Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY 2025

Date: 24-05-2025 **Time:** 09:30 am – 12:30 pm

School: SOE	**Program:** B. Tech.-PET	
Course Code: PET3003	**Course Name:** Offshore Drilling and Petroleum Production Practices	
Semester: VI	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks					

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2 marks. **10Q x 2M=20M**

1.	Identify one suitable fixed-base compliant structure and one appropriate floating-based compliant structure, mentioning their ideal water depth suitability.	**2 Marks**	**L1**	**CO2**
2.	Match the offshore platform type with its suitable water depth range. Platform Type: A. Jack-up Rig; B. Semi-submersible; C. Tension Leg Platform; D. Gravity Based Water Depth Range (meters): a) 500 – 3000 m; b) 300 – 1500 m; c) 0 – 300 m; d) 25 – 150 m	**2 Marks**	**L1**	**CO3**
3.	Name the three primary types of Spars and provide a brief description of any one of them.	**2 Marks**	**L1**	**CO3**
4	outline a basic schematic of any offshore mobile drilling unit or floating production unit.	**2 Marks**	**L1**	**CO3**

5.	Match the unit type with buoyancy behaviour. Offshore Unit Type / Buoyancy Classification A. Semi-submersible — a) Neutrally Buoyant B. TLP — b) Positively Buoyant C. Spar Platform — c) Neutrally Buoyant D. Mini-TLP — d) Positively Buoyant	**2 Marks**	**L1**	**CO3**
6.	List the key contaminants found in produced water that require treatment before disposal or reuse.	**2 Marks**	**L1**	**CO4**
7.	Classify the different types of water that contribute to produced water in oil and gas production.	**2 Marks**	**L1**	**CO4**
8.	Match each component with its correct function: **Component** / **Function** A. Inlet Separator — a) Removes water vapor from gas to prevent hydrate formation B. Suction Scrubber — b) Cools gas after compression C. Gas Compressor — c) Removes fine liquid droplets before compression. D. Aftercooler — d) Increases gas pressure and temperature E. Gas Dehydration Unit — e) Removes bulk liquids at the surface	**2 Marks**	**L1**	**CO4**
9.	Identify the blanks: The temperature inside the TEG regeneration unit is typically around _____ °C, and the separation that occurs inside the glycol absorption tower is a _____ phenomenon caused by mass transfer between gas and liquid phases.	**2 Marks**	**L1**	**CO4**
10.	State the principle of a mooring system and its role in resisting vessel offset.	**2 Marks**	**L1**	**CO1**

Part B

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

11.	Explain the concept, design, and construction elements of jacketed platforms used in offshore oil and gas exploration, highlighting the different types and materials involved. Compare fixed-type and compliant offshore platforms, emphasizing their key differences and the factors, such as environmental conditions and water depth, that influence platform selection.	**20 Marks**	**L2**	**CO2**
	Or			

12.	Discuss the "punch through" phenomenon in jack-up rigs, including its causes, consequences, and mitigation measures. Compare independent leg and mat-supported jack-up rigs, highlighting their advantages, disadvantages, and suitability under different offshore conditions.	**20 Marks**	**L2**	**CO2**

13.	Discuss the structural features, mooring and positioning systems, and stability mechanisms of drillships, semi-submersibles, and spar platforms in deepwater drilling. Highlight the key advantages and operational benefits of each type of offshore structure.	**20 Marks**	**L2**	**CO3**
	Or			
14.	Explain the role of Floating Production Storage and Offloading (FPSO) units in offshore oil and gas production, highlighting their applications, operational challenges, and advantages. Describe the concept of offshore oil storage, outlining the methods used by different platforms such as FPSOs and gravity-based structures to store oil, and examine the risks linked to offshore storage.	**20 Marks**	**L2**	**CO3**

15.	Describe the different methods employed for gas dehydration in offshore facilities, emphasizing their distinctions. Detail the glycol dehydration process in offshore natural gas processing and provide a labeled flow diagram illustrating the main stages of the glycol dehydration unit.	**20 Marks**	**L2**	**CO4**
	Or			
16.	Explain the key components and processes that make up offshore production systems. Describe the two-stage separation process used in offshore facilities and specify the purpose of each stage.	**20 Marks**	**L2**	**CO4**

17.	Explain the concept of subsea technology applied in offshore drilling and production operations by classifying the different subdivisions of subsea systems from the wellhead to the subsea flow lines. Describe the functions of each subdivision in detail and discuss the role of Remotely Operated Vehicles (ROVs) in supporting subsea activities.	**20 Marks**	**L2**	**CO4**
	Or			
18.	**a.** Discuss the advantages and limitations of subsea production systems, highlighting the factors that make them ideal for ultra-deep water operations.	**10 Marks**	**L2**	**CO4**
	b. Explain the significance of gas dehydration in offshore surface facilities, emphasizing the issues caused by water in the gas phase and the techniques employed to eliminate it.	**10 Marks**	**L2**	**CO4**