

1) A transformer has 500 primary turns and 3000 Secondary turns. If the primary voltage is 240V. determine the Secondary Voltage, assuming an ideal transform.

Soln

$$N_1 = 500, N_2 = 3000$$

$$V_1 = 240V$$

$$\frac{V_1}{V_2} = \frac{N_1}{N_2}$$

$$\Rightarrow V_2 = V_1 \left(\frac{N_2}{N_1} \right) = 240 \left(\frac{3000}{500} \right)$$

$$V_2 = 1440V = 1.44KV$$

$$\frac{240}{V_2} = \frac{500}{3000}$$

$$\frac{240}{V_2} = 0.16$$

$$240 = 0.16 \times V_2$$

$$V_2 = \frac{240}{0.16} \approx 1500$$

(OR)

2) An ideal transformer has a turns ratio of 8:1 and the primary current is 3A, when it is supplied at 240V. Calculate the Secondary voltage and current.

Soln Given, turns Ratio = 8:1
 $N_1 : N_2$

$$N_1 = 8$$

$$N_2 = 1$$

$$I_1 = 3A$$

$$V_1 = 240V$$

$$V_2 = ?$$

$$I_2 = ?$$

$$\frac{N_1}{N_2} = \frac{V_1}{V_2}$$

$$\frac{8}{1} = \frac{240}{V_2}$$

$$8 \times V_2 = 240$$

$$V_2 = \frac{240}{8}$$

$$V_2 = 30V$$

$$\frac{V_1}{V_2} = \frac{I_2}{I_1}$$

$$\frac{240}{30} = \frac{I_2}{3}$$

$$8 = \frac{I_2}{3}$$

$$8 \times 3 = I_2$$

$$I_2 = 24 \text{ A}$$

3) An ideal transformer connected to a 240V mains, supplies a 12V, 15W lamp. Calculate the transformer turns ratio and the current taken from the supply

Soln

Ans

$$V_1 = 240 \text{ V}$$

$$V_2 = 12 \text{ V}$$

$$P_2 = 15 \text{ W}$$

$$\frac{N_1}{N_2} = ?$$

$$I_1 = ?$$

$$P_2 = 15 = I_2 V_2$$

$$15 = I_2 \times 12$$

$$I_2 = \frac{15}{12} = 1.25 \text{ A}$$

$$\frac{N_1}{N_2} = \frac{V_1}{V_2} = \frac{240}{12}$$

$$\frac{N_1}{N_2} = 20$$

$$\frac{V_1}{V_2} = \frac{I_2}{I_1}$$

$$\frac{240}{12} = \frac{1.25}{I_1}$$

$$20 \times I_1 = 1.25$$

$$I_1 = \frac{1.25}{20}$$

$$I_1 = 0.063 \text{ A}$$