Name: **Enrolment No:**	

UPES

End Semester Examination, May 2024

Course: Reservoir Engineering **Semester: IV**

Program: B. Tech Applied Petroleum Engineering Upstream **Time : 03 hrs.**

Course Code: PEAU 2013 **Max. Marks: 100**

Instructions:
All Questions are Mandatory.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Propose factors that influence the selection of an appropriate reservoir drive mechanism.	**4M**	**CO2**
Q 2	Investigate a scenario with specific reservoir temperature and pressure and predict which type of reservoir fluid (oil or gas) would be more likely present.	**4M**	**CO3**
Q 3	Explain the concept of permeability and its units (e.g., Darcy, millidarcy). How does permeability relate to the ease of fluid flow through a rock?	**4M**	**CO1**
Q 4	Analyze the possible reasons for reservoir fluid samples collected from a well indicating a decrease in gas-oil ratio (GOR) over time.	**4M**	**CO4**
Q 5	A core is 3 $in.$ long and 2 cm in diameter. When the core is maintained at an upstream pressure was 29.4 $psia$ and downstream pressure was 14.7 $psia$, flow rate of 10 cm^3/sec of air (μ = 0.018 cp) was recorded at downstream pressure. Calculate the permeability of the core in Darcys.	**4M**	**CO2**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	a) Critically analyze the environmental impact of various reservoir drive mechanisms, including the potential risks associated with water and gas injection techniques. b) Evaluate the sustainability of different drive mechanisms in the context of minimizing carbon emissions and water usage.	**5M +5M**	**CO4**
Q 7	Illustrate how reservoir fluid properties such as composition, density, viscosity, and formation volume factor influence the behavior of fluids in a reservoir.	**10M**	**CO3**
Q 8	Given a core sample from a reservoir, describe the laboratory tests you would perform to evaluate its suitability for hydrocarbon production.	**10M**	**CO2**

Q 9	Illustrate the concept of reservoir wettability and the different wettability states (water-wet, oil-wet, mixed-wet). How does wettability affect the distribution of fluids within the rock pores?	**10M**	**CO3**
	(OR)		
Q 9	Analyze the impact of capillary pressure and capillary hysteresis on multiphase flow in reservoirs. How do these phenomena affect reservoir performance, recovery efficiency, and fluid displacement processes?	**10M**	**CO3**
SECTION-C (2Qx20M=40 Marks)			
Q 10	a) Compare and contrast the phase diagrams of a single-component hydrocarbon system and a multi-component hydrocarbon system. Highlight the key differences in terms of phase boundaries, critical points, and phase behavior complexities. b) Illustrate different techniques used for hydrocarbon reservoir fluid sampling, and how they vary based on the type of reservoir and fluid composition.	**10M + 10M**	**CO3**
Q 11	The following data are given for the Hout Oil Field: Area = 26,700 acres Net productive thickness = 49 ft Porosity = 8% Average Sw = 45% Initial reservoir pressure, p_i = 2980 psia Abandonment pressure, p_a = 300 psia, B_o at pi = 1.68 bbl/STB B_o at pa = 1.15 bbl/STB S_g at pa = 34% S_{or} after water invasion = 20% Calculate the following: 1) Initial oil in place 2) Oil in place after volumetric depletion to abandonment pressure 3) Oil in place after water invasion at initial pressure 4) Oil reserve by volumetric depletion to abandonment pressure 5) Oil reserve by full water drive 6) Interpret your answers	**20M**	**CO4**