Course Type	Course Code	Name of Course	L	T	P	Credit
DC	GPC511	**Seismic Data Acquisition**	3	0	0	9

Course Objective
Knowledge on seismic wave theory. Knowledge on 2D seismic data acquisition technique. Knowledge on 3D seismic data acquisition technique. Knowledge on various shooting technique and challenges for marine seismic data acquisition technique. Knowledge on shear data acquisition technique. Finally laboratory and on field practical classes will provide knowledge on seismic data acquisition technique in various geological condition with different geometry and shooting condition.
Learning Outcomes
Upon successful completion of this course, students will:
The primary objective of the course is to introduce fundamental and advanced aspects of seismic data acquisition technique which is vital part for applied geophysics study of any kind sub-surface geological study. The underlying physics and mathematics of the various seismic analysis methods are presented through theory and practical classes, giving students an appreciation of their limitations and potential for creating models of the subsurface.

Unit No.	Details of Lectures	Lecture Hrs.	Outcome
1.	**Fundamentals to seismic wave theory:** Seismic attenuation, reflection and transmission coefficients, Knott and Zoeppritz equations. Geometry of reflection ray path and time distance relationship, seismic noise and their cause. Travel time relation for direct, reflected and head waves over multi layered earth.	5	Fundamentals of Seismic waves
2.	**Instrumentation study for seismic data acquisition:** Land and marine energy sources, electromagnetic pulse and Accelerated Weight Drop. Basic theory and working principle of seismic transducers. Concept of seismic channel. Seismic recording instruments. Non-distributed and distributed systems. Seismic telemetry system.	5	Instruments and Seismic data acquisition system
3.	**Shooting technique:** Various refraction shooting techniques: such as profiling and reverse. Uphole Survey	4	Shooting technique for seismic data acquisition
4.	**Methodology for 2D reflection survey design:** Different kinds of spread geometries, end on, slit spread, crooked lined profiling, linear and tapered geophone arrays, effect of arrays on the seismic response, optimization of spread geometry, offset matching, source arrays. Common depth point shooting and its advantages.	6	2D seismic reflection survey design
5.	**Methodology for 3D reflection survey design:** Different 3D geometries, Fresnel Zone, swath, Offset, Frequency, Fold, Bin, Migration Aperture, SLI, RLI, Template, Group Interval, Channel, 3D survey design shootings- in line, slant	7	3D seismic reflection survey design

	and orthogonal, Spread Type & Arrays, Vertical and Horizontal resolution, Acquisition Filters, Optimization of source and receiver lines, optimization of different offsets.		
6.	**Marine seismic data acquisition technique and Navigation system:** Offshore survey: Single, streamer and multiple streamer surveys, feathering, Q-Marine, OBS & OBN surveys. Various navigation and positioning systems used for reflection survey, Shallow Hazard Seismic Data acquisition Technique and Acquisition Footprints. Introduction to shear data acquisition technique.	6	Marine seismic data acquisition techniques and navigation system
7.	**Basic Seismic data Processing:** Introduction to seismic data processing, Preparation of standard seismic data processing workflow and overview of processing steps and requirement,	3	Seismic data processing technique
8.	**Seismic data Interpretation:** Outlook of seismic data interpretation, Identification of various features in seismic data	3	Seismic data interpretation technique
	Total Classes	**39**	

Text Books:

1. Al Sadi, H. M., 1982, Seismic Exploration: Birkhauser Verlag.

2. Dobrin, M. B., and Savit, C. H., 1988, Introduction to Geophysical Prospecting (Fourth Edition), Tata McGraw Hill.

3. Evans, B., Field Geophysics: SEG Publications

4. Telford, W. M., Geldart, L. P., Sheriff, R. E., and Keys, D. A., 1988, Applied Geophysics.

5. Yilmaz, O., Seismic data processing, SEG Publication.

Reference Books

1. Grifith, and King, Applied Geophysics for Engineers and Geologists.

2. Kearey, P., Brooks, M., and Hill, I., 2002, Introduction to Geophysical Exploration: BlackWell Scientific   Publications.

3. Lavergene, M., Seismic Methods.

4. Lindseth, R. O., 1976, Digital processing of geophysical data - A review: Technical Publication

5. Parasnis, D. S., 1997, Principles of Applied Geophysics (Fifth Edition), Chapman and Hall.

6. Field records and on field setup literature (SEG/EAGE publication)

7. National and International Journal Published Paper for Case Studies