Micro Electronic Circuits

1st Homework

(The University of Guilan - CE)

1. Define an Electron Volt. What is the Volt Equivalent of temperature?
2. Define a Photon.
3. What is the difference between the band structure of an insulator and of a semiconductor?
4. What is the difference between the band structure of a semiconductor and of a metal?
5. Explain why a semiconductor acts as an insulator at $0°K$ and why its conductivity increases with increasing temperature.
6. Define a hole in a semiconductor and explain its movement in Valance band.
7. Define mobility. Give its dimensions.
8. Define conductivity. Give its dimensions.
9. Define (a) donor, (b) acceptor impurities.
10. State the mass-action law as an equation and in words.
11. Consider an open-circuited p-n junction. Sketch curves as a function of distance across the junction of space charge, electric field, and potential.
12. What is the distinction between an intrinsic semiconductor and an extrinsic semiconductor?
13. Show the crystal structure of silicon containing a donor impurity atom and explain how this leads into the increase of the conductance of the structure.
14. Repeat (13) for acceptor impurity.
15. A semiconductor is doped with both donors and acceptors of concentrations N_D and N_A, respectively. Write some equations to determine the electron and hole concentrations (n and p).

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Class webpage: http://webpages.iust.ac.ir/rebrahimi/ELECcircuit.htm