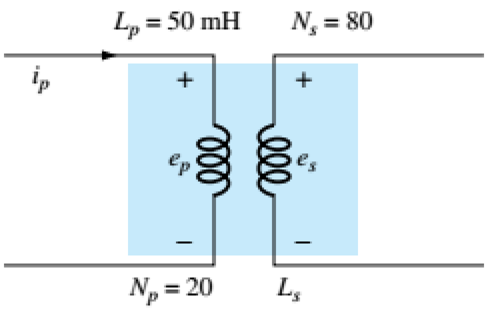
Transformer Intro – In Class Problem



k=1

Find:

a) Ls if M = 200 mH

b) e_p and e_s if the flux linking the primary coil changes at a rate of 0.08 Wb/s

c) e_p and e_s if i_p changes at a rate of 0.3 A/ms

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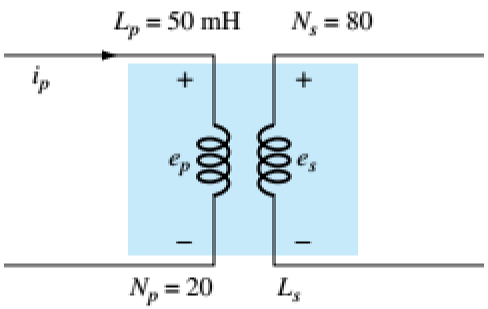

k = 1

$$M = k\sqrt{L_p L_s}$$

$$200mH = (1)\sqrt{(50mH)(L_s)}$$

$$\therefore \boxed{L_s = 800mH}$$

$$e_p = N_p \frac{d\phi_p}{dt}$$

$$= 20\left(0.08\,\frac{Wb}{s}\right)$$

$$\boxed{e_p = 1.6V}$$

$$e_s = kN_s\frac{d\phi_p}{dt}$$

$$= (1)(80)\left(0.08\,\frac{Wb}{s}\right)$$

$$\boxed{e_s = 6.4V}$$

NOTE: $\frac{N_s}{N_p} = \frac{80}{20} = 4$

& $\frac{e_s}{e_p} = \frac{6.4V}{1.6V} = 4$

SAME (LOSSLESS XFMR $k=1$)

$$e_p = L_p\, di_p/dt$$

$$= 50mH\left(\frac{0.3A}{1ms}\right)$$

$$\boxed{e_p = 15V}$$

$$e_s = M\, di_p/dt$$

$$= 200mH\left(\frac{0.3A}{1ms}\right)$$

$$\boxed{e_s = 60V}$$

AGAIN: $\frac{60V}{15V} = 4$, TURNS RATIO