$$\phi_M = \int_{surface} \vec{B} \cdot \hat{n} dA$$

$$EMF = \oint_{curve} \vec{E} \cdot d\vec{\ell} = -\frac{d\phi_M}{dt}$$

$$EMF = vB\ell$$

$$\phi_M = LI \text{ , } EMF = -L\frac{dI}{dt}$$

$$U_M = \frac{1}{2}LI^2, \ u_M = \frac{B^2}{2\mu_0}$$

$$\tau = \frac{L}{R}$$

$$I_{RMS} = \frac{I_0}{\sqrt{2}}, V_{RMS} = \frac{V_0}{\sqrt{2}}$$

$$X_L = \omega L, X_C = \frac{1}{\omega C}$$

$$N_1 I_1 = -N_2 I_2, V_{1RMS} I_{1RMS} = V_{2RMS} I_{2RMS}$$

$$\omega_0 = \frac{1}{\sqrt{LC}}$$

$$c = \frac{1}{\sqrt{\varepsilon_0 \mu_0}}$$

$$\oint_{surface} \vec{E} \cdot \hat{n} dA = \frac{Q_{enclosed}}{\varepsilon_0}$$

$$\oint_{surface} \vec{B} \cdot \hat{n} dA = 0$$

$$\oint_{curve} \vec{E} \cdot d\vec{\ell} = -\frac{d\phi_M}{dt} = -\frac{d}{dt} \int_{surface} \vec{B} \cdot \hat{n} dA$$

$$\oint_{curve} \vec{B} \cdot d\vec{\ell} = \mu_0 (I + I_d)\,,\ I_d = \varepsilon_0 \frac{d\phi_E}{dt} = \frac{d}{dt} \int_{surface} \vec{E} \cdot \hat{n} dA$$

$$\frac{\partial^2 \vec{E}}{\partial x^2} = \frac{1}{c^2} \frac{\partial^2 \vec{E}}{\partial t^2}\,,\ \frac{\partial^2 \vec{B}}{\partial x^2} = \frac{1}{c^2} \frac{\partial^2 \vec{B}}{\partial t^2}$$

$$u = u_E + u_M = \varepsilon_0 E^2 = \frac{EB}{\mu_0 c}$$

$$\vec{S} = \frac{1}{\mu_0} \vec{E} \times \vec{B}\,, E = cB\,,\ \vec{E} \cdot \vec{B} = 0\,,\ \vec{E} \cdot \vec{S} = 0\,,\ \vec{B} \cdot \vec{S} = 0$$

$$n = \frac{c}{v}\,,\ n_1 \sin\theta_1 = n_2 \sin\theta_2\,,\ \theta_1 = \theta_1'\,,\ \sin\theta_C = \frac{n_2}{n_1}$$