Name: **Enrolment No:**	

UPES

End Semester Examination, December 2023

Course: Reservoir Surveillance and Management **Semester: V**

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

Course Code: PEAU 3022 **Max. Marks: 100**

No of pages: 2

Instructions: Attempt all the questions section wise serially. Use diagrams where necessary.

SECTION A

(5Qx4M=20Marks)

S. No.	Statement of question	Marks	CO
Q1	Explain the purpose of waterflooding. Does it form a part of primary recovery. State the factors to considered during waterflooding.	**4**	**CO2**
Q2	Illustrate using diagrams the pattern of fluid flow rates during primary, secondary and tertiary recovery. How does it influence the overall fluid recovery.	**4**	**CO2**
Q3	Highlight the significance of reservoir surveillance and discuss the rock and fluid properties that can be determined using this technology.	**4**	**CO3**
Q4	Describe the Overall Recovery Efficiency and displacement efficiency.	**4**	**CO2**
Q5	Analyze the role of 4D seismic or time lapse geophysics in reservoir surveillance.	**4**	**CO1**
	SECTION B **(4Qx10M= 40 Marks)**		
Q6	Explain the Reservoir Management and Reservoir Management Process in detail.	**10**	**CO4**
Q7	Elaborate the relation between water saturation (average and initial saturations) and displacement efficiency (E_D), considering no initial gas present in the reservoir. A saturated oil reservoir is under consideration to be waterflooded immediately after drilling and completion. Core analysis tests indicate that the initial and residual oil saturations are 80% and 40%, respectively. Calculate the displacement efficiency when the oil saturation is reduced to 75, 60, 40 and 30 %. Assume that Bo will remain constant throughout the project life.	**10**	**CO2**

Q8	Demonstrate the different types of waterflooding patterns used in the industry through diagrammatic approach. Also discuss the salient/main features of every flooding type. **OR** Explain the different drive mechanism for hydrocarbon recovery with their recovery percentage. Also analyze the potential of waterflooding in the presence of individual drive mechanism	**10**	**CO2**
Q9	An oil well is producing from an undersaturated reservoir that is characterized by a bubble-point pressure of 2400 psig. The current average reservoir pressure is 3300 psig. Available flow test data show that the well produced 480 STB/day at a stabilized pwf of 2000 psig. Construct the IPR data and plot the curve. Use normal graph paper for plotting. Determine the AOF using this method and compare with straight line AOF.	**10**	**CO3**
SECTION-C (2Qx20M=40 Marks)			
Q10	**10A.** Demonstrate the fractional flow of water and gas considering a titled reservoir by deriving expressions for fractional flow of water and gas. **10B.** Elaborate the waterflood monitoring/surveillance, different types of data gathering and analysis techniques.	**12 + 8**	**CO3**
Q11	**Attempt any one out of the two questions given below** **11A**. Elaborate the different water influx models with equations. **11B.** A 660-acre lease is to be developed by using 10 vertical wells. Assuming that each vertical well would effectively drain 66 acres, calculate the possible number of either 1,500 or 3,000 ft-long horizontal wells that will drain the lease effectively using. Solve using the method assuming the drainage area is represented by an ellipse. **OR** **11C.** Provide your analysis of the impact of water and gas coning in vertical wells. **11D.** A 660-acre lease is to be developed by using 10 vertical wells. Assuming that each vertical well would effectively drain 66 acres, calculate the possible number of either 1,500 or 3,000 ft-long horizontal wells that will drain the lease effectively. Solve using the method assuming the drainage area is represented by two semi-circles.	**10 +10**	**CO4**