



MANGALORE UNIVERSITY
DEPARTMENT OF ELECTRONICS

MSc Electronics

ELH 401 - SOLID STATE ELECTRONICS

Unit-I

15 Hours

Crystal properties and growth of semiconductors; semiconductor materials, crystal lattice, bulk crystal growth, epitaxial growth.

Atom and electrons; introduction to physical models, experimental observation, quantum mechanics, atomic structure and the periodic table.

Energy bands and charge carrier in semiconductors; bonding forces and energy bands in solids, charge carrier in semiconductors, carrier concentrations, drift of carrier in electric and magnetic fields, invariance of the Fermi level at equilibrium.

Unit-II

12 Hours

Excess carrier in semiconductors; optical absorption, luminescence, carrier life time and photo conductivity, diffusion of carriers,

Junctions; fabrication of pn-junction, equilibrium conditions, forward and reverse biased junctions: steady state conditions reverse biased breakdown, transient and AC conditions. Derivations from the simple theory, metal semiconductor junction, hetero junction.

Unit-III

15 Hours

Field effect transistor; transistor operation, the junction FET, the metal semiconductor FET, the metal insulator semiconductor FET, the MOS field effect transistor.

Bipolar junction transistor; fundamentals of BJT operations, amplifications with BJT, BJT fabrication, minority carrier distributions and terminal currents, generalized biasing, switching, other important effects, frequency limitations of transistors, hetero-junction BJT transistor.

Text Book

1. "solid state electronic devices," B.G Streetman and S.K Banerjee, PHI Pvt Ltd, 6thed, 2006.

Reference:

1. "Semiconductor Physics and Devices," D. A. Neamen, 4th Ed, McGraw-Hill, 2012
2. "Physics of Semiconductor Devices" S.M. Sze and Kwok K. Ng, 3rd Ed, Wiley Interscience, 2007