Equations to Know

Chapter 28

Generalized Ampère's Law $\oint \mathbf{B} \bullet d\boldsymbol{l} = \mu_0 I_{encl} + \mu_0 \varepsilon_0 \frac{d\Phi_E}{dt}$

Biot-Savart Law $dB = \frac{\mu_0 I}{4\pi} \frac{d\ell \times \hat{r}}{r^2}$

B field outside of a wire $B = \frac{\mu_0}{2\pi} \frac{I}{r}$

B field inside of a wire $B = \frac{\mu_0}{2\pi} \frac{Ir}{R^2}$

Force exerted on a wire due to an adjacent current length in any **B** field $\frac{F}{\ell} = \frac{\mu_0}{2\pi} \frac{I_1 I_2}{d}$

B field inside of a solenoid $B = \mu_0 nI$

B field inside of a toroid $B = \frac{\mu_0 NI}{2\pi r}$

B field at the center of a current loop $B = \frac{\mu_0 I}{2R}$

Magnetic Dipole $\mu = NIA$

B field along the axis of a Magnetic Dipole $B = \frac{\mu_0}{2\pi} \frac{\mu}{\left(R^2 + x^2\right)^{3/2}}$

B field along the axis of a Magnetic Dipole [x>>R] $B = \frac{\mu_0}{2\pi} \frac{\mu}{x^3}$