Date-10-02-25 TENDER HEART HIGH SCHOOL, Sec-33(B)(CHD)

Subject - PHYSICS

Teacher:—Charanjit Ram CLASS → VIII

Chapter-9 (Current Electricity)

9(B) (Potential difference and Resistance)

Exercise 9(B) :→

(B) very short ans. type :→

Q1. What is the other name for the unit :
(a) Joule per Coulomb (b) Coulomb per second

Ans

(a) Joule per Coulomb :→ $\frac{\text{Joule}}{\text{Coulomb}} = J/C = \text{Volt}(V)$

(b) Coulomb per second :→ $\frac{\text{Coulomb}}{\text{second}} = C/s = \text{Ampere}(A)$

Q2 :→ For what purpose is a battery connected in a circuit ?

Ans :→ A battery is connected in the circuit when a strong current is required.

Q3 :→ How will the resistance of a wire change if it is stretched ?

Ans The resistance of the wire will increase because by stretching wire, its length increases and area of cross-section decreases.

Qus 4:→ How does current change with voltage when it is altered across a given resistance?

Ans:→ Current will increase by increasing the voltage and decrease by decreasing the voltage because voltage is directly proportional to Current by the Ohm's Law.

Qus 5:→ Name the physical quantities whose units are:→

(a) Coulomb and ampere (b) Volt and ohm

Ans:→ (b) Volt and ohm:→ Volt - Potential difference, ohm - Resistance

(a) Coulomb and ampere → Coulomb - Charge, Ampere - Current

Qus 6:→ Answer given in Book.

Qus 7:→ Determine the term Potential difference?

Ans:→ Potential Difference:→ potential difference between the two conductors is equal to work done in transferring a unit positive charge from one conductor to other conductor. If W is the work done then Potential difference between them is;

$$V_1 - V_2 = \frac{W}{q}$$

V_1 – Potential of Conductor 1

V_2 – Potential of Conductor 2

q – unit positive Charge

Potential difference is a scalar quantity.

Qus 8:- State and define the S.I unit of potential difference?

Ans The S.I unit of potential ~~differ~~ is Joule per Coulomb or Volt.

$$\text{or} \quad 1\,\text{Volt} = \frac{1\,\text{Joule}}{1\,\text{Coulomb}}$$

One Volt:→ The potential difference between the two points is said to one volt, if work done in transferring one Coulomb of Charge from one point to other point is 1 Joule.

Not from exercise

Qus :→ Define Resistance?

Ans :→ The Obstruction offered to flow of current by a Conductor is called its electrical resistance.

Q.9:→ State and define S.I unit of Resistance?

Ans The S.I unit of resistance is Ohm (Ω) or Volt per ampere

$$\text{i.e} \quad R = \frac{V}{I} = \frac{1\,\text{Volt}}{1\,\text{Ampere}} = 1\,\text{ohm} = 1\,\Omega$$

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the potential difference across its ends the same?

Ans :→ We know that $V = IR$

$$\text{or } V = \frac{I}{R}$$

$$\text{or } I = \frac{V}{R} \quad \text{—— (1)}$$

Acc. to question; Resistance is doubled

So $R' = 2R$

also $V' = V$ (same)

So $I' = \frac{V'}{R'} = \frac{V}{2R} = \frac{V}{2R}$

$$\Rightarrow I' = \frac{1}{2}\frac{V}{R} = \frac{1}{2}I \quad \therefore \boxed{I' = \frac{I}{2}}$$

Qus 3:→ Figure shows two conductors A and B. Their Charges and potentials are given in the diagram State the direction of (a) flow of electrons (b) flow of current when both Conductors are joined by a metal wire.

Ans :→

$Q = -10$ Coulomb
$V = 5$ Volt

$Q = 5$ Coulomb
$V = 10$ Volt

(a) A to B. (C. as Conductor A has excess of negative charge)

(B) Current will flow from B to A (∵ B is at higher potential and Conductor A is at lower potential)

Qus 4:→ How is the resistance of a wire affected if (a) its length doubled (b) radius is doubled

Ans (a) **Length of a wire is doubled:→** because Resistance of wire is directly proportional to the length of wire ($R \propto l$)

So resistance doubles

(b) **If radius is doubled:→** because R (resistance) of wire is inversely proportional to area of cross-section of a wire. ($R \propto \frac{1}{A}$)

Wire cross-section area is πr^2

radius is doubled so $\pi(2r)^2$

$A' = 4\pi r^2$

So area becomes 4 times

$R' \propto \frac{1}{A'}$

$\therefore R' \propto \frac{1}{4A}$; So resistance becomes less or one fourth of original resistance

Qus 5:→ The potential difference between two conductors is 'One Volt'. What is the meaning of this statement?

Ans 5:→ It means that 1 Joule of work is done in transferring 1 Coulomb of Charge from one conductor to another.

[∵ 1 Volt ⇒ 1 Joule / 1 Coulomb]

Qus 6:→ The resistance of a wire is one Ohm? Explain the meaning of this statement?

Ans 6:→ It means that Current of one ampere flows through it when the potential difference across its ends is one Volt.

(D) [Long Answer Type :→

Qus 7:→ State and explain three factors on which the resistance of a wire depends?

Ans 3:→

① Length of wire :→ resistance of a wire ∝ length of the wire. It means long wire offers more resistance than a short wire. It is because, the number of ~~electrons~~ suffered by the moving electrons will be more when ~~con~~ have to travel a longer distance in a wire.

② The area of Cross-section of wire :→ resistance of wire is inversely proportional to area of Cross-section of wire (i.e $R \propto \frac{1}{A}$).

It means thick wire offers less resistance because electrons get a larger area of cross-section to flow as compared to a thin wire.

(3) Temperature of wire :→ resistance of a wire increases with the increase of temperature. It is because, with the increase of temperature, the number of collisions increases which increases the resistance of wire.

(E) Numericals :→

(1) In transferring 1.5C charge through a wire, 9J of work is done. Find the potential difference across the wire.

Ans :→ Given $q = 1.5C$

$W = 9J$

We know Potential difference, $V = \frac{W}{q} = \frac{9}{1.5} = \frac{9 \times 10^3}{15} = \frac{9 \times 10^2}{5}$

$\boxed{V = 6V}$

Qus 2 :→ The cell of pot. difference 12V is connected to a bulb. The resistance of the filament of the bulb when it glows is 24Ω. find the current drawn from the cell.

Ans Given; $V = 12V$

$R = 24\Omega$

(∵ by ohm's law $V = IR$) $I = \frac{V}{R} = \frac{12}{24} = \frac{1}{2} A = 0.5A$

$\boxed{I = 0.5A}$

Q3 :→ A bulb draws a current of 1.5A at 6V. find the resistance of the bulb when it is glowing.

Ans :→

$I = 1.5A$, $V = 6V$

$R = ?$ as $V = IR$

So $\frac{V}{I} = R$

$\therefore R = \frac{V}{I} = \frac{6}{1.5}$

$R = \frac{6 \times 10^2}{15} = \frac{6 \times 10^2}{5} = 4\Omega$

So $\boxed{R = 4\Omega}$

Q4 :→ A current of 2A flows in a wire of resistance 15Ω. find the Pot. difference across the ends of the wire?

Ans $I = 2A$, $V = ?$

$R = 15\Omega$ as $V = IR$

$V = 2 \times 15 = 30V$

Ans $\boxed{V = 30V}$