

Name:
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UPES

End Sem Examination, April/May-2024

Programme Name: M.Tech Petroleum Engineering
Course Name: Enhanced Oil Recovery Techniques
Course Code: PEAU 7009

Semester: II
Time: 03 hrs
Max. Marks: 100

Instructions:

- All questions are compulsory.
- All the abbreviations used in the paper have their usual meanings.
- However, internal choice has been provided. You have to attempt only one of the alternatives in all such questions.

SECTION A (5Qx4M=20Marks)

S. No.		Marks	CO
Q1	Define Displacement efficiency and volumetric sweep efficiency.	04	CO1
Q2	Define MMP and MMC.	04	CO1
Q3	List out the different methods of oil and gas reserves estimation.	04	CO2
Q4	Discuss about Inaccessible pore volume and viscous fingering.	04	CO2
Q5	Explain the properties of two polymers used in Polymer flooding	04	CO2

SECTION B (4Qx10M=40 Marks)

Q 6	State the selection criteria and challenges associated with miscible gas flooding process and discuss WAG process. OR Distinguish between first contact miscible and multiple contact miscible displacement process.	10	CO2
Q 7	Discuss Micellar flooding process and effects of brine salinity concentration on Micellar flooding process.	10	CO3
Q 8	Differentiate between miscible and immiscible gas injection processes along with the applications.	10	CO3

Q 9	Discuss the selection criteria of <i>insitu</i> thermal EOR process . A combustion test in a confined pattern was conducted on a depleted reservoir with a current oil recovery of 10 %. Estimate the final oil recovery expected after the commercial development of the <i>insitu</i> combustion method, given the following data:		10	CO4
	Confined area	1.25 acres		
	Net thickness	20 ft		
	Effective porosity	24 %		
	Irreducible water saturation	25 %		
	Oil formation volume factor	1.12 (initial)		
		1.05 (Current)		
Cumulative oil production of the central well P, as the effect of combustion	12470 bbl			

SECTION-C
(2Qx20M=40 Marks)

Q 10	Calculate the total amount of injected water, W, and the time necessary for reservoir pressurization with following reservoir and production data, if water is to be injected at an available rate of 12580 bbl/day (2000 m ³ /day) for reservoir pressurization. Although the original reservoir pressure of 2143 psia was above the MMP of 2114 psia, primary depletion had reduced the reservoir pressure to 1143 psia. The decision was made to return the reservoir to its original pressure before the start of CO ₂ injection.		20	CO4
	Oil formation volume factor	B _{oi} = 1.53 at initial pressure		
		B _o = 1.33 at actual pressure		
	Gas formation volume factor	B _{oi} = 0.010 at initial pressure		
		B _g = 0.014 at actual pressure		
	Solution ratio	R _{si} = 778 scf/bbl (137 m ³ /m ³) at initial pressure		
		R _s = 522 scf/bbl (92 m ³ /m ³) at actual pressure		
Cumulative oil produced	N _P = 2.516 * 10 ⁶ bbl (0.4 * 10 ⁶ m ³)			
Actual recovery factor	E _R = 15% of OOIP			

	<p>Cumulative water produced $W_p = 14 * 10^4 \text{ bbl} (2.3 * 10^4 \text{ m}^3)$</p> <p>Oil production rate (actual) $q_o = 1352 \text{ STB/day} (215 \text{ m}^3/\text{day})$</p> <p>Gas Oil ratio $\text{GOR (average)} = 200 \text{ STB/bbl}$</p> <p>water production rate (actual) $Q_w = 126 \text{ bbl/day} (20 \text{ m}^3/\text{day})$</p> <p style="text-align: center;">OR</p> <p>Explain exponential decline curve method and calculate the data based on given well data:</p> <p>A well with an exponential decline of 1.5% per month currently produces at 300 STB/day.</p> <p>a) Production rate be in 2 years b) Cumulative production be in those 2 years c) Decline rate be in 2 years</p> <p>Cumulative production be from the end of Year 20 to the end of Year 21</p>		
Q 11	<p>Discuss the polymer flooding process with polymer properties. Also discuss the screening criteria along with examples.</p> <p>A steam generator produces the steam of 85% quality at 1000 psia saturation pressure consuming 911 lbm/hr fuel oil with 19000 Btu/lbm heat of combustion. The feed water rate is 150 m³/day at 60 °F. Find the heat loss and efficiency of generator.</p>	20	CO5