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Assignment DC Machine and Transformers

@1/ A transformer, when operated at 100V in the primary, the current in the primary is 4A. find the current in the secondary winding if the voltage is stepped up to 600V.

Given Data
$V_p = 100V$
$I_p = 4A$
$V_s = 600V$
Required:
$I_S = ?$

Solution
we know that

$$\frac{V_p}{V_S} = \frac{I_S}{I_p}$$

$$I_S = \left(\frac{V_p}{V_S}\right) I_p$$

So Putting the value in eq

$$I_S = \left(\frac{100}{600}\right) 4A$$

$$I_S = (0.1666)\,4A$$

$$I_S = 0.666A \text{ Ans}$$

Q3/ A transformer with 800 primary turns and 200 secondary turns is supplied from a 100V AC. Calculate the secondary voltage and the voltage volts per turn.

Given Data:

$E_1 = 100V$

$N_1 = 800$ turns

$N_2 = 200$ turns

Required:

$E_2 = ?$

$E/T = ?$

Solution

$$\frac{E_2}{E_1} = \frac{N_2}{N_1}$$

or $E_2 = \left(\frac{N_2}{N_1}\right) E_1$

$E_2 = \left(\frac{200}{800}\right) 100 \Rightarrow E_2 = \boxed{25V}$

volts per turn: $\frac{E_1}{N_1} = \frac{100}{800} = \boxed{0.125}$

or volts per turns: $\frac{E_2}{N_2} = \frac{25}{200} = \boxed{0.125}$

Q2| A 3300/250V, 50Hz single phase transformer is built on an iron core having an effective cross sectional area of 125 cm^2 and 70 turns low voltage winding calculate.

(a) The value of maximum flux density.

(b) The number of turns on the high voltage winding.

Given Data

$E_1 = 3300V$ $E_2 = 250V$

$f = 50Hz$ $A = 125cm^2 = 125 \times 10^{-4} m^2$

$N_2 = 70$ turns

Required:

(a) $B_m = ?$ (b) $= N_1 = ?$

Solution:

(a) The emf induced on secondary side is give by:

$E_2 = 4.44 \phi_m f N_2 = 4.44 B_m A f N_2$

$\left(A S B = \frac{\phi}{A}\right)$

$$B_m = \frac{E_2}{4.44 A f N_2} = \frac{250}{4.44(125 \times 10^{-4})(50)(70)}$$

$\boxed{B_m = 1.289}$ T Ans.

(b) $\frac{E_2}{E_1} = \frac{N_2}{N_1} \Rightarrow N_1 = \left(\frac{E_1}{E_2}\right) N_2 = \frac{3300 \times 7}{250}$

$= \boxed{N_1 = 924 \text{ Turns}}$ Ans