**Physical Crystallography (D123)**

**I – GENERALITIES**

Definition of the crystalline state. Networks: Definitions: Row and lattice plane. Representative unit cells. Motif. Miller indices. Reciprocal lattice: Definition: Some properties and relationships with direct lattice parameters. Interreticular distance.

**II - SYMMETRY OF FINITE FIGURES**

Symmetry operations: Inversion, Rotation, Reflection, Rotational inversion, Rotational reflection. Notions of equivalent points.

**III - SYMMETRY OF NETWORKS - BRAVAIS NETWORKS**

Crystal systems. Different types of lattices. The fourteen Bravais lattices. Incompatibility of certain orders of rotation axes with lattices. Some geometric relationships in lattices.

**IV - EXPERIMENTAL METHODS OF DIFFRACTION**

Diffraction conditions. Bragg's law. Von Laue's equation. Ewald's construction. Different diffraction methods: Laue method. Debye-Scherrer method. Rotating crystal method. Weissenberg method. Automatic diffractometers.

**V - CHEMICAL BONDS**

General information on chemical bonds. Stable structures and internal energy. Different bonds in crystals: Attractive forces, i) Strong bonds - valence bonds, Ionic bond. Covalent bond. Metallic bond. Ion-dipole interaction. ii) Weak bonds - Van der Waals bond. Charge transfer bond. Hydrogen bond. Repulsive forces.