

## CATEGORY-IV

### COMMON POOL OF GENERIC ELECTIVES (GE) COURSES OFFERED BY DEPARTMENT OF GEOLOGY

#### GENERIC ELECTIVES (GE-2): Physics & Chemistry of Earth

#### 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
		Lecture	Tutorial	Practical/ Practice		
Physics & Chemistry of Earth (GE-2)	4	3	1	0	Class-XII	---

#### Learning Objectives

To develop an understanding of the surface and internal structure of the Earth and its mineralogy and chemistry; To equip the students about the present and past processes operative in shaping the physical and chemical make-up of the planet Earth

#### Learning outcomes

After completion of this course students will learn about:

- Physical, mineralogical and chemical structure of the earth
- Major surface features and their evolution through time
- Concept of geological time and its determination
- Earth's magnetic field, its short term and long term variation and its application
- Physical and chemical evolution of earth through time

#### SYLLABUS OF GE-2 – (Lecture- 45 Hours )

##### UNIT – I

Earth: surface features: Continents, continental margins, oceans

Earth's materials: Rocks and Minerals

##### UNIT – II

Earth's interior - variation of physical parameters and seismic wave velocity inside the earth, major sub divisions and discontinuities. Depth-wise mineralogical variation in the Earth. Concepts of Isostasy; Airy and Pratt Model. Core and Mantle: Seismological and other geophysical constraints. The geodynamo - Convection in the mantle. Plate Tectonics. Types of plate margins and their Dynamics.

##### UNIT – III

Elements of Earth's magnetism: Secular variation and westward drift. Solar activity and magnetic disturbance. Paleomagnetism

#### **UNIT – IV**

Elements: Origin of elements/nucleosynthesis. Abundance of the elements in the solar system/planet Earth. Geochemical classification of elements. Earth accretion and early differentiation. Isotopes and their applications in understanding Earth processes.

#### **UNIT – V**

Isotopes: Radiogenic and Stable. Radiogenic isotopes and their applications  
Stable isotope fractionation. Oxygen isotopes. Sublithospheric Mantle (Mineralogy/phase transitions) Concept of mantle heterogeneity

#### **UNIT – VI**

Low-temperature geochemistry; surface and near-surface processes

#### **Essential/recommended readings**

- Holmes, A. (1992). Principles of Physical Geology, 1992, Chapman and Hall.
- Anderson, G. M. (1996). Thermodynamics of natural systems. John Wiley & Sons Inc.
- Condie, K.C. (2016) Earth as an evolving planetary system (3rd Edn.) Elsevier

#### **Suggestive readings**

- Holmes, A., Principles of Physical Geology, 1992, Chapman and Hall
- Condie, K.C. Plate Tectonics and Crustal Evolution, Pargamon Press, 1989.
- Krauskopf, K. B., & Dennis, K. Bird, 1995, Introduction to Geochemistry. McGraw-Hill
- Faure, G. Principles and Applications of Geochemistry, 2/e (1998), Prentice Hall, 600 pp.
- Anderson, G. M. (1996). Thermodynamics of natural systems. John Wiley & Sons Inc.
- Steiner, E. (2008). The chemistry maths book. Oxford University Press.
- Yates, P. (2007) Chemical calculations. 2nd Ed. CRC Press.
- Condie, K.C. (2016) Earth as an evolving planetary system (3rd Edn.) Elsevier

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**