Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NGPC529	**Seismic Data Processing and Interpretation**	3	0	0	3

Course Objective
Knowledge on fundamentals of seismic data processing. Knowledge on 2D and 3D seismic data processing technique. Knowledge on 3D seismic data special processing technique. Knowledge on seismic data modelling technique and converted wave processing technique. Knowledge on processed seismic data interpretation.
Learning Outcomes
The primary objective of the course is to introduce fundamental and advanced aspects of seismic processing, modelling and interpretation technique which is vital part for applied geophysics stud any kind sub-surface geological study. The underlying physics and mathematics of the various seis analysis methods are presented through theory and practical classes, giving students an appreciatio their limitations and potential for creating models of the subsurface.

Unit No.	Details of Lectures	Lecture Hrs.	Outcome
1.	**Fundamental of seismic data processing and its basic steps:** Introduction to seismic data processing. Processing sequences- preparation of processing geometry, quality checks, true amplitude recovery, deconvolution, filtering, velocity analysis, Statics Corrections, NMO corrections, Stacking; Complex- trace analysis; Hilbert transform (instantaneous frequency; instantaneous phase); noise elimination through multichannel filtering, parameter optimization for generation final stacked section. Discrete time sequence; Z-transform, Linear system; Filtering system, Frequency alias; Nyquist frequency; Interpolating; Low-pass, high-pass, band-pass filters; Notch, Moving average; Gibbs effect; Spectral analysis, Zero Phase; Linear phase shift, DMO and migration.	7	Details of seismic data processing
2.	**3D seismic data processing techniques**: Generation of time slice and stacked sections for both land and marine.	6	3D seismic data processing technique
3.	**Special seismic data processing technique:** Pre Stack Time Migration and Pre Stack Depth Migration, Introduction of Reverse Time Migration.	6	2D/3D seismic data special processing sequences
4.	**Seismic modelling**: Introduction to wave equations & wave equation modelling, VSP and converted wave processing.	6	Seismic modeling for processing and vertical seismic profile/well bore seismic

5.	**Introduction to seismic data interpretation:** Overview of Seismic Stratigraphy. Wavelet analysis for seismic stratigraphic interpretation. Seismic sequence analysis and seismic facies analysis.	6	Fundamentals of seismic data interpretation for different components of seismic; comparative analysis of seismic data

6.	**Seismic data interpretation technique:** Study of seismic section and other geological aspects of prospecting, structural interpretation, construction of isochron and isopach maps, thin bed resolution and pitfalls, LRLC interpretation, AVO and attribute analysis, Prospect evaluation & Ranking, Basis of seismic interpretation in workstation environment.	7	Steps for analyzing seismic data for interpretation; types of interpretation for conventional and challenging reservoir
7.	**Case study:** a) Case study for seismic processing and modelling for Salt and Coal Environment, b) Case study for seismic processing, modelling and interpretation for Unconventional reservoir, c) Case study for seismic processing and modelling for Carbonate reservoir	4	Case study for conventional, unconventional and challenging reservoir for seismic data processing and interpretation
	Total	**42**	

Text Books

1. Al Sadi, H. M., 1982, Seismic Exploration: Birkhauser Verlag.
2. Claerbout, J. F., 1985, Imaging the interior of the earth, BlackWell Scientific Publications.
3. Lavergene, M., 1986, Seismic Methods.
4. Dobrin, M. B., and Savit, C. H., 1988, Introduction to Geophysical Prospecting (Fourth Edition), Tata McGraw Hill.
5. Yilmaz, O., 1987, Seismic data processing, SEG Publication.

Reference Books

1. Digital Signal Processing by Oppenheim and Schafer
2. Field Traces hard/soft for SEG publication
3. Lindseth, R. O., 1976, Digital processing of geophysical data - A review: Technical Publication
4. National and International Journal Published Paper for Case Studies
5. SEGD data for from SEG publication/Industry/Field Acquired
6. Telford, W. M., Geldart, L. P., Sheriff, R. E., and Keys, D. A., 1988, Applied Geophysics.
7. Waters, K. H., Reflection Seismology (Third Edition), John Wiley Publications