

## **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”.