

Physics 244: Modern Physics

Homework 11

Due in class 17 December 2007

Reading: We are still looking at Thornton & Rex Chapter 11.3 (Semiconductor devices). High probability of another (last) reading quiz on Wednesday.

Problems:

1. Thornton & Rex 11.16
2. Thornton & Rex 11.20
3. Thornton & Rex 11.22
4. Thornton & Rex 11.26
5. Thornton & Rex 11.27
6. Thornton & Rex 11.28
7. Find the fractional change in current through a p-n junction when the forward bias is changed from + 0.1 V to + 0.2 V.
8. Consider a p-n diode with $I_0 = 1$ nA. a.) Show that for small reverse biases, the resistance is 25 M Ω . (Hint: do a Taylor expansion of the exponential function.) b.) Find the DC resistance for a reverse bias of 0.5 V. c.) Find the DC resistance for a 0.5 V forward bias. What is the current in this case? d.) Calculate the AC resistance dV/dI for a 0.5 V forward bias.

“At least in my case, the arithmetic should not be one plus one equals two, but one third plus one third equals two thirds.”
John Bardeen (UW ECE 1928)

