

1) An ideal transformer has a turns ratio of 8:1 and the primary current is 5A, when it is supplied at 240V. Calculate the secondary voltage.

Soln:

No. of turns ratio 8:1
 $N_p : N_s$

$$N_p = 8$$

$$N_s = 1$$

$$V_p = 240V$$

$$I_p = 5A$$

We know that,

$$\frac{V_s}{V_p} = \frac{N_s}{N_p}$$

$$V_s = V_p \frac{N_s}{N_p}$$

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

$$V_s = 30V$$

2) A transformer having 20 turns in its primary coil is used to step up a 10V AC voltage to 150V.

a) State the turns ratio and number of turns in the secondary

b) In full load condition the current at the secondary is 3A. Determine the output power rating of this transformer.

c) Determine the maximum load Resistance.

d) If the transformer is 85% efficient, estimate the current flowing in the primary for the condition mentioned in part (b)

Soln.

$$N_p = 20$$

$$V_p = 10V$$

$$V_s = 150V$$

a) To find N_s

$$\frac{V_s}{V_p} = \frac{N_s}{N_p}$$

$$N_s = N_p \cdot \frac{V_s}{V_p}$$

$$N_s = 20 \times \frac{150}{10} = 300$$

$$N_s = 300$$

To find turns ratio

$$N_p = N_s$$

$$\cancel{20} : \cancel{300}$$

15

$$1 : 15$$

Turns ratio = 1:15

b) Output power

$$\text{gn, } I_s = 3A$$

$$P_s = P_{\text{output}} = V_s I_s$$

$$P_{\text{output}} = 150 \times 3$$

$$P_{\text{output}} = 450W$$

c) Maximum load Resistance :

$$R_{L(\text{max})} = \frac{V_s}{I_s}$$

$$= \frac{150}{3}$$

$$R_{L(\text{max})} = 50 \Omega$$

d) Primary Current.

$$\eta.i. = 85\% \quad / \quad \eta = 0.85$$

$$\eta = \frac{P_{\text{output}}}{P_{\text{input}}}$$

$$P_{\text{input}} = \frac{P_{\text{output}}}{\eta}$$

$$P_{\text{input}} = \frac{450}{0.85}$$

$$P_{\text{input}} = 529 \text{ W}$$

$$P_{\text{input}} = V_p I_p$$

$$I_p = \frac{P_{\text{input}}}{V_p}$$

$$= \frac{529}{10}$$

$$I_p = 52.9 \text{ A}$$

