Core III **Semester II**

Crystallography

Course Objectives

- To explain the principles of crystallography and crystal systems.
- To introduce crystallographic calculation using Miller's indices, Lattice parameters and crystallographic axes
- To provide a methodical approach to identification and classification of mineral crystals based on their crystallographic properties.

Learning Outcomes

- Understand the principles of crystallography and crystal systems.
- Explain the fundamental concepts of crystallography, including crystal lattice, unit cell, symmetry elements, and crystal systems.
- Identify and classify crystals based on their crystal systems and symmetry properties.
- Interpret crystallographic data, including crystal symmetry and crystallographic directions
- Analyze crystal structure and properties of minerals.

Unit - I: Elements of crystallography and isometric system

Crystalline and non-crystalline substances, Crystals - definition, characteristics, intercepts, parameters, indices and forms (Open and closed, General and Special). Symmetry elements and classification of crystals in to six systems. Hermann-Mauguin symbol; Holohedrism, hemihedrism, hemi morphism and enantiomorphism. Twinning zone and zonal laws.

Unit - II: Normal classes A

Study of axial relationship, symmetry elements and forms present in normal classes of isometric, tetragonal, hexagonal and Trigonal system.

Unit - III: Normal classes B

Study of axial relationship, symmetry elements and forms present in normal classes of orthorhombic, monoclinic and triclinic system.

Unit - IV: Lower crystal classes

Study of axial relationship, symmetry elements and forms present in lower classes of isometric system. Projection of crystals. Bravais lattice.

Practical:

- Identification of symmetry elements from crystallographic models
- Stereographic projection of crystals belonging to isometric and tetragonal normal class

Text Book:

- ✓ Crystallography by J D Dana.

Suggested Books:

- ✓ Practical approach to crystallography and mineralogy, R. N. Hota (2011), CBS Pub. & Dist., New Delhi
- ✓ Flint, F. (1964): Essentials of Crystallography, Peace Pub., Russia.
- ✓ Babu, S. K. (1987): Practical Manual of Crystal Optics, CBS Pub. & Dist.
- ✓ Ford W. E., (2006) Dana's Text Book of Mineralogy CBS Pub. & Dist., New Delhi