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PRESIDENCY UNIVERSITY BENGALURU

**SET-A**

SCHOOL OF ENGINEERING

**END TERM EXAMINATION –MAY/ JUNE 2024**

**Semester:** Semester VI - 2021

**Course Code:** PET3003

**Course Name:** Offshore Drilling and Petroleum Production Practice

**Program:** B. Tech. Petroleum Engineering

**Date :** June 14, 2024

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

# Max Marks : 100

**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.*

**PART A**

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

1. Describe the terms continental slope and continental rise.
2. Define the term "metacentre" and explain its significance in ship stability.

(CO1) [Knowledge] (CO1) [Knowledge]

1. State primary responsibilities of the Bureau of Safety and Environmental Enforcement.

(CO2) [Knowledge]

1. Name the different types of translational and rotational motions of an offshore vessel and their corresponding directions.

(CO2) [Knowledge]

1. State the importance of station keeping in offshore operations and name the different forces that act on the vessel.
2. Describe the role of FPSO used in offshore operations.

(CO3) [Knowledge]

(CO3) [Knowledge]

1. Define the terms ‘gas conditioning and gas metering’ and state their significance in the context of oil & gas field production.

(CO4) [Knowledge]

**PART B**

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

1. Demonstrate the advantages and key considerations in the selection of various offshore storage structures, including FPSOs, FSRUs, FSUs, oil storage barges, and subsea storage tanks, for storing hydrocarbons in the oil and gas industry.

(CO4) [Comprehension]

1. Estimate the depth of immersion (h) of a solid cylinder with a diameter of 2 meters and a height of 2 meters, given that its specific gravity is 0.65.

(CO1) [Comprehension]

1. Evaluate the key considerations in selecting and deploying anchors for station-keeping in offshore operations. Discuss the significance of the fluke angle and holding power ratio in anchor performance across various bottom soil conditions. Assess the suitability of suction anchors or suction piles for scenarios with predominant vertical forces, considering their lower end angle.

(CO3) [Comprehension]

1. Analyze the design and operational advantages of Spar platforms in offshore oil and gas production, focusing on their cylindrical structure, mooring system, and ballast. Evaluate why Spar platforms are preferred over other offshore platforms in certain scenarios.

(CO3) [Comprehension]

1. Evaluate the primary advantages of concrete offshore structures over steel platforms in offshore oil and gas operations, focusing on factors such as maintenance requirements, cost-effectiveness, construction time, storage capacity, and labor efficiency.

(CO2) [Comprehension]

1. Examine the operational advantages of turret mooring systems for stability in varying sea conditions. Evaluate the role of the turret assembly in rotational movement and classify turret mooring systems based on their configuration, such as moonpool, external, and internal designs, to assess their suitability for offshore applications.

(CO2) [Comprehension]

1. Compare and contrast the differences between dry tree and wet tree completions in offshore oil and gas operations, considering their installation locations, advantages, and disadvantages. Evaluate the difference between these completion methods in terms of riser system complexity, water depth limitations, and potential environmental impacts.

(CO4) [Comprehension]

**PART C**

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

1. In the context of upstream oil and gas operations, explain how do surface production facilities play a crucial role in optimizing the efficiency and safety of the exploration, drilling, and development phases? Discuss the challenges and opportunities associated with integrating wellheads effectively into offshore production facilities to maximize reservoir recovery and operational efficiency.

(CO4) [Application]

1. Demonstrate the strategic advantages and limitations of using drillships as offshore drilling vessels, considering their deepwater capability, larger load capacity, faster travel time, and self-propelled nature. Evaluate the decision-making process for selecting drillships over other drilling platforms, taking into account factors such as operational requirements and cost-effectiveness.

(CO3) [Application]

1. Demonstrate the reasons for treating produced water in oil and gas operations, considering its diverse constituents and potential environmental impact. Discuss various treatment techniques and effectiveness of these methods in ensuring compliance with environmental standards while maintaining operational efficiency.

(CO2) [Application]