ELEG 340: Solid-State Electronics, Fall 2008

Homework #9 (rev) - due Tuesday, 18 November 2008, at the beginning of class

1. Problem 7.7, p. 392 of Streetman-Banerjee, 6th edition. Hint: use the Ebers-Moll equations in form of Eqn. (7-34) and used the distribution most like that of a simple p-n junction diode. The idea is to find the Δp_E and Δp_C that are most like those of an ideal pn diode.

2. Problem 7.10 (without drawing the current arrows), p. 393 of Streetman-Banerjee, 6th edition. Note: do not show the current arrows and directions; just calculate the parameters.

3. Problem 7.11, p. 393 of Streetman-Banerjee, 6th edition. How much does the base width narrow compared to the equilibrium value? Hint: this is called the Early effect, after James Early. Note that V_{CB} = -50 V using our sign convention.

4. Problem 7.18 (V_{EB} = 0.2 V only), p. 394 of Streetman-Banerjee, 6th edition. This problem emphasizes the difference between metallurgical base width W_{met} (or L_b as on p. 371 or text), and neutral base width W_B. Hint: since the emitter doping >> base doping, assume that the depletion width W_{BE} extends only into the base, so that the base portion of W_{BE} = its full value. Note – calculate only for V_{EB} = 0.2 V; do not repeat the calculation for V_{EB} = 0.6 V

5. Problem 7.24, p. 395 of Streetman-Banerjee, 6th edition. Only calculate the emitter base bias; do not comment on the injection efficiency.

Homework assignments will appear on the web at:
http://www.ece.udel.edu/~kolodzey/courses/eleg340f08.html

Note: On each homework and report submission, please give your name, the due date, assignment number and the course number.