

Useful information:

$$m = 1.672 \times 10^{-27} \text{ kg} \quad e = 1.602 \times 10^{-19} \text{ C} \quad a = 0.237 \quad q = 0.706$$

$$\lambda = \frac{2dn}{n} \quad \theta_c = \arcsin\left(\frac{n_2}{n_1}\right) \quad n_i = \frac{c}{u_i} \quad Z = \sqrt{R^2 + X^2}$$

$$\frac{I_R}{I_o} = \frac{(n_2 - n_1)^2}{(n_2 + n_1)^2} \quad V_{\text{out}} = \left(\frac{1}{\sqrt{1 + (2\pi f CR)^2}} \right) V_{\text{in}} \quad V_{\text{out}} = \left(\frac{2\pi f CR}{\sqrt{1 + (2\pi f CR)^2}} \right) V_{\text{in}}$$

$$\Delta f = \frac{1}{3\tau} \quad X_c = \frac{1}{2\pi f C} \quad V_{\text{out}} = V_{\text{max}} e^{-t/\tau}$$

$$V_{\text{noise, rms}} = \sqrt{4 k_B T R \Delta f} \quad i(t) = C \frac{dV(t)}{dt} \quad V(t) = L \frac{di(t)}{dt}$$

$$V_j = V_T \left[\frac{\sum_{j \neq i} R_j}{\sum_i R_i} \right] \quad i_{\text{noise, rms}} = \sqrt{2 q i_{\text{dc}} \Delta f} \quad V_{\text{out}} = V_{\text{max}} \left(1 - e^{-t/\tau} \right)$$

$$N = L/H \quad H = \frac{W^2 L}{16 (t_R')^2} \quad N = \frac{16 (t_R')^2}{W^2} \quad a = \frac{4U}{w_o^2 r_o^2 m/e}$$

$$q = \frac{2V}{w_o^2 r_o^2 m/e} \quad F_M = BzeV \quad F_C = \frac{mv^2}{r}$$