CHAPTER - ELECTRICITY

WORKSHEET

1. Calculate the potential difference required across a conductor of resistance 5 Ω to make a current of 1.5 A flow through it.

2. A torch bulb has 1 Ω resistance. It draws a current of 0.3 A when glowing from a source of 3 V. calculate the resistance of the bulb when glowing and explain the reason for the difference in resistance.

3. How much current does an electric heater draw from a 220 V line, if the resistance of the heater (when hot) is 50 Ω?

4. How much work is done in moving a charge of 2 C across two points having a potential difference of 12 V?

5. An incandescent lamp of resistance 80 Ω draws a current of 0.75 A. Find the line voltage.

6. A current of 0.2 A flows through a conductor of resistance 4.5 Ω. Calculate the potential difference at the ends of the conductor.

7. A bulb of resistance 400 Ω is connected to 220 V mains. Calculate the magnitude of current.

8. An electric heater draws a current of 5 A when connected to 220 V mains. Calculate the resistance of its filament.

9. How much current will an electric bulb draw from a 220 V source, if the resistance of the bulb filament is 1200 Ω?

10. The potential difference between the terminals of an electric heater is 60V when it draws a current of 4A from the source. Calculate the resistance of electric heater. What happens to current if potential difference is doubled?

Answer:

1. Resistance of the conductor, $R = 5\ \Omega$

   Required current, $I = 1.5\ A$

   If V is the potential difference required across the conductor, then

   $V = IR = 1.5 \times 5 = 7.5\ V$

2. Potential difference, $V = 3$ volt

   Current through the bulb when glowing, $I = 0.3\ A$

   Resistance of the bulb when glowing, $R = \frac{V}{I} = \frac{3}{0{\cdot}3} = 10\ \Omega$

   The resistance of the filament of the bulb increases from 1 Ω to 10 Ω (when it becomes hot and glows) because of an increase in its temperature.

3. Potential difference, $V = 220\ V$

   Resistance of the heater, $R = 50\ \Omega$

   Using ohm's law, $I = \frac{V}{R} = \frac{220}{50} = 4.4\ A$

4. $W = QV = 2C \times 12V = 24\ J$

5. $V = IR = 0{\cdot}75 \times 80 = 60\ V$

6. $V = IR = 0{\cdot}2 \times 4{\cdot}5 = 0{\cdot}9\ V$

7. $I = V/R = 220/400 = 0.55\ A$

3. $R = V/I = 220/5 = 44\ \Omega$

9. $I = \frac{V}{R} = \frac{220V}{1200\Omega} = 0{\cdot}18\ A$

0. Resistance of the electric heater, $R = \frac{V}{I} = \frac{60\ V}{4\ A} = 15\ \Omega$

Changed potential difference $V' = 120\ V$

Changed current, i.e., $I' = \frac{V'}{R} = \frac{120V}{15\Omega} = 8\ A$

Since R remains the same, by doubling the potential difference, the current is also doubled, i.e., becomes 8 A as $I \propto V$.