Essentials of MOSFETs

Lecture 5.5: Heterojunction Bipolar Transistors (HBTs)

Short Problem

Mark Lundstrom
Purdue University, Fall 2018

Consider an NPN bipolar transistor with the emitter doped at $N_D = 10^{17}$ cm^{-3}. The thickness of the neutral emitter is five times the thickness of the neutral base. The electron mobility in the base is five times that of the holes in the emitter. The effective densities-of-states in the emitter and the base are the same, but the bandgap of the emitter is 0.3 eV larger than that of the base.

1) How heavily can the base be doped if $\beta = 20$ is desired?