7.12 $\Phi = BS \qquad B = B_0 \cos(\omega t)\,\hat{z} \qquad S = \pi r^2 \qquad r = \frac{a}{2} \qquad S = \pi \frac{a^2}{4}$

$\Phi = \frac{a^2\pi}{4} B_0 \cos(\omega t) \qquad \mathcal{E} = -\frac{d\Phi}{dt} = -\frac{d}{dt}\frac{a^2\pi}{4} B_0 \cos(\omega t) = \frac{a^2\pi}{4} B_0 \omega \sin(\omega t)$

$I(t) = \frac{\mathcal{E}}{R} = \frac{a^2\pi B_0 \omega}{4R} \sin(\omega t)$

7.15 $\oint E \cdot dl = E\,2\pi s \qquad \Phi = \overset{s<a}{B\pi s^2} \text{ or } \overset{s>a}{B\pi a^2} \qquad B = \mu_0 n I$

$s < a$

$\Phi = \pi s^2 \mu_0 n I \qquad E\,2\pi s = -\frac{d}{dt} \pi s^2 \mu_0 n I(t) \qquad E\,2\pi s = -\pi s^2 \mu_0 n \frac{dI}{dt}$

$E = \frac{s \mu_0 n}{2} \frac{dI}{dt} \hat{\phi}$

$s > a$

$\Phi = \pi a^2 \mu_0 n I \qquad E\,2\pi a = -\frac{d}{dt} \pi a^2 \mu_0 n I(t) \qquad E\,2\pi s = -\pi a^2 \mu_0 n \frac{dI}{dt}$

$E = \frac{a \mu_0 n}{2} \frac{dI}{dt} \hat{\phi}$

7.34 $J_d = \varepsilon_0 \frac{\partial E}{\partial t} \qquad \frac{\partial E}{\partial t} = \frac{I}{\varepsilon_0 A} \qquad J_\lambda = \frac{I}{A} \qquad A = \pi a^2 \qquad s < a \qquad \pi s^2$

$\oint B \cdot dl = B \cdot 2\pi s$

$B \cdot 2\pi s = \mu_0 \frac{I}{A} \cdot \pi s^2$

$\frac{B \cdot 2\pi s}{2\pi s} = \mu_0 \frac{I s^2}{a^2} \Big/ 2\pi s$

$B = \mu_0 \frac{2\pi I s^3}{a^2} \hat{\phi}$