Useful values:

$\epsilon_0 = 8.85\times10^{-12}\,\frac{C^2}{Nm^2}$
$\mu_0 = 4\pi\times10^{-7}\,\frac{Tm}{A}$
$m_e = 9.11\times10^{-31}kg$
$m_p = 1.67\times10^{-27}kg$
$q_e = e = 1.60\times10^{-19}C$
$\rho_{copper} = 1.72\times10^{-8}\,\Omega m$

Equations of motion for constant acceleration:

$v_x = v_{0x} + a_x\Delta t$
$v_x^2 = v_{0x}^2 + 2a_x\Delta x$
$\Delta x = v_{0x}\Delta t + \frac{1}{2}a_x\Delta t$
$\Delta x = \frac{1}{2}(v_{0x} + v_x)\,\Delta t$

Ch. 21 – Charge and E-field

$$\vec{F} = \frac{1}{4\pi\epsilon_0}\frac{|q_1||q_2|}{r^2}\hat{r}$$

$$\vec{F} = q\vec{E}$$

$$\vec{E} = \frac{1}{4\pi\epsilon_0}\frac{|q_1|}{r^2}\hat{r}$$

Electric dipole

$\vec{p} = |q|\vec{d}$
$\vec{\tau} = \vec{p}\times\vec{E}$
$U = -\vec{p}\cdot\vec{E}$

Electric field

$$\vec{E} = \frac{1}{4\pi\epsilon_0}\sum_{i=1}\frac{q_i}{r_i^2}\hat{r_i}$$

$$d\vec{E} = \frac{1}{4\pi\epsilon_0}\frac{dq}{r^2}\hat{r}$$

Ch. 22 – Gauss's Law

$\Phi_E = \int \vec{E}\cdot d\vec{A}$
Gauss's Law:
$$\Phi_E = \oint \vec{E}\cdot d\vec{A} = \frac{Q_{encl}}{\epsilon_0}$$

Ch. 23 – Electric potential

Electric potential energy:

$\Delta U = -W_E$
$W = \int \vec{F}\cdot d\vec{l}$
$$U = \frac{q_0}{4\pi\epsilon_0}\sum_i\frac{q_i}{r_i}$$

Electric potential

$$V = \frac{U}{q_0}$$
$$V = \frac{1}{4\pi\epsilon_0}\sum\nolimits_{i=1}\frac{q_i}{r_i}$$
$$\Delta V = V_b - V_a = -\int_a^b \vec{E}\cdot d\vec{s}$$
$\vec{E} = -\vec{\nabla}V$

Ch. 24 – Capacitance

Capacitance
$$C = \frac{Q}{V}$$
Parallel-plate capacitor
$$C = \frac{A}{d}\epsilon$$
Cylindrical capacitor
$$C = \frac{2\pi\epsilon L}{\ln\left[\frac{r_b}{r_a}\right]}$$
Spherical capacitor
$$C = \frac{4\pi\epsilon r_a r_b}{r_b - r_a}$$
Capacitor energy

$$U = \frac{1}{2}\frac{Q^2}{C} = \frac{1}{2}QV = \frac{1}{2}CV^2$$
$$u = \frac{1}{2}E^2\epsilon$$

Dielectric constant
$$K = \frac{\epsilon}{\epsilon_0} = \frac{E_0}{E} = \frac{V_0}{V} = \frac{C}{C_0} = \frac{\sigma}{\sigma - \sigma_i}$$

Ch. 25 – I, R and EMF

$$I = \frac{dQ}{dt} = |q|Anv_D$$

$$J = \frac{I}{A}$$
$$\vec{J} = \frac{\vec{E}}{\rho} = nq\vec{v}_D$$
$$R = \frac{\rho L}{A}$$
$$V = RI$$
$$R = R_0[1 + \alpha(T - T_0)]$$
$$\rho = \rho_0[1 + \alpha(T - T_0)]$$
$$P = \frac{dE}{dt} = VI = RI^2 = V^2/R$$

Ch. 26 – DC circuits

RC Circuits:
$$\tau = RC$$
Charging:
$$q(t) = Q_f(1 - e^{-t/\tau})$$
$$i(t) = I_0 e^{-t/\tau}$$
Discharging:
$$q(t) = Q_0 e^{-t/\tau}$$
$$i(t) = -I_0 e^{-t/\tau}$$

Ch. 27 – B-Field and Forces

$$\vec{F} = q\vec{v}\times\vec{B}$$
$$\vec{F} = I\vec{l}\times\vec{B}$$
$$\vec{\mu} = I\vec{A}$$
$$\vec{\tau} = \vec{\mu}\times\vec{B}$$
$$\Phi_M = \int \vec{B}\cdot d\vec{A}$$

Gauss's Law for Magnetism:
$$\oint \vec{B}\cdot d\vec{A} = 0$$

Charges in magnetic field:

$$R = \frac{mv}{qB}$$
$$\omega = 2\pi f = \frac{v}{R} = \frac{qB}{m}$$

Ch. 28 – Sources of B-Field

$$\vec{B} = \frac{\mu_0}{4\pi}\frac{q\vec{v}\times\hat{r}}{r^2}$$
$$d\vec{B} = \frac{\mu_0}{4\pi}\frac{Id\vec{l}\times\hat{r}}{r^2}$$

Long wire:
$$B = \frac{\mu_0 I}{2\pi x}$$
Current loop:
$$B = \frac{\mu_0 I a^2}{2(a^2 + z^2)^{3/2}}$$
Force between parallel conductors:
$$F = \frac{\mu_0 L I_1 I_2}{2\pi r}$$
Ampere's Law:
$$\oint \vec{B}\cdot d\vec{l} = \mu_0 I_{encl}$$