

## DISCIPLINE SPECIFIC CORE COURSE (DSC-6): Elements of Geochemistry (L3, P1)

### Credit distribution, Eligibility and Pre-requisites of the Course

| Course title & Code                                          | Credits  | Credit distribution of the course |          |                     | Eligibility criteria                     | Pre-requisite of the course (if any)                                              |
|--------------------------------------------------------------|----------|-----------------------------------|----------|---------------------|------------------------------------------|-----------------------------------------------------------------------------------|
|                                                              |          | Lecture                           | Tutorial | Practical/ Practice |                                          |                                                                                   |
| <b>DSC-6</b><br><br><b>Elements of Geochemistry (L3, P1)</b> | <b>4</b> | <b>3</b>                          | <b>0</b> | <b>1</b>            | <b>12<sup>th</sup> pass with science</b> | <b>Studied Earth System Science, Mineral science, Stratigraphy and Equivalent</b> |

#### Learning Objectives

This course on element of geochemistry is intended to provide students with basic scientific knowledge and understanding about the geochemical nature of the earth and other planetary material in relation to relate mineralogy, geochemistry, and bulk chemistry and their evolution.

#### Learning outcomes

After completing the course, the students will acquire knowledge on the formation and abundance of elements in the solar system, in the earth and within different reservoirs of the earth. The students will learn about the chemical characters of different elements present in the periodic table and how they behave in different geological systems. The students will learn the basic concept of stable and radiogenic isotopes. After the end of the course they will develop an understanding on how these isotopes can be used to understand different geological processes. They will be able to plot, analyse and interpret geochemical (oxide, elemental and isotopic) data from different geological materials.

### SYLLABUS OF DSC-6

**Credits 4**

**Theory (45 hours)**

#### UNIT – I (9 hours)

Detailed contents

**Introduction to geochemistry:** The abundance of elements in the cosmos, solar system and earth. Meteorites, distribution of elements in core, mantle, crust.

#### UNIT – II (12 hours)

Detailed contents

**Introduction to properties of elements:** periodic table, chemical bonding, states of matter and atomic environment of elements, geochemical classification of elements, the concept of elemental fractionation.

#### UNIT – III (12 hours)

Detailed contents

**Geochemistry of igneous rocks:** geochemical variability of magma and its products. Near-surface geochemical environment: Chemical weathering of minerals and rocks.

#### UNIT – IV (12 hours)

Detailed contents

**Isotope geochemistry:** Application of stable and radiogenic isotopes in earth science.

**Practical component: (30 hours)**

Geochemical analysis of geological materials (analytical methods, concept of normalization)  
Geochemical variation diagrams, common geochemical plots, and their interpretations.  
Basic idea about handling and interpretation of isotope data.

**Essential/recommended readings**

Mason, B (1986). Principles of Geochemistry. 3<sup>rd</sup> Edition, Wiley New York.

Faure, G., 1986. Principle of Isotope Geology, J. Wiley & Sons.

**Suggestive readings**

Mason, B (1986). Principles of Geochemistry. 3<sup>rd</sup> Edition, Wiley New York.

Rollinson H. (2007). Using geochemical data evaluation. Presentation and interpretation. 2<sup>nd</sup> Edition.  
Publisher Longman Scientific & Technical.

Walther John, V., 2009 Essentials of geochemistry, student edition. Jones and Bartlett Publishers

Albarede, F, 2003. An introduction to geochemistry. Cambridge University Press.

Faure, G., 1986. Principle of Isotope Geology, J. Wiley & Sons.

Geochemistry by William M White, Wiley-Blackwell (2013).