

AMET-25-I OPTO ELECTRONICS & PHOTONICS – I

1. ELEMENTAL AND COMPOUND SEMICONDUCTORS

Introduction, Bonding in Solids, Crystalline Nature of Solids, Alloy Semiconductors, Lattice-Mismatched and Pseudomorphic Materials, Transmission Media and Choice of Materials, Crystal Growth, Device Processing

2. ELECTRONIC PROPERTIES OF SEMICONDUCTORS

Introduction, Carrier Effective Masses and Bandstructure, Effect of Temperature and Pressure on Bandgap, Carrier Scattering Phenomena, Semiconductor Statistics, Conduction Processes in Semiconductors, Bulk and Surface Recombination Phenomena

3. OPTICAL PROCESSES IN SEMICONDUCTORS

Electron-Hole Pair Formation and Recombination, Absorption in Semiconductors, Effect of Electric Field on Absorption: Franz-Keldysh and Stark Effects, Absorption in Quantum Wells and the Quantum-Confined Stark Effect, The Kramers-Kronig Relations, Radiation in Semiconductors, Deep Level Transitions, Auger Recombination, Luminescence from Quantum Wells, measurement of Absorption and Luminescence Spectra, Time-Resolved Photoluminescence

4. JUNCTION THEORY

Introduction, P-N Junctions, Schottky Barriers and Ohmic Contacts, Semiconductor Heterojunctions Highlights

5. LIGHT EMITTING DIODES

Introduction, The Electroluminescent Process, Choice of LED Materials, Device Configuration and Efficiency, Light Output from LED, LED Structures, Device Performance characteristics, Frequency Response and Modulation Bandwidth, Manufacturing Process and Applications

