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**PRESIDENCY
UNIVERSITY
BENGALURU**

School of Engineering

Mid - Term Examinations - November 2024

Semester: 7th

Date: 5-11-2024

Course Code: PET3007

Time: 02:00pm-03:30pm

Course Name: Enhanced Oil Recovery Techniques

Max Marks: 50

Program: B. Tech

Weightage: 25%

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 2 marks.

2Mx5Q=10M

- | | | | | |
|---|--|---------|----|-----|
| 1 | Define Viscoelasticity of polymers. | 2 Marks | L1 | C01 |
| 2 | List different types of reservoirs based on wettability. | 2 Marks | L1 | C01 |
| 3 | Reproduce the schematic of apparent viscosity variation of polymers with shear rate. | 2 Marks | L1 | C01 |
| 4 | List the different Thermal EOR methods. | 2 Marks | L1 | C02 |
| 5 | List the different types of In-situ combustion methods. | 2 Marks | L1 | C02 |

Part B

Answer ALL Questions. Each question carries 10 marks.

4QX10M=40M

- | | | | | |
|---|---|----------------|----|-----|
| 6 | Polymer flooding represents a crucial advancement in enhanced oil recovery, offering a means to recover additional oil that would otherwise remain trapped in the reservoir, significantly increasing overall oil recovery rates and extending the productive life of oil fields. | 2+2+6
Marks | L2 | C01 |
|---|---|----------------|----|-----|

Discuss the mechanism of polymer flooding. Briefly elaborate about the different types of polymers used in industry. Explain the mechanism of viscosity reduction of polymers in high salinity reservoirs.

or

- 7 Polymer degradation plays a significant role in determining the success of polymer flooding in EOR. Addressing degradation helps improve oil recovery efficiency, lower operational costs, and ensure the long-term sustainability of the polymer flooding process.
- 5+5 Marks** **L2** **C01**

Discuss in detail about the degradation of polymers and its types. Explain the factors used for design and implementation planning of Polymer flooding.

- 8 Surfactants play a vital role in enhanced oil recovery (EOR) by improving the efficiency of oil extraction from reservoirs, especially after primary and secondary recovery methods have become less effective.
- 5+5 Marks** **L2** **C01**

Discuss the various types of surfactants. Explain the mechanism of surface tension reduction and formation of micelles with a neat diagram.

or

- 9 Surface-active parameters are key properties and characteristics of surfactants that determine their behavior at interfaces and their effectiveness in applications like enhanced oil recovery.
- 10 Marks** **L2** **C01**

Discuss the various surface-active parameters used to characterize the efficiency of surfactant.

- 10 Steam flooding is a highly effective thermal EOR method that plays a critical role in unlocking heavy oil reserves. Discuss in detail about mechanisms of steam flooding method. Draw the temperature profile and explain each temperature zone in detail.
- 5 +5 Marks** **L2** **C02**

or

- 11 Toe-to-Heel Air Injection (THAI) method is a promising EOR technique that leverages in-situ combustion and thermal processes to enhance oil recovery from heavy oil reservoirs. Discuss in detail with a schematic diagram about mechanisms of Toe-to Heel Air Injection (THAI) Method of In-situ combustion method. Discuss its basic operation and its benefits among other in-situ methods.
- 10 Marks** **L2** **C02**

12 Dry in-situ combustion is a promising thermal EOR technique that leverages the natural combustion of hydrocarbons. Discuss in detail about mechanisms of Dry In-situ combustion. Draw the temperature profile and explain in detail. **10 Marks** **L2** **CO2**

or

13 Wet in-situ combustion is a promising thermal EOR method that leverages the principles of combustion and thermal energy to enhance oil recovery from heavy oil and bitumen reservoirs. Discuss in detail about mechanisms of wet In-situ combustion. Draw the temperature profile for each type of wet In-situ combustion and explain in detail. **10 Marks** **L2** **CO2**