

BS (4 Years) for Affiliated Colleges



Code	Subject Title	Cr. Hrs	Semester
PHY-413	MATERIALS SCIENCE-I (THEORY)	3	VII
Year	Discipline		
4	Physics		

Course Outlines:

Introduction to materials; properties of the materials; Types of Materials (i) metallic materials & (ii) Non metallic materials); Selection of Materials; Bonds in Solid; Ionic Bonding, Covalent Bonding, Metallic Bonding, Van der Waals Bonding, Secondary Bonding, & Mix bonding, Effect of Bond type on structure and properties such as density, stability, melting point, stiffness and electrical properties.

Crystallography or crystal structure; The Space of Lattice, Crystal systems and Brass Lattice, Principal Metallic Crystal Structures, Atom Position in Cubic Unit Cells, Directions in Cubic Unit cells, Miller Indices for Crystallographic Planes in Cubic Unit Cells, Crystallographic Planes and directions in Hexagonal Unit Cells, Comparison of FCC, HCP, and BCC Crystal structures, Volume, Planar, and Linear Density Unit Cell Calculations, Polymorphism or Allotropy, Crystal Structure Analysis.

Non-Metallic Materials: Composite Materials, Ceramic Materials, Polymeric Materials, Semi-conductor / Electronic Materials.

Books Recommended:

1. *Introduction to Physical Metallurgy* by S.H.Avnor, McGraw-Hill Book Comp. New York, 1999.
2. *Materials Science and Engineering and Introduction* by W.D. Cluster, John Wiley & Sons (USA), 1999.
3. *Principles of Materials Science and Engineering* by W.F. Smith, McGraw-Hill Book Comp, New York, 1999.
4. *Material Science & Metallurgy* by O.P. Khanna, DhanpatRai& Sons Delhi, 1994.