

05P1WPH112 Compound Semiconductors

Subject Code	05P1WPH112	
Subject Name	Compound Semiconductors	
Course Credits	3	Contact Hours: 03
Module No.	Subtitle of the Module	Topics
1.	Band theory of solids	Free electron theory, Kronig-Penny model, Band formation in solids, Introduction to “real” (defect-containing) solids, equilibria and kinetic processes in solids. Doping in solids.
2.	Semiconductor basics	intrinsic and extrinsic semiconductors-n & p-type, Fermi level, carrier concentration, mobility, conductivity, p-n junctions-band diagram, forward and reverse I-V characteristics, C-V, Ideality factor, p-n-p and n-p-n transistor-basic concepts
3.	Crystalline Semiconductors	Growth, Diffusion, ion implantation, oxidation, microlithography, plasma etching, thin film deposition, metallization, with emphasis on Si technology. Introduction to compound semiconductors, Characterization by X-ray diffraction, Differential scanning calorimetry, Scanning electron microscopy. I-V characteristics and optical absorption. Process integration for GaAs IC's.
4.	Non-crystalline Semiconductors	Phase diagrams, Formation of inorganic semiconductor glasses. Viscosity and structural relaxation. Phase separation and crystallization. Characterization by DTA, XRD, SEM. I-V characteristics, Optical absorption and photoconducting properties
5.	Advanced materials	Si, GaAs, InP,– synthesis, characterization and properties.

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)	
1.	Fundamentals of semiconductors: Physics and Materials properties, Peter Y. Yu and Manuel Cardona, Springer
2.	Physics of Semiconductor Devices, S.M. Sze
3.	Physics of Amorphous Solids, R Zallen , Wiley-VCH (2004)
4.	Electronic process in Non-Crystalline Materials: Davis & Mott
5.	Disordered Material an Introduction

6.	The Materials Science of Semiconductors by Angus Rockett, Springer 2008
7.	Physics of Optoelectronics, Michael A. Parker, Taylor and Francis (2005)
8.	Material Science of Thin Films, by Milton Ohring, Elsevier 2002
9.	Thin Film Fundamentals by A Goswami, New Age International 2005