Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NGLC533	Geodynamics	3	0	0	3

Course Objective

The primary objective of the course is to provide the students with a detailed understanding of the internal structure of the Earth, the evolution of different crustal segments and the correlations between multiple planetary processes.

Learning Outcomes

Upon completion of the course, students will be able to understand:

- Understand different techniques for tectonic reconstructions.
- Understand the petro-tectonic associations in different regions.
- Understand the behaviour of the Earth in space and time.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Seismic waves; Discontinuities within the Earth; Compositional and structural variationswithin the crust, mantle and core; Heat flow and the geothermal gradient	4	Internal structure of the Earth
2.	Hotspots;Largelow-shear-wave-velocity provinces and mantle flow models; Supercontinental cycles	2	Dynamics of the mantle and correlation with plate tectonics
3.	Focal mechanism solutions of earthquakes; fracture development mechanisms; Paleostress estimation techniques	2	Correlations between earthquakes and past-present plate movements
4.	Earth's magnetic field; The geodynamo, magnetic field lines and reversals; Paleomagnetism; Vine-Matthews hypothesis; Past plate configurations and reconstructions	9	Plate tectonics and reconstructions
5.	Plate margins and their stabilities; Relative plate motions; Stability of triple junctions	9	Plate margins and their stability
6.	Oceanic ridges and transform faults; Continental rifted margins; Active and passive modes of extension; Characteristic of rifts; Kinematic models of extension; The Wilson cycle	5	Extensional plate tectonics
7.	Features and internal structures of strike-slip faults; Development and evolution of transform faults; Subduction initiation models; Gravity anomalies and subduction zones; Temporal changes in Heat Flow; Horizontal and vertical plate tectonics	5	Collisional plate tectonics and variations in the styles of plate tectonics with time
8.	Metamorphism and plate tectonics; Geothermobarometry; Petrochronology; Deformation microtextures; Correlations	2	Hollistic evolution of the Earth's crust w.r.t pressure-temperature-time-deformation
9.	Sea-level and water chemistry fluctuations with time; Weathering patterns, CO_2 budget and effects on the climate; Weathering rates and plate tectonics	2	Correlations between plate tectonics and the climate
10.	Classification of mineral deposits; Occurrences of mineral deposits at different tectonic settings	2	Correlations between plate tectonics and economic geology
	Total	**42**	

Books:

1. Kearey, P. and Vine, F. J. (1996). Global Tectonics. Blackwell Publishing, London
2. Turcotte, D.L. and Schubert, G. (2002). Geodynamics (2nd Edition). Cambridge University Press

Reference

1. Condie, K. C. (1997). Plate tectonics and crustal evolution. Butterworth-Heinemann, Oxford
2. Van der Pluijm, B.A. & Marshak, S. (2004). Earth Structure: An Introduction to Structural Geology and Tectonics (2nd Edition). WW Norton & Company.