UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION

OCTOBER 2025 SEMESTER

COURSE CODE	:	LOM10103
COURSE TITLE	:	MARINE AND COASTAL ENVIRONMENT
PROGRAMME NAME	:	MASTER OF MARITIME OPERATION AND MANAGEMENT
DATE	:	27 JANUARY 2026
TIME	:	9:00AM - 12:00PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Answer ALL questions for Section A.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet. ☐ *Tick if applicable*
9. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

THERE ARE 5 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

Question 1

The marine and coastal atmosphere refers to the air environment over the ocean and near coastal areas, where ocean–atmosphere interactions strongly influence weather, humidity, wind patterns, and local climate. It directly affects maritime activities by shaping operational conditions, safety levels, and decision-making in marine transportation and coastal operations.

(a) A hurricane is an intense tropical storm system that develops over warm ocean waters and is associated with strong rotating winds, heavy rainfall, and low atmospheric pressure. Examine the development of a hurricane, including the atmospheric processes involved.

(10 marks)

(b) Global atmospheric circulation controls large-scale wind and pressure patterns across the Earth, which strongly influence ocean and weather conditions. Assess FIVE impacts of global atmospheric circulation on the maritime industry.

(10 marks)

Question 2

Global atmospheric circulation is the large-scale movement of air around the Earth that distributes heat from the equator to the poles and influences global wind and climate patterns. It also shapes the main global patterns of air pressure and wind movement across different latitudes.

(a) Wind patterns differ across latitudes due to variations in global air pressure and temperature. Examine FIVE types of wind belts and their characteristics.

(10 marks)

(b) Sea breeze and land breeze occur due to unequal heating and cooling rates of land and ocean surfaces. Assess the formation of Land breeze and Sea breeze.

(10 marks)

SECTION B (Total: 60 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

Surface ocean currents are the large-scale movement of seawater at the ocean surface, driven mainly by wind and Earth's rotation, which helps distribute heat and influence climate worldwide. These currents form major circulation patterns called gyres and play an important role in weather systems and marine ecosystems.

(a) Surface currents affect only about 10% of ocean water and occur above the pycnocline. Identify FIVE types of ocean surface currents.

(10 marks)

(b) A subtropical gyre is a large circular system of moving surface water. Outline the formation of a gyre.

(10 marks)

Question 2

The global conveyor belt system is the large-scale movement of ocean water driven by differences in temperature and salinity (thermohaline circulation), which helps transport heat and nutrients around the world. It also plays an important role in regulating Earth's climate by moving warm water toward colder regions and returning cold water to the deep ocean.

(a) Deep-water currents, also known as thermohaline circulation, play an important role in regulating Earth's climate. Determine the formation of deep-water currents.

(10 marks)

(b) ENSO (El Niño–Southern Oscillation) can cause extreme weather changes in South America and Australia. Compare the characteristics of El Niño and La Niña.

(10 marks)

Question 3

Ocean waves are moving surface water caused mainly by wind blowing over the sea. As wind transfers energy to the ocean, waves form and travel across the water. The size of waves depends on wind speed, wind duration, and the distance the wind blows (fetch). When waves reach shallow coastal areas, they slow down, increase in height, and eventually break near the shore.

(a) Ocean waves travel across the ocean and eventually break at the shoreline. Analyse FIVE factors that generate ocean waves.

(10 marks)

(b) Tsunami waves can travel at speeds of about 700 km/h with a wavelength of approximately 200 km. Outline the formation of a tsunami, highlighting the key processes involved in its formation

(10 marks)

Question 4

Ocean tides are the periodic rise and fall of sea level, mainly influenced by the gravitational forces of the Moon and the Sun. High tide occurs when the sea level reaches its maximum height, while low tide occurs when it reaches its minimum height. In many coastal areas, tides follow a regular daily pattern, often producing two high tides and two low tides within 24 hours.

(a) Analyse FIVE impacts of ocean tides on port activities.

(10 marks)

(b) The relative positions of the Sun, Moon, and Earth influence the occurrence of high tides and low tides. Determine the effects of elliptical orbits on tides.

(10 marks)

END OF EXAMINATION PAPER