

Project:Device_Physics

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Prelearnings:

- 1) In class 12, learned about semiconductors
 - A) Doping and its types
 - B) Use of Doping
 - C) PN-Junction
 - D) Applications of PN-Junctions
- 2) During ESC201 in last semester:
 - a) BJT
 - b) MOSFET

Missing:

- a) Quantitative study of semiconductor
- b) Like carrier concentration, Holes and electronic current.
- c) Mathematical approach
- d) Early stages of pn junction and other device in detail with mathematical and physical approach.

Now things I learned and did during this project

Learnings:

A) Theoretical

- 1) Mathematical approach to study effect of excitation, origin of current due to drift and diffusion.
- 2) New way of generation of current due to diffusion.
- 3) Different way of excitation like potential biasing, optical excitation.
- 4) Contents in *Microelectronic Device and Circuit* by *Fonstad* book upto chapter 6.

B) Coding

- 1) To create/visualize semiconductor slab in system using “*devsim*”
- 2) Solving for potential, carrier concentrations under different conditions:
 - a) Different Biasing
- 3) Applying governing mathematical equations
 - a) *Poisson Equations*
 - b) *Boltzmann equation* of carrier concentrations
- 4) Visualizing the results produced with the help of *numpy* and *matplotlib*. It helps in understanding the concept more easily and verifying the functioning of our code properly.

What to learn next:

- 1) Further covering the contents in Book.
- 2) More deep learning of “*Devsim*”.