Solutions:

(a) $F_n(0) - E_i = kT \ln\left(\frac{G_L \tau_n}{n_i}\right) = 0.0259\text{eV} \ln\left(\frac{10^{12}}{10^{10}}\right) = \boxed{0.12\text{eV}}$

→ low level injection

$F_p(0) = -kT \ln\left(\frac{N_A}{n_i}\right) = -0.0259\text{eV} \ln\left(\frac{10^{16}}{10^{10}}\right) = \boxed{-0.36\text{eV}}$

(b) $I_n(0) = -A\, n(0)\, \mu_n \frac{dF_n}{dx} = +(10^{-2}\text{cm}^2)(10^{12}\text{cm}^{-3})(714\text{cm}^2/\text{Vs})\left(\frac{0.36+0.12\text{eV}}{8\times10^{-4}\text{cm}}\right)\left(\frac{1.6\times10^{-19}\text{C}}{e}\right)\text{A}$

$= \boxed{0.685\text{ mA}}$

(c) $n(x) \approx n(0)e^{-x/L_N} = n_i e^{\frac{F_N(x)-E_i}{kT}} = n_i e^{\frac{F_n(0)-Ax-E_i}{kT}}$, $A = \frac{0.06\text{eV}}{\mu\text{m}}$

$n(0)e^{-x/L_N} = n_i e^{\frac{F_N(0)-E_i}{kT}} \cdot e^{-\frac{Ax}{kT}}$

$x/L_N = Ax/kT \rightarrow L_N = \frac{kT}{A} = \frac{0.0259\text{eV}}{0.06\text{eV}}\mu\text{m}$

$L_N = 0.43\mu\text{m}$; $D_N = L_N^2/\tau_N = \boxed{18.5\text{ cm}^2/\text{s}}$

(d) $I_{total} = 2 \cdot 0.685\text{mA} = 1.37\text{mA}$, therefore $I_p(8\mu\text{m}) \approx 1.37\text{mA}$

$I_p(8\mu\text{m}) = A_p(8\mu\text{m})\,\mu_p \frac{dF_p}{dx} = (10^{-2}\text{cm}^2)(10^{16}\text{cm}^{-3})(357\text{cm}^2/\text{Vs})\frac{dF_p}{dx}\left(\frac{1.6\times10^{-19}\text{C}}{e}\right) = 1.37\times10^{-3}\text{A}$

$\frac{dF_p}{dx} = \frac{(1.37\times10^{-3})}{(1.6\times10^{-19})(10^{-2})(10^{16})(357)} \cdot \frac{\text{eV}}{\text{cm}} = 0.240\text{ eV/cm}$,

$\boxed{2.4\times10^{-5}\text{ eV/mm}}$