CONFIDENTIAL

UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION

JULY 2025 SEMESTER SESSION

SUBJECT CODE	:	**LMB22303**
SUBJECT TITLE	:	**MARINE STEAM AND GAS TURBINE PLANT 1**
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	:	**BACHELOR OF MARINE ENGINEERING TECHNOLOGY WITH HONOURS**
TIME / DURATION	:	**09.00 AM - 12.00 PM (3 HOURS)**
DATE	:	**18 DECEMBER 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 **ONE (1)** section ONLY.
4. Answer **FOUR** (4) out of FIVE (5) questions **ONLY**.
5. Please write your answers on this answer booklet provided.
6. Answer **ALL** questions in English language **ONLY**.

THERE ARE 2 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

INSTRUCTION: Answer FOUR (4) questions ONLY. **(Total: 100 marks)**

Please use the answer booklet provided.

Question 1

With reference to gas Turbine overview

a) Apply your understanding of marine gas turbine combustor design by sketching a combustor, labelling its key parts, and explaining how the design supports efficient combustion and flame stability in marine applications.

(10 Marks)

b)Construct detailed sketches of THREE (3) main components of a marine gas turbine engine, label them clearly, and critically evaluate their roles in overall engine performance, reliability, and efficiency.

(15 Marks)

Question 2

With reference to turbine construction found onboard ship,

(a) Apply your understanding of steam turbine operation by defining the following terms in the context of their function and importance onboard a steam ship:

i. Flexible coupling (2 Marks)
ii. Turning gear (2 Marks)
iii. Drain valve (2 Marks)
iv. Diaphragm (2 Marks)

(b) Sketch the main steam turbine engine with TWELVE (12) suitable labels. Explain how the arrangement of these components contributes to effective turbine performance and reliability. (12 Marks)

(c) Critically evaluate the operation of the main steam turbine engine onboard a steam ship. In your explanation, highlight its contribution to propulsion efficiency, thermodynamic performance, and reliability compared to other prime movers. (5 Marks)

Question 3

Steam at a pressure of 60 bar and temperature of 510°C is fed to a steam turbine from a boiler. In the turbine, the steam is expanded isentropically to a pressure of 0.15 bar. The steam is then exhausted into condenser where it is condensed but not undercooled. The condensate is then pumped back into boiler, determine the following by using the Students' Steam Tables, SI units:

(a) The supplied energy to the feed water per kilogram of steam generated (8 Marks)

(b) The dryness fraction of the steam when entering condenser (8 Marks)

(c) The Rankine efficiency, (9 Marks)

Question 4

With reference to the operation of a closed feed system of marine steam turbine plant:

a) Apply your knowledge of steam turbine auxiliary systems by sketching a closed feed system and annotating it with FOURTEEN (14) correctly identified components. Explain how the layout of these components contributes to efficient operation.
(15 Marks)

b) Critically evaluate the operation of the closed feed system in relation to steam turbine performance. In your explanation, highlight how throughout Rankine cycle this system improves efficiency, supports reliability, and prevents operational issues.
(10 Marks)

Question 5

With reference to lubricating oil system for marine steam turbine engines.

You are assigned as the watchkeeping engineer during the operation of a steam turbine propulsion plant. The proper functioning of the Main Turbine Lubricating Oil (LO) system is essential to avoid mechanical failures.

(a) Apply your knowledge of auxiliary systems by sketching the lubricating oil system of a marine steam turbine engine, providing SIXTEEN (16) correctly labelled components. Justify how the arrangement of these components supports continuous lubrication during operation.
(14 Marks)

(b) Demonstrate, with explanation, how the lubricating oil system operates under normal running conditions, highlighting the flow path, pressure maintenance, and temperature control features. (6 Marks)

(c) Critically evaluate FIVE (5) possible causes of low oil pressure in the system and discuss the implications each has on the safe and reliable operation of the steam turbine. (5 Marks)
With reference to lubricating oil system for marine steam turbine engines.

END OF EXAMINATION PAPER