

Subject Code: 1ET4060304	Subject Title: Petroleum Exploration
Pre-Requisite	--

RATIONALE:

The students of petroleum engineering are mainly involved in survey of land for finding petroleum under the ground with various techniques. After finding the suitable land having worth amount of petroleum data will given to further drilling engineers for further process of drilling petroleum well. The actual petroleum production will start after drilling well and installation of the equipment for pumping the crude.

This course has been introduced at Diploma level in order to develop the skills in student so that they can understand the various methods of finding the crude resources under the ground with latest technologies.

COMPETENCY:

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire knowledge of petroleum exploration.

COURSE OBJECTIVE:

1. To provide the fundamental of petroleum exploration, different methods of geophysical surveys and instruments used for it.
2. To provide the understanding of geophysical data interpretation and analysis
3. To provide how to examine the acquired data to understand the position and extent of subsurface prospects in terms of depth and aerial

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment
3	-	2	4	60	40	20	30

DETAILS OF COURSE CONTENTS:

UNIT	TOPIC	Total Hrs.	Weightage in marks
1	Fundamentals of Petroleum Exploration Ingredients of Petroleum Exploration, Concept of source,	14	20

	reservoir, migration, trap and seal, Concept of Play, Lead, Prospect and Drillable Prospect, Types of Petroleum Traps- Structural, Stratigraphic and Combinational traps, Primary and Secondary Migration, E&P Life Cycle, Concept of Reserve, Lease and Reservoir, Techniques of Petroleum Exploration, Geochemical, Gravity, Magnetic, Electrical and seismic method of hydrocarbon exploration.		
2	Geochemical Analysis Geochemical seep, Classification of seep by Link, Weathering of seeps, a geochemical program for petroleum exploration, Surface Reconnaissance, hydrocarbon Mud Logging, Rock Pyrolysis, Understanding S1, S2, S3, S1/S1+S2, Production Index, Hydrogen Index and Oxygen Index, Processing and interpretation of Geochemical data.	8	12
3	Fundamentals of Seismic processing, Interpretation and Attribute Body waves and surface waves, Rayleigh, P and S wave, Seismic acquisition principle, Seismic refraction and reflection surveys, Land and marine sources, Geophone, Hydrophone and Vibroseis survey, Seismic Fold, Signal and Noise, Seismic Processing, SEG D and SEG Y format, CDP/CMP and NMO, DMO, Seismic migration, Base map, Strike Line and Dip Line, 2D and 3D seismic, inline and cross line, 3D fold, time slice and its importance. Horizon and Fault mapping, Seismic impedance and reflection coefficient, convolution and autocorrelation, Fault skeleton preparation, wrench system Structural and Stratigraphic interpretation, Synthetic generation, Time and depth map, VSP survey, Attributes: Amplitude, Frequency and Sweetness, AVO analysis, Classification of sands, Rock solid attributes.	10	14

4	G and M Methods Gravity and magnetic prospecting, Instruments of G&M survey, Gravity and magnetic data correction, Interpretation of G&M anomaly, Correlation of Gravity anomaly with seismic anomaly SP, Telluric and Magnetotelluric data interpretation, Electrical properties of hydrocarbon, Electrical conductivities, Resistivity of various lithologies, Dielectric constants, land airborne EM, Interpretation and modeling of data, Potential estimation for various buried bodies, Anomaly and well placement based on electrical data. Basic well logs, GR	10	14
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COURSE OUTCOME:

On completion of the course, student will be able to

CO1- Evaluate prospects and drillable prospects

CO2- Understand the petroleum system along with the source analysis

CO3- Examine the Process of gravity, magnetic, seismic and resistivity data acquisition, processing and interpretation will help students to handle instruments like gravimeter, magnetometer, seismometer, seismometer and resistivity meter.

CO4- Integrate gravity and magnetic data to understand the density and magnetic susceptibility of the subsurface

CO5- Integrate seismic, well log and other geophysical data for volume estimation

CO6- Examine the structural and stratigraphic data to understand the position and extent of subsurface prospects in terms of depth and aerial extent

LIST OF PRACTICAL:

1. Basics of Contouring
2. Gravity data Acquisition
3. Gravity Data Processing and Interpretation
4. Magnetic Data Acquisition
5. Magnetic Processing and Interpretation
6. Seismic Data Acquisition (Shallow Seismic-Hammer source)

7. Seismic data processing (Shallow seismic-Hammer source)
8. Seismic data interpretation (Shallow seismic-Hammer source)
9. Unconformity and Seismic facies identification
10. Horizon and Fault Mapping of processed 2D line
11. Identifying Play, Lead and Drillable prospects from seismic data

LIST OF REFERENCES:

Sr. No.	Title of Books	Author	Publication
01	Introduction to Sedimentology	Supriya Mohan Sengupta	A.A.Balkema publication
02	Reservoir Seismology	Mamdough, R. Gadallah	Pennwell Books, Pennwell Publishing Company, Tusa, Oklahoma
03	Applied Geophysics	Telford, W M, Geldart, L.P., Sheriff, R.E. and Keys, D.E.,	Oxford and IBH Publishing Co Pvt Ltd.