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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

END TERM EXAMINATION, SUMMER TERM - August 2024

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| **Semester: Summer Term** | **Date: 06/08/2024** |
| **Course Code: PET229** | **Time: 9.30am-12.30 pm** |
| **Course Name: Offfshore Drilling and Production** | **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 | Name the different types of translational and rotational motions of an offshore vessel and their corresponding directions. | (CO1) | [Knowledge] |
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| 2 | Briefly describe the role of FPSO used in offshore operations. | (CO2) | [Knowledge] |
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| 3 | Define the term Centre of Gravity & Centre of Buoyancy | (CO1) | [Knowledge] |
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| 4 | Define the terms Gas Conditioning and Gas Metering in processing system. | (CO4) | [Knowledge] |
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| 5 | Recite the mission of the Bureau of Ocean Energy Management (BOEM). | (CO1) | [Knowledge] |
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| 6 | Mention the problems caused by water in gas processing and pipeline transport. | (CO3) | [Knowledge] |
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| 7 | List three key components that are included in a Field Development Plan (FDP). | (CO4) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 4 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Explain different components of Dynamic positioning system in details and also demonstrate how dynamic positioning (DP) systems on offshore vessels work to maintain station-keeping and mitigate the effects of surge, sway, and yaw motions. | (CO3) | [Comprehension] |
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| 9 | Sketch a neat and clean processing block diagram illustrating the integration of separation, treatment, and environmental compliance in offshore oil and gas production: | (CO4) | [Comprehension] |
| 10 | Illustrate the application of Gravity-Based Structures (GBS) in offshore operations, outlining their reasons for selection, and potential drawbacks. | (CO2) | [Comprehension] |
| 11 | Examine the operational advantages of turret mooring system 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 asses their suitability for offshore applications. | (CO3) | [Comprehension] |
| 12 | A solid cylinder 3m in diameter and 3m high is floating in water axis vertical. If the specific gravity of the material of cylinder is 0.7, find height of cylinder submerged in water. | (CO1) | [Comprehension] |
| 13 | Illustrate and explain the stability conditions for stable, unstable, and neutral equilibrium using clear diagrams depicting the positions of the metacenter and the center of gravity. | (CO1) | [Comprehension] |
| 14 | 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. | (CO3) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 15 | 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] |
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| 16 | Sketch a comprehensive process diagram depicting the dehydration of compressed gas. Illustrate the preferred gas dehydration method in a column with bubble cap trays and discuss the key outcomes of this process in offshore oil and gas production. | (CO4) | [Application] |
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| 17 | Demonstrate the reasons for treating produced water in oil and gas operations, considering its diverse constituents and potential environmental impact. Discuss the various treatment techniques and the effectiveness of these methods in water treatment, ensuring compliance with environmental standards. | (CO3) | [Application] |
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