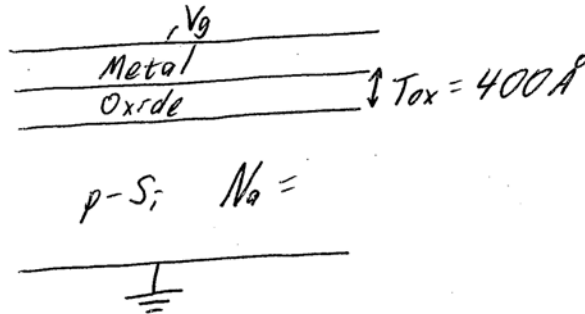


Recitation 10
EE 3161 – Spring 2008

- 1) For the MOS capacitor shown below,
- Qualitatively show how the band diagram at threshold changes if the substrate doping is changed from $N_a = 10^{16} \text{ cm}^{-3}$ to $N_a = 10^{17} \text{ cm}^{-3}$.
 - What is the electric field across the oxide at threshold with the higher doping?
 - What is the electric field across the oxide if $V_g = 5\text{V}$ (use the higher doping)?



- 2) For the MOS capacitor drawn below, the left-hand side of the silicon is doped p-type while the right-hand side is doped n-type. Assume there is no metal-semiconductor workfunction difference, and that the MOS-C otherwise conforms to our ideal structure described in class and in Ch. 16. The device width is $Z = 10\mu\text{m}$ and the oxide thickness is 300\AA .
- Find C_{ox} .
 - What are the threshold voltages at positions "a" and "b"?
 - What is the threshold depletion width at positions "a" and "b"?
 - Draw a C-V curve for the structure assuming that the AC measurement frequency is 1MHz. Label the key voltages and capacitances.

