22PEB201T					Thermodynamics of Petroleum Reservoir Fluids					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- To provide the understanding of fundamentals of thermodynamics of reservoir fluids and their phase behaviour
- To provide the concept and understanding of fluid sampling and PVT study
- To provide the understanding of compositional characterization and application of various correlations in real field and simulation application

Unit-1 Reservoir fluids and Hydrocarbon phase behaviour **10 Hrs.**

Reservoir and reservoir fluids, Hydrocarbon-formation in source rock and crude oil in reservoirs, Thermodynamic behaviour – single, two, three and multicomponent system. Physical properties of petroleum reservoir fluids, classification of reservoirs and reservoir fluids

Unit 2 Properties Hydrocarbon components, characterization and correlation **10 Hrs.**

Natural gas properties, behavior of ideal and real gases. Characterizing Hydrocarbon-plus fractions: generalized correlations, PNA determination, splitting and lumping scheme including various correlation methods.

Unit 3 Sampling, PVT properties and laboratory study of PVT **10 Hrs.**

Collection of reservoir fluid samples for PVT study, PVT analysis: Constant composition expansion, flash liberation, differential liberation, separator test for PVT data of hydrocarbon fluids. Evaluation and correlation of physical and chemical properties of reservoir fluids including laboratory and empirical methods. Water from petroleum reservoirs, water production and parameters

Unit-4 Equation of state and application **9 Hrs.**

Vapor-liquid equilibrium calculation, Use of various equations of state for simulation of laboratory PVT data, tuning EOS parameters and original fluid composition calculation.

Total 39 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Understand the compositional range of hydrocarbon components present in reservoir fluids with crude typing.
CO2- Understand hydrocarbon phase behaviour in dynamic reservoir conditions.
CO3- Understand chemical characterization of hydrocarbon reservoir fluids and available correlations.
CO4- Design sample collection for various purposed and understand PVT study and analysis
CO5- Analyse situation dependent applicability of different correlation and equation of state (EoS).
CO6- Apply the knowledge for petroleum engineers real field activities.

TEXT/REFERENCE BOOKS

1. Equation of state and PVT analysis: Applications for improved Reservoir Modelling, Tarek Ahmed, Gulf Publishing Company 2007
2. Thermodynamics of Hydrocarbon Reservoirs, Abbas Firoozabadi, McGraw-Hill.
3. PVT and Phase behavior of Petroleum Reservoir Fluids, Ali Danesh, Elsevier, 1998.
4. Properties of Petroleum Rocks and Fluids, Abhijeet Dandekar.
5. PVT Property Correlations: Selection and estimation, Ahmed El-Banbvi, Ahmed Alzahabi, Ahmed El-Maraghi, Gulf Publishing Company 2018

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

PART A: <Question: <Short Notes, Problems, Numerical> **20 Marks**

PART B: <Justification, Criticism, Long answers, Interpretation > **80 Marks**