

20PEB123					SEDIMENTARY AND PETROLEUM GEOLOGY					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hours/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	-	-	100

COURSE OBJECTIVES

- Demonstrate the fundamentals of sediments
- Demonstrate the geological process involved in formation of rocks
- Imbibe the knowledge of petroliferous Basins of India
- Improve analytical skills to interpret the geological history with current state of rocks

Unit – I

Hours- 9

Sedimentology: Subaerial weathering processes: physical and chemical weathering; distinction between soil, alluvium and sediments; Transport and deposition of sediments: fundamentals of fluid flow, particle transport by fluids and by sediment gravity flows. Sedimentary textures: grain size, particle shape, sorting and fabric and their effect on porosity and permeability of sedimentary rocks; sedimentary structures: stratification and bedforms, bedding plane markings; paleocurrent analysis.

Unit – II

Hours- 10

Sedimentary Rocks and Depositional Environments: Diagenesis of siliciclastic sediments. Classification of siliciclastic sedimentary rocks: rudaceous, arenaceous, and lutaceous sedimentary rocks; carbonate sedimentary rocks: textures, classification, diagenesis; other nonclastic sedimentary rocks: evaporites, cherts, coal, oil-shale. Introduction to different types of sedimentary basins. Introduction to depositional environments: Eh-pH fence diagram; continental (fluvial, lake, aeolian), marginal marine (estuarine, lacustrine), shallow marine (tidal flat, beach, deltaic), shelf and deep marine environments.

Unit – III

Hours-10

Origin and Migration of Petroleum: Introduction to petroleum system. Theories of inorganic, Organic and duplex origin of petroleum. Conversion of organic matter to petroleum: diagenesis of organic matter and formation of kerogens, pristane and phytane; classification of kerogens; catagenesis, and metagenesis of kerogens; thermal maturity indicators. Classification, composition, and physical properties of crude oils; composition of natural gases. Primary, Secondary, and Tertiary Migrations; physico-chemical aspects of migration of petroleum; effects of temperature (geothermal gradients, thermal conductivities of subsurface rocks) and pressure (types and causes of subsurface pressures) on primary and secondary migration; possible modes of primary migration of petroleum; mechanisms of secondary migration under hydrostatic and hydrodynamic conditions; petroleum prospect of sedimentary basins; termination of secondary migration and accumulation of oil and gas; oil/gas saturation in reservoirs. Reconstruction of the migration history.

Unit – IV

Hours- 10

Petroleum Traps and Petroliferous Basins of India: Traps and their associations. Cap rock and seal formation: lithological aspects and capillary characteristics of seals; diagenetic seals. Trap formation: structural – fold (anticlinal) traps, fault (sealing/non-sealing) traps; growth faults; traps associated with salt domes; stratigraphic – channel sand, up-dip wedges, sand lenses, sand bars; carbonate traps (bioherm and biostrome), etc. Classification of sedimentary basins of India. Structures, petroleum geology of petroleum producing basins of India.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- recognize, describe and classify the different types of sediments and sedimentary rocks; and petroleum components too;

CO2- understand and analyse the different components of the petroleum system;

CO3- analyse the depositional environment and correlate with the petroleum system;

CO3- evaluate the petrophysical properties of the sedimentary rocks, and estimate the reservoir potential and evaluate the seal integrity;

CO5- evaluate the petroleum source rocks, and estimate the petroleum potential of the petroleum system(s) in a sedimentary basin;

CO6- understand, and analyse the different components of the petroleum systems viz., source rocks, reservoir rocks, migration paths, and traps in the different petroliferous basins of India thereby evaluate the petroleum potential of a sedimentary basin.

TEXT / REFERENCE BOOKS

1. Sengupta S.M.: Introduction to Sedimentology.
2. Kunt Bjorlykke: Sedimentology and Petroleum Geology.
3. F.J. Pettijohn: Sedimentary Rocks.
4. Sam Boggs Jr: Principals of Sedimentology and Stratigraphy.
5. Reineck H.E. and Singh I.B.: Depositional Sedimentary Environments; Springer.
6. Killips and Killips: Introduction to Organic Geochemistry.
7. B.P. Tissot and D.H. Welte: Petroleum formation and occurrence: a new approach to oil and gas exploration.
8. F.K. North: Petroleum Geology.
9. Lavorsen: Petroleum Geology

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: 10 Questions of 2 marks each-No choice

20 Marks

PART B: 2 Questions from each unit with internal choice, each carrying 16 marks

80 Marks