



Bangladesh University of Engineering & Technology
Department of Physics
Course Code: PHY105 (ME)/ PHY113 (NAME) /PHY117 (IPE)
Teacher's name: Mehnaz Sharmin

Course Objectives:

Structure of Matter is fundamental part of Solid State Physics which basically deals with the different classes of solids and their structure. Solid is one of the three stable states of matter which can only have definite structure. Solid is very essential in everyday life since it is useful in almost all scientific, industrial and household purposes. Structure of a solid affects almost all the physical properties of the solid. So it is essential acquire a good knowledge about structure and properties of solids to clarify the understanding of their fields of applications. The ultimate goal of this course is to learn about different types of solid and their structures, law and experiments used for crystallographic measurements, types of bonding in solids, Band theory of solid and different types of defects in crystalline solids.

Lecture Plan for Structure of Matter:

Lectures	Topics
1-3	Crystalline and non-crystalline solids, Single crystal and polycrystalline solids, Unit cell, Crystal systems, Co-ordinations number, Density and Packing factor.
4-6	Crystal planes and directions, Miller indices, Relation between interplanar spacing and Miller indices, Crystal structure: NaCl, CsCl, etc.
7-8	Bragg's Law, Methods of determination of interplanar spacing from diffraction patterns.
9-10	Bonds in solids, Interatomic distances, Calculation of cohesive and bonding energy.
11-12	Introduction to band theory: Distinction between metal, semiconductor and insulator.
13-14	Defects in solids: Point defects, Line defects, Plane defects, Volume defects.

References:

1. Solid State Physics – M. A. Wahab (2nd Ed.)
2. Introduction to Solid State Physics – Charles Kittel (5th Ed.)
3. Concepts of Modern Physics- Arthur Beiser
4. Physics for Engineers (Part-2)- Dr. Gias Uddin Ahmad

Learning Outcomes:

After finishing this course a student will be capable of -

1. Classifying solids in terms of their structure.
2. Describing and drawing different types of crystal structure.
3. Identifying different types of structure from the information gained from crystallographic measurements and calculating various crystallographic parameters.
4. Distinguishing various types of solid in the light of Band theory.
5. Elucidating different kinds of defect in solids and their importance.