1 Constants

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

$$\epsilon_0 = 8.85 \times 10^{-12}\ \text{C}^2/\text{Nm}^2 \qquad k = \frac{1}{4\pi\epsilon_0} = 9 \times 10^9\ \text{Nm}^2/\text{C}^2 \qquad 1\text{eV} = 1.6 \times 10^{-19}\text{J}$$

2 Formulas

$$F = k\frac{q_1 q_2}{r^2} \qquad \mathbf{E} = \frac{\mathbf{F}}{q_0} \qquad \text{Electric Flux} = \Phi_E = EA\cos\phi \qquad \Phi_{\text{Gaussian}} = \frac{q_{\text{in}}}{\epsilon_0}$$

$$E_{\text{point}} = k\frac{q}{r^2} \qquad V_{\text{point}} = k\frac{q}{r} \qquad \text{EPE}_{q_1 q_2} = k\frac{q_1 q_2}{r} \qquad V = \frac{\text{EPE}}{q}$$

$$W_{AB} = \text{EPE}_A - \text{EPE}_B \qquad V_B - V_A = \Delta V = \frac{\text{EPE}_B}{q} - \frac{\text{EPE}_A}{q} = \frac{\Delta EPE}{q} = \frac{-W_{AB}}{q}$$

$$\text{KE} = \frac{1}{2}mv^2 \qquad \text{EPE}_A + \text{KE}_A = \text{EPE}_B + \text{KE}_B \qquad E = -\frac{\Delta V}{\Delta x}$$

$$q = CV \qquad \text{Energy} = \frac{1}{2}CV^2 = \frac{q^2}{2C} \qquad \text{Energy Density} = \frac{1}{2}\kappa\epsilon_0 E^2$$

$$C_{\text{pp}} = \frac{\epsilon_0 A}{d} \qquad E_{\text{pp}} = \frac{\sigma}{\epsilon_0} \qquad \sigma = \frac{q}{A} \qquad C = \kappa C_0 \qquad E = \frac{E_0}{\kappa}$$

$$\frac{1}{C_S} = \frac{1}{C_1} + \frac{1}{C_2} + \cdots \qquad C_P = C_1 + C_2 + \cdots$$

$$I = \frac{\Delta q}{\Delta t} \qquad V = IR \qquad P = IV = I^2 R = \frac{V^2}{R}$$

$$R = \rho\frac{L}{A} \qquad \rho = \rho_0[1 + \alpha(T - T_0)] \qquad R = R_0[1 + \alpha(T - T_0)]$$

$$R_S = R_1 + R_2 + \cdots \qquad \frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots$$

$$V(t) = V_{\text{max}}\sin(2\pi f t) \qquad V_{\text{rms}} = \frac{V_{\text{max}}}{\sqrt{2}} \qquad I(t) = I_{\text{max}}\sin(2\pi f t) \qquad I_{\text{rms}} = \frac{I_{\text{max}}}{\sqrt{2}}$$

$$V(t) = R\,I(t) \qquad \bar{P} = V_{\text{rms}} I_{\text{rms}} = \frac{V_{\text{rms}}^2}{R} = I_{\text{rms}}^2 R$$