SOLUTION TO TEST - ELECTRICITY / CLASS-X (AT14-3)

1. Resistivity of a substance can be defined as the resistance of a wire having length 1m and cross sectional area $1m^2$. Its SI unit is Ωm.

2. $V = 2.5\ V$ $\quad I = 500\ mA = 500 \times 10^{-3} A = 0.5\ A$ $\quad P = VI = 2.5 \times 0.5 = 1.25\ W$

3. **(a)** In series circuit, current is constant throughout the circuit, Thus it is impractical to connect electrical appliances as they need different currents.

(b) In a series circuit, if a fault occurs in one circuit, then all the other distribution lines will be affected.

4. **Case-I :** $P = 50\ W$ **Case-II :** $P_B = 2.5\ W$

As $P = \frac{V^2}{R} \quad \therefore \quad P \times \frac{1}{R}$

Hence $P_A > P_B \quad \therefore \quad R_A < R_B$

Also $\frac{R_B}{R_A} = \frac{50}{25} = 20$ times

5. Positive terminal to negative terminal.

6. Water is good conductor of electricity. So, we may get an electric shock if we will handle the electrical appliances with we hands.

7. **Case-I :** $P_A = 100\,W$, $V_A = 220\,V$ **Case-II :** $P_B = 200\,W$, $V_B = 200\,V$

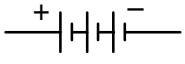
Now, $P = \frac{V^2}{R}$

$\therefore \quad R_A = \frac{V_A^2}{P_A} = \frac{(220)^2}{100} = 484\,\Omega$ $\qquad \therefore \quad R_B = \frac{V_B^2}{P_B} = \frac{(200)^2}{200} = 100\,\Omega$

Also, $R \propto \frac{1}{A}$, So, $R_A > R_B \quad \therefore \quad A_A < A_B$

Hence, bulb B has thicker filament.

8. $R = S\frac{\ell}{A}, \quad R \propto \frac{1}{A}$

9. **(i)** Battery 

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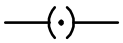
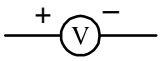
(ii) Switch closed 

(iii) Resistor of resistance R 

(iv) Voltmeter 

10. P = 1500 W V = 250 V

(i) Current drawn (I) $= \frac{P}{V} = \frac{1500}{250} = 6A$

(ii) Energy consumed in 50 hour H = V & T
= 250 × 6 × 50
75 kwH = 75 unit

(iii) Cost = 75 × 2.20 = ` 165.0.

11. A fuse prevents an electric circuit from receiving too much current. In the event too component the fuse is designed to melt and separate thus breaking the circuit.

Aluminium and copper is used for making fuse. In a household circuit, it is connected in series to main switch board.

12. Alternate Current (AC) can be easily produced and can be stepped up to high voltage for easy transmission over great distance with less loss and can be converted to DC easily.

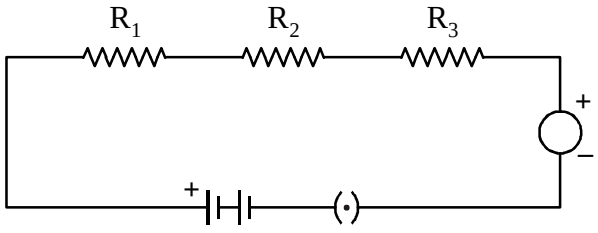
(a) In DC, the electrons flow steadily in a single direction. In AC, electrons help switching the directions.

(b) The frequency of DC is O. The frequency of AC in our country is 50 Hz.

13. Overloading in a condition when high current flows through a circuit. During overload, the circuit may break due to Joule's heating and damage any appliance.

Short circuit, on the other hand, is when the current takes an unintended path.

14. (a)



(b) $R_s = 4\Omega + 12\Omega = 16\Omega$

$$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{12} = \frac{3+1}{12} = \frac{4}{12} = \frac{1}{3}\Omega$$

$$R_p = 3\Omega$$