GEOLOGY

Core V **Semester III**

Geochemistry And Elementary Petrology

Course Objectives:

- To introduce the chemical characteristics and cosmic abundance of elements
- To explain the geochemistry of water and sediments
- To classify and name of the rocks based on their mineral composition and properties
- To explain the petrographic characteristics and petrographic features, such as mineral assemblages, textures, and structures, exhibited by rocks.

Learning Outcomes

- Explain the geochemistry of water and sediments
- Classify elements based on their geochemistry and mode of affinity.
- Elaborate on the cosmic abundance of elements
- Explain the petrographic characteristics and petrographic features of rocks.

Unit - I: Elements of geochemistry

Chemical bonding, states of matter and atomic environment of elements. Cosmic abundance of elements; composition of planets and meteorites. Structure and composition of earth. Conservation of mass, isotopic and elemental fractionation. Concept of radiogenic isotopes in geochronology and isotopic tracers.

Unit - II: Geochemical classification of elements

Geochemical classification of elements, Primary geochemical differentiation; Atomic substitution. Advection and diffusion; Solid solution, Chromatography; Elements of marine chemistry; Mineral reactions- diagenesis and hydrothermal reactions.

Unit - III: Cosmic abundance of elements

Distribution of elements in solar system; Chemical differentiation and composition of the Earth; General concepts about geochemical cycles and mass balance; Geo-chemical behavior of major elements.

Unit – IV: Elements of petrology

Types of rocks, Physical properties, genesis, evolution and types of magma. Processes of formation of sedimentary rocks; origin of metamorphic rock.

Practical:

- Geochemical data analysis and interpretation of common geochemical plots.
- Geochemical phase variation diagrams and its interpretations.
- Rock classification and Megascopic identification of rocks

Text book:

- ✓ *Principles of Geochemistry, Brian Mason*
- ✓ *Principles of Petrology: An Introduction to the Science of Rocks, Tyrrell, G.W.*

Suggested Readings:

- ✓ *Essentials of geochemistry, John V Walther*
- ✓ *Petrology of Igneous, Sedimentary and Metamorphic Rocks, Sachin Changotra*
- ✓ *Petrography, An Introduction to the Study of Rocks. Williams, H., F. J. Turner, and C. M. Gilbert.*