



PAST PAPERS

Faculty	Department / Section/Division
Not Applicable	Learning Resource Centre

<h1>Past Papers</h1>

Faculty of maritime Science
Department of Navigation

Navigation Phase I (Academic) 2013-2022

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CINEC CAMPUS (PVT) LTD.
Faculty of Maritime Sciences
Department of Navigation

EDUCATION & TRAINING COURSE : Navigation Cadet Training Program - Phase
COURSE CODE : ND-100PI - BATCH 040/041



FINAL EXAMINATION - QUESTION PAPER
COMMUNICATIONS

- Answer 05 questions.
- Total Marks: 100

Date: 23.05.2022

Pass mark 70%

Time allocated: 03 Hours

1) State the meaning of following flags with the aid of sketches:

- i) Alfa
- ii) Bravo
- iii) Golf
- iv) Hotel
- v) Foxtrot

(20 marks)

2) Write down the Morse signals for following words.

- i) DEVIATION
- ii) WRECK
- iii) NADAZERO
- iv) PANTAFIVE
- v) INSTRUMENTS

(20 marks)

3) a) Explain the use of substitute flags.

(5 marks)

b) You are required to fly the following flags. Indicate the order how you would display?

- | | | |
|------|-------|--------|
| i. K | ii. Y | iii. C |
| 3 | 5 | C |
| 3 | 5 | 5 |
| 8 | 5 | 6 |
| 8 | 5 | 6 |

(15 marks)

- 4) You are signaling by flag hoist using the International Code of Signals. Explain the procedure of how to call, how to answer signals and how to complete a signal in a communication.

(20 marks)

- 5) Working at sea might lead to a situation wherein an emergency arises requiring the assistance of another vessel or that of shore authorities. Give 10 International Code Signals which can be used in distress requiring assistance from other vessels or from the shore.

(20 marks)

- 6) a) Your vessel M.T. Phoenix (call sign ZCKC7) manned with 25 crew on board has run aground in position Lat $16^{\circ} 45' N$, Long $074^{\circ} 07' E$ and is in danger of sinking.

Write down the message you would verbally transmit on VHF ch. 16 requesting for immediate assistance.

(15 marks)

- b) How do you indicate a decimal point between numerals in following signalling

- i) Flag signalling
- ii) Flashing light & sound signalling
- iii) Voice

(5 marks)

- 7) a) How do you express Latitude $25^{\circ} 32' N$ and Longitude $145^{\circ} 56' E$ by flashing light or flag signalling method?

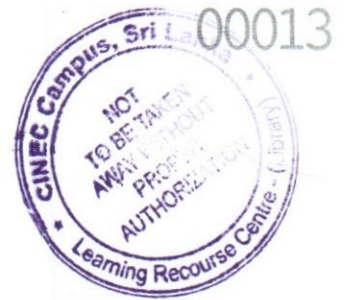
- b) What is the purpose of distress flares and smoke signals?

- c) In flag signaling, if you do not understand a signal made for your ship, what are you required to do?

- d) What is used to separate each group of flag signal in a single hoist?

- e) During your watch, you see a sailing vessel giving off orange-smoke signal. What does it mean?

(20 marks)



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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase I
COURSE CODE: ND-100 P1 - BATCH 040/041

FINAL REPEAT EXAMINATION - QUESTION PAPER
General Ship Knowledge

- Answer all questions.
- Total Marks: 100

Date: May 2022

Pass mark 60%

Time allocated: 3 Hours

1. What is TPC? Prove $TPC = A/100 \times \text{density of water displaced}$.

(Where, A is the Area of Water plane.)

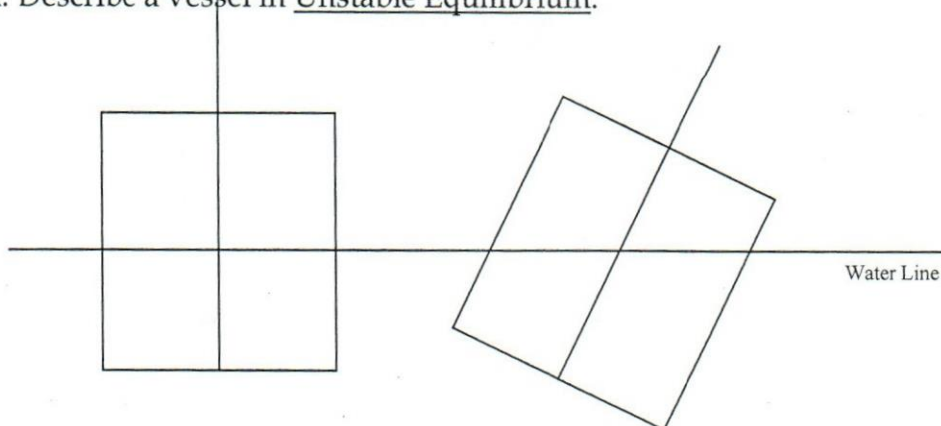
A ship is floating at a draft of 8.2m in DW of RD 1.010. If her TPC in SW is 40, find how much cargo she can load to bring her draft in DW to 8.4m.

(15 Marks)

2. i. Mark the following references of a Stable vessel given below when she is upright and after heeled by an external influence.

COG, COB, Keel, Transverse Metacenter(M), Angle of heel, COB & COG after heeling, Metacentric Height (GM), Righting Lever (GZ) .

ii. Describe a vessel in Unstable Equilibrium.



iii. Explain what is Righting Lever and Righting moment

(20 marks)

3. a. The hydrostatic particulars are given by the shipyard in the form of curves or tables plotted or tabulated against draft. Give a brief explanation of those particulars that you are aware of.

b. i. With an aid of sketch describe the function of cargo hold bilge.

(15 marks)

4. a. Define what DWA is and prove $\text{Change of draft} = \text{Change of RD} / 0.025 \times \text{FWA}$

b. A vessel floats in SW with her length and breadth of the Water plane area 150m and 30 m . If her Co-efficient of fineness of the water plane is 0.7 and her displacement is 27000 t find the change of draft expected when she goes in to the dock water of 1.018 density.

(15 marks)

5. a. Explain what Free Surface effect is?

b. The stability particulars of a ship indicate that, for her present condition, her $W=5532$ t, $KM=8.7$ m, 'i' (moment of inertia) of no 3 Double Bottom Tank about its center line= 1428 m⁴. If No DB is 3 is partly full of DO of RD 0.88, and the ship's KG is 8.5 m, calculate her FSC and Fluid GM. ($\text{FSC} = \text{FSM} / W$)

(15 marks)

6. With an aid of sketches explain the following terms.

- a) Forward Perpendicular.
- b) Camber
- c) Water Plane Coefficient
- d) Block Coefficient
- e) Flare

(20 Marks)

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Department of Navigation

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

COURSE CODE: ND-100P1 - BATCH 040/041

FINAL REPEAT EXAMINATION – QUESTION PAPER

INTRODUCTION TO NAVIGATION

- Answer all questions.
- Formulae & all intermediate steps taken in reaching your answer should be clearly shown.
- Total Marks: 100

Date: May 2022

Pass mark 70%

Time allocated: 3 Hours

1.

i. For the purpose of Navigation, we assume the earth to be at the center of a sphere of infinite radius (Celestial Sphere), on the inside surface of which, all the Celestial bodies are situated.

With an aid of sketches define and explain Declination, GHA Aries, SHA, and LHA of a body.

(10 marks)

ii. Following Celestial references of a Star were obtained from the Nautical Almanac. GHA Aries 313° , SHA Star 113° , DEC Star 26° S. If the Longitude of the Observer is 010° W;

i. Find the value of LHA, GHA and RA of the Star.

ii. With an aid of a diagram indicate all above-mentioned Celestial references.

(10 marks)

2. On 1st May 1992, AM at ship in DR Position $62^{\circ} 11' S$ $179^{\circ} 58' E$, the azimuth of the star SPICA was 312° (C) at 01h 03m 16s Chronometer time (error 03m 08 s fast). If variation was 10° E, find the deviation for the ship's head. (15 marks)

3. On 02nd Sept 1992, in DR $40^{\circ} 28' N$ $064^{\circ} 20' E$, the rising Sun bore 090° (C) . Find the LMT of sunrise and the Compass Error by Amplitude method. If variation was 1.0° E, find the deviation of the compass.

(10 marks)

4. Find by Mercator Sailing, the position arrived if the starting point $44^{\circ} 11' N$ $140^{\circ} 20' W$, the course steered is 056° (T) and the distance travelled is 2222 miles.

(20 marks)

5. i. A Ship with a speed of 16 knots, observe Anvil Point Lt. Ho. bearing 325 (T) and St. Catherine Point Lt. Ho. bearing 050 (T) . Find the Ships Position.

ii. From this position, course was set to pass Start Point Lt. Ho. 12 miles off, on the starboard side. Find the true course to steer.

iii. While on this course, Bill of Portland Lt. Ho. bore 285 (T) and 30 mins later, it bore 315 (T). Find the position of the ship at the time of second bearing.

(please refer the attached diagram)

(15 marks)

6. Briefly explain the followings

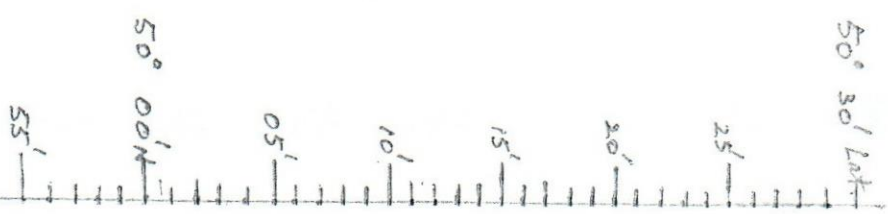
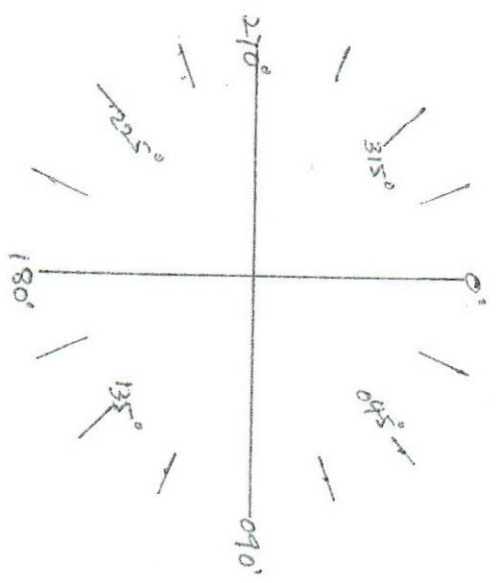
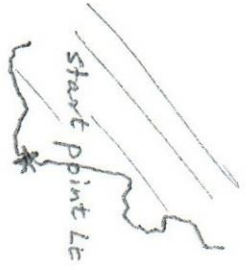
i. Dead Reckoning Position, Estimated Position, Observed Position.

ii. Procedure of obtaining a Set and Drift of a current.

iii. Various methods of obtaining a position line of a ship.

(20 marks)

End.





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Faculty of Maritime Sciences
Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase I
COURSE CODE: ND-100 P1 - BATCH 040/041

FINAL EXAMINATION - QUESTION PAPER
SEAMANSHIP THEORY

- Answer 05 questions.
- Total Marks: 100

Date: 21.05.2022

Pass mark 70%

Time allocated: 03 Hours

1) i) Draw a sketch of a stockless anchor and name the parts. (10 marks)

ii) With the aid of a side view diagram of an anchor cable arrangement on forecastle, describe the following;

- Hawse pipe
- Spurling pipe
- Chain locker
- Guillotine (bow stopper)
- Devil's claw

(10 marks)

2) Explain what to do when a ship encounters heavy weather situation so that mistakes can be avoided and in minimal time, ship can be prepared for adverse weather condition.

(20 marks)

3) State the repeat order, action to take & final report by helmsman for the following helm orders.

Order by Master/OOW/Pilot	Repeat order by Helmsman	Action to take	Final report by Helmsman
Steer 050°			
Mid ship			
Hard a Port			
Port 5			
Steady			

(20 marks)

- 4) Mooring operation is one of the important tasks that seafarers have to perform on ship's deck. List the precautions to be taken when engaged in the mooring operation.

(20 marks)

- 5) Pilots come aboard ships to ensure safe arrival and departure of vessels from ports. Draw a sketch of a pilot ladder and name the parts with standard dimensions.

(20 marks)

- 6) Explain the procedure of getting Anchor clear and ready for letting go.

(20 marks)

- 7) i) Describe the types of paints used on ships.

(10 marks)

- ii) Describe the surface preparation techniques prior to painting.

(10 marks)

- 8) a) What do you understand by rig the accommodation ladder in combination with the pilot ladder?

b) What are the sources to obtain information on weather forecasts?

c) How do you make paint brushes last longer?

d) What is the use of fenders in the mooring process?

e) What are the two ways an anchor can be dropped to the seabed?

(20 marks)

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CINEC CAMPUS
Faculty of Maritime Sciences
Department of Navigation
EDUCATION & TRAINING COURSE: Navigation Officer Cadet Training Course – Phase 1
COURSE CODE: ND- 0100 P1 - BATCH 41/42

MATHEMATICS

- Answer only 5 questions.
- Total Marks : 100
- Pass mark : 55 %
- Formulae and all intermediate steps taken in reaching your answer should be clearly shown.
- Diagrams should be shown wherever possible

Date: 20.05.2022

Time allocated: 3 Hours

1.

- a) Write the inequality $8 \geq x > -1$ in interval notation (3 marks)
- b) Find the domain of following functions

i. $f(x) = 6x^3$

ii. $f(x) = \sqrt{x - 3}$

iii. $f(x) = \frac{1}{x-5}$ (3 × 3 = 9 marks)

- c) Find the answer

i. $[(-4) + \{(-8) \div 4\}] * 53 - (-2)$

ii. $\{[(-60) \div (-5)] 2 - (-5)\} \cdot (-2) + (-2)$

iii. $\{[(-78) \div (-13)] - (-8)\} \cdot (-3)$

iv. $4^2 / (4^2 + 8 - 7 \times 2)$ (2 × 4 = 8 marks)

2.

- a) Solve following Quadratic equations using completing the square method

i. $2x^2 - 5x - 9 = 0$

ii. $x^2 + 2x - 3 = 0$ (4 × 2 = 8 marks)

- iii. Find a if $x^4 - 7x^2 + ax + 1$ gives equal remainders when divided by $x - 3$ and $x - 1$

(5 marks)

- b) Show that $x + 3$ is a factor of the polynomial $f(x) = x^5 + 3x^4 + x^2 + 8x + 15$ (4 marks)

- c) Given $h(z) = z^2 - 3z + 9$, find $h(4)$

(3 marks)

3.

- a) Solve for x

$$\log 5 + \log(5x + 1) = \log(x + 5) + 1 \quad (4 \text{ marks})$$

- b) $\log 2 = C$ find $\log 20$, $\log 5$ in terms of C

($2 \times 2 = 4$ marks)

- c) Find x

i. $\log_4 x = 3$

ii. $\log_{10} x = -1$

iii. $\log_x 2 = 2$

iv. $\log_3 \frac{1}{9} = x$

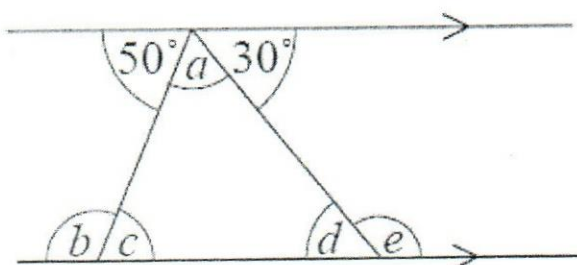
v. $\log_x 8 = 3$

vi. $\log_4 x^2 = -1$

($6 \times 2 = 12$ marks)

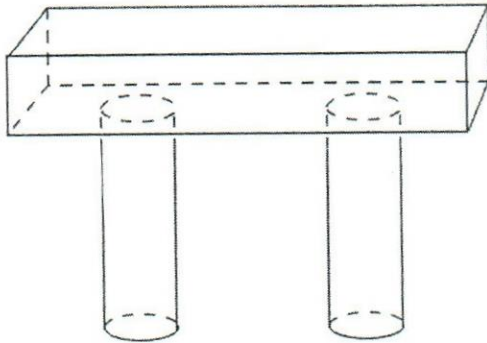
4.

- a) Find the sizes of the unknown angles marked with letters in the diagram:



(5 marks)

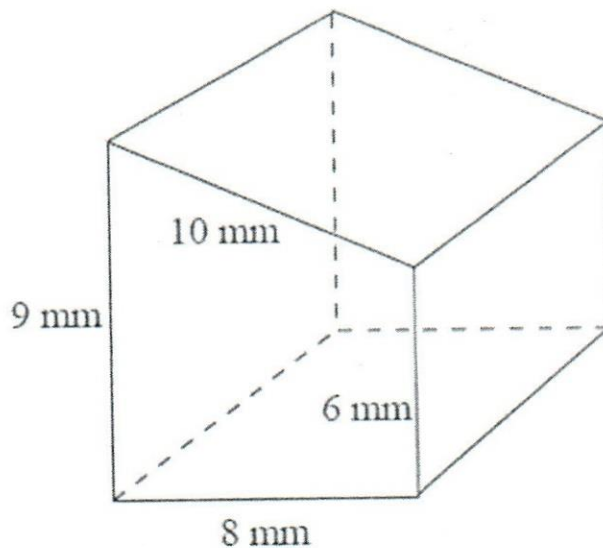
- b) A concrete beam is to rest on two concrete pillars. The beam is a cuboid with sides of length 0.5 m, 3 m and 0.4 m. The pillars have diameter 0.4 m and height 2 m. Calculate the *total volume* of concrete needed to make the beam



and the pillars.

(7 marks)

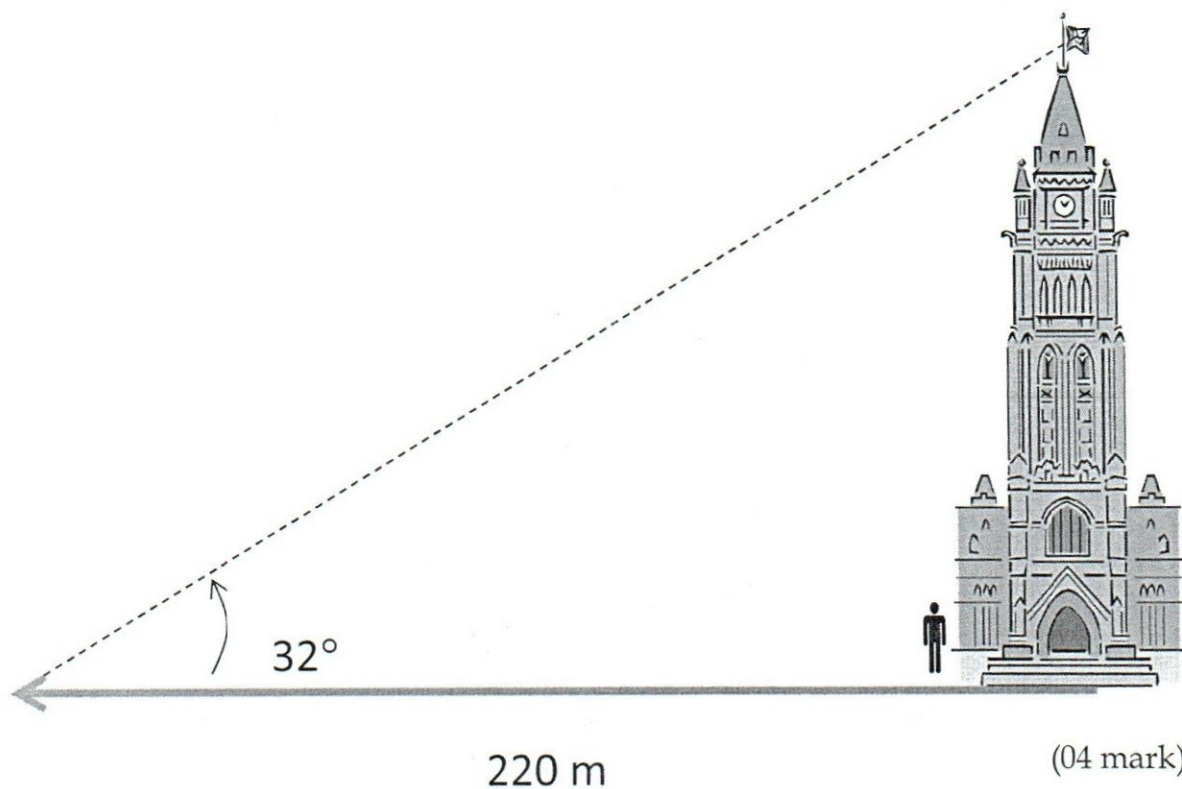
- c) The volume of the prism shown is 720 mm^3



- Determine the *length* of the prism.
 - Calculate the *surface area* of the prism.
- (8 marks)

5.

- a) To establish the height of a building, a person walks 220 m away from the building. At that point an angle of elevation (angle of depression) of 32° is formed when looking at the top of the building. Find the **height** of the building.



- b) A person 100 meters from the base of a tree, observes that the angle between the ground and the top of the tree is 18 degrees. Estimate the height h of the tree? (4 marks)
- c) Find the values of the expressions given bellow.

i.
$$\frac{\tan 60^\circ - \tan 30^\circ}{1 + \tan 60^\circ \tan 30^\circ}$$
 (03 marks)

- d) Prove following identities.

i. (i) $\sin x - \sin x \cos^2 x = \sin^3 x$

ii.
$$\frac{\sin^4 x - \cos^4 x}{\sin^2 x - \cos^2 x} = 1$$

iii. $\cos \theta + \tan \theta \sin \theta \equiv \sec \theta$ (09 marks)

6.

a)

$$C = \begin{pmatrix} -15 & 5 \\ 12 & -4 \\ 2 & 4 & 3 \\ -2 & 12 & -3 \\ 1 & -1 & 0 \end{pmatrix}, D = \begin{pmatrix} 1 & 0 \\ -5 & 1 \end{pmatrix}, E = \begin{pmatrix} 1 & -2 & 3 \\ 7 & 6 & -6 \end{pmatrix}, F = \begin{pmatrix} 1 & 5 & 3 \\ 0 & -1 & 2 \\ 1 & 2 & 5 \end{pmatrix}$$

Use above matrices to perform the indicated operations, If possible, If not possible write "impossible"

- i. $F+G$
- ii. $2C + D$
- iii. $-3E$
- iv. $E - C$

(12 marks)

b) Solve the simultaneous equation by using matrix method.

$$\begin{aligned} 2x + 8y &= 10 \\ 11x - 9y &= 15 \end{aligned}$$

(8 marks)

7.

a) Consider the cosine function $y = \frac{1}{2} \sin(2x)$.

Find the followings.

- i. Amplitude (01 mark)
- ii. Period (01 mark)
- iii. Sketch $y = \frac{1}{2} \sin(2x)$ (05 marks)

b) Consider the sine function $y = -3 \cos\left(\frac{x}{2}\right)$

Find the followings.

- iv. Amplitude (01 mark)
- v. Period (01 mark)
- vi. Sketch $y = -3 \cos\left(\frac{x}{2}\right)$ (05 marks)

c) Draw following graphs

- i. $y = x^2 + 2x + 1$
- ii. $y = x^2 + 3$ (10 marks)

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CINEC CAMPUS (PVT) LTD.
Faculty of Maritime Sciences
Department of Navigation

EDUCATION & TRAINING COURSE : Navigation Cadet Training Program - Phase 1
COURSE CODE : ND-100 P1 - BATCH 041/042

FINAL REPEAT EXAMINATION - QUESTION PAPER

WATCH KEEPING, RULES OF THE ROAD & BRIDGE EQUIPMENT

- Total marks = 125
- All questions should be answered.
- Electronic storing devices are NOT allowed

Date: 20.05.2022

Time allocated: 03 Hours

1. With the aid of relevant sketches, explain the difference in theory and construction of a magnetic Compass and a Gyro Compass.

(25MARKS)

2. List the purpose of following buoys:

- a) Lateral Marks
- b) Cardinal Marks
- c) Isolated Danger Marks
- d) Safe Water Marks
- e) Special Marks

(25MARKS)

3. With a brief introduction to each, discuss the messages given in the following rules of International Regulations for Preventing Collusion At Sea?

- a. 38
- b. 15
- c. 2
- d. 9
- e. 13
- f. 1

(25MARKS)

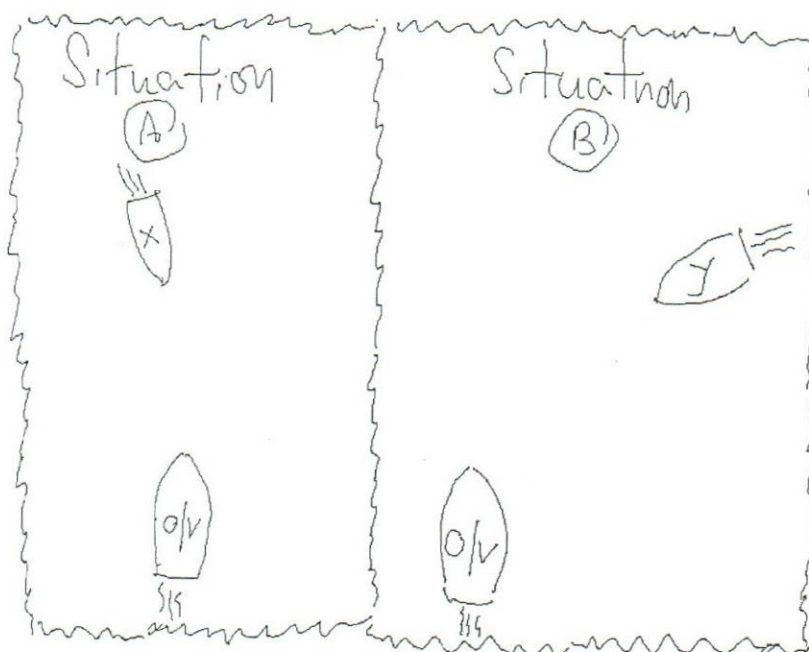
4. Preferably with a basic 3D Sketch, show the following vessel when seen by at night.

- Power driven vessel underway
- Vessel not under command making way
- Vessel constrained by draft making way
- Vessel restricted in her ability to maneuver making way
- Vessel engaged in clearing mines

(25MARKS)

5. "OV" is own vessel.

- Define below situations "A" & "B"
- Which is the "give-way vessel" & which is the "stand-on vessel" in both situations?
- What would be your most suitable actions in both situations?



(25MARKS)

XXX END XXX

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Faculty of Marine Engineering
Department of Marine Engineering

Examination for Officer in Charge of an Engineering Watch on Ships of 750kW Propulsion Power or More

ENGINEERING KNOWLEDGE – II (Motor)

Time Allowed- Three Hours

Answer Six questions

Marks for each part of the question are shown in the brackets

Date: 2022.05.20

Pass marks: 50%

1. a) Sketch a section through the bedplate and A frame of a large slow speed engine, identifying parts. (8 Marks)
- b) State the method of construction and materials used. (4 Marks)
- c) Explain the function of the tie bolts and how these would be re-tightened. (4 Marks)

2. a) Describe, with the aid of a sketch, an engine fuel injection system which may be controlled electronically. (10 Marks)
- b) Explain how the fuel injection system described in part (a) operates. (4 Marks)
- c) State the function of the exhaust valve position sensor. (2 Marks)

3. Explain why EACH of the following is tested, stating how a representative sample of EACH may be obtained:
 - a) Main engine jacket water cooling; (4 Marks)
 - b) Main engine crankcase oil; (4 Marks)
 - c) Bunker fuel during loading; (4 Marks)
 - d) Boiler water. (4 Marks)

4. With reference to the operation of a main engine:
 - a) explain the checks to be made prior to putting the engine room in UMS mode (9 Marks)
 - b) in the event of failure of the engine monitoring and control equipment, explain how the machinery may be monitored and controlled safely and effectively (4 Marks)
 - c) list SIX main engine parameters which should be recorded manually in the event of UMS failure (3 Marks)

- 5.a) With the aid of a sketch explain the working principle of a fuel oil injector (6 marks)
- b) Explain how the injection pressure is adjusted (2 marks)
- c) Briefly describe with sketches Penetration, Turbulence and Swirl (6 marks)
- d) What is the best viscosity to be maintained at the time of injection. (2 marks)
6. a) With reference to turbochargers state the purpose of EACH of the following:
- (i) diffuser (2 Marks)
- (ii) labyrinth glands (2 Marks)
- (iii) damping wire (2 Marks)
- (iv) Air filter (1 Mark)
- b) Explain why electrically driven scavenge air blowers are fitted to slow speed diesel engines. (2 Marks)
- c) Explain why scavenge air is cooled after leaving the turbocharger and before it enters the scavenge air space. (3 Marks)
- d) Describe two methods of cleaning the turbocharger during operation (4 Marks)
7. With reference to slow speed engines, write short notes on the following.
- a) Scavenge fire (4 Marks)
- b) Crankcase explosion (4 Marks)
- c) Starting air pipe explosion (4 Marks)
- d) Exhaust boiler uptake fire (4 Marks)
8. Describe, with the aid of a sketch, EACH of the following:
- a) a simple isochronous hydraulic governor (6 Marks)
- b) a droop governor. (6 Marks)
- c) Explain why speed droop is necessary in some governors. (4 Marks)
9. With reference to Auxiliary Boiler
- a) State the safety features incorporated. (4 marks)
- b) State three onboard Boiler water tests carried out and explain the importance of each test. (6 Marks)
- c) What is the suitable temperature of water to be maintained at the feed water tank. (2 Marks)
- d) State the reason for maintaining the suggested temperature. (2 Marks)
- e) State the minimum allowable exhaust gas temperature and explain the reason (2 Marks)



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 Faculty of Maritime Sciences
 Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase I
 COURSE CODE: ND- 100 P1 - BATCH 040/041

FINAL REPEAT EXAMINATION – QUESTION PAPER

Operational Safety

- Total marks = 160
- Ensure of clear numbering and identifying of the answer to the respective question.
- Answer all questions.

Date: 19.05.2022

Pass mark 60%

Time allocated: 03 Hours

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

- Prevention of an oil spill during taking bunkering.
- Proceeding though a pirate infested area.
- Stowaway prevention.

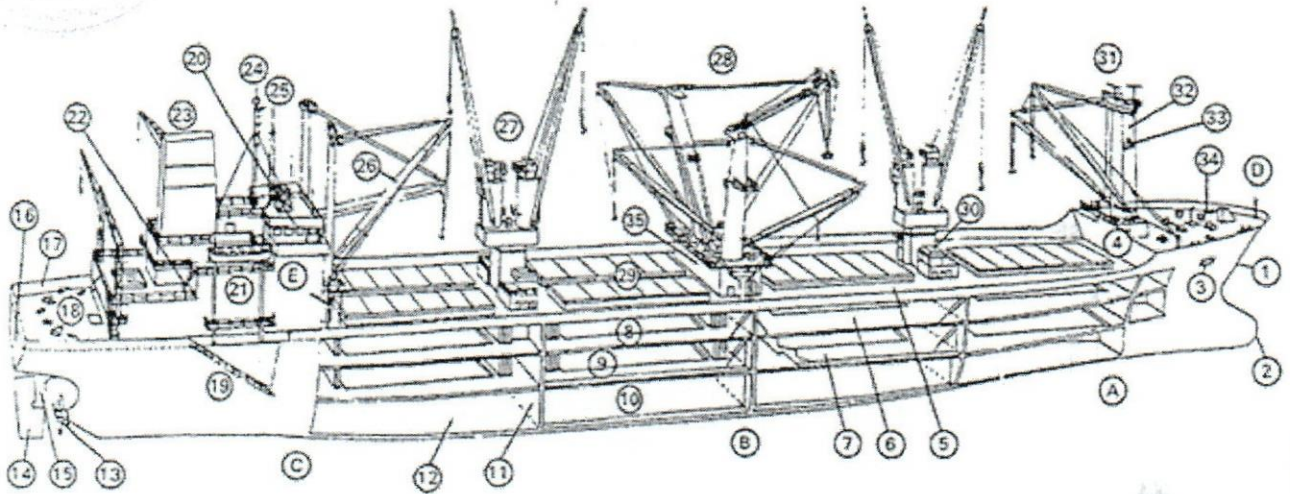
(10 MARKS EACH)
(TOTAL 30)

2. Define following:

- Handysize
- Handymax
- Panamax
- Suezmax
- Capesize
- Supper tanker
- ULCC
- VLCC
- Light Ship
- GT
- NT
- DWT

(2.5 MARKS EACH)
(TOTAL 30)

3. Name by identifying all 35 items and A, B, C, D & E in the below sketch.



(01 MARKS
EACH)
(TOTAL 40)

4. Last cargo was cement in bulk, and the cargo hold now cleaned, dry and ready to receive the next parcel of cargo.

Your Chief Officer entrusts you at 2200 hours to check this cargo hold and it's preparedness to receive a parcel of sugar in bulk.

How would you plan and execute the inspection in order to prepare the relevant report to Chief Officer?

(30 MARKS)

5. With the aid of suitable sketches, indicate 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) Plimsol mark on port side
- 24) Bulbous bow
- 25) Trnaom stern
- 26) Docking plug
- 27) Goose neck
- 28) Derrick head block
- 29) Cargo block
- 30) Heal block

(30 MARKS)

===END ===



Course - Phase 1
 COURSE CODE : ND-100 P1 - BATCH 041/42



FINAL EXAMINATION - QUESTION PAPER
APPLIED SCIENCE

- Answer any 05 questions
- Total Marks 100 - (each question carries 20 marks)
- Electronic storing devices are NOT allowed
- ($g = 9.8 \text{ ms}^{-2}$)

Date: 19.05.2022

Pass mark 55%

Time allocated: 03 Hours

1.

- a) Differentiate velocity and speed. (02 marks)
- b) A motorcycle starts from rest and travels for 8 seconds with a constant acceleration of 6 ms^{-2} . Then it travels with that velocity for 50 seconds. After that it travels with constant retardation and comes to rest in 10 seconds.
- i. Draw the Velocity - time graph for the motorcycle's movement.
 - ii. Find the maximum velocity.
 - iii. Find the displacement during the time accelerated.
 - iv. Find the value of constant retardation.
 - v. Find the Displacement during the time it retarded.
 - vi. Find the total displacement and the total time. (3 × 6 = 18 marks)

2.

- a) Man through a ball at $u \text{ ms}^{-1}$ at angle θ to horizontal .(gravitational acceleration as $g \text{ ms}^{-2}$).show that maximum height of projectile (H) is

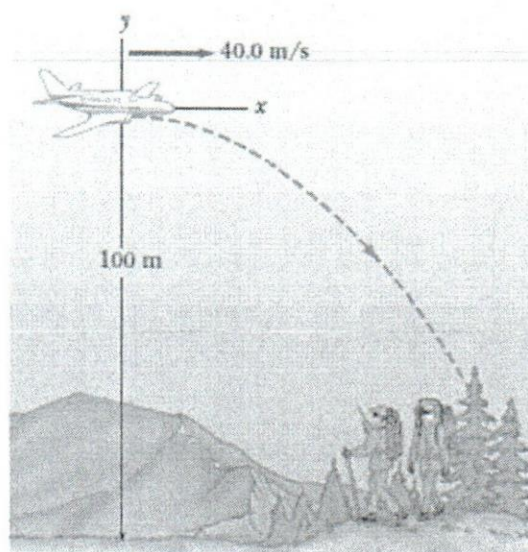
$$H = \frac{u^2 \sin^2 \theta}{2g}$$

- a. (Show your work out) (8marks)

b)

An Alaskan rescue plane drops a package of emergency rations to a stranded hiker, as shown in Figure. The plane is traveling horizontally at 40.0 m/s at a height of $1.00 \times 10^2 \text{ m}$ above the ground.

(a) Where does the package strike the ground relative to the point at which it was released? (b) What are the horizontal and vertical components of the velocity of the package just before it hits the ground?



(15 marks)

3.

i. A 0.5 kg ball moves in a circle that is 1.2 m in radius at a speed of 6.0 m/s . Calculate,

(a) Angular velocity

(b) Period

(c) Frequency

(d) The centripetal force on the ball.

(3 × 4 = 12 marks)

- ii. A race car accelerates uniformly from a speed of 40.0 m/s to a speed of 60.0 m/s in 5.00 s while traveling counterclockwise around a circular track of radius 4.00×10^2 m. When the car reaches a speed of 50.0 m/s, find

(a) the magnitude of the car's centripetal acceleration (b) the angular speed

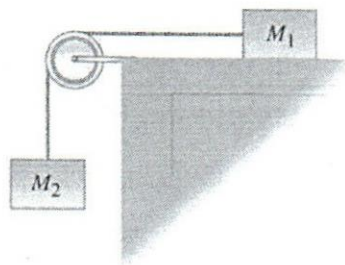
(8 marks)

4.

- i. Write the Newton's first law of motion.

(4 marks)

- ii. The two masses of the system shown in the figure are $M_1 = 5$ kg and $M_2 = 10$ kg. You may assume that the string is inextensible, coefficient of kinetic friction between the crate and the floor is 0.3 and the coefficient of static friction is 0.25. and the pulley is a mass less smooth one.



of static friction is 0.25. and the pulley is a mass less smooth one.

- Find the limiting friction force
- Find the acceleration of the system.
- Find the tension of the system.

(3 × 4 = 12 marks)

5.

- i. The reading on a mercury barometer is 755 mm. Calculate the atmospheric pressure in N/m^2 . The density of mercury = 13600 kg/m^3

(4 marks)

- ii. State Archimedes Principle and Law of Floatation. (8 marks)

- iii. A block of Ice cube of volume 20 m^3 and mass of 17000 Kg floats on fresh water of $\rho = 1000 \text{ kg/m}^3$.

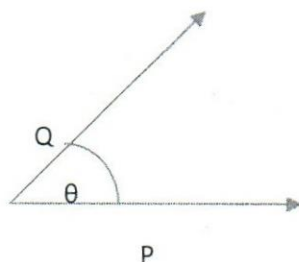
(4 × 2 = 8 marks)

- Find the up thrust on the ice cube.
- Find the volume of the ice cube under the water surface

- 6.
- State the Kepler's laws (2 × 3 = 6 marks)
 - State Newton's universal law of Gravitation (4 marks)
 - The diagram shows two bowling balls, A and B, each having a mass of 9 kilograms, placed 2.5 meters apart. What is the magnitude of the gravitational force exerted by ball A on ball B? (5 marks)
 - A person weighing 785 N on the surface of Earth would weigh 298 N on the surface of Mars. What is the magnitude of the gravitational field strength on the surface of Mars? (5 marks)

7.

- P and Q are two forces acting with θ angle. Find the resultant force and direction of resultant force by force parallelogram method?



(8 marks)

- A car of mass 1000 kg, moving with a velocity of 36 kmh^{-1} . Find its kinetic energy. (3 marks)
- An object of mass 8kg moving with a velocity of 12 m/s collides with a stationary object of mass 12 kg . Calculate:
 - The velocity with which they move off together.
 - The kinetic energy before that impact.
 - The kinetic energy after impact.

(9 marks)



CINEC CAMPUS (PVT) LTD
Faculty of Maritime Sciences
Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Officer Cadet Training Course – Phase I
COURSE CODE: ND- 0100 P1 - BATCH 040 AND 041

OPERATIONAL SAFETY



- Answer all questions.
- Total Marks : 110
- Pass mark : 60 %
- Ensure of clear numbering and identifying of the answer to the respective question
- Diagrams should be shown wherever possible

Date: 15.02.2022

Time allocated: 3 Hours

1. Discuss to precautions to be taken during midstream cargo operations with special emphasis to container handling.

(20 marks)
2. a. Why should cargo hold be ventilated ?

(10 marks)

b. Explain what you understand by the terms “cargo sweat” and “ship sweat”?

(10 marks)
3. i. Define what is a confined or enclosed space with 12 examples of such spaces you may find in a ship.

(10 marks)

ii. Explain how you would conduct a mission with your crew on entry into enclosed or confine space for a welding operation.

(10 marks)

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

- a) Prevention of an oil spill during taking bunkering.
- b) Proceeding through a pirate infested area.
- c) Stowaway prevention.

(10 marks)

(10 marks)

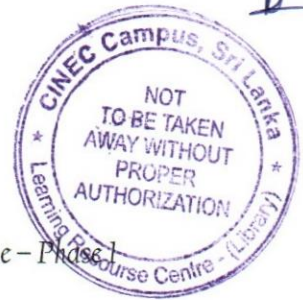
(10 marks)

5. In a 3 dimensional sketch of a union purchase system, indicate the essential standing riggings, running rigging and deck fittings.

(20 marks)

===END===


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 Department of Navigation

 EDUCATION & TRAINING COURSE: Navigation Officer Cadet Training Course - Phase 1
 COURSE CODE: ND-0100 P1 - BATCH 40/41


APPLIED SCIENCE

- Answer any 05 questions
- Total Marks 100 – (each question carries 20 marks)
- Electronic storing devices are NOT allowed
- ($g = 9.8 \text{ ms}^{-2}$)

Date: 14.02.2022

Pass mark 55%

Time allocated: Hours

1.

- a) Define Path and Displacement (2 × 2 = 4 marks)
- b) A cyclist leaves home O and rides along a straight road with a constant acceleration. After 10 seconds he has reached point A with a speed 15m/s and he maintains this speed for a further 20 seconds until he reaches B before retarding (decelerating) uniformly to rest at C. The whole journey takes 45 seconds. Sketch the **velocity-time graph** for the journey and find; (4 marks)
- i) His acceleration from O to A.
 - ii) His retardation (deceleration) from B to C.
 - iii) The total distance traveled from O to C.
- (3 × 2 = 6 marks)
- c) A space-rocket is launched and accelerates uniformly from rest to 160 m s⁻¹ in 4.5 s.
- (i) Calculate the acceleration of the rocket.
 - (ii) How far does the rocket travel in this time?
 - (iii) What is the final speed of the rocket in km h⁻¹? (3 × 2 = 6 marks)

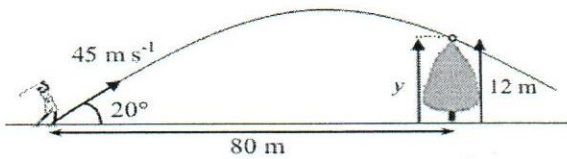
2.

- i. Man through a ball at $u \text{ ms}^{-1}$ at angle θ to horizontal .(gravitational acceleration as $g \text{ ms}^{-2}$).show that maximum height of projectile (H) is

$$H = \frac{u^2 \sin^2 \theta}{2g}$$

- a. (Show your work out) (8marks)

- ii. if the golf ball is hit in the direction of a 12 meter tree which is 80 meter from the golfer, will the ball pass over the tree or hit it?



(12 marks)

3.

- i. A 0.4 kg ball moves in a circle that is 0.4 m in radius at a speed of 6.0 m/s. Calculate,

(a) Angular velocity

(b) Period

(c) Frequency

(d) The centripetal force on the ball.

(3 × 4 = 12 marks)

- ii. A race car accelerates uniformly from a speed of 40.0 m/s to a speed of 60.0 m/s in 5.00 s while traveling counterclockwise around a circular track of radius $4.00 \times 10^2 \text{ m}$. When the car reaches a speed of 50.0 m/s, find

(a) the magnitude of the car's centripetal acceleration (b) the angular speed

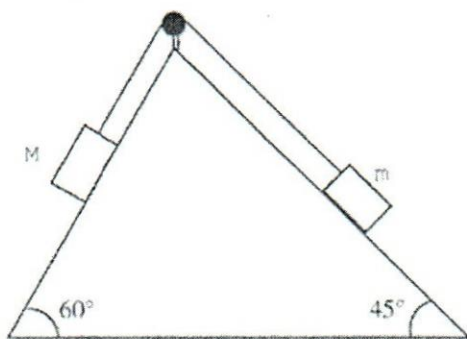
(8 marks)

4.

a) Write the Newton's first law of motion.

(4 marks)

b) The two masses of the system shown in the figure are $M = 5 \text{ kg}$ and $m = 8 \text{ kg}$. You may assume that the string is inextensible, coefficient of kinetic friction between the crate and the floor is 0.25 and the coefficient of static friction is 0.3. and the pulley is a mass less smooth one.



i. Find the limiting friction force

ii. Find the acceleration of the system.

iii. Find the tension of the system.

(16 marks)

5.

i. The reading on a mercury barometer is 755 mm. Calculate the atmospheric pressure in N/m^2 . The density of mercury = 13600 kg/m^3

(4 marks)

ii. State Archimedes Principle and Law of Floatation. (8 marks)

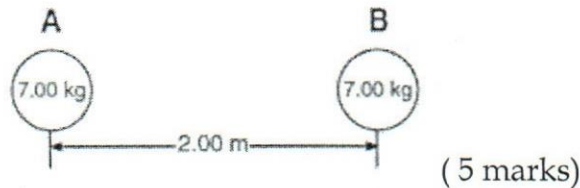
iii. A block of Ice cube of volume 20 m^3 and mass of 18000 Kg floats on fresh water of $\rho = 1000 \text{ kg/m}^3$.

(4 × 2 = 8 marks)

i. Find the up thrust on the ice cube.

ii. Find the volume of the ice cube under the water surface

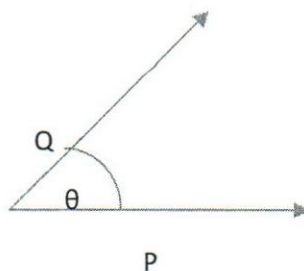
- 6.
- State the Kepler's laws (2 × 3 = 6 marks)
 - State Newton's universal law of Gravitation (4 marks)
 - The diagram shows two bowling balls, A and B, each having a mass of 7 kilograms, placed 2 meters apart. What is the magnitude of the gravitational force exerted by ball A on ball B?



- A person weighing 785 N on the surface of Earth would weigh 298 N on the surface of Mars. What is the magnitude of the gravitational field strength on the surface of Mars? (5 marks)

7.

- P and Q are two forces acting with θ angle. Find the resultant force and direction of resultant force by force parallelogram method?



- A car of mass 1000 kg, moving with a velocity of 36 kmh⁻¹. Find its kinetic energy. (3 marks)

- iii. An object of mass 5kg moving with a velocity of 12 m/s collides with a stationary object of mass 7 kg . Calculate:
- The velocity with which they move off together.
 - The kinetic energy before that impact.
 - The kinetic energy after impact.

(9 marks)

End.

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Department of Navigation

EDUCATION & TRAINING COURSE : Navigation Cadet Training Program – Phase 1
COURSE CODE : ND- 100 P1 - BATCH 040 / 041

=====

FINAL EXAMINATION – QUESTION PAPER
COMMUNICATIONS

=====

- Answer 05 questions.
- Total Marks: 100

Date: 20.02.2022

Pass mark 70%

Time allocated: 03 Hours

1) a) Explain the use of substitute flags.

(5 marks)

b) You are required to fly the following flags. Indicate the order how you would display?

i. K	ii. Y	iii. C
3	5	C
3	5	5
8	5	6
8	5	6

(15 marks)

2) State the meaning of following flags with the aid of sketches.

- i) Foxtrot
- ii) Juliett
- iii) Oscar
- iv) Quebec
- v) Whiskey

(20 marks)

3) Write down the Morse signals for following words.

- i) COLLISION
- ii) AZIMUTH
- iii) AGROUND
- iv) PNEUMONIA
- iv) FREQUENCY

(20 marks)

- 4) a) Your vessel M.T. Phoenix (call sign ZCKC7) manned with 25 crew on board has run aground in position Lat $16^{\circ} 45' N$, Long $074^{\circ} 07' E$ and is in danger of sinking.

Write down the message you would verbally transmit on VHF ch. 16 requesting for immediate assistance.

(15 marks)

- b) How do you indicate a decimal point between numerals in following signalling

- i) Flag signalling
- ii) Flashing light & sound signalling
- iii) Voice

(5 marks)

- 5) Explain the following with reference to flashing light signalling.

- i) The General Call signal
- ii) The Answering signal
- iii) The Erase signal
- iv) The Repeat signal

(20 marks)

- 6) a) During your watch, you see a sailing vessel giving off orange-smoke signal. What does it mean?

- b) With reference to flashing light signaling, what is the signal use by the transmitting station to indicate the end of a signal or the end of the transmission?

- c) With reference to flag signaling, how do you identify that you are receiving a plain language signal?

- d) What is used to separate each group of flag signal in a single hoist?

- e) How does a distress message normally initiated through the INMARSAT system?

(20 marks)



CINEC CAMPUS PVT LTD
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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Officer Cadet Training Course – Phase I
COURSE CODE: ND-0100 P1 - BATCH 040/041

FINAL EXAMINATION – QUESTION PAPER
GENERAL SHIP KNOWLEDGE

- Answer all questions.
- Formulae & all intermediate steps taken in reaching your answer should be clearly shown.
- Total Marks : 110
- Pass mark 60%

Date: 20.02.2022

Time allocated: 2.5 Hours

1. a. The hydrostatic particulars are given by the shipyard in the form of curves or tables plotted or tabulated against draft. Give a brief explanation of those particulars that you are aware of.

b. With an aid of sketch describe the function of cargo hold bilge. (20 arks)
2. a. Describe i. Stable ii. Unstable and iii. Neutral Equilibriums of a vessel.

b. For small angles of heel, where GM may be considered constant, prove $GZ = GM \times \sin(\text{angle of heel})$ (20 marks)
3. A vessel floats in DW of RD 1.008 with her length and maximum breadth of the Water plane area 180m and 35 m. If her Co-efficient of fineness of the water plane is 0.9 and her displacement is 35000 t.
find; i. Her TPC in SW
ii. FWA
iii. The change of draft expected when she goes into the dock water of 1.018 density.

(15 marks)

4. a. Define the term "List".

b. Illustrating the Angle of List, Metacenter and the shift of COB ,COG.

Prove that ;

$\tan \alpha = d \times w / W.GM$ where; α = angle of list

d = final listing moment in tonne metres

W = final displacement in tonnes

GM = final fluid GM in metres.

c. A ship of 8000 t, GM 0.6 m, is listed 5 degrees to Starboard. How many tonnes of Fuel oil must be transferred from No 2 Starboard to No 2 Port to upright the vessel, if the centers of the tanks are 7m apart?

(20 marks)

5. a. Explain what Free Surface effect is?

b. Prove that $FSC = FSM / W$

c. A vessel has a deep tank on the starboard side 12m long, 9m wide which is partly full coconut oil of RD 0.72. If $W = 12000t$, $KM = 9m$, and $KG = 8.5m$, find the GM fluid.

If 'i' of a rectangular tank about its centerline is $\frac{\text{length} \times (\text{breadth})^3}{12}$

(20 marks)

6. With the help of diagrams describe how an unstable vessel may reach "angle of loll"?

(15 marks)

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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase I
COURSE CODE: ND-100PI-BATCH 040/041



FINAL EXAMINATION - QUESTION PAPER
INTRODUCTION TO NAVIGATION

• Answer all questions.

• Total Marks: 100

Date: 21.02.2022

Pass mark 70%

Time allocated: 3 Hours

1). Following Celestial references of a Star were obtained from the Nautical Almanac. GHA Aries 313° , SHA Star 113° , DEC Star 26° S. If the Longitude of the Observer is 010° W;

i. Find the value of LHA, GHA and RA of the Star.

ii. With an aid of a diagram indicate all above-mentioned Celestial references. (10 marks)

2). On 06th March 1992, AM at ship in DR Position $24^{\circ} 12' S$ $083^{\circ} 46' E$ the azimuth of the star ALTAIR was 078° (C) at 10h 38m 40s Chronometer time. If Chronometer was 03m 24 s fast and variation was 3.0° W, calculate the deviation of the Compass. (20 marks)

3). On 20th January 1992, in DR $54^{\circ} 20' S$ $046^{\circ} 27' W$, the bearing of Sun set found to be 234° (C). Find the LMT of Sunset and the Compass Error by Amplitude method. If variation was 3.0° W, find the deviation of the compass. (15 marks)

4). Find by Mercator Sailing, the course and distance from $32^{\circ} 29' S$ $064^{\circ} 00' E$ to $49^{\circ} 50' S$ $005^{\circ} 15' E$. (15 marks)

5). i. What is Set, Drift and the Rate of a Current? (05 marks)

ii. At 1700 hrs Dungeness Lt. bore 270 (T) and S. Foreland Lt bore 031 (T). The vessel then steered 230 (T). with a speed of 13 knots. At 1900 hrs Royal Sovereign Lt vessel was observed 262 (T), at a Radar range of 6.0 miles. a. Find the Set and Drift of the current. b. Find the Course Made Good and the Speed made good. (15 marks)

iii. what is meant by "Leeway"? A ship heading due North (course steered 000 T) encounters strong Westerly wind causing 10 degrees of Leeway. Using a simple sketch indicate the Ships heading (course steered), Course Made Good and the Leeway angle. (05 marks)

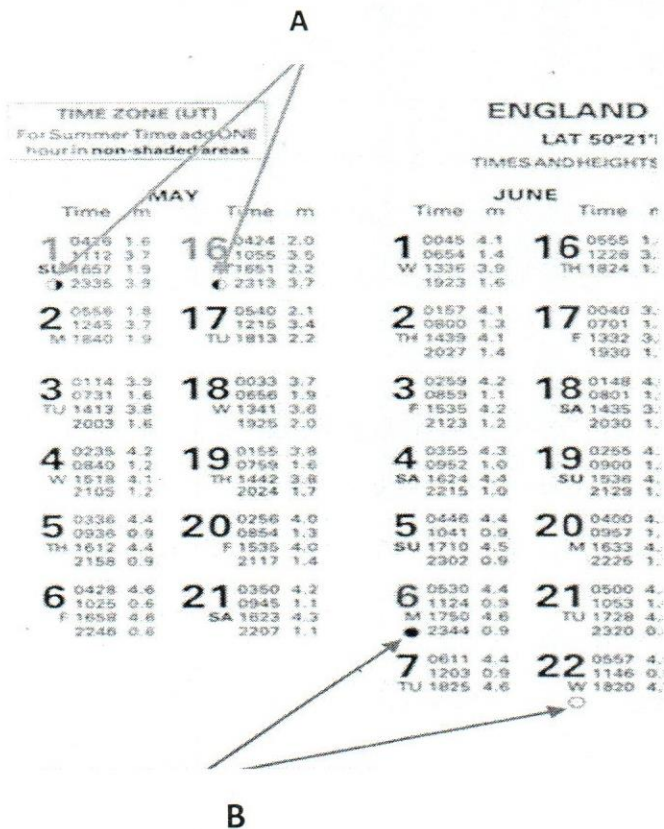
6) a. While steering a course of 070 (T) Start Point Light bore 010(T) at 2200hrs. The same light bore 300(T) at 2300 hrs. If the ship's speed is 12 knots find the ships position by running fix method at 2200 hrs and 2300 hrs. While continuing same course and speed (for one hour and 18 mins), at 0018 hrs on the following day, Bill of Portland Lt was observed 020(T). Find the ship's position at 0018 hrs by using the running fix method. (10 marks)

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

i. What is meant by Neap and Spring Tides? Indicate the arrows (A and B) showing Neap and Spring Tides separately.


ii. Explain, how the depth of water of this major port is calculated at any given time?

(05 marks)



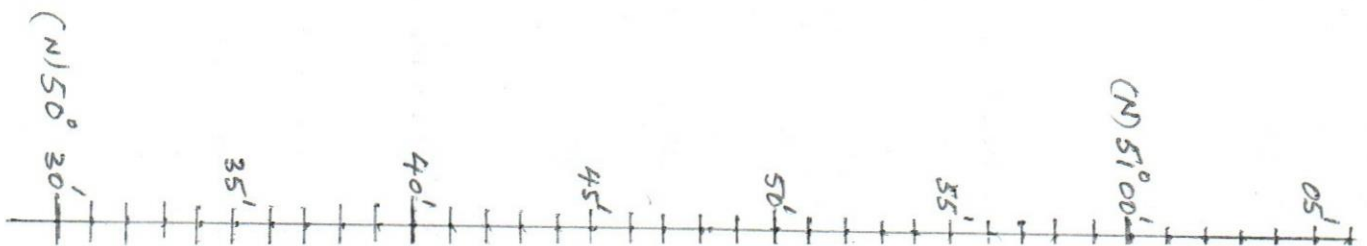
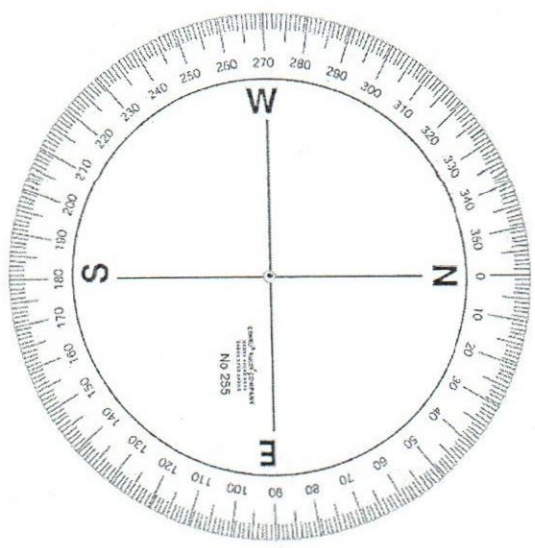
Q (5)

Please attach this sheet to your Answer script.

Royal  Sovereign
f1 (2) 6 m

Dunagehness
f1 (4) 117 m

S. Foreland
GP f1 (3) 267 m

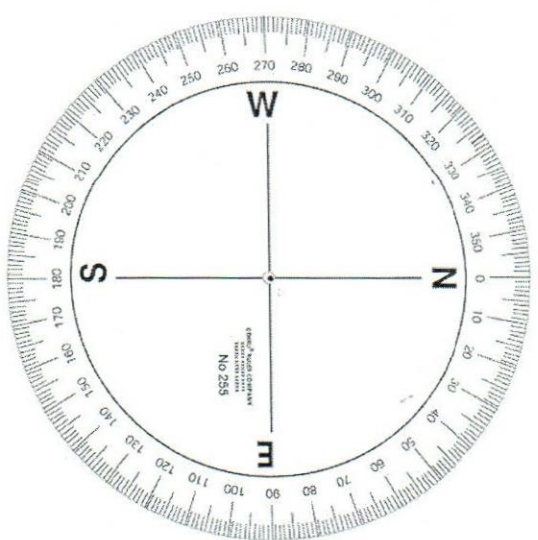


Q (6)

Please attach
this sheet to your
answer script.

Start P
GPF1(3) 20M

Bill of Portland
GPF1(4) 18m



(N) 50° 25'

20'

15'

10'

05'

(N) 50° 00'

55'

(N) 49° 50'

Scale in nautical miles.



CINEC CAMPUS (PVT) LTD
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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Officer Cadet Training Course - Phase 1
COURSE CODE: ND-0100 PI - BATCH 39



RULES OF THE ROAD, WATCH KEEPING & BRIDGE EQUIPMENT Final Re-Repeat Examination

- Answer all questions.
- Total Marks : 100
- Pass mark : 50 %
- Formulae and all intermediate steps taken in reaching your answer should be clearly shown.
- Diagrams should be shown wherever possible

Date: 10.01.2022

Time allocated: 3 Hours

1. With an easterly current, (i.e. waterbody moves westerly) you are required to cross a TSS (traffic separation scheme).

With the aid of a technical sketch, indicate how you would perform this crossing from south to north to pick up a pilot in the inshore TSS.

(20 MARKS)

2. Your vessel having suffered a powerful lightning strike resulting in putting the ships gyro systems, radars, all other electronic navigational aids out of order, and due the collapse of radar mast on to the standard magnetic compass unit which is on the monkey bridge, discuss how you would plan to proceed your passage with special emphasis to steering directions and position fixing.

(20 MARKS)

3. Discuss the sources of errors you can expect in an echo sounder unit.

(20 MARKS)

4. What is the message you get from Collision regulation No's: 2, 38 and 39/40/41 ?

(20 MARKS)

5. With the aid of one basic sketch indicate the horizontal & vertical positioning of the following in a vessel of 125 m long and 20 M wide.

- a. Masthead light
- b. Sidelights
- c. Stern light

(20 MARKS)



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Department of Navigation



EDUCATION & TRAINING COURSE: Navigation Officer Cadet Training Course - Phase 1
COURSE CODE: ND-0100 P1 - BATCH 39

OPERATIONAL SAFETY

- Answer all questions.
- Total Marks : 130
- Pass mark : 50 %
- Formulae and all intermediate steps taken in reaching your answer should be clearly shown.
- Diagrams should be shown wherever possible

Date: 10.01.2022

Time allocated: 3 Hours

1. i. What is ISPS
(5 MARKS)

ii. Define the 3 security levels

(10 MARKS)

iii. What is meant by the following:

- a. SSO
- b. DPA
- c. CSO
- d. SSP
- e. PFSP

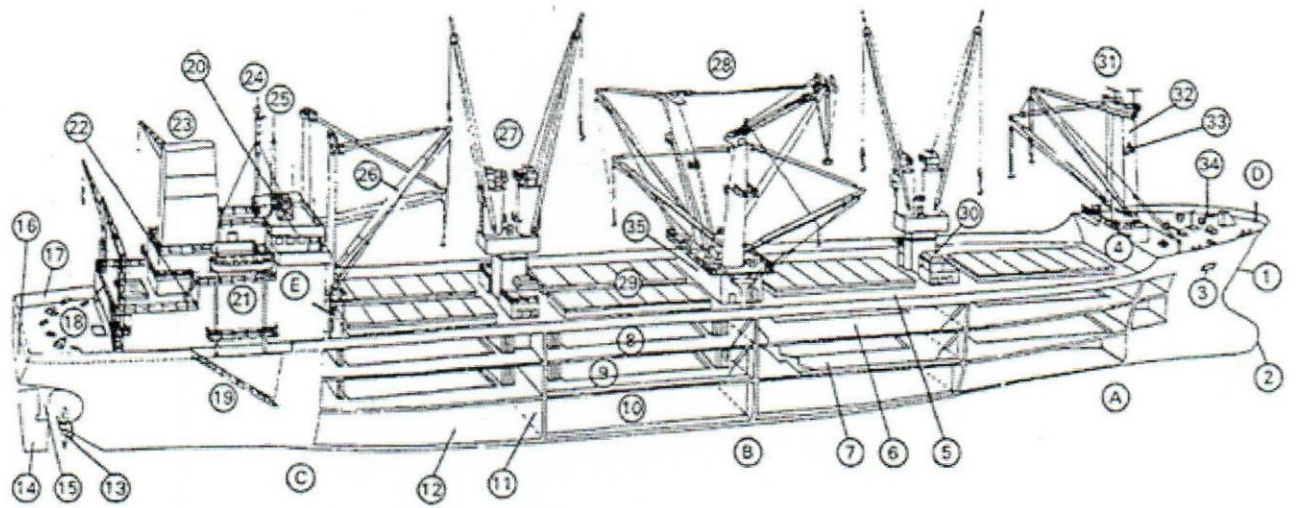
(2 MARKS EACH)

iv. What is ISM and describe its purpose.

(5 MARKS)

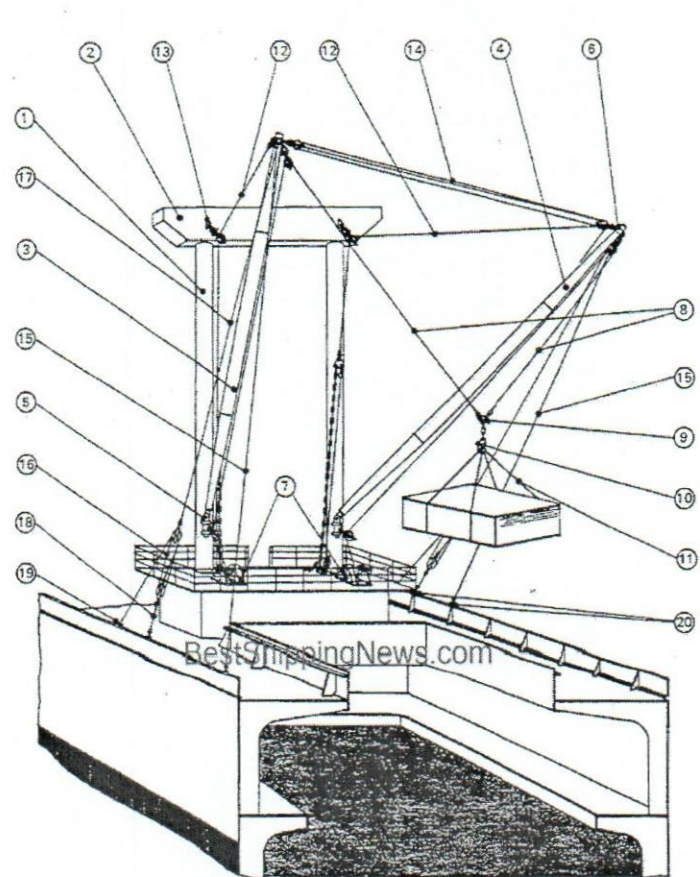
(TOTAL 30 MARKS)

2. Name by identifying all 35 items and A, B, C, D & E in the below sketch.



(1 MARK EACH)
(TOTAL 40 MARKS)

3. Along with a brief introduction to below sketch, name the parts against the given number.



(20 MARKS)

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

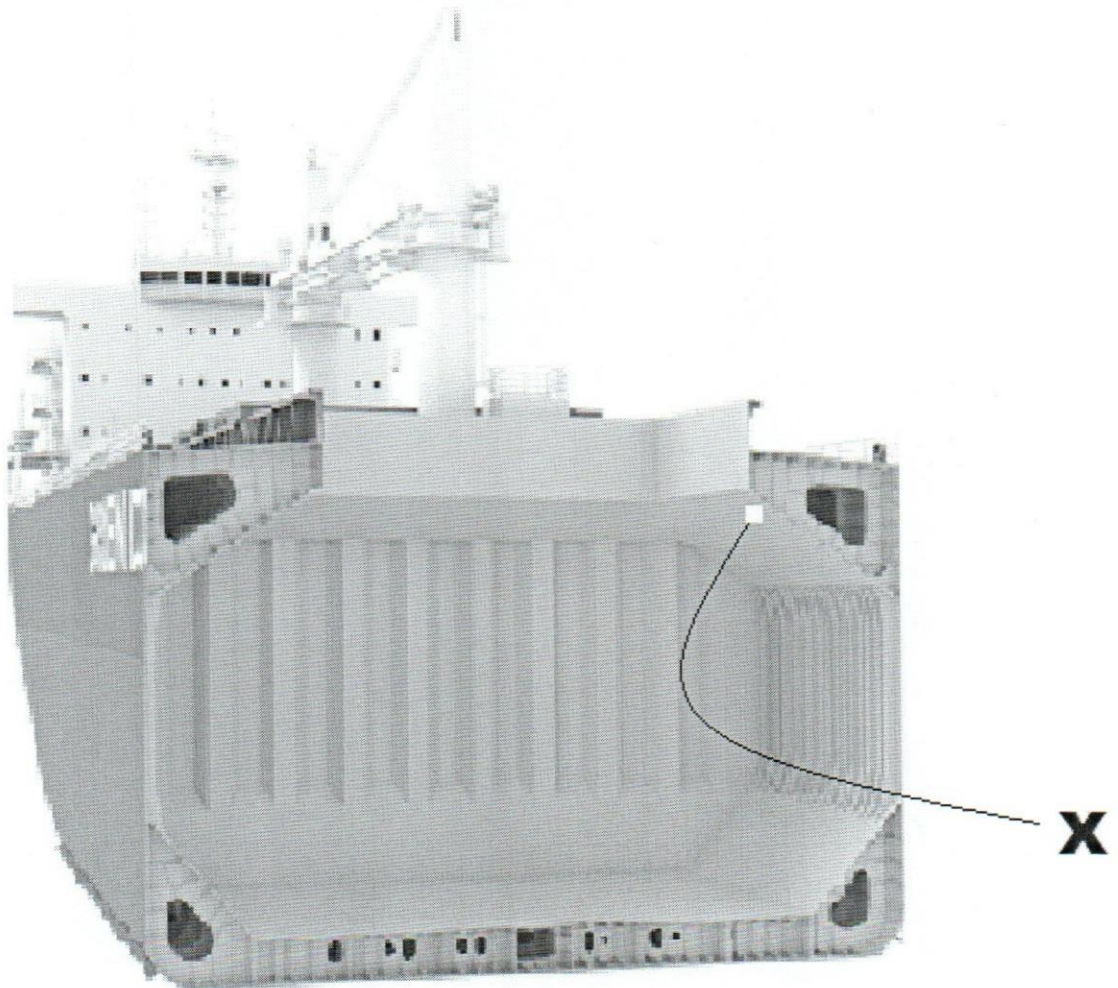
(5 MARKS)

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)



(TOTAL MARKS 20)

5.

a. Why should cargo hold be ventilated ?

(10 MARKS)

b. Explain what you understand by the terms “cargo sweat” and “ship sweat”?

(10 MARKS)

(TOTAL MARKS 20)

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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Officer Cadet Training Course – Phase I
COURSE CODE: ND- 0100 P1 - BATCH 39

Final Repeat
OPERATIONIAL SAFETY

- Total marks = 100
- Answer all questions.

Date: 10.11.2021

Time allocated: 3 Hours

1. Sketch a complete load line marking with appropriate of presented on ships starboard side with appropriate dimensions based on the following particulars of ship.

Summer draft = 10 M
FWA = 160 mm
Ships LOA 150 M

(20 marks)

2. a) Give a brief introduction to what ISPS is?(5 marks)
b) Define the 3 security levels(5 marks)
c) What is meant by the following:(5 marks)

- i. SSO
- ii. DPA
- iii. CSO
- iv. SSP
- v. PFSP

- d) What is IMO and describe it's purpose.....(5 marks)

3. a. Briefly explain the use of MARPOL..... (10 marks)
b. List down the MARPOL annexes with each of its introductory note.....(10 marks)
(10 marks)

4. You are asked to do a hold inspection for its readiness to receive a parcel of rice cargo.

Having the holds cleaned after discharging Sulphur, list down 20 items related to the entrusted task to you.

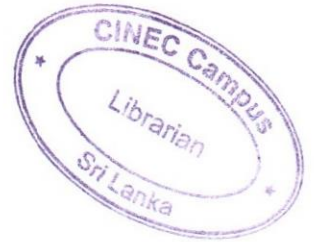
(20 marks)

5. Draw a sketch of any types of cargo lifting appliances or gear, name the type, identify 4 items each under "standing rigging", "running rigging" and "deck fittings".

(20 marks)

XXX END XXX

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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Officer Cadet Training Course – Phase I
COURSE CODE: ND- 0100 P1 - BATCH 39

FINAL REPEAT EXAMINATION – QUESTION PAPER
MATHEMATICS

- Answer only 5 questions.
 - Total Marks: 100
 - Pass mark: 55 %
 - Formulae and all intermediate steps taken in reaching your answer should be clearly shown.
 - Diagrams should be shown wherever possible
- Date: 10.11.2021

Time allocated: 3 Hours

1.

a) Write the inequality $5 \geq x > -3$ in interval notation (3 marks)

b)

Find the domain of following functions

c) i. $f(x) = 6x^3$

ii. $f(x) = \sqrt{2x - 4}$

iii. $f(x) = \frac{1}{x+2}$

(3 × 3 = 9 marks)

d) Find the answer

i. $\frac{2^3 + (16 - 2 \times 4)}{(6 + 3^2) \div (9 - 4)}$

ii. $[{(-2)3 + (-10)}] \cdot (-2) - (-9) + (-10)$

iii. $(-10) - (-5) \cdot [(-2) - \{(-2)2 + (-5)\}]$

iv. $4^2 / (4^2 + 18 - 7 \times 2)$

(2 × 4 = 8 marks)

2.

a) Solve following Quadratic equations

i. $x^2 - 3x - 6 = 0$

ii. $x^2 + 2x - 3 = 0$

(4 × 2 = 8 marks)

b) Find the remainder and quotient when $3x^2 + 3x - 4$ is divided by $(x + 1)$

(5 marks)

c) If $f(x) = 2x^3 + 8x^2 - 4x - 6$ Show that $(x - 1)$ is a factor (4 marks)

d) Given $h(z) = z^2 - 4z + 9$, find $h(-2)$

(3 marks)

3.

a) Solve for x

$$\log 600 - \log 20 = \log x \quad (4 \text{ marks})$$

b) $\log 2 = C$ find $\log 20$, $\log 5$ in terms of C

(2 × 2 = 4 marks)

c) Solve each equation

1. $\sqrt{x} + 5 = 8$

2. $\sqrt{x} - 4 = 0$

3. $2\sqrt{x} + 10 = 6$

4. $\sqrt{x+7} - 4 = 21$

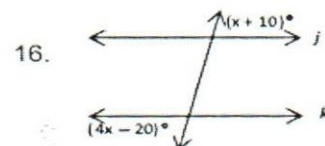
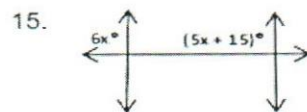
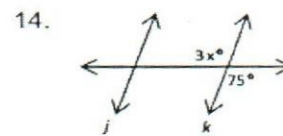
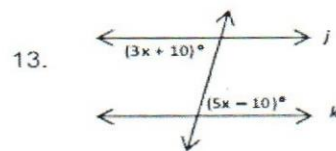
5. $4 - \sqrt{x+3} = -2$

6. $\sqrt{2x-5} = 7$

(6 × 2 = 12 marks)

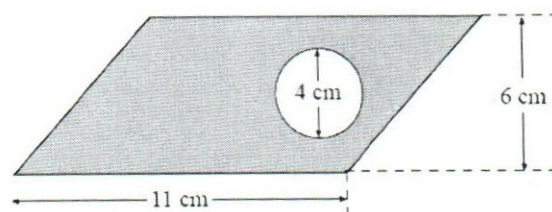
4.

a) Find the value of X that makes k parallel to j



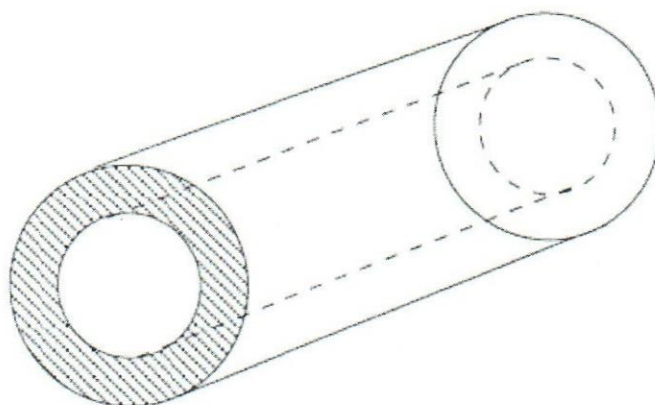
(8 marks)

- b) The diagram shows a piece of card in the shape of a parallelogram, that has had a circular hole cut in it.
Calculate the area of the shaded part.



(4 marks)

- c) The diagram shows the cross-section of a pipe of length 50 cm. The inner diameter of the pipe is 20 cm and the outer diameter is 30 cm.



- Calculate the volume of metal needed to make the pipe. Round your answer to a sensible level of accuracy.
- Calculate the total surface area of the pipe, including the inside surface. Round your answer to a sensible level of accuracy.

(8 marks)

5.

- a) Simplify the followings (show your work out)

i. $(-2x^4 + 5x^2 + 7) + (x^4 - 6x^3 + 2x^2 - 3)$ (03 marks)

ii. $(2x - 3)(x^3 - 4x + 2)$ (03 marks)

iii. $a^{-\frac{1}{3}} \times 2a^{-\frac{1}{2}}$ (03 marks)

iv. (04 marks)

$$\frac{3}{\sqrt{5}+2} - \frac{\sqrt{2}}{2\sqrt{2}-1}$$

- b) In each of the following, find the quotient and remainder when $f(x)$ is divided by $g(x)$

i. $f(x) = 3x^2 + 4x - 2$, $g(x) = x + 1$

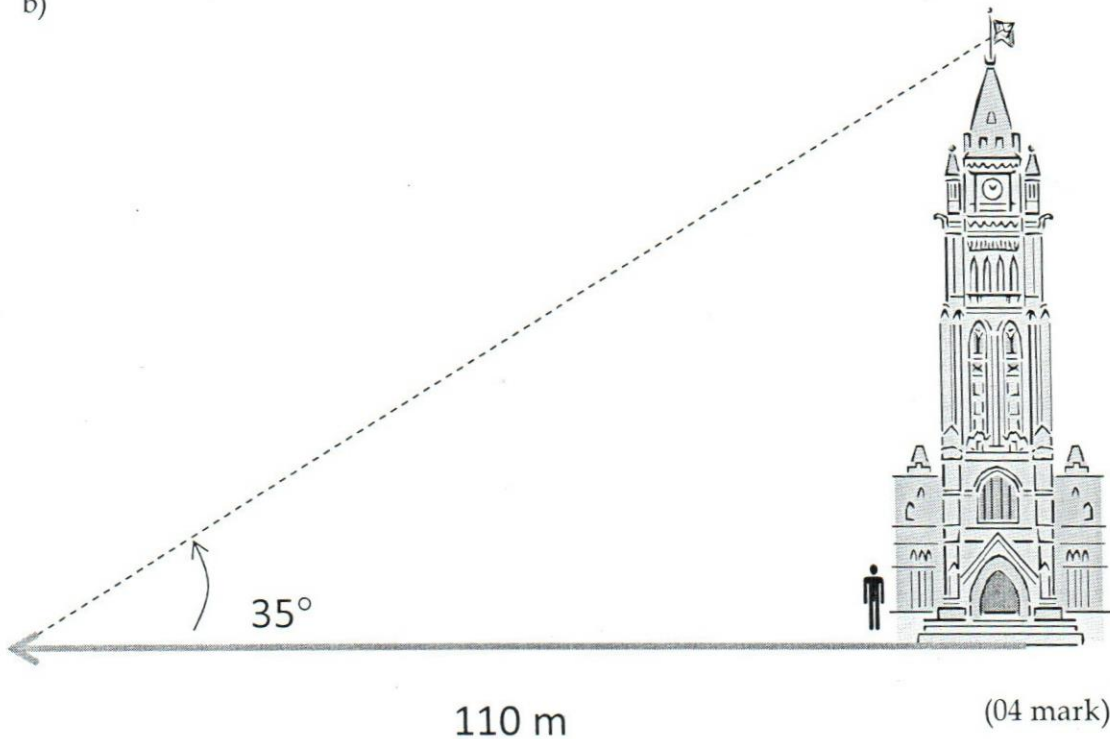
ii. $f(x) = x^5 - 8x^3 + 9$, $g(x) = x^2 - 1$

(2×6=12 marks)

6.

- a) To establish the height of a building, a person walks 110 m away from the building. At that point an angle of elevation (angle of depression) of 35° is formed when looking at the top of the building. Find the height of the building.

b)



(04 mark)

- c) A person 100 meters from the base of a tree, observes that the angle between the ground and the top of the tree is 18 degrees. Estimate the height h of the tree? (4 marks)
- d) Find the values of the expressions given below.

i. $\frac{\tan 60^\circ - \tan 30^\circ}{1 + \tan 60^\circ \tan 30^\circ}$

(03 marks)

- e) Prove following identities.

i. (i) $\sin x - \sin x \cos^2 x = \sin^3 x$

ii. $\frac{\sin^4 x - \cos^4 x}{\sin^2 x - \cos^2 x} = 1$

iii. $\cos \theta + \tan \theta \sin \theta \equiv \sec \theta$ (09 marks)

7.

a)

$$C = \begin{pmatrix} -15 & 5 \\ 12 & -4 \end{pmatrix}, D = \begin{pmatrix} 1 & 0 \\ -5 & 1 \end{pmatrix}, E = \begin{pmatrix} 1 & -2 & 3 \\ 7 & 6 & -6 \end{pmatrix}, F = \begin{pmatrix} 2 & 4 & 3 \\ -2 & 12 & -3 \\ 1 & -1 & 0 \end{pmatrix} \text{ and } G = \begin{pmatrix} 1 & 5 & 3 \\ 0 & -1 & 2 \\ 1 & 2 & 5 \end{pmatrix}$$

Use above matrices to perform the indicated operations, If possible, If not possible write "impossible"

i. $F+G$

ii. $2C + D$

iii. $-2E$

iv. $E + C$

(12 marks)

b) Solve the simultaneous equation by using matrix method.

$$2x + 6y = 8$$

$$11x - 7y = 13$$

(8 marks)

8.

a) Consider the cosine function $y = -\cos(x)$.

Find the followings.

i. Amplitude (01 mark)

ii. Period (01 mark)

iii. Sketch $y = -\cos(x)$ (05 marks)

b) Consider the sine function $y = 2\sin\left(\frac{x}{2}\right)$

Find the followings.

iv. Amplitude (01 mark)

v. Period (01 mark)

vi. Sketch $y = 2\sin\left(\frac{x}{2}\right)$ (05 marks)

c) Draw following graphs

i. $y=x^2+x+2$

ii. $y= x^2 +3$

(10 marks)

CINEC CAMPUS (PVT) LTD.
Faculty of Maritime Sciences
Department of Navigation
EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase I
COURSE CODE: ND-100 P1 - BATCH 039

FINAL REPEAT EXAMINATION - QUESTION PAPER
SEAMANSHIP THEORY

- Answer 5 questions.
- Total Marks: 100

Date: 09.11.2021

Pass mark 70%

Time allocated: 03 Hours

1) With the aid of a side view diagram of an anchor cable arrangement on forecastle, describe the following;

- Hawse pipe
- Spurling pipe
- Chain locker
- Guillotine (bow stopper)
- Devil's claw

(20 marks)

2) State the repeat order, action to take & final report by helmsman for the following helm orders.

Order by Master/OOW/Pilot	Repeat order by Helmsman	Action to take	Final report by Helmsman
Steer 050°			
Mid ship			
Hard a Port			
Port 5			
Steady			

(20 marks)

3) a) Describe the types of paints used on ships.

(10 marks)

b) Describe the surface preparation techniques prior to painting.

(10 marks)

4) Explain what to do when a ship encounters heavy weather situation so that mistakes can be avoided and in minimal time, ship can be prepared for adverse weather condition.

(20 marks)

5) a) How does the anchor cable is marked to show the number of the shackle?

(5 marks)

b) What are the two ways an anchor can be dropped to the seabed.

(5 marks)

c) What is the use of fenders in the mooring process?

(4 marks)

d) Briefly describe the operation of the following.

i) Manual twistlock

ii) Semi automatic twistlock

iii) Automatic twistlock

(6 marks)

6) a) What do you understand by rig the accommodation ladder in combination with the pilot ladder?

(5 marks)

b) What should be the maximum value of the angle of slope of the accommodation ladder?

(5 marks)

c) With reference to rigging of the pilot ladder, what is the purpose of 9m mark?

(5 marks)

d) What is the purpose of the spreader steps fitted in a pilot ladder?

(5 marks)