Calculus-Based Physics II by Jeffrey W. Schnick

$$F = k\frac{|q_1||q_2|}{r^2}$$
$$\vec{\mathbf{F}} = q\vec{\mathbf{E}}$$
$$E = \frac{k|q|}{r^2}$$
$$U = q\varphi$$
$$\varphi = Ed$$
$$W = -q\,\Delta\varphi$$
$$\varphi = \frac{kq}{r}$$

$$I = \dot{Q}$$
$$V = IR$$
$$R = \varrho\frac{L}{A}$$
$$P = IV$$
$$R_s = R_1 + R_2$$
$$R_p = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}}$$
$$\mathcal{E} = \mathcal{E}_{\text{MAX}}\sin(2\pi f t)$$
$$\mathcal{E}_{\text{RMS}} = \sqrt{\tfrac{1}{2}}\;\mathcal{E}_{\text{MAX}}$$
$$C_{\text{sc}} = \frac{Q}{\varphi}\;,\; C = \frac{Q}{V}$$
$$U = \tfrac{1}{2}CV^2$$
$$C = \kappa\,\epsilon_o\frac{A}{d}$$
$$C_s = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2}}$$
$$C_p = C_1 + C_2$$
$$\tau = RC$$
$$V = \mathcal{E}(1 - e^{-t/\tau})$$
$$V = V_o\,e^{-t/\tau}$$
$$I = I_o\,e^{-t/\tau}$$

$$\vec{\boldsymbol{\tau}} = \vec{\boldsymbol{\mu}}\times\vec{\mathbf{B}}$$
$$\vec{\boldsymbol{\mu}} = NI\vec{\mathbf{A}}$$
$$\vec{\mathbf{F}}_{\text{B}} = \nabla(\vec{\boldsymbol{\mu}}\cdot\vec{\mathbf{B}})$$
$$\vec{\mathbf{F}} = I\,\vec{\mathbf{L}}\times\vec{\mathbf{B}}$$
$$\vec{\mathbf{F}} = q\,\vec{\mathrm{v}}\times\vec{\mathbf{B}}$$
$$\vec{\mathbf{B}} = \frac{\mu_o}{4\pi}\frac{3(\vec{\boldsymbol{\mu}}\cdot\hat{\mathrm{r}})\hat{\mathrm{r}} - \vec{\boldsymbol{\mu}}}{r^3}$$
$$B = \frac{\mu_o}{2\pi}\frac{I}{r}$$
$$\vec{\mathbf{E}} = \vec{\mathrm{v}}_{\text{P}}\times\vec{\mathbf{B}}$$
$$\vec{\mathbf{B}} = -\mu_o\,\epsilon_o\,\vec{\mathrm{v}}_{\text{P}}\times\vec{\mathbf{E}}$$
$$\Phi_{\text{B}} = \int\vec{\mathbf{B}}\cdot\vec{\mathbf{dA}}$$
$$\Phi_{\text{B}} = \vec{\mathbf{B}}\cdot\vec{\mathbf{A}}$$
$$|\mathcal{E}| = N\left|\dot{\Phi}_{\text{B}}\right|$$
$$E = \frac{1}{2\pi r}\left|\dot{\Phi}_{\text{B}}\right|$$
$$m\lambda = d\sin\theta$$
$$(m + \tfrac{1}{2})\,\lambda = d\sin\theta$$
$$m\lambda = w\sin\theta$$
$$m\lambda_2 = 2t$$
$$(m + \tfrac{1}{2})\,\lambda_2 = 2t$$
$$\lambda_2 = \frac{n_1}{n_2}\lambda_1$$
$$I = I_o(\cos\theta)^2$$
$$n = \frac{c}{v}$$
$$n_1\sin\theta_1 = n_2\sin\theta_2$$
$$\sin\theta_c = \frac{n_2}{n_1}$$

$$\frac{1}{f} = \frac{1}{o} + \frac{1}{i}$$
$$M = \frac{h'}{h}$$
$$M = -\frac{i}{o}$$
$$P = \frac{1}{f}$$
$$P = P_1 + P_2$$
$$\frac{1}{f} = (n - n_o)\left(\frac{1}{R_1} + \frac{1}{R_2}\right)$$

$$\int(\cos x)\,dx = \sin x$$
$$\int(\cos x)^2\,dx = \frac{x}{2} + \frac{\sin 2x}{4}$$
$$\int\frac{dx}{\cos x} = \tfrac{1}{2}\ln\frac{1 + \sin x}{1 - \sin x}$$
$$\int\frac{dx}{(\cos x)^2} = \tan x$$
$$\int\frac{dx}{\sqrt{x^2 + a^2}} = \ln\left(x + \sqrt{x^2 + a^2}\right)$$
$$\int\frac{x\,dx}{\sqrt{x^2 + a^2}} = \sqrt{x^2 + a^2}$$
$$\int\frac{x^2\,dx}{\sqrt{x^2 + a^2}} = \frac{x}{2}\sqrt{x^2 + a^2} - \frac{a^2}{2}\ln\left(x + \sqrt{x^2 + a^2}\right)$$
$$\int\frac{dx}{(x^2 + a^2)^{3/2}} = \frac{1}{a^2}\frac{x}{\sqrt{x^2 + a^2}}$$
$$\int\frac{x\,dx}{(x^2 + a^2)^{3/2}} = -\frac{1}{\sqrt{x^2 + a^2}}$$
$$\int\frac{x^2\,dx}{(x^2 + a^2)^{3/2}} = -\frac{x}{\sqrt{x^2 + a^2}} + \ln\left(x + \sqrt{x^2 + a^2}\right)$$

$$dq = \lambda\,dx$$
$$dE = \frac{k\,dq}{r^2}$$
$$d\varphi = \frac{k\,dq}{r}$$
$$\vec{\mathbf{F}} = -\nabla U$$
$$\vec{\mathbf{E}} = -\nabla\varphi$$
$$\Phi_{\text{E}} = \int\vec{\mathbf{E}}\cdot\vec{\mathbf{dA}}$$
$$\vec{\mathbf{dB}} = \frac{\mu_o}{4\pi}\frac{I\,\vec{\mathbf{d\ell}}\times\vec{\mathrm{r}}}{r^3}$$

$$\oint\vec{\mathbf{E}}\cdot\vec{\mathbf{d\ell}} = -\dot{\Phi}_{\text{B}}$$
$$\oint\vec{\mathbf{B}}\cdot\vec{\mathbf{dA}} = 0$$
$$\oint\vec{\mathbf{B}}\cdot\vec{\mathbf{d\ell}} = \mu_o I_{\text{THROUGH}} + \mu_0\epsilon_0\dot{\Phi}_{\text{E}}$$
$$\oint\vec{\mathbf{E}}\cdot\vec{\mathbf{dA}} = \frac{Q_{\text{ENCLOSED}}}{\epsilon_o}$$

$$1\,\text{e} = 1.60\times10^{-19}\,\text{C}$$
$$k = \frac{1}{4\pi\epsilon_o}$$
$$k = 8.99\times10^9\,\frac{\text{N}\cdot\text{m}^2}{\text{C}^2}$$
$$\epsilon_o = 8.85\times10^{-12}\,\frac{\text{C}^2}{\text{N}\cdot\text{m}^2}$$
$$\mu_o = 4\pi\times10^{-7}\,\frac{\text{T}\cdot\text{m}}{\text{A}}$$
$$n_{\text{H}_2\text{O}} = 1.33$$
$$m_e = 9.11\times10^{-31}\,\text{kg}$$
$$m_p = 1.6726\times10^{-27}\,\text{kg}$$
$$c = 3.00\times10^8\,\frac{\text{m}}{\text{s}}$$
$$N_A = 6.022\times10^{23}\,\frac{\text{particles}}{\text{mole}}$$