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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – JANUARY 2025** |
| Date: 07 – 01- 2025 Time: 09:30 am – 12:30 pm |

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| **School:** School of Engineering | **Program:** B. Tech. in Petroleum Engineering | |
| **Course Code:** PET3007 | **Course Name:** Enhanced Oil & Gas Recovery Techniques  (DE-IX) | |
| **Semester**: VII | **Max Marks**: 100 | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **10** | **10** | **40** | **40** | **NA** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

|  |  |  |  |  |
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| **Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M** | | | | |
| **1** | Define Miscibility Rupture**.** | **2 Marks** | **L1** | **CO3** |
| **2** | Define first contact miscibility. | **2 Marks** | **L1** | **CO3** |
| **3** | State the theoretical Oil recovery value at miscibility condition. | **2 Marks** | **L1** | **CO3** |
| **4** | State the difference between near miscibility and miscible condition. | **2 Marks** | **L1** | **CO3** |
| **5** | State the IFT value required for achieving complete Miscibility. | **2 Marks** | **L1** | **CO3** |
| **6** | List the disadvantages of using Nanoparticle in reservoir. | **2 Marks** | **L1** | **CO4** |
| **7** | Define Nano emulsion | **2 Marks** | **L1** | **CO4** |
| **8** | State the basic idea of selective plugging recovery in MEOR. | **2 Marks** | **L1** | **CO4** |
| **9** | State the basic idea of Huff & Puff recovery in MEOR. | **2 Marks** | **L1** | **CO4** |
| **10** | Define Nanofluids. | **2 Marks** | **L1** | **CO4** |

**Part B**

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| **Answer the Questions. Total Marks 80** | | | | | |
| **11.** |  | Surfactants play a crucial role in Enhanced Oil Recovery (EOR) by facilitating two key mechanisms: **reduction of interfacial tension (IFT)** and **wettability alteration**. Both mechanisms are essential for rock formations, especially in difficult-to-recover reservoirs.  Explain in detail about the mechanism of surfactants in reduction of IFT & Wettability alteration with schematics. Also discuss the loss of different surfactant due to adsorption in reservoir rocks. | **10 Marks** | **L2** | **CO1** |
| **or** | | | | | |
| **12.** |  | Polymer flooding is a significant technique in enhanced oil recovery, offering improved oil recovery efficiency, reduced water production, and adaptability for high-viscosity reservoirs. Explain the factors that affects the polymer flooding. Explain the mechanism of polymer retention in the porous media. | **10 Marks** | **L2** | **CO1** |
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| **13.** |  | Steam-Assisted Gravity Drainage (SAGD) is a highly effective thermal EOR technique for recovering heavy oil and bitumen from deep, challenging reservoirs like oil sands. Discuss in detail with schematics about the procedure and mechanisms of steam assisted gravity drainage (SAGD) method of oil recovery. | **10 Marks** | **L2** | **CO2** |
| **or** | | | | | |  | **or** |
| **14.** |  | Cyclic steam injection offers a cost-effective solution, especially in mature or declining oil fields, providing a rapid production boost with relatively simple infrastructure Discuss in detail with schematics about the steps and mechanisms of cyclic steam injection method. | **10 Marks** | **L2** | **CO2** |

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| **15.** |  | Explain the procedure with proper slug schematic and mechanisms of LPG slug injection with the help of Ternary phase diagram. Explain how miscibility is achieved for efficient working of LPG slug. | **15 Marks** | **L2** | **CO3** |
| **Or** | | | | | |
| **16.** |  | Explain the procedure with proper slug schematic and mechanisms of Alcohol flooding with the help of Ternary phase diagram. Explain how miscibility is achieved for efficient working of Alcohol flooding. | **15 Marks** | **L2** | **CO3** |

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| **17.** |  | Explain the different experimental methods of determining the Miscibility condition of crude oil in detail with proper schematics. | **15 Marks** | **L2** | **CO3** |
| **Or** | | | | | |
| **18.** |  | Discuss in detail about the various design aspects of Miscible flooding. | **15 Marks** | **L2** | **CO3** |

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| **19.** |  | Discuss in brief about MEOR. Discuss the mechanisms associated with it. Also, Explain its advantages and limitations. | **15**  **Marks** | **L2** | **CO4** |
| **Or** | | | | | |
| **20.** |  | Discuss in detail about the different factors to be considered for applying MEOR. | **15 Marks** | **L2** | **CO4** |

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| **21.** |  | Explain in detail about the role of Nano-particles as Mobility improver, foam stabilizers. Discuss in detail about the application of nanotechnology in various fields of Oil and gas Industry. | **15 Marks** | **L2** | **CO4** |
| **Or** | | | | | |
| **22.** |  | Explain in detail about the Pickering emulsion. Explain how it is different from conventional emulsion technique. Also discuss the different desirable properties with explanation required for successful Nano emulsion formation and flooding. | **15 Marks** | **L2** | **CO4** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***