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# PRESIDENCY UNIVERSITY
# BENGALURU

**SET-A**

## SCHOOL OF ENGINEERING
## END TERM EXAMINATION – MAY/JUNE 2024

**Semester :** Semester VIII - 2020

**Course Code :** PET3007

**Course Name :** Enhanced Oil and Gas Recovery Techniques

**Program :** B.Tech.

**Date :** May 31, 2024

**Time :**1:00 PM - 4:00 PM

**Max Marks :** 100

**Weightage :** 50%

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**Instructions:**

*(i) Read all questions carefully and answer accordingly.*
*(ii) Question paper consists of 3 parts.*
*(iii) Scientific and non-programmable calculator are permitted.*
*(iv) Do not write any information on the question paper other than Roll Number.*

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### PART A

**ANSWER ANY FIVE QUESTIONS** **5QX2M=10M**

**1.** Describe the mechanism behind Gas Cycling in Enhanced Oil Recovery Operations.
(CO3) [Knowledge]

**2.** Discuss the significance of Reservoir Pressure Maintenance in Gas Flooding Techniques**.**
(CO4) [Knowledge]

**3.** Outline the advantages and limitations of using CO2 for Enhanced Oil Recovery**.**
(CO3) [Knowledge]

**4.** State how the composition of injected gas affects the efficiency of Miscible Gas Flooding**.**
(CO4) [Knowledge]

**5.** Compare and contrast Thermal and Chemical Enhanced Oil Recovery Methods.
(CO3) [Knowledge]

**6.** Define the term "Immiscible Gas Flooding" in the context of Enhanced Oil Recovery.
(CO4) [Knowledge]

**7.** List the concept of Reservoir Sweep Efficiency in Enhanced Oil Recovery.
(CO3) [Knowledge]

## PART B

**ANSWER ANY FIVE QUESTIONS** **5QX10M=50M**

**8.** Enhanced oil recovery (EOR) methods can aid in closing the disparity between existing oil reserves and projected future energy demands, but they require continuous evaluation and execution plans. This analysis involves assessing the potential of EOR techniques to augment recoverable reserves, thereby bolstering the global supply of energy resources. Such evaluation necessitates a comprehensive understanding of reservoir dynamics, technological advancements, and market trends to gauge the role of EOR in meeting future energy needs. Determine the steps to bridge the gap between the current oil reserves and future energy demand using EOR technical knowledge.

(CO3) [Comprehension]

**9.** The feasibility of using Bio-based effluents as EOR fluids requires a lot of Research and Trials. Discuss the potential societal impacts of the widespread adoption of Microbial-Enhanced Oil Recovery on local communities.

(CO4) [Comprehension]

**10.** Analyzing the potential for cross-sectoral collaboration between the oil and gas industry and academia to foster innovation in enhanced oil recovery (EOR) technologies involves a nuanced examination. This evaluation entails deciphering the capacity of joint endeavors between industry stakeholders and academic researchers to catalyze advancements in EOR methodologies. Such assessment requires a comprehensive understanding of the synergistic benefits, technological challenges, and knowledge exchange mechanisms inherent in collaborative ventures between these sectors. Construct the steps through which innovation in EOR technologies may be executed through cross-sectional collaboration.

(CO3) [Comprehension]

**11.** In unconventional reservoirs, the technical and economic viability of incorporating microbes into EOR fluids poses considerable challenges, necessitating thorough assessment and innovation for effective implementation. Summarize the scalability of Microbial Enhanced Oil Recovery techniques for application in unconventional reservoirs and heavy oil deposits.

(CO4) [Comprehension]

**12.** Enumerating the consequences of technology transfer and knowledge dissemination from established oil-producing regions to emerging markets aspiring to enhance their enhanced oil recovery (EOR) capabilities involves a detailed analysis. This examination delineates the potential impacts of sharing expertise, methodologies, and technological advancements on the development and sustainability of EOR practices within burgeoning oil-producing regions. Such assessment necessitates considering the ramifications of technology diffusion on resource utilization, economic growth, and environmental stewardship in emerging markets striving to fortify their foothold in the global energy landscape. List the implications of technology transfer and knowledge diffusion from mature oil-producing regions to emerging markets seeking to develop their EOR capabilities.

(CO3) [Comprehension]

**13.** The complexities associated with injecting microorganisms into EOR projects may result in elevated expenses and constraints in achieving widespread availability on a large scale. Develop the economic viability of scaling up Microbial Enhanced Oil Recovery techniques for commercial application.

(CO4) [Comprehension]

**14.** Assessing the viability of incorporating renewable energy sources like geothermal engineering, CCUS (Carbon Capture, Utilization, and Storage), and hydrogen storage within EOR processes presents a complex endeavor to mitigate carbon intensity. This evaluation requires a comprehensive analysis of technological compatibility, economic feasibility, and environmental impact to ascertain the potential efficacy of integrating renewable energy solutions with EOR techniques. Such an assessment necessitates a multidisciplinary approach, encompassing engineering, environmental science, and economic modeling to inform strategic decision-making and drive sustainable energy transitions in oil and gas production. Construct a process that can integrate Renewable Energy sources into EOR projects that may reduce Carbon Footprint in the atmosphere.

(CO3) [Comprehension]

## PART C

**ANSWER ANY TWO QUESTIONS** **2QX20M=40M**

**15.** Formulate the criterion of a Petroleum Engineer tasked with designing an Immiscible Gas Flooding project for a heavy oil reservoir in a remote location, overcoming logistical challenges and technical complexities.

(CO3) [Application]

**16.** Tell the tale of a Petroleum Engineer developing a groundbreaking Nanotechnology-based solution to improve sweep efficiency in Gas Flooding operations, significantly increasing oil recovery rates.

(CO4) [Application]

**17.** Compile the challenges and triumphs of a Team of Engineers implementing Polymer Flooding in a highly heterogeneous reservoir, navigating through geological uncertainties to achieve remarkable oil production enhancements.

(CO3) [Application]