$$

7. In transferring 1.5 C charge through a wire, 9J of work is needed. find the potential difference across the wire.

Ans. Potential difference (V) = work done (W) / charge (q)

$$\text{Or, } V = 9/1.5 = 6 \text{ volt.}$$

8. A cell of potential difference 12 V is connected to a bulb. The resistance of filament of bulb when it glows is 24 ohms. find the current drawn from the cell.

Ans. Given, potential difference (V) = 12 V

$$\text{Resistance, } R = 24 \Omega$$

$$\text{Therefore, current (I) = } V / R$$

$$\text{Or, } I = 12/24 = 0.5 \text{ A}$$

9. A bulb draws current 1.5 A at 6.0 V. Find the resistance of filament of bulb while glowing.

Ans. $I = 1.5 \text{ A}$

$$V = 6.0 \text{ V}$$

According to ohm's law,

$$V = IR$$

$$\therefore R = \frac{V}{I} = \frac{6.0}{1.5} = 4 \Omega$$

10. A current 0.2 A flows in a wire of resistance 15 ohms. Find the potential difference across the ends of the wire.

Ans. $I = 0.2 \text{ A}$

$$R = 15 \text{ V}$$

According to ohm's law,

$$V = IR$$

$$\therefore V = 0.2 \times 15 = 3 \text{ V}$$