7.24 A 60 W load is connected to the secondary of a transformer whose primary draws line voltage. If a current of 0.54 A flows in the

load, what is the current in the primary coil? Comment on the type of transformer being used.

24. $P_s = 60W$, $I_s = 0.54A$ (Given) & $V_p = 220V$

$\therefore P_s = V_s I_s$

$\Rightarrow 60 = V_s (0.54)$

$\Rightarrow \boxed{V_s = \frac{1000}{9} V}$

(Here; subscript P is for primary coil and subscript S is for secondary coil.)

Now, $\frac{V_s}{V_p} = \frac{1000/9}{220} \simeq \frac{1}{2} < 1$

(As $\frac{V_s}{V_p} < 1 \Rightarrow$ Transformer is step-down)

In a transformer, Output power = Input power

$\Rightarrow I_s V_s = I_p V_p$

$\Rightarrow (0.54)\left(\frac{1000}{9}\right) = I_p (220)$

$\Rightarrow I_p = \frac{6}{22}$

$\Rightarrow \boxed{I_p = 0.272 A}$