Physics 200 Formula Sheet 2

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

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

$$F = i\, l\, B$$

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

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

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

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

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

$$i_d = \frac{\varepsilon_o\, d\phi_E}{dt}$$

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

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

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

$$i = i_{max}\,(1 - e^{-\frac{R\,t}{L}})$$

$$i = i_{max}\,(e^{-\frac{R\,t}{L}})$$

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

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

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

$$\omega = \frac{1}{\sqrt{L\,C}}$$

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

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

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

$$\chi_L = \omega\, L$$

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

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

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

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

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

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

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

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

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

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

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

$$\omega_o = \frac{1}{\sqrt{L\,C}}$$

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

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

$$c = \frac{1}{\sqrt{\mu_o\,\varepsilon_o}}$$

$$\omega = 2\pi f$$

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

$$c = \lambda\, f$$

$$E = E_{max} \cos(k\, x - \omega\, t)$$

$$B = B_{max} \cos(k\, x - \omega\, t)$$

$$E = B\, c$$

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

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

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

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