

Equations

$$F = \frac{k|q_1||q_2|}{r^2}$$

$$\vec{E} = \frac{\vec{F}}{q_o}$$

$$\Phi = E A \cos \theta$$

$$\Phi = \frac{q}{\epsilon_o}$$

$$\Delta V = \frac{\Delta U}{q_o} = \frac{-W}{q_o}$$

$$E = \frac{-\Delta V}{\Delta s}$$

$$V = \frac{kq}{r}$$

$$U = \frac{kq_o q}{r}$$

$$C = \frac{Q}{V}$$

$$C = \frac{\kappa \epsilon_o A}{d}$$

$$U = \frac{1}{2} C V^2$$

$$I = \frac{\Delta Q}{\Delta t}$$

$$V = IR$$

$$R = \frac{\rho L}{A}$$

$$P = IV$$

$$\tau = RC$$

$$q(t) = Q(1 - e^{-t/\tau})$$

$$q(t) = Q e^{-t/\tau}$$

$$F = |q|vB \sin \theta$$

$$\sum F = ma$$

$$a_{cp} = \frac{v^2}{r}$$

$$F = ILB \sin \theta$$

$$\tau = NIB A \sin \theta$$

$$B = \frac{\mu_o I}{2\pi r}$$

$$\sum B_{\parallel} \Delta L = \mu_o I_{enclosed}$$

$$B = \frac{N\mu_o I}{2R}$$

$$B = \mu_o n I$$

$$\Phi = BA \cos \theta$$

$$\mathcal{E} = -N \frac{\Delta \Phi}{\Delta t}$$

$$\mathcal{E} = BLv$$

$$\mathcal{E} = NBA \omega \sin(\omega t)$$

$$|\mathcal{E}| = L \left| \frac{\Delta I}{\Delta t} \right|$$

$$L = \mu_o n^2 A l$$

$$I = \frac{\mathcal{E}}{R} (1 - e^{-t/\tau})$$

$$\tau = \frac{L}{R}$$

$$U = \frac{1}{2} L I^2$$

$$\frac{V_p}{V_s} = \frac{N_p}{N_s} = \frac{I_s}{I_p}$$

$$V = V_{max} \sin(\omega t)$$

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

$$I_{rms} = \frac{V_{rms}}{X_C}$$

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

$$I_{rms} = \frac{V_{rms}}{X_L}$$

$$X_L = \omega L$$

$$\omega_o = \frac{1}{\sqrt{LC}} = 2\pi f$$

Constants

$$e = 1.60 \times 10^{-19} \text{C}$$

$$k = 8.99 \times 10^9 \text{ Nm}^2/\text{C}^2$$

$$\epsilon_o = 8.85 \times 10^{-12} \text{ C}^2/(\text{Nm}^2)$$

$$1\text{eV} = 1.60 \times 10^{-19} \text{J}$$

$$m_e = 9.11 \times 10^{-31} \text{kg}$$

$$m_p = 1.67 \times 10^{-27} \text{kg}$$

$$\mu_o = 4\pi \times 10^{-7} \text{Tm/A}$$