



CINEC CAMPUS
FACULTY OF ENGINEERING TECHNOLOGY
BACHELOR OF SCIENCE HONOURS IN ENGINEERING
FINAL EXAMINATION

Module code	: ME1323
Module Title	: Thermodynamics
Academic Year	: Semester 2 / Batch 7
Date	: 08 May 2025
Time Allowed	: Three (3) hours

INSTRUCTIONS TO CANDIDATES

- This is a Closed book examination.
- This question paper consists of **Five** questions.
- Answer **Four questions only**.
- All questions carry equal marks.
- Data sheet is back of the paper.
- Steam table is provided during the examination.
- All the steps of the calculations should be shown clearly.

1.
 - (a) Explain the steady flow using a schematic diagram clearly mentioning inlet and outlet mass flow rate for a compressible fluid. (5 marks)
 - (b) Write down the steady flow energy equation with usual notations for a turbine with a schematic diagram. (5 marks)
 - (c) A steady flow of steam enters a condenser with a specific enthalpy of 2300 kJ/kg and a velocity of 350 m/s. The condensate leaves the condenser with a specific enthalpy of 160 kJ/kg and a velocity of 70 m/s. Draw a schematic diagram for the same. (5 marks)
 - (d) Calculate the heat transfer to the cooling fluid per kg of steam condensed in part (c) (10 marks)

2.
 - (a) What is a perfect gas ? (5 marks)
 - (b) Oxygen O_2 , at 200 bar is to be stored in a steel vessel at 20 °C. The capacity of the vessel is 0.04 m³. Assuming that O_2 is a perfect gas, calculate the mass of oxygen that can be stored in the vessel. The molar mass of oxygen is 32 kg / kmol. (10 marks)
 - (c) Above vessel is protected against excessive pressure by a fusible plug which will melt if the temperature rises too high. At what temperature must the plug melt to limit the pressure in the vessel to 240 bar ? (10 marks)

3.

A fluid at 0.7 bar occupying 0.09 m^3 is compressed reversibly to a pressure of 3.5 bar according to a law $pv^n = \text{constant}$. The fluid is then heated reversibly at constant volume until the pressure is 4 bar. The specific volume is then $0.5 \text{ m}^3/\text{kg}$. A reversible expansion according to a law $pv^2 = \text{constant}$ restores the fluid to its initial state.

- (a) Sketch the cycle on a p-v diagram. (4 marks)
- (b) Calculate the mass of fluid present (9 marks)
- (c) Calculate the value of n in the first process. (4 marks)
- (d) Calculate the net work of the cycle. (8 marks)

4.

- (a) Two reversible heat engines operate in series between a source at 527°C and a sink at 17°C . If the engines have equal efficiencies and the first rejects 400 kJ to the second. Assuming that each engine operates on Carnot cycle (7 marks)

Calculate the temperature at which heat is supplied to the second engine

- (b) Calculate the heat taken from the source in part (a) (7 marks)
- (c) Calculate the work done by each engine in part (a). (11 marks)

5. (a) 5 kg of steam at a pressure of 2 bar occupies a volume of 2.5m^3 . Determine, (5 marks)
(i) the temperature, and
(ii) the dryness fraction of steam.
- (b) 0.05 kg of steam at 16 bar is contained in a rigid vessel of volume 0.007933 m^3 . What is the temperature of the steam? (8 marks)
- (c) If the vessel is cooled at constant pressure, at what temperature will the steam be just dry saturated in part (b)? (4 marks)
- (d) Cooling is continued until the pressure in the vessel is 11 bar. (8 marks)
Calculate the final dryness fraction of the steam in part (b)

End of the Examination

Data Sheet

The ideal gas equations

$$pv=RT$$

$$pV=mRT$$

$$pV=n\hat{R}T$$

$$C_p - C_v = R$$

$$\gamma = C_p/C_v$$

$$\Delta U = mC_v\Delta T$$

$$\hat{R} = 8.3145 \text{ kJ/kmol.K}$$

Properties of air

$$R = 0.287 \text{ kJ/kg.K}$$

$$C_v = 0.718 \text{ kJ/kg.K}$$

$$\gamma = 1.4$$

Foundation

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Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE : NAVIGATION OFFICER CADET FOUNDATION COURSE

COURSE CODE : ND- 0199, B-025

FINAL TERM REPEAT EXAMINATION - QUESTION PAPER

PHYSICS

- Answer Any 06 Questions

Date: 08.04.2025

Pass mark 50%

Time allocated: 03 Hrs

➤ Some helpful Data:

*Speed of light in air 3×10^8 m/s**Speed of sound in air 340 m/s* $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$, $\mu_0 = 4\pi \times 10^{-7} \text{ H/m}$, $m_e = 9.11 \times 10^{-31} \text{ kg}$, $m_p = 1 \text{ amu} = 1.6726 \times 10^{-27} \text{ kg}$, $e = 1.6 \times 10^{-19} \text{ C}$

1.

- Draw the ray diagram for an object between focus and centre of a convex lens (4 marks)
- Define the linear magnification and angular magnification (6 marks)
- An observer with their eyes close to the eyepiece of an opera glass sees a clear final image of a star at infinity (normal adjustment). The opera glass has an objective lens with a focal length of **300 cm** and an eyepiece with a focal length of **-20 cm**.
 - Draw the ray diagram of the opera glass for the condition given (5 marks)
 - Find the separation between the lenses (5 marks)

2.

- A plane mirror is oriented face up, making an angle of **65°** with the vertical. If a ray of light shines vertically downwards onto this mirror, what is the angle of incidence? What will be the angle between the reflected ray and the vertical? (8 marks)
- When light passes from oil ($n = 1.43$) into a liquid at an angle of incidence of **48°**, it is deviated **17°** towards the interface. Under what conditions will total internal reflection occur at this interface? (6 marks)
- A beam of sodium light, with an initial angle of incidence of **38°** in air, passes through parallel surfaces of water ($n = 1.333$) and then into flint glass ($n = 1.63$). What is the angle of refraction in the flint glass? (6 marks)

3.

- a. Write the mirror formula specifying the sign convention. (6 marks)
- b. Draw the ray diagram for an object in front of a concave mirror
 - i. When the object is placed at the center (3 marks)
 - ii. When the object is placed between the center and focus (3 marks)
- c. A concave mirror has a radius of curvature of **0.12 m**. An object **20 mm** high is placed **1.8 m** from this mirror. Find the focal length of the mirror, and determine the location, height, and orientation of the image formed. (8 marks)

4.

- a. Define the index of refraction and critical angle of a material medium. (4 marks)
- b. To some extent, the brilliance of diamonds ($n = 2.42$) is attributable to total internal reflection. Calculate the critical angle for a diamond-air surface. (4 marks)
- c. In practice, optical fibers have a coating of glass ($n_1 = 1.512$) to protect the optical surface of the fiber. If the fiber itself has an index of refraction $n_2 = 1.7$, what is the critical angle for total reflection of ray inside the fiber? (6 marks)
- d. The optical fiber ($n = 1.3$) is **2 m** long and has a diameter of **20 μm** . If a ray of light is incident on one end of the fiber at an angle **40°**, how many reflections does it make before emerging from the other end? (6 marks)

5.

- a. Describe terms of interference and diffraction of light waves. Express the formula for a thin slit. (4 marks)
- b. A light source emits a mixture of wavelength from **452 to 580 nm**. When a diffraction grating is illuminated normally by this source, it is noted that two adjacent spectra barely overlap at an angle of **15°**. How many lines per meter are ruled on the grating? (8 marks)
- c. A grating having **300 lines per mm** produces spectra of a mercury arc. The green line of the mercury spectrum has a wavelength of **5461 Å**. What is the angular separation between the first-order green line and the second-order green line? (8 marks)

6.

- a. Write an expression for the force(F) act on a charge(q) moving with a velocity of v in a magnetic field(B). Hence, show that the charge moves in a circular path. (5 marks)
- b. Cathode ray beam (an electron beam) is bent in a circle when it ejects at the speed of $9.6 \times 10^7 \text{ m/s}$ by a uniform field with 6 mT . What is the radius of circular path of the electron? (5 marks)
- c. Write an expression for the force on a current carrying conducting rod in a magnetic field (4 marks)
- d. The earth's magnetic field around Sweden and horizontal surface is around $76^\circ 40'$ (Dip angle), directed from the southern to northern hemisphere. Its magnitude is about 0.528 G . Find the force on a 500 m wire carrying a current of 15 A parallel to earth
 - i. From east to west (3 marks)
 - ii. From north to south (3 marks)

Hint : $1 \text{ G} = 10^{-4} \text{ T}$

7.

- a. A standard radio broadcasting station has an assigned frequency between 600 and 1500 kHz . The VHF television stations have frequencies between 50 and 200 MHz . While the UHF have frequencies between 400 and 900 MHz . What is the wavelength corresponding to each of the frequencies mentioned? (10 marks)
- b. Bluetooth technology operates within the frequency range is from 2400 to 2483.5 MHz . Determine the corresponding wavelength range. (6 marks)
- c. A radar set for determining the speed of approaching cars sends out waves of frequency 1200 MHz . If the beat frequency observed is 150 Hz , what is the speed of the car in km/h ? (4 marks)

8.

- a. Write a mathematical expression for **Biot-Sarvat law** and explain the term on it (5 marks)
- b. A circular loop of 140 mm diameter and 200 turns carries of 600 mA . Find the magnetic field at the center of the loop (5 marks)
- c. Write an expression for the magnetic field inside a solenoid having N terns per unit length and carrying current I . (5 marks)
- d. A solenoid 0.25 m long has 5000 turns . The magnetic induction near the center of the solenoid is 0.85 T . What is the current in the solenoid? (5 marks)

9.

- a. Write an expression for the magnetic field around a long current carrying conductor (4 marks)
- b. Two long, fixed, and parallel wires, A and B, are separated by a distance of **42 cm** in air. If they carry currents of **10 A** and **15 A**, respectively, in the same direction, determine the resultant magnetic flux density.
- i. On a line midway between the wires and parallel to them (5 marks)
 - ii. On a line **14 cm** from wire A and **56 cm** from wire B (5 marks)
 - iii. Find the points where the flux density is zero (6 marks)



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Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE : NAVIGATION OFFICER CADET FOUNDATION COURSE

COURSE CODE : ND- 0199, B-025

FINAL REPEAT EXAMINATION – QUESTION PAPER
INTRODUCTION TO SHIPPING

- Total Marks – 100

Date: 07.04.2025

Pass mark 50%

Time allocated: ^{2.5}~~3.0~~ Hours

Answer all questions....

1. Draw a sketch and label the following on a vessel (20 Marks)
 - a) Propeller
 - b) Main Deck
 - c) Bulbous Bow
 - d) Engine Room
 - e) Accommodation
2. Briefly explain the following terms (4x5=20 Marks)
 - a) Helmsman
 - b) Lookout
 - c) Anchor
 - d) Ballast
 - e) Berth
3. (i) Name 10 types of vessels that you can find at sea (10 marks)

(ii) Explain the following types of vessels (5x2=10 marks)
 - a) Tanker
 - b) Bulk Carrier
4. Explain the following terms (5x4=20 marks)
 - a) MLC
 - b) HFO
 - c) STCW
 - d) MDO

5. (i) What are the general factors influencing the size of a ship (10 marks)
- (ii) What is an auxiliary equipment (05 marks)
- (iii) What is an auxiliary steering system (05 marks)



FINAL REPEAT EXAMINATION QUESTION PAPER

CODE - QP

Approved for Quality Management System

EDUCATION & TRAINING COURSE: NAVIGATION OFFICER CADET FOUNDATION COURSE

SUBJECT: ENGLISH LANGUAGE

Faculty	Department / Section/Division
Humanities and Education	ELTU

INSTRUCTIONS TO CANDIDATES	Date of the examination = 2025.04.06
Answer all questions.	Duration of the examination = 03 hours
Candidates are not allowed to communicate with and disturb fellow candidates during the examination.	Pass Mark = 60 marks
	Candidates could be disqualified if you violate examination rules

INDEX NUMBER:

For Office use Only

Question No:	1	2	3	4	5	6	7	8	9	Total Marks	%	Signature
For Scrutinizer's Use Only (marks)												
For Moderator's Use Only (marks)												

- **Answer all questions.**

Section A: Reading

Question 01

(15 Marks)

Read the following passage and answer the questions

The Importance of Communication Skills in the Maritime Industry

Effective communication is a fundamental skill in the maritime industry. Mariners, from deck cadets to senior officers, need to communicate clearly and efficiently to ensure safety and operational efficiency. Miscommunication can lead to accidents, delays, and even environmental disasters. Hence, training in Maritime English is essential, particularly for non-native speakers.

Maritime English courses often include topics such as giving commands, reporting incidents, and maintaining clear radio communication. In multicultural crews, English serves as the common language, helping overcome language barriers. Additionally, the International Maritime Organization (IMO) has developed standard phrases to minimize misunderstandings, especially during emergencies.

Technological advancements have introduced new challenges and opportunities for communication at sea. Digital tools like Electronic Chart Display and Information Systems (ECDIS) and automated reporting systems require mariners to interpret and communicate information accurately. Therefore, ongoing training and assessment are crucial to maintaining high standards of communication.

In summary, strong communication skills not only enhance personal effectiveness but also contribute to the overall safety and success of maritime operations. For mariners, mastering Maritime English is not just an academic exercise but a professional necessity.

Answer the following questions in complete sentences.

1. Why is communication important in the maritime industry?

2. What can happen if communication fails at sea?

3. Why do mariners need to learn Maritime English?

4. What are some things taught in Maritime English courses?

5. How does English help in multicultural crews?

6. What does the IMO do to help communication in emergencies?

7. How has technology changed communication at sea?

8. Why might it be hard for non-native English speakers on a ship?

Section B: Grammar

Question 02

(10 marks)

Fill in the blanks with **the correct form of the verb** given within brackets.

1. The sun usually in the east. (rise)
2. She a letter to her friend yesterday. (write)
3. My brother his homework when the phone rang. (do)
4. The children at the park when it started raining. (play)
5. They their tickets online last night. (book)
6. By the time we arrived, she her dinner. (finish)
7. Look! The baby to walk. (try)
8. He always his car before going to work. (wash)
9. The teacher the test papers tomorrow. (check)
10. The train by the time we reached the station. (leave)

Question 03

(10 marks)

Combine the following sentences using an appropriate conjunction given in brackets.

1. She wanted to buy the dress. It was too expensive. (but/or/yet)
-

2. He passed the exam. He didn't study well. (because/even though/and)
-

3. The children were playing outside. Their parents were preparing dinner.
(while/after/and)
-

4. We missed the train. We left home late. (**because/after/and**)

.....

5. They arrived early. They could get good seats. (**so that/and/before**)

.....

6. She finished her homework. She went to bed. (**after/and/so**)

.....

7. You need to practice every day. You will fail. (**otherwise/unless/because**)

.....

8. She doesn't eat meat. She doesn't eat fish. (**nor/and/either**)

.....

9. They wanted to go out for dinner. They had watched the movie. (**or/ unless/after**)

.....

10. You can pay by cash. You can transfer the money to my account. (**and/after/or**)

.....

Question 04

(10 marks)

Fill in the blanks with the correct form of the pronoun given within brackets.

1. This is my book. Where is _____? (yours/your)
2. John is very tired because _____ has been working all day. (he/him)
3. Maria and I are going to the market. Would you like to come with _____?
(us/we)
4. Sarah is an excellent student. Everyone admires _____ for her dedication.
(she/her)
5. The children are playing outside. Have you seen _____ toys? (their/them)
6. The dog loves its owner. _____ follows her everywhere. (It/They)

7. This bag belongs to me. It is _____. (mine/my)
8. My brother and I made dinner, so Mom thanked _____. (we/us)
9. The cake was delicious. Did you bake _____ yourself? (it/its)
10. The team finished the project earlier than expected, which surprised even _____ . (them/they)

Question 05**(10 marks)**

Choose the correct preposition from the choices given in brackets and complete each sentence.

1. The captain is responsible _____ the safety of the crew. (for / to / of)
2. The ship will arrive _____ the port early in the morning. (at / in / on)
3. The cadet is familiar _____ the ship's navigation systems. (to / with / on)
4. The seafarers were warned _____ the approaching storm. (for / about / of)
5. The vessel is currently sailing _____ the Indian Ocean. (on / in / over)
6. The crew members must comply _____ all safety regulations. (to / with / for)
7. The chief officer is looking forward _____ his next contract. (to / for / at)
8. The cargo was loaded _____ the ship carefully. (into / onto / in)
9. The engine room must be kept free _____ any obstructions. (of / from / out)
10. The ship's route depends _____ the weather conditions. (from / on / at)

Question 06**(10 marks)**

Rearrange the words in correct order to make complete sentences

1. a / beautiful / saw / I / sunset / yesterday

.....

2. father / my / breakfast / his / eats / always / at / 7:30 AM

.....

3. cinema / the / friends / to / went / yesterday / my

.....

4. rains / heavily / in / it / sometimes / the / afternoon

.....

5. book / interesting / an / reading / is / she

.....

6. music / listens / brother / my / to / evening / the / in

.....

7. never / late / school / I / for / am

.....

8. trip / going / next / on / we / are / a / month

.....

9. library / to / the / goes / every / she / Saturday

.....

10. the / birthday / celebrated / we / yesterday / party

.....

Question 07

(10 marks)

Fill in the blanks with suitable articles 'a, an, the.'

Marie Curie was (1) pioneering physicist and chemist who made groundbreaking discoveries in (2) field of radioactivity. She was (3) first woman to win (4) Nobel Prize and remains the only person to win Nobel Prizes in two different sciences. She was born in (5) small town in Poland and later moved to (6) France to continue her studies. Her work led to (7) development of Xray machines, which revolutionized (8) medical field and saved countless lives during (9) wars. Marie Curie remains (10) symbol of dedication and perseverance in science.

Question 08

(10 marks)

Complete the following questions with the words given below.

(Which/ whose/ how much/ what kind/ why/ how far/ where/ how many/ how long/ how often)

1. _____ do you want to go during the lunch break?
2. _____ does it take you to complete your daily tasks?
3. _____ apartment do you live in?
4. _____ books have you read so far?
5. _____ is she taking too long to get ready?
6. _____ of beverages do you prefer the most?
7. _____ money do you have in your bank account?
8. _____ car is parked outside my driveway?
9. _____ do you visit the library?
10. _____ is your friend's house from your home?

Section C: Writing

Question 09

(15 marks)

Write a formal letter to the Captain of your ship requesting one week's leave due to an unexpected personal emergency. (200 words)

OR

Write a short story beginning with the following sentence. (200 words)

It was a dark gloomy day with signs of heavy rain. I was at home all by myself.

.....

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Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE : Navigation Cadet Training Program – Phase I

COURSE CODE : ND- 0100 PI

FINAL REPEAT EXAMINATION – QUESTION PAPER

OPERATIONAL SAFETY

- Answer all questions.
- Total Marks: 120

Date: 06.04.2025

Pass mark 60%

Time allocated: 03 Hours

1.
 - a. Why should cargo hold be ventilated when it occupies with cargo?
 - b. Explain what you understand by the terms “cargo sweat” and “ship sweat”?
 - c. What is meant by hygroscopic cargo and non-hygroscopic cargo
 - e. With the aid of a sketch, briefly explain a natural and a mechanical ventilation system installed in a tween deck cargo hold.

(5 marks each)

2. Sketch a complete load line marking of the starboard side of a ship indicating its dimensions based on the following information.

Summer draft = 10 M

FWA = 160 mm

Ships Length 150 M

Freeboard 7 M

(20 marks)

3. With the aid of suitable sketched, indicate 20 items from the following:

- 1) Fore-body
- 2) After-body
- 3) Parallel middle-body
- 4) Entrance
- 5) Run
6. Shoulder
7. Length Between Perpendiculars (LBP or L)
8. Beam
9. Draft
10. Depth
11. Length Overall (LOA)
12. Length on Waterline (LWL)
13. Freeboard
14. Sheer
15. Camber:
16. Tumblehome

17. Flare
18. Rise of floor
19. Dead -rise
20. Rake
21. Cut-up
22. Baseline
23. Cut Away

(20 marks)

4. Discuss about the term “permit to work” under the code of safe working practices for merchant seafarers.

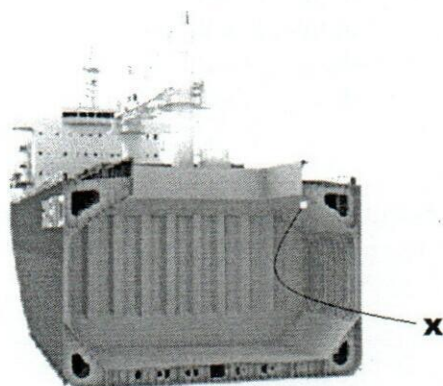
(5 marks)

- ii. Define an enclosed space.

(5 marks)

- iii. Briefly discuss how you would approach a task of crack repair at position “X” in below sketch.

(10 marks)



5. Briefly explain the various things required to perform by seafarers in the event of:

- a) Prevention of an oil spill during taking bunkering

(10 marks)

- b) Proceeding through a pirate infested area.

(10 marks)

6. a) What is ISPS
 b) Define the 3 security levels
 c) What is meant by the following: i. SSO
 ii. DPA
 iii. CSO
 iv. SSP
 v. PFSP
 d) What is ISM and describe it's purpose.

(5 marks each)



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Faculty of Maritime Sciences
Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase I
COURSE CODE: ND- 0100 PI , BATCH - 47

FINAL REPEAT EXAMINATION
METORLOGY

- Answer all questions.
- Total Marks: 100

Date: 05.04.2025

Pass mark 60%

Time allocated: 3 Hours

1. Briefly explain,
 - (i) Radiation
 - (ii) Conduction
 - (iii) Convection
 - (iv) Turbulence

(20 marks)
2. A ship steering 100° (T) at 20 knots and the relative wind speed 15 knots from 135° Determine the true wind direction and the speed by sketching a wind triangle

(20 marks)
3. Briefly explain
 - (i) Rain
 - (ii) Frontal Rain
 - (iii) Convective Rain
 - (iv) Orographic Rain

(20 marks)
4. Define,
 - (i) True Wind
 - (ii) Apparent Wind
 - (iii) Geostrophic Wind
 - (iv) ISO Bars

(20 marks)
5. (a) Briefly explain,
 - (i) Condensation
 - (ii) Precipitation

(10 marks)

(b) You are in a bridge of 20m height from the sea level and your barometer reading is 1010mb. What is the correct reading that you going to log down on the bridge log book After applying Height correction.
(10marks)

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Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase I

COURSE CODE: ND-0100 PI, BATCH 047

FINAL REPEAT EXAMINATION – QUESTION PAPER

INTRODUCTION TO NAVIGATION

- Answer all questions.
- Total Marks: 100
- Diagrams should be shown wherever possible

Date: 05.04.2025

Pass mark 60%

Time allocated: 03 hrs

1. Describe the following terms with suitable diagrams;
 - i) Parallels of Latitudes
 - ii) Ecliptic
 - iii) Prime Meridian
 - iv) A Nautical Mile

(03 Marks Each)
2. On 22nd September 2008, PM at ship in DR $18^{\circ} 20.0'N$, $085^{\circ} 40.0'E$, the Azimuth of the Sun was $265^{\circ}(C)$ when the Chronometer showed 10h 08m 30s. If Chronometer Error was 01m 8s Slow and Variation was $2^{\circ}W$, find the Deviation of for the Ship's Heading

(18 Marks)
3. i) Draw Plane Sailing Triangles for vessel's heading NE and SW courses indicating Departure, D'Lat, Course & Distance.

(6 Marks)

 - ii) A vessel steamed on a Course 301° for a Distance of 589 nautical miles. The initial position of the vessel was $03^{\circ} 40.3'S$, Longitude $175^{\circ} 40.1'W$. With the use of Plane Sailing, find the arrived position of the vessel.

(14 Marks)
4. i) Calculate the LHA Star, If GHA Aries was 120° , Longitude was $110^{\circ} 00.0'W$ and SHA Star was 250° .

(5 Marks)

 - ii) Draw a diagram to show the above GHA Aries, Longitude, SHA Star, LHA Star and Equinoctial.

(5 Marks)

5. With reference to Chart work, briefly explain the followings

- Dead Reckoning Position, Estimated Position, Observed Position.
- Procedure of obtaining Set, Drift of a current, Course made good, and Speed made good. (20 marks)

6. a. Indicated below is the Tidal information of a major port in England.

i. What is meant by Neap and Spring Tides? Indicate what tides are referred to by arrows A and B.

ii. Calculate the depth of water at this port on 4th May 0840 hrs and 0701hrs if the charted depth given is 12.5 m. (8 marks)

TIME ZONE (UT)
For Summer Time add ONE hour in non-shaded areas

MAY				JUNE			
Time	m	Time	m	Time	m	Time	m
1 0428	1.6	16 0424	2.0	1 0045	4.1	16 0555	1.0
2 0412	3.7	17 1055	3.5	2 0654	1.4	17 1228	3.0
SU 1657	1.9	18 1651	2.2	W 1336	3.9	TH 1824	1.0
3 2335	3.9	19 2313	3.7	1922	1.6		
2 0556	1.8	17 0540	2.1	2 0157	4.1	17 0040	3.0
4 1245	3.7	18 1215	3.4	3 0800	1.3	18 0701	1.0
5 1840	1.9	19 1813	2.2	TH 1439	4.1	F 1332	3.0
				2027	1.4	1930	1.0
3 0114	3.9	18 0033	3.7	3 0259	4.2	18 0148	4.0
4 0731	1.6	19 0656	1.9	4 0859	1.1	19 0801	1.0
TU 1413	3.8	20 1341	3.6	F 1535	4.2	SA 1435	3.0
2003	1.6	1925	2.0	2123	1.2	2030	1.0
4 0235	4.2	19 0155	3.8	4 0355	4.3	19 0255	4.0
5 0840	1.2	20 0759	1.6	5 0952	1.0	20 0900	1.0
W 1518	4.1	TH 1442	3.8	SA 1624	4.4	SU 1536	4.0
2105	1.2	2024	1.7	2215	1.0	2129	1.0
5 0336	4.4	20 0256	4.0	5 0446	4.4	20 0400	4.0
TH 1612	4.4	F 1535	4.0	6 1041	0.9	20 0957	1.0
2158	0.9	2117	1.4	SU 1710	4.5	M 1633	4.0
6 0428	4.6	21 0350	4.2	2302	0.9	2225	1.0
F 1025	0.6	0945	1.1	6 0530	4.4	21 0500	4.0
F 1658	4.6	SA 1623	4.3	M 1750	4.6	TU 1728	4.0
2246	0.6	2207	1.1	2344	0.9	2320	0.0
				7 0611	4.4	22 0557	4.0
				1203	0.9	1146	0.0
				TU 1825	4.6	W 1820	4.0

B

b. A ship observed S. Foreland Lt. 280 (T) at 1900hrs. One hour later the same light bore 340(T). If the ship is steering 225(T) and her speed is 23 knots find the ships position by running fix method at 1900hrs and 2000 hrs. (12 marks)



CINEC CAMPUS
FACULTY OF ENGINEERING TECHNOLOGY
BACHELOR OF SCIENCE HONOURS IN ENGINEERING
RE-SIT EXAMINATION

Module code	: ME1323
Module Title	: Thermodynamics
Academic Year	: Semester 2
Date	: 04 April 2025
Time Allowed	: Three (3) hours

INSTRUCTIONS TO CANDIDATES

- This is a Closed book examination.
- This question paper consists of **Four** questions.
- Answer **All questions**.
- All questions carry equal marks.
- Data sheet is back of the paper.
- Steam table is provided during the examination.
- All the steps of the calculations should be shown clearly.

1.	(a)	What is a perfect gas?	(5 marks)
	(b)	Oxygen, O_2 , at 200 bar is to be stored in a steel vessel at 20 °C. The capacity of the vessel is 0.04 m ³ . Assuming that O_2 is a perfect gas, calculate the mass of oxygen that can be stored in the vessel. The vessel is protected against excessive pressure by a fusible plug which will melt if the temperature rises too high. At what temperature must the plug melt to limit the pressure in the vessel to 240 bar? The molar mass of oxygen is 32 kg/kmol.	(20 marks)

2.	(a)	Write down the steady flow energy equation with usual notations for a turbine with a schematic diagram.	(5 marks)
	(b)	Air having a density of 1.25 kg/m ³ enters a gas turbine at a velocity of 105 m/s through an inlet area of 0.05 m ² . The air stream exits from the gas turbine at a velocity of 135 m/s and a density of 0.67 kg/m ³ . During the flow process, air loses 27 kJ/kg of heat, and its specific enthalpy comes down by 145 kJ/kg. Determine the mass flow rate of air through the turbine,	(10 marks)
	(c)	Determine the turbine exit area in part (b)	(5 marks)
	(d)	Determine the power developed by the turbine in part (b)	(5 marks)

3.		A fluid at 0.7 bar occupying 0.09 m^3 is compressed reversibly to a pressure of 3.5 bar according to a law $pv^n = \text{constant}$. The fluid is then heated reversibly at constant volume until the pressure is 4 bar. The specific volume is then $0.5 \text{ m}^3/\text{kg}$. A reversible expansion according to a law $pv^2 = \text{constant}$ restores the fluid to its initial state.	
	(a)	Sketch the cycle on a p-v diagram.	(4 marks)
	(b)	Calculate the mass of fluid present	(9 marks)
	(c)	Calculate the value of n in the first process.	(4 marks)
	(d)	Calculate the net work of the cycle.	(8 marks)

4.	(a)	Draw the T-s diagram for heating water for various pressures with saturation curve and explain regions of steam.	(5 marks)
	(b)	0.05 kg of steam at 16 bar is contained in a rigid vessel of volume 0.007933 m^3 . What is the temperature of the steam?	(8 marks)
	(c)	If the vessel is cooled, at what temperature will the steam be just dry saturated in part (b)?	(4 marks)
	(d)	Cooling is continued until the pressure in the vessel is 11 bar. Calculate the final dryness fraction of the steam in part (b)	(8 marks)

End of the Examination

Data Sheet

The ideal gas equations

$$pv=RT$$

$$pV=mRT$$

$$pV=n\hat{R}T$$

$$C_p - C_v = R$$

$$\gamma = C_p/C_v$$

$$\Delta U = mC_v\Delta T$$

$$\hat{R} = 8.3145 \text{ kJ/kmol.K}$$

Properties of air

$$R = 0.287 \text{ kJ/kg.K}$$

$$C_v = 0.718 \text{ kJ/kg.K}$$

$$\gamma = 1.4$$



CINEC CAMPUS (PVT) LTD.

Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE :Navigation Cadet Training Program – Phase I

COURSE CODE : ND- 0100 PI , BATCH - 48

MID TERM EXAMINATION –QUESTION PAPER

Meteorology

Answer all questions

Total Marks: 100

Date: 03.04.2025

Pass mark 60%

Time allocated: 3 Hours

- 1) a. Draw and name the components of a hygrometer. (10marks)
- b. Describe how the hygrometer is used to measure humidity. (10 marks)
- 2) a. Explain the process of evaporation in the context of the hydrological cycle. (10 marks)
- b. Explain the concept of 'insolation' and its effect on the Earth's temperature. (10 marks)
- 3) a. Briefly explain the following terms (05 marks each)
 - i) Frontal Rain
 - ii) Convectional Rain
 - iii) Orthographic Rain
- b. You are at a bridge of 30m height from the sea level and your barometer reading is 1012mb. What is the correct reading that you going to log down on the bridge logbook After applying Height Correction. (5marks)
- 4) a. Explain the following terms (5 marks each)
 - i) Condensation
 - ii) Precipitation
 - iii) Troposphere
 - iii) convection
- 5) a. Describe the conditions necessary for cloud formation. (10 marks)
- b. Describe how barometers and hygrometers are used to predict weather conditions. (10 marks)



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Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE : Navigation Cadet Training Program – Phase I

COURSE CODE : ND- 0100 PI , BATCH – 048

MID TERM EXAMINATION – QUESTION PAPER

Navigation

Answer all questions

Total Marks: 100

Date: 02.04.2025

Pass mark: 70%

Time allocated: 3 Hours

1) a) Define with suitable sketches

- I. Equator
- II. Geocentric latitude of a place
- III. Rhumb Line
- IV. Departure
- V. True Course

(03 marks each)

b) A vessel in position 47°S ,

054°W steers a course of $270^{\circ}(\text{T})$ for a distance of 412 miles. Find the position arrived.

(10 marks)

2)

a) Define, the meridional parts.

(05 marks)

b) Find the course and distance by mercator sailing between A in $12^{\circ} 14'\text{N}$ $073^{\circ} 12'\text{E}$ B in $23^{\circ} 37'\text{S}$ $010^{\circ} 19'\text{E}$.

(10 marks)

c) Find the position arrived in the following case by plane sailing method, latitude $65^{\circ} 01.7\text{S}$, longitude $170^{\circ} 54.9\text{W}$ Course 332, Distance 319 miles

(10 marks)

3)

a) Define,

i) Deviation

ii) Variation

(04 marks each)

- b) If the ship's head by Compass. Was 055(C), Variation 2° W, Deviation Card 2, Find the true course.

(12 marks)

4)

- a) A vessel steering 240° (C) at 2030 hrs. Needles Point Lt. bore 007° (C) and Anvil Point Lt. bore 308° (C). Find the ship's position at 2030 hrs.
- b) From this position set a course by Compass to pass Start Point Lt. 10 miles off when abeam on the starboard side.
- c) While on this course at 2200 hrs. Bill of Portland Light was 4 points on the bow and at 2300hrs, the same light was abeam. Find the ship's position at 2300 hrs. (Variation 8° W. Ship's speed 10 knots. Deviation Card I).

(30 marks)



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Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE : Navigation Cadet Training Program – Phase I

COURSE CODE : ND- 0100 PI , BATCH – 48

MID TERM - EXAMINATION – QUESTION PAPER

Seamanship Theory

Answer all questions

Total Marks: 120

Date: 02.04.2024

Pass mark: 70%

Time allocated: 3 Hours

1.

- a) Describe the procedure for rigging up a pilot ladder correctly, including safety precautions. (10 Marks)
- b) Explain the construction of a pilot ladder with a diagram. (10 Marks)

2.

- a) When you receive the following “Helm Orders” What will be your action?

- Port 10
- Wheel hard a port
- Ease to 20
- Wheel amidships
- Steady as she goes
- Nothing to STBD
- Steady on 030 (T)
- STBD 20
- Wheel hard a STBD
- Finish with the wheel.

(2 Marks each)

- 3.
- a) Named the parts of a Stockless Anchor with a diagram. (7 Marks)
 - b) Draw and explain the 3rd shackle of the anchor chain. (5 marks)
 - c) Explain the procedure for preparing the anchors for letting go, including the necessary safety precautions and checks before release. (8 marks)
4. Your vessel is arriving in Singapore for berthing and you are in charge of forward mooring stations. You received instructions from the captain "Vessel will be STBD side alongside, 4+2+2 and first line will be spring line" as your mooring arrangement.
- a) Explain the mooring plan with a suitable diagram. (10 marks)
 - b) Explain the purpose of each line. (10 marks)
 - a) List different types of natural fibre ropes used in maritime operations. (4 Marks)
 - b) List different types of Synthetic fibre ropes used in maritime operations. (4 marks)
 - c) What are the best practices for the safe handling of wire ropes on board a ship? (12 marks)
- 5.
- a) What is meant by a "Purchase". (6 Marks)
 - b) What are the different types of Blocks used on ships? (6 Marks)
 - c) How to use of purchase to advantage and disadvantage ? (8 Marks)



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Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE : Navigation Cadet Training Program – Phase I

COURSE CODE : ND- 0100 PI , BATCH – 48

MID TERM - EXAMINATION – QUESTION PAPER

Watchkeeping / ROR and Bridge Equipment

Answer all questions

Total Marks: 200

Date: 02.04.2024

Pass mark: 70%

Time allocated: 3 Hours

Bridge Equipment

1.
 - a) What is meant by VDR? (5 Marks)
 - b) What types of data are recorded by a VDR on a vessel? (12 Marks)
 - c) What are the purposes of VDR? (8 Marks)
2.
 - a) What are the segments of GPS and explain in detail. (15 marks)
 - b) Sketch and label simplified block diagram of an Echo Sounder. (10 marks)
3.
 - a) Describe the starting up procedure of the RADAR. (5 marks)
 - b) Name and write short notes on RADAR Main controls. (20 marks)
4.
 - a) Name the main types of data transmitted and received by AIS? (3 marks)
 - b) What are the **Dynamic data** that should be available? (8 marks)
 - c) Explain the changeover procedure of Manual steering to automatic pilot. (10 marks)
 - d) What are the alarms fitted to the Automatic pilot system? (4 marks)

ROR/Watchkeeping

- 5.
- a) State what is IALA stands for. (2 Marks)
 - b) Name three countries in region B under IALA system (3 Marks)
 - c) Draw, colour and state light rhythms of following, (20 Marks)
 - Port hand lateral mark region B
 - North Cardinal Mark
 - Isolated danger mark
 - Safe water mark
- 6.
- a) State rule number 05 of COLREGS (5 Marks)
 - b) Write down definitions of following as per COLREGS (16 Marks)
 - Sea planeSide light
 - Vessel engaged in fishingAll round light
 - Vessel not under commandTowing light
 - In sight of one another
 - c) Draw a diagram of navigation lights showing arc of visibility and their colours. (4 Marks)
- 7.
- a) Draw light formations and day signals for following (40 Marks)
 - Power driven vessel underway, 50m or more in length seen from stbd side
 - Vessel constrained by her draught 50m or more in length underway seen from astern
 - Vessel restricted in her ability to maneuver underway less than 50m in length seen from right ahead
 - Vessel not under command underway seen from port side
 - Fishing vessel other than a trawler with an outlying gear more than 150 in length on port side seen from right ahead
 - Vessel engaged in trawling probably 50m or more in length making way through the water seen from right ahead
 - Vessel engaged in pilotage duties underway seen from port side
 - Vessel under sails propelled by machinery underway seen from astern
- 8.
- a) Name four types of logbooks that you find onboard ships (4 Marks)
 - b) What are the entries to be made on the bridge deck logbook (6 Marks)



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Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE : NAVIGATION OFFICER CADET PHASE I – B48

MID EXAMINATION – QUESTION PAPER

English Language

INSTRUCTIONS TO CANDIDATES	Date of the examination = 2025.04.01
Answer all questions.	Duration of the examination = 03 hours
Candidates are not allowed to communicate with and disturb fellow candidates during the examination.	Pass Mark = 70 marks
	Candidates could be disqualified if you violate examination rules

INDEX NUMBER:

For Office use Only

Question No:	1	2	3	4	5	6	7	8	9	Total Marks	%	Signature
For Scrutinizer's Use Only (marks)												
For Moderator's Use Only (marks)												

Section A- Reading**Question 01****(10 marks)**Read the letter of notice given and write **complete answers** for the following questions.**Letter of Notice to the Student**

Maritime Training Academy
123 Ocean Drive, Colombo 10
Date: 15/10/2024

To: Cadet R. Silva
456 Beach Road, Galle

Dear Cadet Silva,

We are writing to bring to your attention certain aspects of your academic performance during this semester at the Maritime Training Academy. Our aim is to ensure that all cadets receive the support they need to excel in their studies and prepare effectively for their future careers at sea.

Upon reviewing your recent academic progress, we have noticed that your grades in subjects such as Navigation and Maritime Law have fallen below the academy's expected standards. We understand that adapting to the rigorous demands of maritime studies can be challenging, especially for cadets in their initial years.

Please be aware that this notice is not intended as a warning, but as an opportunity to help you identify areas where you can improve. We encourage you to make full use of the resources provided by the academy, including study groups, one-on-one tutorials, and our counseling services.

The academy faculty and staff are here to support you. We advise you to contact your instructors or the Academic Support Office for guidance on how to improve in these subjects. They can provide valuable insights and strategies to help you meet the requirements necessary for successful completion of the program.

Remember, setbacks are a normal part of the learning process, and taking proactive steps now can lead to significant progress. We believe in your potential and are confident that you will achieve the improvement needed to succeed in your studies and career.

Please feel free to reach out for assistance, and let us work together towards a positive outcome in your academic journey.

Yours sincerely,

Signature

Capt. D. Fernando

Head of Academic Affairs

Maritime Training Academy

1. Why is the academy writing this letter to Cadet R. Silva? (01 mark)

.....
.....

2. What subjects does the letter mention that Cadet Silva is struggling with? (01 mark)

-
3. What specific resources does the letter suggest Cadet Silva should use to improve his academic performance? (01 mark)
-
-
4. What does the letter say about the normality of setbacks in the learning process? (01mark)
-
-
5. What is the overall tone of the letter: supportive, critical, or neutral? Explain your choice. (02 marks)
-
-
6. Write similar words from the passage for the words given below (04 marks)
- a) *development* -
- b) *supervision* -
- c) *obstacles* -
- d) *difficult* -

Section B – Grammar

Question 02

(15 marks)

Fill in the blanks with **the correct form of the verb** given in the bracket.

1. My mother _____ breakfast daily. (prepare)
2. By this time next year, they _____ (complete) their training.
3. While he (drive) _____ to the port yesterday, he (realize) _____ he _____ (forget) his documents.
4. The nanny (watch) _____ the babies every weekday when Mama _____ (leave) for work.
5. Look! That man _____ to cut down that valuable tree. (try)
6. They (not finish) _____ the report by the time the manager (arrive) _____ yesterday.

7. If you (*study*) _____ hard, you (*pass*) _____ the exam.
8. He always _____ the garbage out before going to sleep. (*take*)
9. My aunt _____ to India tomorrow. (*fly*)
10. The students _____ answers when the teacher entered the class. (*write*)

Question 03**(15 marks)**

Fill in the blanks with suitable articles 'a, an, the.'

In (1) maritime industry, safety is (2) top priority. When onboard (3) ship, every crew member must follow (4) safety protocols to ensure (5) smooth and secure operation. For example, wearing (6) life jacket is essential during emergency drills. Navigating through (7) open sea requires experience, as unexpected weather conditions can arise at any time. It's important for each crew member to complete (8) emergency response training as part of their duties. Before setting sail (9) captain and crew review (10) ship's route and prepare for potential hazards. Additionally, it is vital to monitor (11) weather forecast closely to avoid dangerous situations. In (12) emergency, (13) alarm will sound to alert the crew to take action. Maintaining (14) high standard of safety is (15) shared responsibility among all crew members.

Question 04**(10 marks)**

Complete the following questions with the words given below.

(Which, how much, why, when, how, what, who, how long, where, how often)

1. _____ does it take to complete maritime safety training?
2. _____ safety protocols are most important on a ship?
3. _____ can crew members stay prepared for emergencies at sea?
4. _____ is responsible for checking the ship's navigation plan?
5. _____ experience is required to become a ship captain?
6. _____ is weather monitoring crucial for maritime safety?
7. _____ should crew members do if an emergency alarm sounds?
8. _____ are emergency drills conducted onboard?
9. _____ should a crew member wear a life jacket?
10. _____ can crew members find emergency equipment on a ship?

Question 05**(10 marks)**

Form a question using question words to elicit the underlined word as the answer.

1. The mechanic repaired the damaged car.

.....

2. The ship left the port yesterday.

.....

3. The 2nd officer managed the loading operations.

.....

4. The engineers checked the engine's performance daily.

.....

5. The safety drills were conducted in the training area.

.....

6. The accident happened because of bad weather.

.....

7. The engineer checked the fuel system.

.....

8. He speaks French fluently.

.....

9. The captain called me last night.

.....

10. The meeting starts at 10:00 a.m.

.....

Question 06**(10 marks)**

Convert the following sentences into compound sentences using coordinating conjunctions:

(for, and, nor, but, or, yet, so)

1. I can take you to the airport. You can find another ride.

.....

2. It was snowing heavily. They canceled the outdoor event.

.....

3. Mark enjoys playing football. He likes basketball too.

.....

4. He was allergic to peanuts. He avoided eating them.

.....

5. He apologized for the mistake. He was not sorry at all.

.....

6. I looked everywhere for my keys. I couldn't find them.

.....

7. He didn't bring his lunch. He had no money to buy food.

.....

8. He could work late tonight. He could finish the task tomorrow.

.....

9. She enjoys baking. She dislikes washing dishes.

.....

10. He didn't call his friends. He didn't text them either.

.....

Question 07

(10 marks)

Rearrange the words in correct order to make complete sentences.

1. should / you / carefully / instructions / these / follow

.....

2. is taking / long time / quite / The construction / a
.....
3. the project / really focused / he / was / on
.....
4. research paper / submitted / was / his / last week
.....
5. a / she / delicious dish / for / lunch / prepared
.....
6. his / about / studies / he / is / very serious
.....
7. was / closed / yesterday / the / store
.....
8. homework / already / her / finished / has / she
.....
9. in / the weekend / the family / the park / visited
.....
10. raining / hard / when / started / we / it / left
.....

Question 08**(10 marks)**

Fill in the blanks with the correct form of the pronoun given within brackets.

1. Sam and _____ went to the bookshop to buy stationary. (I / me)
2. "Is this book _____?" he asked. (yours / you)
3. _____ were thrilled to hear about the concert. (We / Us)
4. The manager invited _____ to the company's annual event. (him / he)
5. My parents asked _____ to join them for dinner. (mine / me)
6. Jenny brought her dog with _____ to the park. (her / she)
7. All students must bring _____ own supplies for the experiment. (his / their / themselves)
8. _____ who are interested in volunteering should sign up by Friday. (Those / Them / Theirs)
9. The assignment needs to be completed by either _____ or my colleague by the end of the day. (my / me / myself)

10. Both twins shared _____ experiences from the trip with the family. (their / theirs / them)

Question 09**(10 marks)**

Change the following into passive voice.

1. The crew inspects the vessel every month.

.....

2. The captain gives instructions before each voyage.

.....

3. They will load the cargo in the morning.

.....

4. Engineers maintain the engines daily.

.....

5. The coast guard checked the ship's documents.

.....

6. The officer will announce the emergency procedure.

.....

7. The crew cleaned the deck after the storm.

.....

8. They store life vests in the cabins.

.....

9. The training officer conducts safety drills every week.

.....

10. The company will update the safety guidelines soon.

.....



CINEC CAMPUS (PVT) LTD.

Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE :Navigation Cadet Training Program – Phase I

COURSE CODE : ND- 0100-PI, BATCH - 047

FINAL REPEAT EXAMINATION
COMMUNICATION

Answer all questions

Date: 30.03.2025

Pass mark 70%

Total Marks: 100

Time allocated: 2.5 Hours

1. 1) Write the below ship name in phonetics – MAERSK DJIBOUTII. 15 marks
 2) What is the maximum range that VHF communication is successful? 3 marks
 3) How many Watts consumed in VHF high power mode? 2 marks

2. 1) When you will hoist below alphabetical flags on merchant ships.
 Flags: A, B, Q, H, O, Z, N&C14 marks
 2) Identify the flag category by the shapes given below 6 marks
 - a. 
 - b. 
 - c. 

3. 1) Briefly describe " international Code of Signals"10 marks
 2) Draw a flag at close up position. 5 marks
 3) Draw a flag at half-mast (dip) position5 marks

4. 1) Sort below message types according to **priority**. Write Highest priority message first
 (Routine message, Distress message, Safety message, and Urgency message)4 marks
 2) Sort below situations under Distress, urgency and safety situations 8 marks
 (Engine failure, Ship sinking, Cyclone warning, Sighting an iceberg, man overboard, sick crew member onboard, onboard fire at initial stage and trying to control.
 3) When the below words used during VHF communication 4 marks
 a. OVER.
 b. OVER AND OUT
 4) Write the meaning of below words4 marks
 a. AFFIRMATIVE
 b. NEGATIVE

5. 1) Name 2 **methods and equipment** for Morse messaging..... 4 marks
 2) What is the Erasing a signal in Morse2 marks
 3) What is the starting signal in Morse2 marks
 4) Write the below phrase in Morse code10 marks
 "MERCHANT NAVY"
 5) Who is the inventor of Morse Code2 marks



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Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE : Navigation Cadet Training Program – Phase I

COURSE CODE : ND- 0100 PI , BATCH – 47

FINAL - REPEAT EXAMINATION – QUESTION PAPER

Seamanship Theory

Answer all questions

Date: 30.03.2024

Pass mark: 70%

Total Marks: 120

Time allocated: 3 Hours

1.

a) When you receive the following “Helm Orders” What will be your action?

- Port 10
- Wheel hard a port
- Ease to 20
- Wheel amidships
- Steady as she goes
- Nothing to STBD
- Steady on 030 (T)
- STBD 20
- Wheel hard a STBD
- Finish with the wheel.

(2 Marks each)

2. Your vessel is arriving in Singapore for berthing and you are in charge of forward mooring stations. You received instructions from the captain “ Vessel will be STBD side alongside, 3+2+3 and first line will be spring line” as your mooring arrangement.

a) Explain the mooring plan with a suitable diagram. (10 marks)

b) Explain the purpose of each line. (10 marks)

3. Answer below questions with regards to the ropes.

a) Explain 4 types of Synthetic fibre ropes. (8 marks)

b) Explain 4 types of Natural fibre ropes. (8 marks)

c) Explain Safe Working Load (SWL) and Breaking Stress (BS). (4 marks)

- 4.
- a) Describe the risks involved while carrying out following work and how to mitigate the risks.
- De-rusting on Main deck
 - Mooring operation
 - Working Aloft
 - Painting on ships side
- (5 Marks each)
- 5.
- a) Named the parts of a Stockless Anchor with a diagram.
- (10 Marks)
- b) Explain the following anchor terms.
- Anchor cock-a-bill
 - Anchor Brought up
 - Anchor aweigh
 - Anchor Dragging
 - Anchor Cable up and down
- (2 marks each)
- 6.
- a) Draw and explain the Gyn tackle, when it is used for disadvantage. (6 Marks)
- b) What are the different types of derricks used on ships? (4 Marks)
- c) Draw and label the parts of any Stülcken derrick. (10 Marks)



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Faculty of Maritime Sciences
Department of Navigation

EDUCATION & TRAINING COURSE : Navigation Cadet Training Program – Phase I
COURSE CODE : ND- 0100-PI, BATCH - 047

FINAL REPEAT EXAMINATION
GENERAL SHIP KNOWLEDGE

Answer all questions

Total Marks: 100

Date: 29.03.2025

Pass mark 60%

Time allocated: 2.5 Hours

* **Diagrams should be shown wherever possible**

1. With respect to ship's stability define the following terms.

- i. Waterplane Coefficient (C_w).
- ii. Load Displacement.
- iii. Dead weight Available.
- iv. Heel and List.
- v. Centre of Gravity

(15 marks)

2. Define what is i) TPC ii) DWA iii) FWA

A ship's Stability data book gives her Load displacement to be 28000t and TPC to be 30. If she is now loading in DW of RD 1.018t, by how much may her load line be immersed so that she would not be overloaded?

(20 marks)

3. Following observations were made during a draft survey carried out:

Forward Port 8.39m Forward STBD 8.43m

Midship Port 9.18m Midship STBD 9.26m

Aft Port 10.10m Aft STBD 10.22m

Find the Trim and the Quarter mean Draft of the vessel.

(10 marks)

4. a) What is Metacentric height? State its relationship with GZ.?

b) With an aid of diagrams describe the following equilibriums of a ship

- a) Stable Equilibrium.
- b) Unstable Equilibrium
- c) Neutral

(30 marks)

5. On a ship of 40 000t displacement, KG 8.90 m, the following changes took place.

2500t of cargo discharged from no 2 LH, KG 5.5 m

4000t of cargo discharged from UD, KG 11.0 m

950t FW taken into peak tank KG 8.0m

1500 t fuel oil taken into no 4 DBT KG 0.5m

1000t of cargo is shifted up through a distance of 9m.

Find the final KG of the ship.

(25 marks)



Colombo International Nautical & Engineering College
Faculty of Engineering & Technology

Bachelor of Science Honours in Engineering

CE1322: Fluid Mechanics

Mid Exam - Resit (Semester-2)

(20% of Component 2 weighting)

Date : 24th March 2025

Examiner : Nimali Sugandika

Time Allowed : 2 Hours

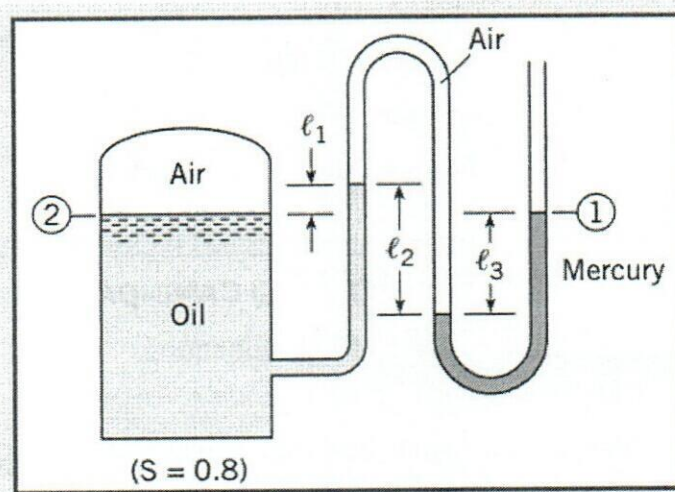
INSTRUCTIONS TO CANDIDATES

- This question paper consists of **ten** Questions.
- Answer **all** questions.
- Show **all stages** of your work, and marks **will not be given** only for answers.
- You should write legibly in black or blue ink.
- This is a closed book examination.
- All questions should be answered within 2 hours.
- Write your student number on all papers very clearly.

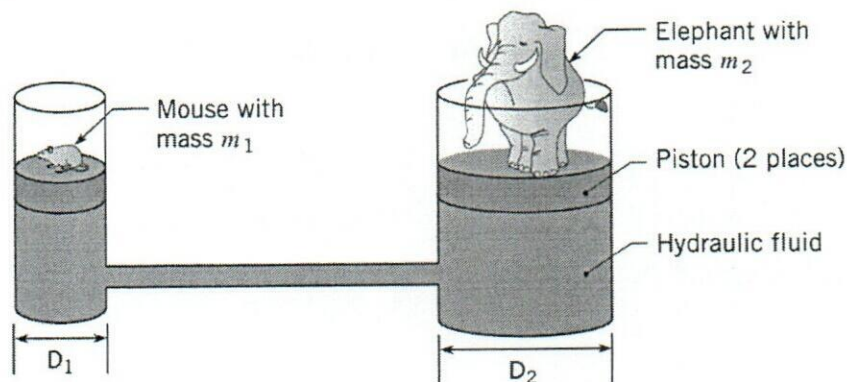
MATERIALS REQUIRED

- Answer booklet.
- You may use a scientific calculator. This must not be programmable and may be inspected during the examination. Programmable calculators, PDAs and mobile phones are not permitted in the exam.

1. A rectangular concrete channel is 3 m wide and 2 m high. The water in the channel is 1.5 m deep and is flowing at a rate of 30 m³/s. What is the Reynold's number, is the flow laminar or turbulent? ($R = \frac{\rho V d_h}{\mu}$, and $\mu = 1.0 \times 10^{-3}$ pa.s.).
2. If the cross-section area, A, is 1.2×10^{-3} m² and the discharge, Q is 24 l/s, calculate the mean velocity, u_m , of the fluid.
3. What is the gauge pressure of the air in the tank, if $l_1=50$ cm, $l_2=120$ cm, and $l_3=90$ cm, where $S_{oil}=0.8$ and $S_{mercury}=13.6$



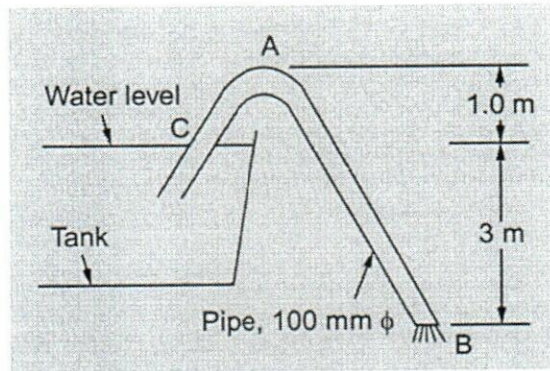
4. A mouse can have a mass of 50 g and an elephant a mass of 10000 kg. Determine the relationship of D_1 and D_2 so that the mouse can support the elephant.



5. A liquid of specific gravity 1.3, flows in a pipe at a rate of 800 l/s, from point 1 to point 2 which is 1 m above point 1. The diameters at section 1 and 2

are 0.6 m and 0.3 m respectively. If the pressure at section 1 is 10 bar, determine the pressure at section 2 (1 bar = 10^5 Pa).

6. Determine the flow rate through the siphon when flow is established. Also determine the pressure at A,



7. The mass of an object is 10 kg. The gravitational acceleration at a location is 5 m/s^2 . What is the specific weight?
8. The dynamic viscosity is $1.2 \times 10^{-4} \text{ Ns/m}^2$. The density is 600 kg/m^3 . What is the kinematic viscosity in m^2/s ?
9. The velocity gradient is $1000/\text{s}$. The viscosity is $1.2 \times 10^{-4} \text{ Ns/m}^2$. What is the shear stress?
10. The gravity at a location is 5 m/s^2 . The density of fluid was 2000 kg/m^3 . What is the pressure exerted by a column of 1 m of the fluid column?



Colombo International Nautical & Engineering College
Faculty of Engineering & Technology
Bachelor of Science Honours in Engineering
CE1322: Fluid Mechanics
Final Exam – Resit (Semester-2)
(70% of Component 2 weighting)

Date : 24th March 2025

Examiner : Nimali Sugandika

Time Allowed : 3 Hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **three** Questions.
- Answer **all** questions.
- Show **all stages** of your work, and marks **will not be given** only for answers.
- You should write legibly in black or blue ink.
- This is a closed book examination.
- Write your student number on all papers very clearly.

MATERIALS REQUIRED

- Answer booklet.
- You may use a scientific calculator. This must not be programmable and may be inspected during the examination. Programmable calculators, PDAs and mobile phones are not permitted in the exam.

Question 1

- (a) A dam that retains fresh water has a vertical face. Over a one-meter length of the face at the center of the valley the water has a depth of 38 m.

[20%]

- (i) Calculate the resultant force on this unit length of the face,
- (ii) At what depth from the surface does the resultant force act?

- (b) Why a trainer will not damage a soft wooden floor but a stiletto heel?

[20%]

- (c) A radial gate whose face is part of a circle of radius 5.0 m holds back water as shown in Figure 1. The sector of the circle represented by the gate has an angle of 30° at its center. Water stands to a depth of 2.0 m above the top of the upstream face of the gate. The other side of the gate is open to the atmosphere. Determine the magnitude and direction of the resultant hydrostatic force. The gate is 3.5 m long. **[60%]**

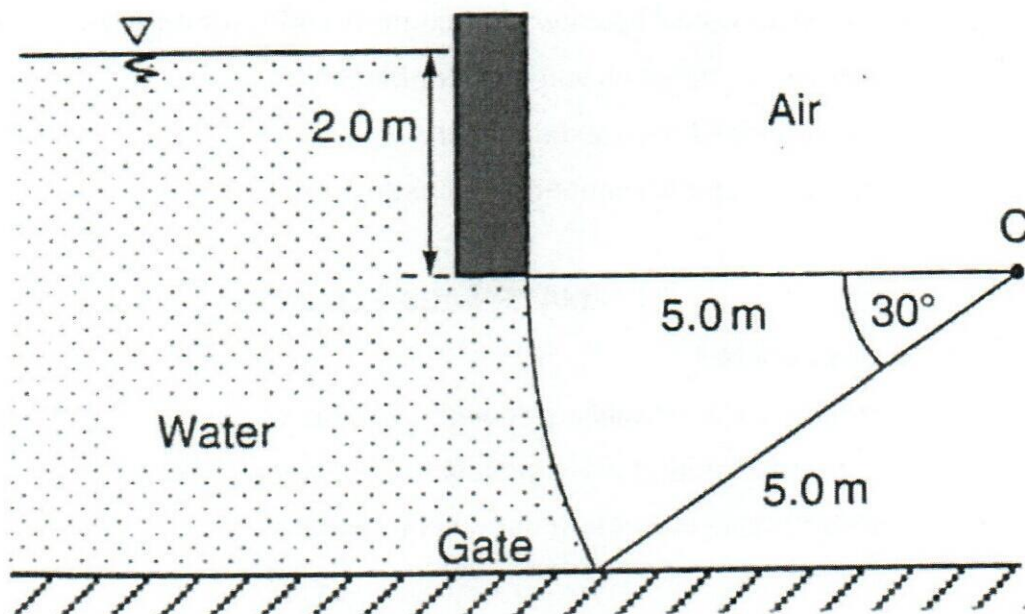
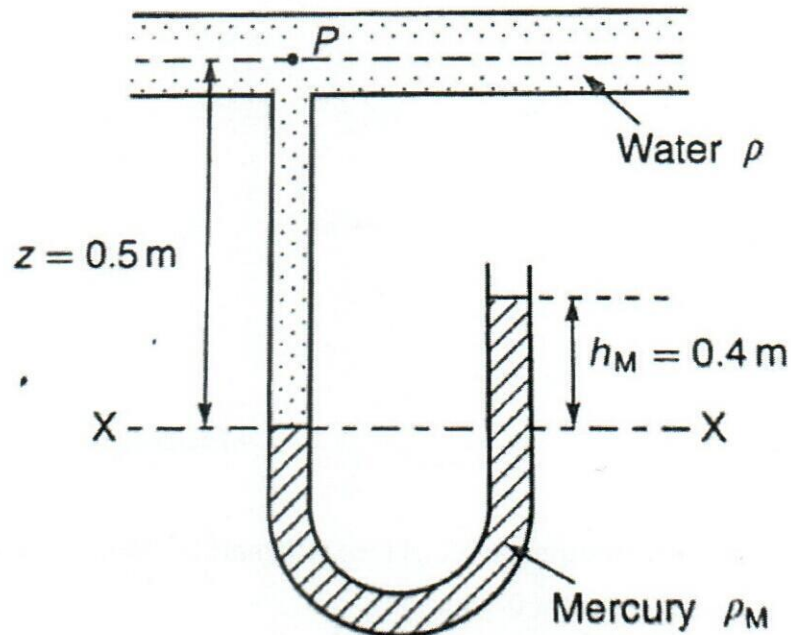


Figure 1

Question 2

- (a) The lower part of the U-tube manometer in Figure 2 contains mercury (13600 kg/m^3). The pipe contains water. Determine the gauge pressure, P , at the center of the pipe if the manometer readings are as shown in the diagram. [20%]

**Figure 2**

- (b) A differential pressure is measured using a manometer with the same geometry and reading as that in Figure 3. The pipe liquid is water and there is oil (800 kg/m^3) in the upper part of the gauge. What is the value of $(P_1 - P_2)$ and how has the sensitivity of the gauge been affected? [50%]

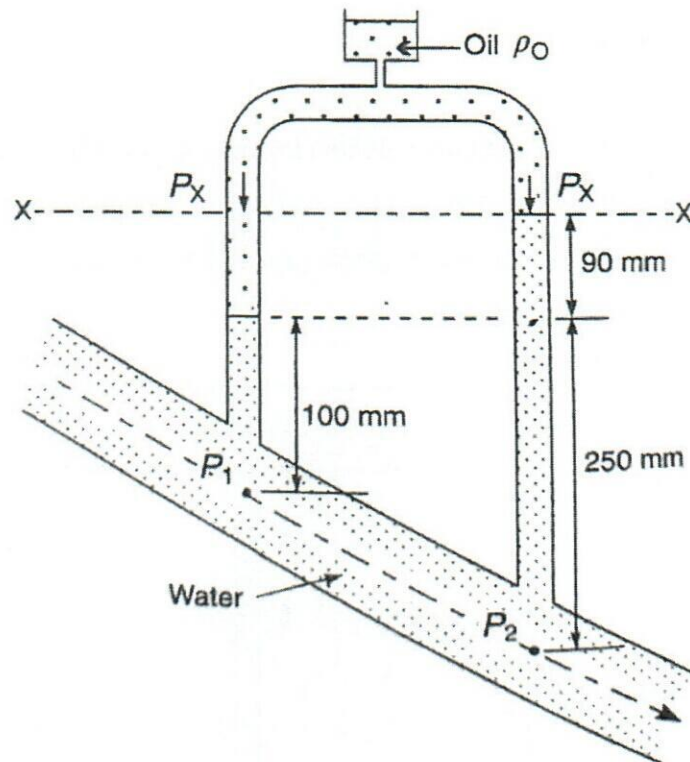


Figure 3

(c) A rectangular tank is 1.0 m long and 0.7 m wide and contains fresh water to a depth of 0.5 m, [30%]

- what is meant by gauge pressure and absolute pressure?
- What is the gauge pressure at the bottom of the tank in N/m^2 ?
- What is the absolute pressure at the bottom of the tank, if the atmospheric pressure is equal to the 10m height of the water column?

Question 3

(a) A straight pipeline with a horizontal centerline increases in diameter uniformly and symmetrically from $D_1=1.3$ m to $D_2=2.0$ m. The flow rate through the pipeline is $4.114 \text{ m}^3/\text{s}$ and the corresponding pressures are $P_1=149.573 \times 10^3 \text{ N/m}^2$ and $P_2=153.523 \times 10^3 \text{ N/m}^2$. Calculate the force exerted on the pipe expansion by the water, and state clearly in which direction it acts. [40%]

(b) A Venturi meter is being calibrated in the laboratory, [30%]

- (i) The meter has a diameter of 60 mm at the entrance and 55 mm at the throat. The differential head is 1.584 m. The flow rate is obtained by measuring the time required to collect a certain quantity of water. The average of a few such measurements gives 0.624 m³ of water collected in 55.62 s. At this discharge, what is the value of the coefficient of discharge, C_D ?
- (c) Water drained from a large reservoir using a syphon, as shown in Figure 4. The end of the syphon pipe is 3.2 m below the water level in the reservoir. At the highest part of the syphon the centerline of the pipe is 2.3 m above the water surface. The pipe has a diameter of 200 mm, and it discharges to the atmosphere. Calculate the discharge through the syphon and the pressure head at the crest (the highest part) of the syphon. **[30%]**

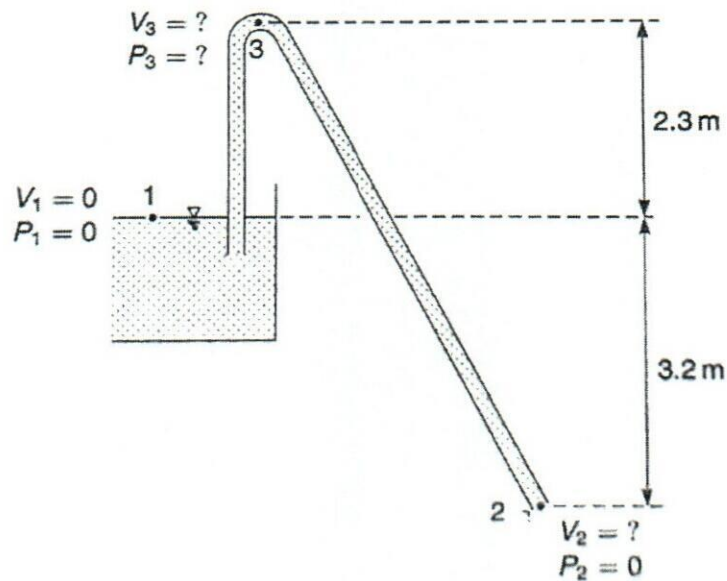


Figure 4