

Core IV

Mineralogy and Mineral Optics

Course Objective:

- To introduce Minerals and their properties
- To provide the basis of mineral classification
- To provide an understanding of an optical microscope and how to observe optical properties of minerals in thin sections

Learning Outcome:

- Identify and classify minerals in hand specimens
- Observe optical properties and identify minerals under the microscope
- Describe the macro and micro properties of minerals and mineral groups

Unit – I: Elements of mineralogy

Chemical bonding and compound formation. Definition and classification of minerals. Physical properties of minerals, Silicate structure and its classification. Isomorphism, polymorphism and pseudo morphism.

Unit - II: Silicate groups

Study of atomic structure, chemistry, physical, optical properties and uses of minerals of Olivine, Pyroxene, Amphibole, Garnet, Feldspar, Feldspathoids, silica and Mica groups.

Unit- III: Principles of mineral optics

Nature of light rays and their propagation, internal reflection, double refraction, interference and polarization. Nicol Prism and polaroids. Petrological microscope - parts and their functions. Preparation of thin section of minerals and rocks.

Unit - IV: Optical properties

Behaviour of light in thin section and production of interference colours. Order of interference colour, twinkling, Optic axis, Uniaxial and biaxial minerals. Isotropism and anemotropism, Extinction and extinction angle. Pleochroism, pleochroic scheme, Birefringence; Outline of study of optical characters of minerals in thin sections.

Practical:

- Megascopic identification of Minerals
- Microscopic identification of Minerals;
- Measurement of extinction angle; sign of elongation and order of interference color.

Text Book:

- ✓ *Dexter Perkins (2002) Mineralogy, Prentice-Hall of India, New Delhi.*

Suggested Readings:

- ✓ *Klein, C., Dutrow, B., Dwight, J. & Klein. (2007). Manual of Mineral Science (after James D. Dana). J. Wiley & Sons.*
- ✓ *Kerr, P. F. (1959). Optical Mineralogy. McGraw-Hill.*
- ✓ *Verma, P.K. (2010). Optical Mineralogy (Four Colour). Ane Books Pvt. Ltd.*
- ✓ *Deer, W.A., Howie, R.A., & Zussman, J. (1992). An introduction to the rock-forming minerals (Vol. 696). London: Longman.*
- ✓ *Hota, R. N. (2017) Practical approach to crystallography and mineralogy, CBS Publishers and Distributors, New Delhi.*