

**ECE 132 HW# 7**  
**Introduction to Solid State Electronics**

BJTs and LEDs (Read Chapter 7 and 8)

Homework Due Thursday December 6, 2007 IN CLASS

1. Draw the energy band diagram for a PNP transistor in equilibrium, saturation, cut-off and in forward active mode. Clearly label the Fermi Levels and conduction and Valence Band positions.
  
2. Do Problem 7.18 in Streetman
  
3. What effect would increasing the Base doping of a BJT have on
  - a) Base Transport Factor
  
  - b) Emitter injection efficiency
  
4. If the spontaneous recombination lifetime in a GaN LED is 2 nanoseconds and the non-radiative lifetime is 10 nanoseconds calculate the estimated internal quantum efficiency of the LED.
  
5. Solar Cells. If a Silicon Solar Cell generates 200mA with an open-circuit voltage of 0.8V and a fill factor of 0.65 under a total solar power flux of 900mW what is the power conversion efficiency of the cell?