Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NGPC514	Solid Earth Geophysics	3	1	0	4

Course Objective
Comprehensive understanding of various physical properties of the interior of the earth and plate tectonics. Students are exposed to fundamental concepts of seismology and Radiometric dating techniques.
Learning Outcomes
This course module introduces basic concepts of plate tectonics and also provides a comprehensive understanding of the internal structure of the earth.

Unit No.	Topics to be Covered	Lecture Hours (L+T)	Learning Outcome
1.	Interior of the Earth. Various Earth Surface Features and Topography, Plate tectonics. Modeling of Topography using *Generic Mapping Tools (GMT).* Introduction to geophysics, different branches of geophysics, and relationship with other sciences.	6L + 2T	Helps to understand the internal structure of the earth and various morphological features on the surface of the earth.
2.	Introduction and derivation of physical parameters, like a) density, b) pressure, c) gravity, d) seismic velocities, e) temperature, f) melting point, g) specific heat at constant pressure (cp), h) volume coefficient of thermal expansion, i) Gruneisen parameter, j) seismic wave attenuation parameters. Variations of all these parameters inside the earth.	10L +2T	It provides a comprehensive understanding of the variation of different physical and chemical properties inside the earth.
3.	Creep mechanisms in the earth. The viscoelastic model under creeping inside the earth. The rigidity of the lithosphere and its bending. Strength of rocks, Strength envelop of continental and oceanic lithosphere and its interpretation	6L + 2T	It provides a basic understanding of the deformation and flow of earth materials from both the continuum mechanics and the microphysical viewpoints.
4.	Introduction to Geoid and Spheroid. Derivation and explanation of Geoid and Spheroid at different locations of earth's surface. Its significance to the dynamics of the earth.	4L +2T	Helps to understand the theoretical determination of Geoid, Geoid anomalies and its applications on mantle dynamics

5.	Age of the earth and various methods of its determination. Geochronology: Radioactive decay; Dating of rocks: Rubidium-Strontium, Uranium-Lead, Thorium-Lead, Potassium-Argon, Argon-Argon, Samarium-Neodymium; Age of the earth.	**8L +2T**	It emphasises on various radiometric dating techniques and their applications to understand the complexities of mantle processes and magmatic evolution
6.	Introduction to geomagnetism. Magnetic fields of internal and external origin. Dipole field. Non-dipole field. Secular variation of the dipole and non-dipole fields. Virtual Geomagnetic poles and its derivation. MAGSAT earth-orbiting satellite and the analysis of acquired MAGSAT data.	**6L + 2T**	It explains the natural magnetic fields in and surrounding the Earth and its temporal changes.
7.	Onshore and offshore geophysics	**2L +2T**	It provides a basic understanding of marine geophysical interpretations
	Total	**42L + 14T**	

Textbooks

- Anderson, D., New Theory of the Earth, Cambridge University Press, 2007
- Fowler, C.M.R., Solid Earth: An Introduction to Global Geophysics, Cambridge University Press, 2005.

Reference Books

- Lowrie, W., Fundamentals of Geophysics, Cambridge Univ. Press, 2007.
- Howell, B. F., An Introduction to Geophysics, Mc-Graw Hill
- Jacobs, J. A., A Text Book of Geonomy, Adam-Hilger
- Tucker, R. H., Cook, A. H., Iyer, H. M. and Stacey, F. D., Global Geophysics, English
- Stacey F. and Davis P., Physics of the Earth, Cambridge University Press, 2008.