

Answer on Question 49199, Electromagnetism

Question:

A doorbell requires 12 volts to operate. A transformer is used to step down 120 volts. If the primary has 500 turns, how many turns should the secondary have?

Solution:

By the ideal transformer equation we have:

$$\frac{V_P}{V_S} = \frac{N_P}{N_S},$$

where V_P is the primary voltage on the ends of the primary winding, V_S is the secondary voltage on the ends of the secondary winding, N_P and N_S is the number of turns in the primary and secondary windings respectively. From this equation we can find the number of turns in the secondary winding:

$$N_S = \frac{N_P V_S}{V_P} = \frac{500 \text{turns} \cdot 12V}{120V} = 50 \text{turns}.$$

Answer:

The secondary winding should have 50 turns.