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Assignment DC Machines & Transformers

Q1 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 600 V.

Given Data:-

$V_P = 100\,V$
$I_P = 4A$
$V_S = 600\,V$

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 values in eq

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

$I_S = (0.1666)\,4A \Rightarrow I_S = 0.6661$ Ans

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Q2 A 3300/250V, 50Hz single phase transformer is but on an iron core having an effective cross sectional area of 125 cm² 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:

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

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

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

$\boxed{B_m = 1.289}$ Ans.

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

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

Checked By:..... Parents:..... Excellent

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

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. $\frac{E_2}{N_2} = \frac{25}{200} = \boxed{0.125}$

Checked By: Remarks: