CHAPTER 1. (ELECTRICITY) (BASED ON NCERT PATTERN) (IMPORTANT QUESTIONS)

Q1. A hot plate of an electric oven connected to a 220 V line has two resistance coils A and B, each of 24 Ω resistance, which may be used separately, in series, or in parallel. What are the currents in the three cases?

Ans. (i) When used separately

$$I = \frac{V}{R} = \frac{220}{24} = 9.2 A.$$

(ii) When connected in series

$(R1 = 24\,\Omega, R2 = 24\,\Omega)\, I =$

$$\frac{V}{R_s} = \frac{220}{48} = 4.6\ A.$$

(iii) When connected in parallel

$(R1 = 24\,\Omega, R2 = 24\,\Omega)\, I =$

$$\frac{V}{R_p} = \frac{220}{12} = 18.3\ A$$

Q2. Compare the power used in the 2 Ω resistor in each of the following circuits:

(i) a 6 V battery in series with 1 Ω and 2 Ω resistors, and

(ii) a 4 V battery in parallel with 12 Ω and 2 Ω resistors.

Ans. (i) V = 6 V , R1 = 1 Ω series with R3 = 2 Ω . P = ?, R2 = 2 Ω

R = R1 + R2 + R3 =1 + 2 = 30

$$\text{Current} = I = \frac{V}{R} = \frac{6V}{3\Omega} = 2\Omega$$

$P1 = O^2R \therefore P1 = (2)^2 \times 2 = 8\,W$

(ii) R1 = 12 Ω

R2 = 2 Ω Parallel V = 4V P2 = ?

$$\therefore I_1 \text{ through } 2\Omega = \frac{4V}{2\Omega} = 2A$$

$P2 = I^2R = (2)^2 \times 2 = 8\,W$

Comparison: Power used by 2 Ω resistor in both the circuits are same, i.e. 8 W.

Q3. Two lamps, one rated 100 W at 220 V, and the other rated 60 W at 220 V, are connected in parallel to electric mains supply. What current is drawn from the line if the supply voltage is 220 V?

Ans. P1 = 100 w

P2 = 60 W

P = P1 + P2 = 160 W

V = 220 V

I = ?

$$\text{Using } P = IV \text{ or } I = \frac{P}{V} = \frac{160}{220} = 0.73\,A$$