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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION - JULY 2024

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| **Semester :V** | **Date :02-07-2024** |
| **Course Code : PET2010** | **Time :1:30 PM-4:30 PM** |
| **Course Name : Introduction to Oil and Gas Reservoir Simulation** | **Max Marks : 100** |
| **Program: B.Tech. in Petroleum Engineering** | **Weightage : 50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 2M=10M** | | | |
| 1 | Describe the use of reservoir simulation in the oil and gas industry. | (CO 1) | [Knowledge] |
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| 2 | Define Material Balance Equation. | (CO 1) | [Knowledge] |
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| 3 | List the Chemical Simulator's advantages. | (CO 1) | [Knowledge] |
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| 4 | State the application of Equation of state. | (CO 1) | [Knowledge] |
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| 5 | State the features of compositional simulator (GEM). | (CO 1) | [Knowledge] |
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| 6 | Define CBM reservoir. | (CO 1) | [Knowledge] |
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| 7 | Describe the role of Minimum Miscibility Pressure in enhanced oil recovery. | (CO 1) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Elucidate the benefits, drawbacks, and procedural stages associated with employing reservoir simulation in the oil and gas industry, following an explanation of how reservoir simulation examines fluid flow within hydrocarbon reservoirs under production conditions. | (CO 1) | [Comprehension] |
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| 9 | Outline the fundamental steps of reservoir simulation and elucidate the necessity for employing reservoir simulation techniques. | (CO 1) | [Comprehension] |
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| 10 | IMEX, which stands for Implicit Pressure, Explicit Saturation (IMEX), is a type of black oil simulator used in reservoir engineering for modeling fluid flow in oil reservoirs. This simulator employs implicit numerical methods for solving the pressure equation, providing stability and efficiency in handling the pressure terms. Illustrates the characteristics of the IMEX (Black Oil Simulator). | (CO 1) | [Comprehension] |
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| 11 | The general steps involved in reservoir simulation, a complex process used in reservoir engineering to model and analyze the behavior of hydrocarbon reservoirs over time. Discuss the statement in details. | (CO 1) | [Comprehension] |
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| 12 | Elaborate 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. | (CO 1) | [Comprehension] |
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| 13 | It is crucial for reservoir simulation engineers to discern the distinct impacts of compositional simulation versus black oil simulation in influencing decision-making processes within the oil and gas industry, particularly in capturing intricate fluid dynamics and overcoming simplified assumptions and constraints. Give reasons why it is crucial. | (CO 1) | [Comprehension] |
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| 14 | Explain 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. | (CO 1) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 14 | Brown field is an oil or gas accumulation that has matured to a production plateau or even progressed to a stage of declining production. Operating companies seek to extend the economic producing life of the field using cost-effective, low-risk technologies. Being a reservoir simulation engineer discuss the steps involved in reservoir simulation for a brown field. | (CO 1) | [Application] |
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| 15 | Elucidate, how a reservoir simulation engineer distinguishes between material balance equations and reservoir simulation as separate tools for assessing and analyzing subsurface reservoir behavior in oil and gas fields. | (CO 1) | [Application] |
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| 16 | 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. Being a reservoir simulation engineer compare and contrast static and dynamic modelling with an analytical approach. | (CO 1) | [Application] |
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