

INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

1. Name of the Academic Unit: Geology and Geophysics

2. Subject Name: Introductory Geophysics L-T-P: 3-0-0
Credits:3

3. Pre-requisites: NA

4. Syllabus and reference books:

Syllabus:

Basic of various branches of Geophysics and its inter relations.

Importance of radioactive study in Geophysics, radioactive series and equilibrium, Rutherford Soddy's relations and applications, Applications of radioactivity to studies of Earth's interior, geochronology and environmental studies.

Geothermal basics and evolution. Modeling of temperature using Maxwell's equation, implications of Clausius-Clapeyron and Weidman Franz law for the temperature models within the mantle and core, adiabats in the oceanic and continental lithosphere,

Elasticity basics and variation of bulk modulus and rigidity modulus and its implications, creep and inelasticity of the mantle, diffusion creep and dislocation creep.

Global seismology, Seismotectonics Seismic Ray theory, Seismic wave velocities and the interior of the earth, Richter, Gutenberg and PREM models of velocity distribution within the Earth, density modelling, Adams-Williamson equation and its application for density models.

Geopotential and gravity field, isostatic equilibrium and compensation, isostatic systems and their applications

Earth's magnetic field and the elements of geomagnetism, origin of geomagnetic field, magnetism of minerals and rocks, polar wandering,

Reference Books:

- 1.The Solid Earth by C.M.R. Fowler, Cambridge University Press
2. Looking into the Earth by Alan E . Musset and M. Aftab Khan, Cambridge University Press
- 3.Introduction to Seismology by Peter M. Shearer, Cambridge University Press
- 4.Applied Geophysics by W.M. Telford, L.P. Geldart and R.E. Sherifi, Cambridge University Press
- 5.Fundamentals of Geophysics by W. Lowrie, Cambridge University Press

6. Geodynamics by D L Turcotte and Schubert, Cambridge University Press

5. Lecture-wise break-up:

Sl. No.	Topic	No. of lectures
1.	Basic of various branches of Geophysics and its inter relations.	2
2.	Importance of radioactive study in Geophysics, radioactive series and equilibrium, Rutherford Soddy's relations and applications, Applications of radioactivity to studies of Earth's interior, geochronology and environmental studies.	10
3.	Geothermal basics and evolution. Modeling of temperature using Maxwell's equation, implications of Clausius-Clapeyron and Weidman Franz law for the temperature models within the mantle and core, adiabats in the oceanic and continental lithosphere.	10
4.	Elasticity basics and variation of bulk modulus and rigidity modulus and its implications, creep and inelasticity of the mantle, diffusion creep and dislocation creep.	6
5	Global seismology, Seismotectonics Seismic Ray theory, Seismic wave velocities and the interior of the earth, Richter, Gutenberg and PREM models of velocity distribution within the Earth, density modelling, Adams-Williamson equation and its application for density models.	7
6	Geopotential and gravity field, isostatic equilibrium and compensation, isostatic systems and their applications.	4
7	Earth's magnetic field and the elements of geomagnetism, origin of geomagnetic field, magnetism of minerals and rocks, polar wandering.	4
Total number of hours		43