Summer 2012

Ve320 Introduction to Semiconductor Device

Homework #4, due next Friday (June 15,2012) **before class**

Note: homework can be submitted to my mail box before 8 AM June 15. **Before you work on this homework, you should read RFP Chapter 3.**

1. RFP, 3.5
2. Assume that the doping density vs. position is given by

   $N_A(x) = N_0 e^{-x/x_0} + N_{AB}$, Where $N_0 = 10^{18}\,\text{cm}^{-3}, N_{AB} = 10^{15}\,\text{cm}^{-3}, x_0 = 10^4\,\text{cm}$

   (i.e. one micron). Assume that the semiconductor is silicon in equilibrium at room temperature (you may also assume nondegenerate carrier statistics).

   1) Draw an energy band diagram and label ($E_i(0) - E_F$) and ($E_i(0) - E_F$) is eV

   and note the location of x_0 on your plot.

   2) Compute the electric field for $x \gg x_0$ and for $x < x_0$
3. RFP 3.12. Only work on case (a) and (e) in Fig P3.12
4. Derive Einstein's Relationship.
5. RFP 3.15
6. RFP 3.19
7. RFP 3.24