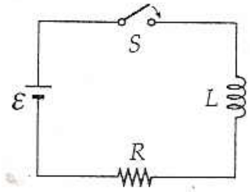
32.4 $L = \mu_0 n^2 A \ell$ so $n = \sqrt{\dfrac{L}{\mu_0 A \ell}} = \boxed{7.80 \times 10^3 \text{ turns/m}}$

32.7 $\mathcal{E}_{back} = -\mathcal{E} = L\dfrac{dI}{dt} = L\dfrac{d}{dt}(I_{max} \sin \omega t) = L\omega I_{max} \cos \omega t = (10.0 \times 10^{-3})(120\pi)(5.00) \cos \omega t$

$\mathcal{E}_{back} = (6.00\pi) \cos(120\pi t) = \boxed{(18.8 \text{ V}) \cos(377t)}$

***32.19** (a) $\tau = L/R = 2.00 \times 10^{-3} \text{ s} = \boxed{2.00 \text{ ms}}$

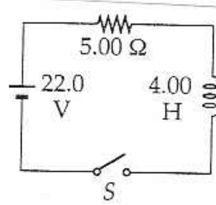


(b) $I = I_{max}\left(1 - e^{-t/\tau}\right) = \left(\dfrac{6.00 \text{ V}}{4.00\ \Omega}\right)\left(1 - e^{-0.250/2.00}\right) = \boxed{0.176 \text{ A}}$

(c) $I_{max} = \dfrac{\mathcal{E}}{R} = \dfrac{6.00 \text{ V}}{4.00\ \Omega} = \boxed{1.50 \text{ A}}$

(d) $0.800 = 1 - e^{-t/2.00 \text{ ms}} \rightarrow t = -(2.00 \text{ ms}) \ln(0.200) = \boxed{3.22 \text{ ms}}$

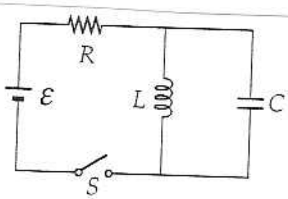
***32.36** (a) $U = \frac{1}{2}LI^2 = \frac{1}{2}(4.00 \text{ H})(0.500 \text{ A})^2 = \boxed{0.500 \text{ J}}$



(b) $\dfrac{dU}{dt} = LI = (4.00 \text{ H})(1.00 \text{ A}) = 4.00 \text{ J/s} = \boxed{4.00 \text{ W}}$

(c) $\mathcal{P} = (\Delta V)I = (22.0 \text{ V})(0.500 \text{ A}) = \boxed{11.0 \text{ W}}$

32.50 When the switch has been closed for a long time, battery, resistor, and coil carry constant current $I_{max} = \mathcal{E}/R$. When the switch is opened, current in battery and resistor drops to zero, but the coil carries this same current for a moment as oscillations begin in the LC loop.



We interpret the problem to mean that the voltage amplitude of these oscillations is ΔV, in $\frac{1}{2}C(\Delta V)^2 = \frac{1}{2}LI_{max}^2$.

Then, $L = \dfrac{C(\Delta V)^2}{I_{max}^2} = \dfrac{C(\Delta V)^2 R^2}{\mathcal{E}^2} = \dfrac{\left(0.500 \times 10^{-6} \text{ F}\right)(150 \text{ V})^2 (250\ \Omega)^2}{(50.0 \text{ V})^2} = \boxed{0.281 \text{ H}}$