

Physics 200 Formula Sheet 2

$$\vec{F} = q \vec{v} \times \vec{B} \sin \phi, \text{ RHR}$$

$$dF = i B dl \sin \phi$$

$$F = i l B$$

$$\tau = i A B \sin \theta$$

$$dB = \frac{\mu_o i ds \sin \phi}{4 \pi r^2}$$

$$\mu_o = 4 \pi \times 10^{-7} \frac{T \cdot m}{A}$$

$$\int \vec{B} \cdot d\vec{s} = \mu_o (i + i_d)$$

$$\phi_B = \int \vec{B} \cdot d\vec{A} = 0$$

$$i_d = \frac{\epsilon_o d\phi_E}{dt}$$

$$V = \int \vec{E} \cdot d\vec{s} = - \frac{N d\phi_B}{dt}$$

$$\text{emf} = -L \frac{di}{dt}$$

$$L = \frac{N \phi_B}{i}$$

$$i = i_{\max} \left(1 - e^{-\frac{Rt}{L}} \right)$$

$$i = i_{\max} \left(e^{-\frac{Rt}{L}} \right)$$

$$U_B = \frac{L i^2}{2}$$

$$u_B = \frac{B^2}{2 \mu_o}$$

$$Q = Q_{\max} \cos(\omega t + \delta)$$

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

$$U = \frac{Q_{\max}^2}{2C} = \frac{L i_{\max}^2}{2}$$

$$V_{\max} = i_{\max} R$$

$$i_R = \frac{V_{\max}}{R} \sin(\omega t)$$

$$\chi_L = \omega L$$

$$V_{\max} = i_{\max} \chi_L$$

$$i_L = \frac{V_{\max}}{\omega L} \sin\left(\omega t - \frac{\pi}{2}\right)$$

$$\chi_C = \frac{1}{\omega C}$$

$$V_{\max} = i_{\max} \chi_C$$

$$i_C = \omega C V_{\max} \sin\left(\omega t + \frac{\pi}{2}\right)$$

$$i_{\text{rms}} = \frac{i_{\max}}{\sqrt{2}}$$

$$Z = \sqrt{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$$

$$i_{\max} = \frac{V_{\max}}{Z}$$

$$\tan \phi = \frac{\omega L - \frac{1}{\omega C}}{R}$$

$$P_{\text{av}} = i_{\text{rms}} V_{\text{rms}} \cos \phi$$

$$P_{\text{av}} = i_{\text{rms}}^2 R$$

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

$$\frac{\partial^2 E}{\partial x^2} = \mu_o \epsilon_o \frac{\partial^2 E}{\partial t^2}$$

$$\frac{\partial^2 B}{\partial x^2} = \mu_o \epsilon_o \frac{\partial^2 B}{\partial t^2}$$

$$c = \frac{1}{\sqrt{\mu_o \epsilon_o}}$$

$$\omega = 2 \pi f$$

$$k = \frac{2 \pi}{\lambda}$$

$$c = \lambda f$$

$$E = E_{\max} \cos(kx - \omega t)$$

$$B = B_{\max} \cos(kx - \omega t)$$

$$E = B c$$

$$\vec{S} = \frac{\vec{E} \times \vec{B}}{\mu_o}$$

$$S_{\text{av}} = \frac{P_{\text{ow}}}{A} = \frac{E_{\max}^2}{2 \mu_o c} = \frac{c B_{\max}^2}{2 \mu_o}$$

$$p = \frac{F}{A} = \frac{S_{\text{av}}}{c} \text{ absorption}$$

$$p = \frac{F}{A} = \frac{2 S_{\text{av}}}{c} \text{ reflection}$$