



PRESIDENCY UNIVERSITY

BENGALURU

Roll No.												
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End - Term Examinations – May / June 2026

Date: 25-05-2026

Time: 01:00pm – 04:00pm

School: SOE	Program: B. Tech-PET	
Course Code: PET3007	Course Name: Enhanced Oil and Gas Recovery Techniques	
Semester: VI	Max Marks: 100	Weightage: 50%

CO - Levels	C01	C02	C03	C04	C05	C06
Marks	10	16	12	14	24	24

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

1.	Explain the mechanism of oil displacement by surfactant flooding.	2 Marks	L2	C02
2.	Classify the types of surfactants used in EOR.	2 Marks	L2	C02
3.	Define ultra-low interfacial tension in the context of surfactant flooding.	2 Marks	L2	C02
4.	Explain water treatment processes for steam generation.	2 Marks	L2	C03
5.	Distinguish between forward and reverse in-situ combustion.	2 Marks	L2	C04
6.	State the main objective of using in-situ combustion in oil recovery.	2 Marks	L1	C04
7.	Label the supercritical zone and two-phase zone in the ternary phase diagram.	2 Marks	L1	C05
8.	Explain the types of multiple contact miscibility during Gas injection.	2 Marks	L1	C05
9.	Identify the types of Microorganisms Used during microbial EOR.	2 Marks	L1	C06
10.	Identify different types of nanoparticles used in enhanced oil recovery.	2 Marks	L2	C06

Part B

Answer the Questions.

Total Marks 80M

11.	a.	A reservoir shows early water breakthrough during water flooding. How would you apply polymer flooding to improve sweep efficiency? Explain the steps involved in planning the project.	10 Marks	L2	CO1,
	b.	A reservoir has high interfacial tension between oil and water, leading to poor recovery. Determine How would you apply surfactant flooding to achieve ultra-low interfacial tension and improve oil displacement	10 Marks	L3	CO2
Or					
12.	a.	A field shows poor recovery due to strong oil entrapment in porous media. How would alkaline flooding help in releasing the residual oil? Explain with mechanisms.	10 Marks	L2	CO1,
	b.	Predict the screening parameters for the surfactant flooding and determine the types of surfactant used for the enhanced oil and gas recovery.	10 Marks	L3	CO2
13.	a.	10 Kg of ice sample initially at -100°C is heated to steam at 100°C use the data given below to determine the total heat required. $C_{\text{ice}} = 3 \text{ KJ/Kg. }^{\circ}\text{C}$, $h_f = 100\text{KJ/Kg}$, $C_{\text{water}} = 5 \text{ KJ/Kg. }^{\circ}\text{C}$, $h_{fg} = 4000\text{KJ/Kg}$, $C_{\text{stem}} = 2\text{KJ/Kg}$	10 Marks	L3	CO3
	b.	A heavy oil reservoir shows poor recovery with conventional methods. How would you apply in-situ combustion to improve recovery? Discuss reservoir characteristics and ignition requirements.	10 Marks	L3	CO4
Or					
14.	a.	A reservoir has: - Volume = 800 m^3 - Rock density = 2600 kg/m^3 - Rock heat capacity = $0.9 \text{ kJ/kg}^{\circ}\text{C}$ - Temperature rise = 60°C Calculate heat required to heat the rock also determine the sensible heat with an example.	10 Marks	L3	CO3
	b.	A steam flood project injects: - Steam injected per day = 6000 bbl - Oil produced per day = 1500 bbl - Cost of generating steam = ₹500 per bbl of steam - Other operating cost = ₹200,000 per day Calculate: 1. Steam–Oil Ratio (SOR) 2. Daily steam cost 3. Total daily cost 4. Cost per barrel of oil produced Also determine wheater it is economical project or not.	10 Marks	L3	CO4

15.	Illustrate the vapourization and condensation gas drive with the help of a ternary phase diagram for both. and determine a point where composition of mixture is 20% light, 40 % intermediate and 40% heavy	20 Marks	L3	C05
Or				
16.	Determine: (i) First Contact Miscibility during Gas injection (ii) Water alternating Gas (WAG) (iii) Ternary phase diagram and favorable condition for the Miscible displacement (iv) Alcohol slug injection for enhanced oil recovery.	20 Marks	L3	C05
17.	A mature oil reservoir has high residual oil saturation. How would you apply microbial enhanced oil recovery techniques to improve oil production? Interpret the mechanisms involved and determine the Reservoir Conditions for MEOR.	20 Marks	L3	C06
Or				
18.	(i) Apply the concept of nanoparticle-induced IFT reduction to explain improvements in microscopic displacement efficiency in porous media (ii) Determine How would economic and environmental challenges influence the application of nanoparticle-based EOR in a real oil field? Prepare practical solutions.	20 Marks	L3	C06