INEL 6055 Homework No. 1

Due February 2

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For the following problems refer to the semiconductor resistor designed in the example on section 1.1.2 of the lecture notes. It is acceptable to substitute finite differences for partial derivatives or to calculate partial derivatives graphically.

1. Determine the surface donor concentration if the conductivity profile shown in figure shown on figure 2 correspond to an N-type device. (10 points)

2. Estimate the temperature coefficient of the $100k\Omega$ resistor. The temperature coefficient is defined as

$$\alpha = \frac{1}{R_0}\frac{\partial R}{\partial T}$$

   Assume room temperature (300K) and that the linear thermal expansion coefficient of Silicon is 3×10^{-6} parts per degree Kelvin. (20 points)

3. Find the voltage that, when applied to the resistor, will increase the room-temperature incremental resistance to twice its nominal value. (20 points)