Seat No: _____ Enrollment No: _____

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Winter 2022 - 23 Examination

Semester: 7 **Date: 06/10/2022**
Subject Code: 203120403 **Time: 10:30 am to 01:00 pm**
Subject Name: Enhanced oil Recovery Technique **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 **Objective Type Questions** - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) **(15)**

1. _____is to reduce the aqueous phase viscosity?
2. Define the position and number of injector and producer in regular 9-spot pattern?
3. What is the use of polymer in enhanced oil recovery?
4. Write down the mechanism of IOR?
5. The use of artificial lift technique methods comes under_____ recovery?
6. The mobility ratio of oil in the reservoir is affected by?

(a) Gravity (b) Permeability
(c) Viscosities of fluids (d) All of the above

7. The terms EOR stands for?

(a) Enhanced oil recovery (b) Enhanced old recovery
(c) Enhanced oil release (d) Entrapped oil recovery

8. Calculate the microscopic displacement efficiency in % for an oil reservoir. If the connate water saturation before flooding is 0.2 and the residual oil saturation after the flooding is 0.4?

(a) 20 (b) 25
(c) 50 (d) 75

9. When the polymer are added to water, the mobility ratio?

(a) Increases (b) Decreases
(c) Remains same (d) All of the above

10. Which of the following is the maximum optimum depth for the use of steam process?

(a) 1000 ft. (b) 2000 ft.
(c) 3000 ft. (d) 4000 ft.

11. Write the name of 2 thermal EOR methods?
12. Define the steam enthalpy?
13. Steam stimulation is also known as?
14. Define the use of Surfactant in EOR methods?
15. Write down the four names of polymers?

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) What is the concept of polymer flooding? Explain with the help of basic mechanism?
B) Write down the mechanism of chemical flooding and thermal flooding?
C) What is the fluid hydrocarbon classification? Explain it with the help of flow diagram.
D) Derive the relation between reservoir f_W and reservoir water oil ratio?

Q.3 A) A combustion test in a confined pattern was conducted on a depleted oil reservoir with a current oil recovery of 10 percent. Estimate the final oil recovery expected after the commercial development of the in-situ combustion method? **(07)**

Given data:
Confined area=1.25 acres
Net thickness=20 ft
Effective porosity=24

Irreducible water saturation=25%

Initial oil formation volume factor=1.12

Current oil formation volume factor=1.05

Cumulative oil production of the central well, as the effect of combustion=12470 bbl.

B) What is cyclic steam injection process? Explain all cyclic steam injection process scheme with necessary diagram? **(08)**

OR

B) Draw the diagram of polymer flooding, In-situ combustion and alkaline flooding? Mention all the necessary terms in all the diagram. **(08)**

Q.4 A) What is the classification of EOR methods? Explain the screening criteria of polymer and surfactant flooding in detail. **(07)**

OR

A) What is microbial enhanced oil recovery? Explain it with necessary parameters of mechanism. **(07)**

B) What is heat career agent in thermal EOR?

Find the total enthalpy of 1 lbm of steam at P=400 psia and T=444.59F

Given data:

The enthalpy of saturated liquid (sensible heat)=424 Btu/lbm

The enthalpy of vaporization (Latent heat of vaporization)=780.5 Btu/lbm