WORKSHEET 2

CHAPTER 8 – CURRENT ELECTRICITY

A. Tick (✓) the correct option.

1. The SI unit of current is
   a. volt. b. watt. c. ampere. d. none of these.
2. Current is measured using an instrument called
   a. ammeter. b. voltmeter. c. spectrometer. d. none of these.
3. The reciprocal of resistance of a conductor is called
   a. transconductance. b. reactance. c. conductance. d. resistance.
4. SI unit of resistivity is
   a. ohm. b. ohm-m. c. ohm-m^{-1}. d. none of these.
5. 1 micro-ohm or 1 μΩ is equal to
   a. 10^{-3} Ω. b. 10^{3} Ω. c. 10^{6} Ω. d. 10^{-6} Ω.

B. Fill in the blanks.

1. The SI unit of work is _____
2. 1 milliampere is equal to _____ ampere.
3. The slope of the straight line on *V-I* graph gives the _____ of the conductor.
4. The resistors that be not obey Ohm's law are called _____
5. The resistance offered by the electrolyte of the cell to the flow of current is called _____

C. State whether the following statements are true or false.

1. Resistors in series combination have same potential difference across them.
2. A cell is a device which provides the necessary potential difference to a circuit to maintain continuous flow of current.
3. Internal resistance of cell is directly proportional to the concentration of the electrolyte.
4. Resistivity of a substance does not depend on its length or thickness.
5. Resistance is directly proportional to the area of cross section of the conductor.

D. Match the following.

1. Ohm's law $I = \frac{Q}{t}$
2. Parallel combination $\frac{I}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$

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3. Current $V = \varepsilon - Ir$
4. Series combination $R_s = R_1 + R_2$
5. Terminal voltage $V \propto I$

E. Answer the following questions.

Very short answer questions

1. State the SI unit of resistivity.
2. What is critical temperature for tungsten?

Short answer questions

1. What are linear resistors?
2. Define conductance and give its SI unit.

Long answer questions

1. What are the factors on which the internal resistance of a cell depends?
2. Derive the expression of equivalent resistance for three resistors connected in series.

ANSWERS

WORKSHEET 1

A. Tick (✓) the correct option.

1. c 2. a 3. c 4. b 5. d

B. Fill in the blanks.

1. Joule
2. 10^{-3}
3. resistance
4. non-ohmic resistors
5. internal resistance

C. State whether the following statements are true or false.

1. F 2. T 3. T 4. T 5. F

D. Match the following.

1. Ohm's law — $V \propto I$
2. Parallel combination — $\frac{I}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$
3. Current — $I = \frac{Q}{t}$
4. Series combination — $R_s = R_1 + R_2$
5. Terminal voltage — $V = \varepsilon - Ir$

E. Answer the following questions.

Very short answer questions

1. Ohm-metre (Ω-m)
2. Tungsten, $T_c = 0.01$ K

Short answer questions

1. The conductors which obey ohm's law are called ohmic or linear resistors.
2. The reciprocal of resistance of a conductor is called its conductance. Its SI unit is mho.

Long answer questions

1. Factors affecting the internal resistance of a cell are
   i. The surface area of electrodes in contact with the electrolyte.
   ii. The distance between the electrodes.
   iii. The nature and concentration of electrolyte.
   iv. The temperature of the electrolyte.
2. Consider three resistors R_1, R_2 and R_3 respectively connected in series. Let I be the current flowing through each resistor and V be the poletential difference across each resistor.

   If V_1, V_2 and V_3 are potential differences across resistors R_1, R_2 and R_3 respectively, then

   $$V = V_1 + V_2 + V_3 \quad \text{...(i)}$$

By Ohm's law, we have

$$V_1 = IR_1$$
$$V_2 = IR_2$$
$$V_3 = IR_3$$

Equation (i) becomes

$$V = IR_1 + IR_2 + IR_3$$
$$= I\,(R_1 + R_2 + R_3) \quad \text{...(ii)}$$

If R_s be the effective resistance of series combination then

$$V = IR_s \quad \text{...(iii)}$$

From equations (ii) and (iii), we get

$$IR_s = I\,(R_1 + R_2 + R_3)$$
$$R_s = R_1 + R_2 + R_3$$