|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Roll No. |  |  |  |  |  |  |  |  |  |  |  |  |



**PRESIDENCY UNIVERSITY**

**Bengaluru**

|  |
| --- |
| **End - Term Examinations – MAY 2025** |
| **Date:** 22-05-2025 **Time:** 09:30 am – 12:30 pm |

|  |  |  |
| --- | --- | --- |
| **School:** SOE | **Program**: B. Tech. in Petroleum Engineering | |
| **Course Code:** PET2010 | **Course Name:** Introduction to Oil and Gas Reservoir Simulation | |
| **Semester**: VI | **Max Marks**: 100 | **Weightage**: 50% |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **100** | **NA** | **NA** | **NA** | **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**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M** | | | | |
| **1.** | State the type of reservoirs typically simulated by GEM. | **2 Marks** | **L1** | **CO1** |
| **2.** | State the application of Equation of state. | **2 Marks** | **L1** | **CO1** |
| **3.** | List the significance of reservoir continuity in modeling? | **2 Marks** | **L1** | **CO1** |
| **4.** | List the Data required in a cell and Block. | **2 Marks** | **L1** | **CO1** |
| **5.** | List the Chemical Simulator's advantages. | **2 Marks** | **L1** | **CO1** |
| **6.** | Recall the role of grids in reservoir simulation | **2 Marks** | **L1** | **CO1** |
| **7.** | Define Material Balance Equation. | **2 Marks** | **L1** | **CO1** |
| **8.** | Describe the role of Minimum Miscibility Pressure in enhanced oil recovery | **2 Marks** | **L1** | **CO1** |
| **9.** | State the features of compositional simulator (STARS). | **2 Marks** | **L1** | **CO1** |
| **10.** | Define CBM reservoir and mention how it differs from conventional reservoir. | **2 Marks** | **L1** | **CO1** |

**Part B**

**Answer the Questions. Total Marks 80M**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 11. | Discuss the advantages of using a chemical simulator in reservoir engineering and how it enhances the understanding of fluid-rock interactions, optimizes chemical EOR processes, and predicts reservoir performance. | 20  Marks | L2 | CO1 |
| Or | | | | |
| 12. | Explain the significance of historical data and history matching within reservoir simulation, detailing their roles in achieving precision in depicting past occurrences and enhancing predictions for future hydrocarbon recovery in reservoir engineering. Describe in detail about the steps for history matching in a reservoir. | **20 Marks** | **L2** | **CO1** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 13. | As a reservoir simulation engineer give an overview of the steps for reservoir simulation for a brown field. Discuss the difference between material balance equations and reservoir simulation, focusing on their roles in analyzing subsurface reservoir behavior in oil and gas fields | 20 Marks | L2 | CO1 |
| Or | | | | |
| 14. | Discuss the importance of understanding the differences between compositional and black oil simulations for reservoir simulation engineers. Explain how do these differences influence decision-making and the ability to address complex reservoir challenges in the oil and gas industry | **20 Marks** | **L2** | **CO1** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 15. | Reservoir simulation modeling involves creating computerized representations of subsurface reservoirs to simulate and analyze their behavior. This modeling process is crucial in the field of reservoir engineering for predicting fluid flow, estimating hydrocarbon recovery, and optimizing production strategies.  Discuss, compare and contrast static and dynamic modelling with an analytical approach in detail. | 20 Marks | L2 | CO1 |
| Or | | | | |
| 16. | Describe the difference between static and dynamic modeling in reservoir simulation, highlighting their roles in predicting fluid flow, estimating hydrocarbon recovery, and optimizing production strategies. Explain why are both models important for effective reservoir management. | **20 Marks** | **L2** | **CO1** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 17. | Discuss how upscaling serves as a crucial link between detailed geological models and practical simulation processes, enabling more precise predictions of fluid flow and recovery in complex subsurface reservoirs. | 20 Marks | L2 | CO1 |
| Or | | | | |
| 18. | Discuss in detail about the Uncertainties in static modelling. Discuss the measures that can be taken to address these above Uncertainties. | **20 Marks** | **L2** | **CO1** |