

Answer on Question #45750, Physics, Electric Circuits

An air-cored transformer is assumed to be 100 % efficient. The ratio of the secondary turns to the primary turns is 1:20. A 240V ac supply is connected to the primary coil and a $6\ \Omega$ load is connected to the secondary coil. what is the current in the primary coil? a. 0.10A b. 0.14A c. 2.0A d. 40.0A
Solution

100 % efficiency means that transformer will save power. Hence

$$\frac{U_1}{U_2} = \frac{I_2}{I_1} = \frac{N_1}{N_2} = \frac{20}{1}$$

If in primary coil there is 240 V, in secondary it will be

$$U_2 = \frac{U_1}{20} = 240/20 = 12\ V$$

Then current in secondary coil is

$$I_2 = \frac{U_2}{R} = \frac{12}{6} = 2\ A$$

So now we can find current in primary coil

$$I_1 = 20I_2 = 20 \cdot 2 = 40\ A$$

Answer is d.40 A.