

Subject Code: 1ET4060201	Subject Title: Petroleum Geology
Pre-Requisite	----

RATIONALE:

Petroleum geology concepts have been evolving in recent years with the development of shale gas and tight oil. The old methodology for conventional resources that relied on assessing source rocks, thermal maturity, migration paths, and reservoir traps and seals has become mostly irrelevant for continuous, unconventional resources like shale. For these resources, some level of production is possible from almost anywhere in the formation, although some locations typically produce better than others. Finding these so-called “sweet spots” and understanding the geological parameters that create them have become the new focus of petroleum geology.

COURSE OBJECTIVE:

This basic course in petroleum geology is designed to train the students to understand the basics of geology: formation of earth, layers of earth, different types of rocks, formation of sedimentary basins and the micro fossils and their relationship to oil and gas.

- It exposes the students to different geological environments relates to petroleum industry

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment	
2	0	2	3	-	-	-	50	50

DETAILS OF COURSE CONTENTS:

SR. NO.	TOPIC	TOTAL HOURS	WEIGHTAGE (%)
1	General Geology 1.1. Geology: definition, Branches 1.2. Importance of Geology for petroleum. 1.3. Origin of Earth- age, internal structure and constitution of earth 1.4. Introduction to earth's lithosphere, atmosphere, hydrosphere, and biosphere; plate tectonic theory, tectonic elements of continents and oceans; continental drift; concept of isostasy. 1.5. Explanation from history & organic evolution, rate of sedimentation, salinity of sea water, rate of cooling, radiometric dating.	06	14

2	Physical Geology 2.1. Physical & Chemical Weathering. 2.2. Soil profile, soils types, like Residual and Transported soil. 2.3. Introduction of works of wind, stream, sea & Glaciers. 2.4. Introduction of volcanoes & Earth quakes.	04	14
3	Primary Structures 3.1. Definition, classification into Major & Minor types 3.2. Significance of studying all such primary features 3.3. Why they are called Top & Bottom? 3.4. Description of different important primary features.	03	09
4	Attitude of Beds Advance Form Controls 4.1. Define-strike, Dip, angle of dip, & direction of dip, initial dip, True dip & apparent dip.	03	09
5	Secondary Structures 5.1. Geological folds: origin, categories of folds, parts of folds, Nomenclature of different folds 5.2. Description with three dimensional diagrams. Preconisation off old sin the field, on geological Map, Underground. 5.3. Geological joints: description of some important joints. 5.4. Faults in Geology: Distinction between joints & fault, origin, classification, Description of important faults with three dimensional figures. 5.5. Different types of Unconformity- Definition with three dimensional sketches.	08	14
6	Crystallography & Mineralogy 6.1. Definition of crystal & Mineral 6.2. Classification of crystal systems & classification of Minerals 6.3. Physical properties of Minerals 6.4. Description of important Rock forming & Economic Mineral sin terms of their physical properties & chemical composition.	09	20
7	Petrology 7.1. Kinds of Rocks: description & 7.2. comparison of Igneous, sedimentary, Metamorphic rocks 7.3. Igneous Rocks: Mode of formation, classification, Characteristics, properties. Effect of injections on sedimentary rocks like coal seams. 7.4. Sedimentary Rocks: Formation, Different classes, characteristic properties of sedimentary rocks. 7.5. Metamorphism & Metamorphic rocks: Characteristic & properties. 7.6. Important of Igneous, sedimentary & metamorphic rocks : Megascopic studies only, their uses of & occurrence in India with particular reference to lignite, lime stone, Multi metal & other major minerals occurring in Gujarat other major mineral deposits of India.	09	20
TOTAL		42	

COURSE OUTCOME:

1. Discern the dimension of earth structure, composition, origin of earth, formation of earth. It deals essence of scientific studies dealing with the origin, age, structure of the earth and with

the evolution, modification, and extinction of various surface and subsurface physical features.

2. Understand the land forms as geomorphology, physiography and to gain a better perspective conforming to the present day thinking on the aspects of geology.
3. Understand different types of primary structures & textures & its significance.
4. Understand the origin of different kinds of igneous, sedimentary, metamorphic rocks that can be understood in terms of their tectonic setting.

LIST OF PRACTICAL:

The exercises/practical/experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency. Following is the list of exercises/practical/experiments for guidance.

Sr. No.	Suggested List of Practical/ Drawings Exercises
1	Observe samples of minerals and study and record their physical properties.
2	Determining the Specific Gravity of Minerals by various methods
3	Observe samples of igneous Rocks with Tabular Classification Megascopic ally and record their properties.
4	Observe samples of sedimentary Rocks with Tabular Classification Megascopic ally and record their properties.
5	Observe samples of Metamorphic Rocks Megascopic ally and record their properties.
6	Study and Identify important Rock forming Minerals in Hand Specimen
7	Observe samples of important Economic Minerals in Hand Specimen
8	Draw sketch of model showing different types of Faults, Folds and their relations to photography.

LIST OF REFERENCES:

S. No.	Title of Books	Author	Publication
1.	General & Engineering Geology	Parbin Singh	SK Kataria & Sons
3.	Engineering Geology	R. S. Khurmi	Dhanpat Rai & Co. Ltd
5.	Principle of Petrology	Tyrell	Chapman and Hall Publication
6.	Physical Geology	Dutta	Macmillan Publishers Ind. Ltd.
7.	Text book of Geology	G. B. Mahapatra	CBS Publishers And Distributors
8.	Structural Geology	M.P. Billings	Prentice-Hall Publication