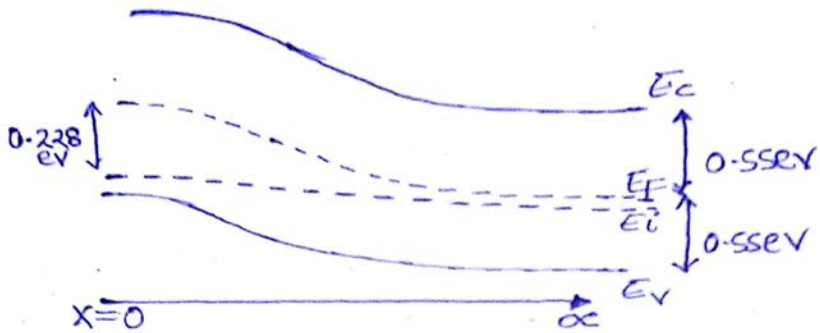
Practice sheet - 2

Sol-1 a)



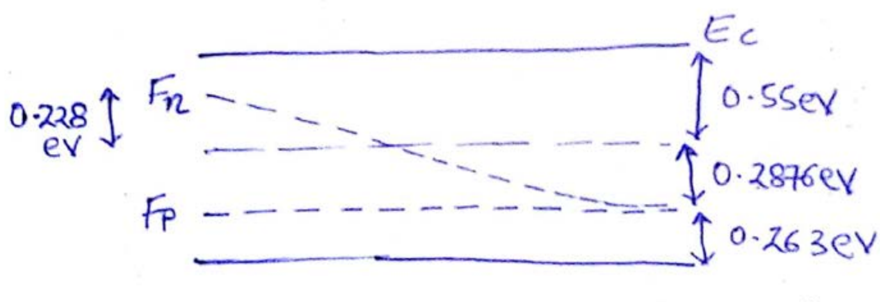
b) For, x > 2.14 μm , Intrinsic concentration overcomes the effect of acceptor doping.

So, at x = 1 μm.

$E_i - E_f = KTln(\frac{p(x)}{p_i})$. Then $\hat{E} = \frac{1}{q}\frac{d(E_i)}{d(x)}$ = 0.0259(-2ax) For x : $10^{14}e^{-ax^2}$ >> 10^{10}

For {x = 1 μm , $\hat{E}$ = -103.6$X10^3$ Volts/m } & { x=3 μm, $\hat{E}$ ~0 Volts/m}.

Sol-2 P-type semiconductor. $n_o = 2.25X10^5 cm^{-3}$ and $p_o = 10^{15} cm^{-3}$. $n|_{x=L_p}$=3.67$X10^{13} cm^{-3}$.



Sol-3

1) **Electron** mobility decreases as T increases (scattering).
   Metal - $\sigma = qn\mu$, μ decreases => σ decreases. (q and n are fairly constant in metals)
   Semiconductor - $\sigma = qn(\mu_n + \mu_p)$, μ decreases but increase in n and p is more => σ increases.
2) Generation rate will remain same (function of T) while recombination rate will increase (function of n.p).
3) In a high level injection case of pn diode electric field in neutral region is not neglected and minority current will comprise of both drift and diffusion.