

Homework #6: Chapter 8: Semiconductors (Part II)

Due Date: November 8, 2010

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This week, we have learned p-n diode and its electrical properties based on band-diagram. This is the bases of all semiconductor devices along with MOS transistor device. I first would like to ask you to draw the band diagram of each of the devices and ask you to have a clear understanding of how it will work. We did not go in detail of the mathematics and calculation. It will be all right. But still you have to have a clear vision of them.

1. So, please describe in detail of the operating principle of the following devices. If you need, you have to draw the band diagram.
 - (a) p-n Rectifier (Diode) with characteristic I-V curve for the forward bias and reverse bias.
 - (b) Zener Diode
 - (c) Solar Cell (Photodiode)
 - (d) Tunnel Diode with characteristic I-V curve
 - (e) n-p-n Bipolar Transistor
 - (f) depletion-type MOSFET
 - (g) enhancement-type MOSFET
 - (h) JFET (junction Field Effect Transistor)
 - (i) GaAs MESFET and the operation mechanism
 - (j) AND Gate – how it operates and what it means?
 - (k) NOT Gate – how it operates and what it means?
 - (l) NAND Gate – how it operates and what it means?
 - (m) AND Gate – how it operates and what it means?
 - (n) OR logic circuit – how it operates and what it means?
 - (o) DRAM (Dynamic Random Access Memory) – Volatile Memory
 - (p) EEPROM and what it means of the Non-volatile Memory

2. Textbook 11-12

3. Textbook 11-14

4. Textbook 11-15

5. Textbook 11-20