

Paper No-12: Geophysics

Introduction to geophysics, different branches of geophysics and relationship with other sciences. Formation of solar system, theories explaining its origin and characteristics of various planetary members; Earth: its rotation and figure. Gravity and its variation over the Earth (4lectures)

General and Exploration geophysics- Different types of geophysical methods; Gravity, magnetic, Electrical, Seismic- their principles and applications. Concepts and Usage of corrections in geophysical data. (12 lectures)

Geophysical field operations.- Different types of surveys, grid and route surveys, profiling and sounding techniques, scales of survey, presentation of geophysical data. (6 lectures)

Application of Geophysical methods - Regional geophysics, oil and gas geophysics, ore geophysics, groundwater geophysics, engineering geophysics. (6 lectures)

Geophysical anomalies : correction to measured quantities, geophysical, anomaly, regional and residual (local) anomalies, factors controlling anomaly, depth of exploration. (4 lectures)

Introduction to well log techniques. Principles of some basic logging methods (2 lectures)

Integrated geophysical methods - Ambiguities in geophysical interpretation, Planning and execution of geophysical surveys. (2 lectures)

12 rounds of student presentations will be arranged in Groups on different topics covered under Theory

Practicals: (12 lectures)

1. Identification of residual gravity anomaly from supplied data sheet and drawing transect
2. Problems on two-layer seismic refraction
3. Drawing of isopach map and interpretation
4. Interpretation of seismic reflector geometry
5. Problems on well-log
6. Electrical resistivity survey

Proposed project (extendable)

1. Comparative study of different well log techniques
2. Project of Logging while drilling (LWD)
3. Crustal structure through geophysical signals
4. Discontinuities in Earth structure. How geophysics help in delineating those?
5. Geophysics- A tool in mineral exploration
6. Electrical survey of different areas of Delhi NCR

Suggested Readings:

1. Outlines of Geophysical Prospecting - A manual for geologists by RamachandraRao, M.B., Prasaraanga, University of Mysore 1975.
2. Exploration Geophysics - An Outline by Bhimasarikaram Y.L.S., Association of Exploration Geophysicists, Osmania University,Hyderabad, 1990.
3. An introduction to Geophysical Prospecting by Oobrin, M.B. and Savit, C.H., McGraw Hill, New Delhi, 1988.
4. Applied Geophysics by Telford W.M. Geldart L.P., Sheriff, R.E. and Keys D.A. Oxford and IBH Publishing Co. Pvt., Ltd. New Delhi, 1976.