

Formulae

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

$$c = (\epsilon_0 \mu_0)^{1/2}$$

$$F = qE$$

$$v = v_0 + at$$

$$x - x_0 = v_{avg} t = \frac{1}{2} (v_0 + v)t$$

$$x - x_0 = v_0 t + \frac{1}{2} at^2$$

$$v^2 = v_0^2 + 2a(x - x_0)$$

$$V_b - V_a = -W_f/q$$

$$W = \Delta KE$$

$$\Delta KE = - (U_f - U_i)$$

$$\Delta V = - (U_f - U_i)/q$$

$$V = Ed$$

$$V = IR$$

$$R = \rho L/A$$

$$\rho_T = \rho_{20^\circ C} (1 + \alpha \Delta T)$$

$$J = I/A$$

$$\sigma = 1/\rho$$

$$J = \sigma E$$

$$1/\lambda = R(1/n_f^2 - 1/n_i^2)$$

$$mvr = n\hbar$$

$$r = n^2 \hbar^2 / (e^2 km)$$

$$E_n = (-1/n^2) [me^4 / 8\epsilon_0^2 h^2]$$

$$E = hf$$

$$p = h/\lambda$$

$$c = f\lambda$$

$$p = \hbar k$$

$$k = 2\pi/\lambda$$

$$KE = hf - E_{work}$$

$$\sigma = \sigma_e + \sigma_h$$

$$I = -nAev_d$$

$$\sigma = ne^2\tau/m$$

$$\sigma = ne\mu$$

$$J = ne\mu E$$

$$F_B = qv \times B$$

$$n = I_x B_z / edV_H$$

$$R_H = 1/ne$$

$$f_{FD}(E) = \frac{1}{e^{(E - E_F)/kT} + 1}$$

$$n_o = N_c e^{-(E_C - E_F)/kT}$$

$$p_o = N_v e^{-(E_F - E_V)/kT}$$

$$N_c = 2(2\pi m_n^* kT/h^2)^{3/2}$$

$$N_v = 2(2\pi m_p^* kT/h^2)^{3/2}$$

$$n_i = (N_c N_v)^{1/2} e^{-E_g/2kT}$$

$$n_i^2 = n_o p_o$$

$$n_o = n_i e^{(E_{Fn} - E_i)/kT}$$

$$p_o = p_i e^{(E_i - E_{Fp})/kT}$$

$$E_{Fi} = E_{midgap} + \frac{3}{4}(kT) \ln[m_p^*/m_n^*]$$

$$V_o = kT/e \ln[N_a N_d / n_i^2]$$

$$x_p N_a = x_n N_d$$

$$x_n = [(2\epsilon_s V_o / e)(N_a / N_d) (1 / (N_a + N_d))]^{1/2}$$

$$x_p = [(2\epsilon_s V_o / e)(N_d / N_a) (1 / (N_a + N_d))]^{1/2}$$

$$\xi_{max} = -eN_d x_n / \epsilon_s = -eN_a x_p / \epsilon_s$$

$$I = I_s (e^{eV/kT} - 1)$$

$$\alpha = \Delta i_c / \Delta i_E$$

$$\beta = \Delta i_c / \Delta i_B$$

$$\beta = \alpha / (1 - \alpha)$$

$$V_p = (eN_d w^2) / (2\epsilon_s) - V_o$$