1 Constants

$$e = 1.6 \times 10^{-19} \text{ C} \qquad m_e = 9.11 \times 10^{-31} \text{ kg} \qquad m_p = 1.67 \times 10^{-27} \text{ kg}$$

$$\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2 \qquad 1 \text{ Wb} = 1\text{T} \cdot \text{m}^2 \qquad \mu_0 = 4\pi \times 10^{-7} \text{ Tm/A}$$

2 Formulas

$$F = qvB\sin\theta \qquad r = \frac{mv}{|q|B} \qquad m = \frac{er^2 B^2}{2V}$$

$$F = ILB\sin\theta \qquad \tau = NIAB\sin\phi$$

$$\sum B_{\parallel}\Delta l = \mu_0 I \qquad B_{\text{line}} = \frac{\mu_0 I}{2\pi r} \qquad B_{\text{circle}} = \frac{N\mu_0 I}{2R} \qquad B_{\text{solenoid}} = \mu_0 nI = \frac{\mu_0 NI}{L}$$

$$\Phi = BA\cos\theta \qquad \Delta\Phi = (B\Delta A + A\Delta B)\cos\theta$$

$$\text{emf} : \mathcal{E} \qquad \mathcal{E}_m = vB\ell \qquad \mathcal{E} = -N\frac{\Delta\Phi}{\Delta t} \qquad I_{\text{ind}} = \frac{\mathcal{E}}{R} \qquad I = \frac{V - \mathcal{E}}{R}$$

$$\mathcal{E} = NAB\omega\sin\omega t \qquad \mathcal{E}_s = -M\frac{\Delta I_p}{\Delta t} \qquad \frac{V_s}{V_p} = \frac{N_s}{N_p} = \frac{I_p}{I_s} \qquad P_s = P_p$$

$$\mathcal{E} = -L\frac{\Delta I}{\Delta t} \qquad \text{Energy} = \frac{1}{2}LI^2 \qquad L = \frac{N\Phi_B}{I} \qquad \text{Energy Density} = \frac{1}{2\mu_0}B^2 = \frac{\text{Energy}}{\text{Volume}}$$

$$V_{\text{rms}} = \frac{V_{\text{peak}}}{\sqrt{2}} \qquad I_{\text{rms}} = \frac{I_{\text{peak}}}{\sqrt{2}} \qquad Z = \frac{V_{\text{peak}}}{I_{\text{peak}}} = \frac{V_{\text{rms}}}{I_{\text{rms}}} \qquad Z = \sqrt{R^2 + (X_L - X_C)^2}$$

$$X_L = 2\pi f L \qquad X_C = \frac{1}{2\pi f C} \qquad V = V_{\text{peak}}\sin(2\pi ft + \phi_V) \qquad I = I_{\text{peak}}\sin(2\pi ft + \phi_I)$$

$$\tan\phi = \frac{X_L - X_C}{R} \qquad \phi = \phi_V - \phi_I \qquad \bar{P} = I_{\text{rms}}V_{\text{rms}}\cos\phi \qquad f_0 = \frac{1}{2\pi\sqrt{LC}}$$