CONFIDENTIAL

UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION

JULY 2025 SEMESTER SESSION (7-WEEK)

SUBJECT CODE	:	**LKB31303**
SUBJECT TITLE	:	**OFFSHORE PRODUCTION TECHNOLOGY**
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	:	**BET (OFFSHORE) WITH HONOURS**
TIME / DURATION	:	**09.00 AM - 12.00PM (3 HOURS)**
DATE	:	**17 SEPTEMBER 2025**

INSTRUCTIONS TO CANDIDATES

1. Please read **CAREFULLY** the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of FIVE (5) questions.
4. Answer **FOUR (4)** questions **ONLY**.
5. Please write your answers in the answer booklet provided.
6. Answer **ALL** questions in English language **ONLY**.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS COVER PAGE.

INSTRUCTION: Answer FOUR (4) questions ONLY.

Question 1

(a) Analyze the factors that significantly influence the design of offshore production systems for a newly discovered field.

(5 marks)

(b) Jacket refers in the oil and gas exploration and production to the steel frame supporting the topsides in a fixed offshore platform. Examine two disadvantages of using a Jacket structure in offshore oil and gas exploration, particularly for exploratory drilling of new oil or gas wells in deep-water environments.

(5 marks)

(c) Assess the most suitable production system for a new deep-water oil and gas Limbayong field has been discovered approximately 120km offshore Sabah in East Malaysia in water depths of around 1,200 m. The area is close to the seismic region and consists of one large reservoir and several scattered marginal reservoirs with production capacity of 40,000 barrel per day. Justify your recommendation based on factors such as water depth, reservoir characteristics, cost-effectiveness, and environmental considerations.

(15 marks)

Question 2

(a) Subsea production risers are typically composite flexible risers, which are more tolerant of vessel motions. These risers have been used with all types of floating platforms. Steel catenary risers (SCRs) have been employed from TLPs, Spars and semi-submersibles. Analyze the key design characteristics of SCRs, their advantages, and limitations in offshore oil and gas production systems.

(10 marks)

(b) Assess the limitations of the J-Lay method in extremely deep-water installations (over 3,000 meters).

(5 marks)

(c) Examine the importance of route surveying in the installation of offshore pipelines and flowlines.

(5 marks)

(d) Discuss the challenges that arise from the interaction between the production riser and other equipment or structures in an offshore environment.

(5 marks)

Question 3

(a) Offshore pipeline systems for the transportation of fluids including the flow of oil, gas, water and mixtures should be analyzed to optimize performance and minimize the operational risks

i) Briefly explain the functions of Pipeline end terminator (PLET).

(2 marks)

ii) Briefly explain the functions of Manifold.

(3 marks)

(b) Oil companies are increasingly opting for sub sea technology in new field developments due to its numerous advantages over traditional methods. The appropriate technology for reservoir exploitation and the associated challenges should be thoroughly assessed before initiating operations. Explain two (2) critical factors that need to be considered when planning for sub sea field development.

(8 marks)

(c) Remotely Operated Vehicles (ROVs) play a critical role in subsea inspections and maintenance, especially in deepwater operations where human intervention is not possible. Their performance and effectiveness depend on several technical and environmental factors, as well as operational challenges. Analyse two (2) key factors that influence the performance and effectiveness of subsea inspections using ROVs, and relate them to the main challenges faced in deepwater operations during inspection and maintenance of subsea systems.

(12 marks)

Question 4

(a) Analyze the basic principle behind water and gas (WAG) injection in enhanced oil recovery (EOR) to improve oil production, especially in old or depleted oil fields.

(5 marks)

(b) Evaluate the potential environmental impact of discharging untreated produced water into the sea and the risks associated with exceeding acceptable oil ppm levels.

(5 marks)

(c) Separation of oil, gas and water is done in static separators or tank farm. The crude oil from the well is usually a mixture of oil, gas and water. To process the oil and its ingredients, these three components are separated. Based on Figure 1 below, with your own evaluation, describe the process for the separation of oil, gas and water system.

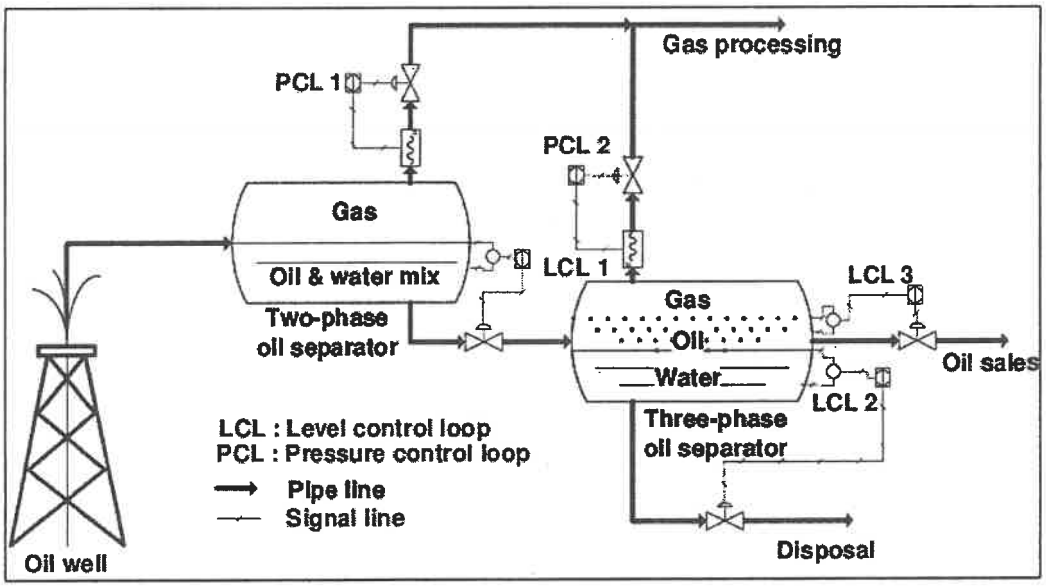

Figure 1. Separation of oil, water and gas

(15 marks)

Question 5

(a) During routine offshore production operations on a fixed platform in 120 m water depth, the crew observes increased volumes of contaminated drill cuttings and sludge in the waste management area. At the same time, minor leaks are reported from a chemical injection line near the wellhead module, Apply your knowledge to identify the major risks of oil spill from this situation, and recommend practical preventive measures to avoid such incidents.

(10 marks)

(b) Offshore decommissioning in Malaysia is becoming increasingly challenging due to sustainable development concerns, the complexity of removal activities, high costs, and intricate regulatory requirements. Apply your understanding of offshore asset lifecycle management to evaluate the significant issues arising from current decommissioning practices in Malaysia and propose improvements that could address these challenges.

(10 marks)

(c) Well plugging and abandonment is a major element of offshore decommissioning and represents the largest cost of the project. Explain the process of well plugging during the decommissioning stage.

(5 marks)

END OF QUESTION PAPER