

ECE 4243 - PHYSICAL ELECTRONICS

Textbook: Ben G. Streetman, Sanjay K. Banerjee, Solid State Electronic Devices, 6th Ed., Prentice-Hall

1. Introduction to Modern Physics

- a. Crystal properties of solids
- b. Fundamentals of quantum mechanics, atoms and electrons

2. Semiconductor Physics

- a. Energy bands and charge carriers in semiconductors
- b. Excess carriers in semiconductors

3. Junctions and Related Devices

- a. p-n junction at equilibrium
- b. Forward- and reverse-biased p-n junctions
- c. Reverse-bias breakdown
- d. Transient and a-c conditions
- e. Metal-Semiconductor junctions

4. Bipolar Devices

- a. Fundamentals of bipolar junction transistor (BJT) operation
- b. Minority carrier distributions, and terminal currents
- c. Modes of BJT operation, amplification with BJT

5. Field Effect Devices

- a. Junction Field-Effect Transistor (FET) – fundamentals of operation
- b. Metal-semiconductor FET
- c. Metal-insulator capacitor and metal-insulator FET; MOSFET