16PL202 PETROLEUM EXPLORATION

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	-	20	50	-	5	5	5

Course Description and Objectives:

This course mainly deals with exploring and analyzing active processes of the earth through physical measurement .The objective of this course is to expose students to a broad spectrum of geophysics, including resourse exploration, environmental geophysics, seismology and tectonics.

Course Outcomes:

The student will be able to:

- understand the physics and geology that form the basis for geophysical observation and measurement
- understand Earth structure and evolution
- apply skills developed in fundamental courses to geophysical problems.
- quantitatively describe the behavior of natural systems and the principles of geophysical measurement with physics-based mathematical models.

SKILLS:

- ✓ *Identify the physical processes governing the behavior of common geophysical systems*
- ✓ *Explain the principles of applying geophysical methods to societally relevant problems, including natural hazards, resource exploration and management, and environmental issues*
- ✓ *Quantitatively describe the behavior of natural systems and the principles of geophysical measurement with physics-based mathematical models.*

ACTIVITIES:

- *Research, analyze, and synthesize solutions to an original and contemporary geophysics problem.*
- *Make their own observations with a variety of geophysical instruments, and reduce, model, and interpret their data and uncertainties.*

UNIT - 1 **L- 10**

Reflection Seismics: Basic Principle and Objective, Theory of seismic wave propagation, Types of seismic waves, Absorption and attenueation, reflection, refraction, diffraction and mode conversion of seismic waves.

UNIT - 2 **L-9**

2-D and 3-D seismic data acquisition: Survey objective, geological plan, logistics in the area, recording technique, Seismic velocities, geometry of seismic wave path.Recording systems, geophones, cables and ground electronics. Common depth point technique.

UNIT - 3 **L-9**

Seismic Data Processing: Objective, concept of autocorrelation, cross correlation and convolution, understanding processing parameters such as deconvolution, NMO, velocity analysis, filtering, stacking and migrations, understanding the concept of time domain and frequency domain for seismic wave and fourier transform. Processing systems.

UNIT - 4 **L-8**

Seismic Data Analysis and Interpretation: Objective, understanding seismic data in terms of geological information, structural information, statigraphic information, seismic attr ibutes, direct detection of hydrocarbons – AVO technique, inversion integrating geophysical data with geological understanding and identifying prospects for drilling.

Refraction Method: Basic principle, geometry of refracted wave path, methodology of refraction profiling, field surveys, recording instrument and energy source. Corrections applied to refraction data. Interpretation of refraction data for understanding basin configuration.

UNIT - 5 **L-9**

Gravity Method: Basic principle and objective, recording instrument, recording technique, data analysis including various gravity corrections, gravity anomalies and geological features.

Magnetic Method: Basic principle and objective, recording instrument, data analysis including various magnetic corrections, magnetic anomalies and geological features.

Aeromagnetic method: Recording technique and objective, operations advantage.

TEXT BOOKS:

1. Fundamentals of Geophysics, Lowri, W ., Cambridge University Press. (1997).

REFERENCE BOOKS:

1. Introduction to Geophysical Prospecting, Dobrin M.B., New York, McGraw-Hill, Inc.
2. Basic Exploration Geophysics, Robinson, E.S. and Coruh C., John Willey and Sons, New York,1998.
3. Applied Geophysics, Telford,W.M. ,Geldart L.P., Sheriff, R.E., Keys, D.A. (1990).
4. The solid Earth by Fowler.
5. Seismic Interpretation: The Physical Aspect, Anstey N.A., Boston, IHRDC.
6. Seismic data processing: by Yilmaz