



PAST PAPERS

<i>Faculty</i>	<i>Department / Section/Division</i>
<i>Not Applicable</i>	<i>Learning Resource Centre</i>

<h1>Past Papers</h1>

Faculty of maritime Science
Department of Navigation

Navigation Phase I (Academic) 2013-2022

<i>Document Control & Approving Authority</i>		<i>Senior Director – Quality Management & Administration</i>	
<i>1st Issue Date: 2017.011.30</i>	<i>Revision No.00</i>	<i>Revision Date: 16.012022</i>	<i>Validated by: Librarian</i>

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

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase I
COURSE CODE: ND-100P1 - BATCH 042/043



MID TERM EXAMINATION - QUESTION PAPER

Applied Science

- Answer any four (4) questions
- Total Marks: 100
- $g = 9.8 \text{ ms}^{-2}$

Date: 29.08.2022

Pass mark 55%

Time allocated: 3 Hours

1)

- a) Define **acceleration** and **velocity** (5 marks)
- b) A body starts from rest travels for 10 s with a constant acceleration of 7 ms^{-2} . Then it travels with that velocity for 1 minute. After that it travels with constant retardation and comes to rest in 5 s. **Draw velocity time graph**
Find, (5 marks)
- Maximum velocity.
 - Displacement while accelerating.
 - Displacement with constant velocity.
 - Constant retardation.
 - Displacement while retarding.
 - Total displacement.

(2.5 × 6 = 15 marks)

2)

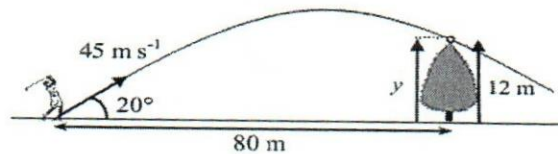
- a) Man through a ball at $u \text{ ms}^{-1}$ at angle θ to horizontal. (gravitational acceleration as $g \text{ ms}^{-2}$). show that horizontal range of projectile (R) is

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

(Show your work out)

(10 marks)

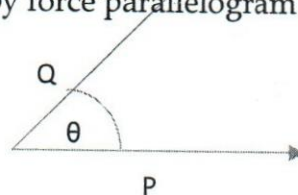
- b) If the golf ball is hit in the direction of a 12 meter tree which is 80 meter from the golfer, will the ball pass over the tree or hit it?



(15 marks)

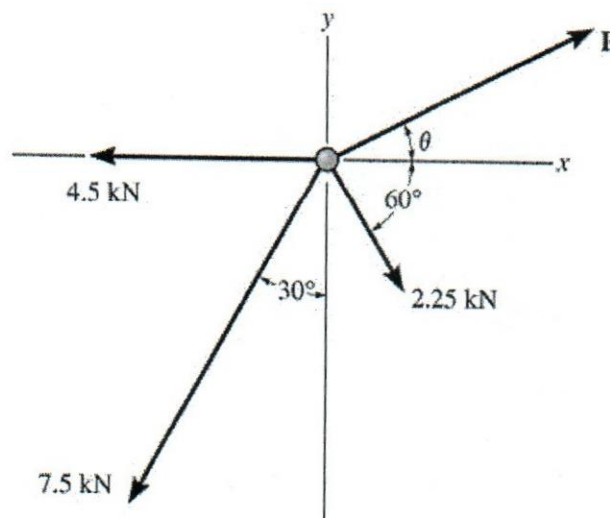
3)

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



(10 marks)

- b) Determine the magnitude and direction of F so that the particle is in equilibrium magnitude



(15 marks)

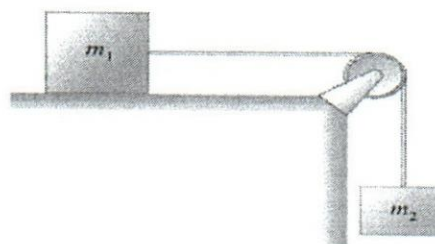
4)

- a) State Newton's second law of motion (7 marks)
- b) A light string passes over a smooth pulley, and carries box of masses 5kg and 7kg at each end. If the system moves freely;
- Mark all the forces acting on them system
 - Acceleration of each box
 - Tension in the string (12 marks)
- c) A block of mass 5 kg lies on a smooth plane tilted at an angle 22.0° to the horizontal. Determine the acceleration of the block as it slides down the plane (6 marks)

5)

- a) Draw a graph to illustrate the variation of frictional force (F) with applied force. Mention limiting frictional force, Static region and Kinetic region on the graph. (10 marks)

- b) A cord running over a pulley connects two objects. The coefficient of static friction between the object and the table is 0.33, The coefficient of dynamic friction is 0.25. If $m_1 = 3.0$ kg and $m_2 = 8$ kg



- Mark all the force acting on the each object of the system (4 marks)
- Find Limiting frictional force. (3 marks)
- Find acceleration of the system. (5 marks)
- Find tension of the string. (3 marks)

===END===



CINEC CAMPUS (PVT) LTD.
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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase 1
COURSE CODE: ND-100 P1 - BATCH 042/043



FINAL EXAMINATION - QUESTION PAPER
INTRODUCTION TO NAVIGATION

- Answer all questions.
- Total Marks: 100

Date: 12.12.2022

Pass mark 70%

Time allocated: 3 Hours

- Draw Plane Sailing Triangles for vessels heading NE and SW courses indicating Departure, D' lat., and Distance. State the Parallel Sailing formula for calculating D'Long
(05 marks)
 - Where the distance between two places exceeds 600 M, it is recommended that the calculation done by Mercator Sailing. Explain the Mercator Sailing formula? Find by Mercator Sailing, the rhumb line course and distance from $32^{\circ} 29' S$, $064^{\circ} 00' E$ to $49^{\circ} 50' S$, $005^{\circ} 15' E$.
(15 marks)
- On 20th January 1992, in DR $54^{\circ} 20' S$ $046^{\circ} 27' W$, the Sunset bearing 234° (C). Find the LMT of Sunset and the Compass Error by Amplitude method using Nautical Tables. If variation was $3.0^{\circ} W$, find the deviation of the compass.
(15 marks)
- 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 $10^{\circ} E$, find the deviation for the ship's head.
(20 Marks)

4.

(a) On 3rd March 0900 GMT a vessel departs a port of westerly longitude having 3hrs difference from GMT, bound for a port of easterly longitude having 5.5 hrs difference from GMT. If the total distance is 8800 miles and her average speed is 16 kts, find the Estimated Time of Arrival (ETA) in GMT and Local time. (07 marks)

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

- i. What is meant by Neap and Spring Tides? What tides are referred by arrows A and B.
- ii. Calculate the depth of water at this port on 17th June 0040 hrs and 0701hrs if the charted depth given is 5.5 m.

(08 marks)

TIME ZONE (UT)		ENGLAND	
For Summer Time add ONE hour in non-shaded areas		LAT 50°21'	
MAY		JUNE	
Time	m	Time	m
1 0525	1.6	16 0555	1.
2 0556	1.8	17 0640	3.
3 0731	3.6	18 0859	1.1
4 0840	1.2	19 0952	1.0
5 0936	0.9	20 0408	4.
6 1025	0.6	21 0500	4.
7 1203	0.9	22 0557	4.
8 1328	1.2	23 0651	4.
9 1443	3.6	24 0745	1.1
10 1518	4.1	25 0839	1.6
11 1558	0.9	26 0933	1.1
12 1657	1.9	27 1027	1.6
13 1800	3.9	28 1121	3.
14 1840	3.9	29 1215	3.4
15 1925	3.0	30 1309	3.0
16 1955	3.5	1 1403	4.1
17 1951	3.2	2 1457	4.1
18 2013	3.7	3 1551	4.2
19 0040	3.7	4 1645	4.4
20 0656	1.9	5 1739	4.5
21 1341	3.6	6 1833	4.5
22 1925	3.0	7 1927	4.6
23 0003	3.7	8 2021	4.6
24 0656	1.9	9 2115	4.6
25 1341	3.6	10 2209	4.6
26 1925	3.0	11 2303	4.6
27 0003	3.7	12 2357	4.6
28 0656	1.9	13 0051	4.6
29 1341	3.6	14 0145	4.6
30 1925	3.0	15 0239	4.6
1 0003	3.7	16 0333	4.6
2 0656	1.9	17 0427	4.6
3 1341	3.6	18 0521	4.6
4 1925	3.0	19 0615	4.6
5 0003	3.7	20 0709	4.6
6 0656	1.9	21 0803	4.6
7 1341	3.6	22 0897	4.6
8 1925	3.0	23 0991	4.6
9 0003	3.7	24 1085	4.6
10 0656	1.9	25 1179	4.6
11 1341	3.6	26 1273	4.6
12 1925	3.0	27 1367	4.6
13 0003	3.7	28 1461	4.6
14 0656	1.9	29 1555	4.6
15 1341	3.6	30 1649	4.6
16 1925	3.0	1 1743	4.6
17 0003	3.7	2 1837	4.6
18 0656	1.9	3 1931	4.6
19 1341	3.6	4 2025	4.6
20 1925	3.0	5 2119	4.6
21 0003	3.7	6 2213	4.6
22 0656	1.9	7 2307	4.6
23 1341	3.6	8 0001	4.6
24 1925	3.0	9 0095	4.6
25 0003	3.7	10 0189	4.6
26 0656	1.9	11 0283	4.6
27 1341	3.6	12 0377	4.6
28 1925	3.0	13 0471	4.6
29 0003	3.7	14 0565	4.6
30 0656	1.9	15 0659	4.6
1 1341	3.6	16 0753	4.6
2 1925	3.0	17 0847	4.6
3 0003	3.7	18 0941	4.6
4 0656	1.9	19 1035	4.6
5 1341	3.6	20 1129	4.6
6 1925	3.0	21 1223	4.6
7 0003	3.7	22 1317	4.6
8 0656	1.9	23 1411	4.6
9 1341	3.6	24 1505	4.6
10 1925	3.0	25 1599	4.6
11 0003	3.7	26 1693	4.6
12 0656	1.9	27 1787	4.6
13 1341	3.6	28 1881	4.6
14 1925	3.0	29 1975	4.6
15 0003	3.7	30 2069	4.6
16 0656	1.9	1 2163	4.6
17 1341	3.6	2 2257	4.6
18 1925	3.0	3 2351	4.6
19 0003	3.7	4 0045	4.6
20 0656	1.9	5 0139	4.6
21 1341	3.6	6 0233	4.6
22 1925	3.0	7 0327	4.6
23 0003	3.7	8 0421	4.6
24 0656	1.9	9 0515	4.6
25 1341	3.6	10 0609	4.6
26 1925	3.0	11 0703	4.6
27 0003	3.7	12 0797	4.6
28 0656	1.9	13 0891	4.6
29 1341	3.6	14 0985	4.6
30 1925	3.0	15 1079	4.6
1 0003	3.7	16 1173	4.6
2 0656	1.9	17 1267	4.6
3 1341	3.6	18 1361	4.6
4 1925	3.0	19 1455	4.6
5 0003	3.7	20 1549	4.6
6 0656	1.9	21 1643	4.6
7 1341	3.6	22 1737	4.6
8 1925	3.0	23 1831	4.6
9 0003	3.7	24 1925	4.6
10 0656	1.9	25 2019	4.6
11 1341	3.6	26 2113	4.6
12 1925	3.0	27 2207	4.6
13 0003	3.7	28 2301	4.6
14 0656	1.9	29 2395	4.6
15 1341	3.6	30 2489	4.6
16 1925	3.0	1 2583	4.6
17 0003	3.7	2 2677	4.6
18 0656	1.9	3 2771	4.6
19 1341	3.6	4 2865	4.6
20 1925	3.0	5 2959	4.6
21 0003	3.7	6 3053	4.6
22 0656	1.9	7 3147	4.6
23 1341	3.6	8 3241	4.6
24 1925	3.0	9 3335	4.6
25 0003	3.7	10 3429	4.6
26 0656	1.9	11 3523	4.6
27 1341	3.6	12 3617	4.6
28 1925	3.0	13 3711	4.6
29 0003	3.7	14 3805	4.6
30 0656	1.9	15 3899	4.6
1 1341	3.6	16 3993	4.6
2 1925	3.0	17 4087	4.6
3 0003	3.7	18 4181	4.6
4 0656	1.9	19 4275	4.6
5 1341	3.6	20 4369	4.6
6 1925	3.0	21 4463	4.6
7 0003	3.7	22 4557	4.6
8 0656	1.9	23 4651	4.6
9 1341	3.6	24 4745	4.6
10 1925	3.0	25 4839	4.6
11 0003	3.7	26 4933	4.6
12 0656	1.9	27 5027	4.6
13 1341	3.6	28 5121	4.6
14 1925	3.0	29 5215	4.6
15 0003	3.7	30 5309	4.6
16 0656	1.9	1 5403	4.6
17 1341	3.6	2 5497	4.6
18 1925	3.0	3 5591	4.6
19 0003	3.7	4 5685	4.6
20 0656	1.9	5 5779	4.6
21 1341	3.6	6 5873	4.6
22 1925	3.0	7 5967	4.6
23 0003	3.7	8 6061	4.6
24 0656	1.9	9 6155	4.6
25 1341	3.6	10 6249	4.6
26 1925	3.0	11 6343	4.6
27 0003	3.7	12 6437	4.6
28 0656	1.9	13 6531	4.6
29 1341	3.6	14 6625	4.6
30 1925	3.0	15 6719	4.6
1 0003	3.7	16 6813	4.6
2 0656	1.9	17 6907	4.6
3 1341	3.6	18 6999	4.6
4 1925	3.0	19 7093	4.6
5 0003	3.7	20 7187	4.6
6 0656	1.9	21 7281	4.6
7 1341	3.6	22 7375	4.6
8 1925	3.0	23 7469	4.6
9 0003	3.7	24 7563	4.6
10 0656	1.9	25 7657	4.6
11 1341	3.6	26 7751	4.6
12 1925	3.0	27 7845	4.6
13 0003	3.7	28 7939	4.6
14 0656	1.9	29 8033	4.6
15 1341	3.6	30 8127	4.6
16 1925	3.0	1 8221	4.6
17 0003	3.7	2 8315	4.6
18 0656	1.9	3 8409	4.6
19 1341	3.6	4 8503	4.6
20 1925	3.0	5 8597	4.6
21 0003	3.7	6 8691	4.6
22 0656	1.9	7 8785	4.6
23 1341	3.6	8 8879	4.6
24 1925	3.0	9 8973	4.6
25 0003	3.7	10 9067	4.6
26 0656	1.9	11 9161	4.6
27 1341	3.6	12 9255	4.6
28 1925	3.0	13 9349	4.6
29 0003	3.7	14 9443	4.6
30 0656	1.9	15 9537	4.6
1 1341	3.6	16 9631	4.6
2 1925	3.0	17 9725	4.6
3 0003	3.7	18 9819	4.6
4 0656	1.9	19 9913	4.6
5 1341	3.6	20 1007	4.6
6 1925	3.0	21 1101	4.6
7 0003	3.7	22 1195	4.6
8 0656	1.9	23 1289	4.6
9 1341	3.6	24 1383	4.6
10 1925	3.0	25 1477	4.6
11 0003	3.7	26 1571	4.6
12 0656	1.9	27 1665	4.6
13 1341	3.6	28 1759	4.6
14 1925	3.0	29 1853	4.6
15 0003	3.7	30 1947	4.6
16 0656	1.9	1 2041	4.6
17 1341	3.6	2 2135	4.6
18 1925	3.0	3 2229	4.6
19 0003	3.7	4 2323	4.6
20 0656	1.9	5 2417	4.6
21 1341	3.6	6 2511	4.6
22 1925	3.0	7 2605	4.6
23 0003	3.7	8 2699	4.6
24 0656	1.9	9 2793	4.6
25 1341	3.6	10 2887	4.6
26 1925	3.0	11 2981	4.6
27 0003	3.7	12 3075	4.6
28 0656	1.9	13 3169	4.6
29 1341	3.6	14 3263	4.6
30 1925	3.0	15 3357	4.6
1 0003	3.7	16 3451	4.6
2 0656	1.9	17 3545	4.6
3 1341	3.6	18 3639	4.6
4 1925	3.0	19 3733	4.6
5 0003	3.7	20 3827	4.6
6 0656	1.9	21 3921	4.6
7 1341	3.6	22 4015	4.6
8 1925	3.0	23 4109	4.6
9 0003	3.7	24 4203	4.6
10 0656	1.9	25 4297	4.6
11 1341	3.6	26 4391	4.6
12 1925	3.0	27 4485	4.6
13 0003	3.7	28 4579	4.6
14 0656	1.9	29 4673	4.6
15 1341	3.6	30 4767	4.6
16 1925	3.0	1 4861	4.6
17 0003	3.7	2 4955	4.6
18 0656	1.9	3 5049	4.6
19 1341	3.6	4 5143	4.6
20 1925	3.0	5 5237	4.6
21 0003	3.7	6 5331	4.6
22 0656	1.9	7 5425	4.6
23 1341	3.6	8 5519	4.6
24 1925	3.0	9 5613	4.6
25 0003	3.7	1	



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 042/043



FINAL EXAMINATION – QUESTION PAPER

COMMUNICATIONS

- Answer 05 questions.
- Total Marks: 100

Date: 09.12.2022

Pass mark 70%

Time allocated: 03 Hours

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

- Alfa
- Bravo
- Golf
- Hotel
- Foxtrot

(20 marks)

2) Write down the Morse signals for following words.

- DEVIATION
- WRECK
- NADAZERO
- PANTAFIVE
- INSTRUMENTS

(20 marks)

3) Name the categories and list the possibilities for each of following terms used over the VHF with regard to safety:

- Pan Pan Pan Pan Pan Pan
- Mayday Mayday Mayday
- Securite Securite Securite

(15 marks)

iv) A flash light can serve as an effective distress signal at night or during periods of reduced visibility. Explain, how do you indicate a distress with a flashing light.

(05 marks)

4) 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)

5) a) You are signalling 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.

(15 marks)

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

(05 marks)

6) 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 best remedy if there is language difficulty in Radiotelephony communication?

c) What is the signal being used when calling to an unknown station by flashing light?

d) 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?

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

(20 marks)

Library.



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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase I
COURSE CODE: ND-100 P1 - BATCH 042/043

FINAL EXAMINATION - QUESTION PAPER
GENERAL SHIP KNOWLEDGE

- Answer all questions.
- Total Marks: 100

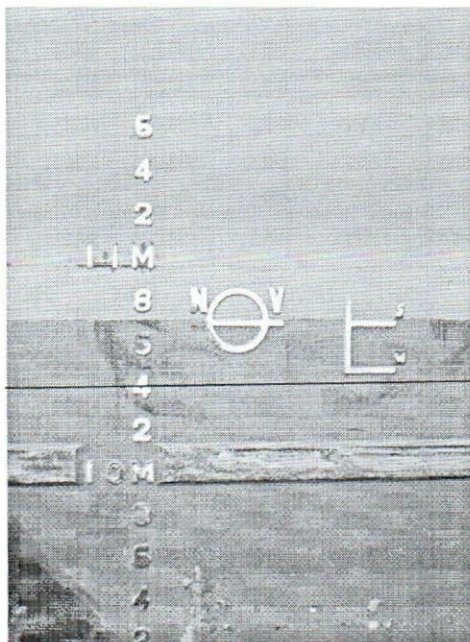
Date: 09.12.2022

Pass mark 60%

Time allocated: 3 Hours

01. Answer the following using the picture below.

- What is the Summer Load Draft? **(03 marks)**
- Show the Load Line Mark. **(02 marks)**
- Complete the load line marks by drawing the other associated marks. **(03 marks)**
- What is the Present Draft? **(02 marks)**



Water Level

02. a. With the aid of diagram describes Unstable equilibrium of a ship.
- b. What is Metacentric height and its relationship with GZ?
- c. ship of 12000t displacement is heeled by 6 degrees. If her righting lever is then 0.1 m, find the moment of statical stability. If her KM is 8.2 m, find her KG.

(25 marks)

03. On a ship of 2000t displacement and KG 3.66m, loads 1500t (KG 5.5 m), 3500t (KG 4.60), and takes 1520t of bunkers (KG 0.60). She discharges 2000t of cargo (KG 2.44m) and consumes 900t of bunkers (KG.0.40m). Find the KG at the end of the voyage.

(15 marks)

04.

- a. Explain what Free Surface Effect is. $FSC = \frac{i \cdot di}{w}$ in the formula given explain what i, di, and w stands for. If 'i' of a rectangular tank about its centerline is $\frac{length \cdot (breadth)^3}{12}$, find the fluid GM of a vessel of 50000t displacement, KM 8.5m KG 7.7m, No 2 port DB tank is partly full of FW. (L 20m, B 15m)

(15 marks)

- b. Explain the difference between Stiff and Tender ships. (10 marks)

05. Draw a labeled cross section of followings;

- a) Cargo Hold Bilge.
 b) General cargo Vessel.
 c) Bulk Carrier.

(25 marks)



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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase I
COURSE CODE: ND-100 P1 - BATCH 042/043

FINAL EXAMINATION - QUESTION PAPER
SEAMANSHIP THEORY

- Answer 05 questions.
- Total Marks: 100

Date: 08.12.2022

Pass mark 70%

Time allocated: 03 Hours

- 1) 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)
- 2) 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)
- 3) a) With the aid of a side view diagram of an anchor cable arrangement on forecastle, describe the following;
 - i) Hawse pipe
 - ii) Spurling pipe
 - iii) Chain locker
 - iv) Guillotine (bow stopper)
 - v) Bitter end(10 marks)
b) With the aid of a diagram (side / aerial views), explain the following with respect to reporting of anchor.
 - i) Anchor Up & Down.
 - ii) Starboard Anchor 4 points on stbd. bow and short stay.
 - iii) Port Anchor 4 points on stbd. bow and long stay.(10 marks)
- 4) a) A paint defect is in many cases due to a number of causes. Write short notes on 8 common defects found in paint work.
(15 marks)
b) List the types of paints used on ships.
(05 marks)

5) Different types of ropes are used for different applications on a ship. State the types of ropes used onboard and give a short note of each type.

(20 marks)

6) a) Define the term heavy weather.

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

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

d) With reference to ISM Code, what is a risk assessment?

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

(20 marks)



Course - Phase 1
 COURSE CODE : ND- 100 P1 - BATCH 042/43

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: 12.12.2022

Pass mark 55%

Time allocated: 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)

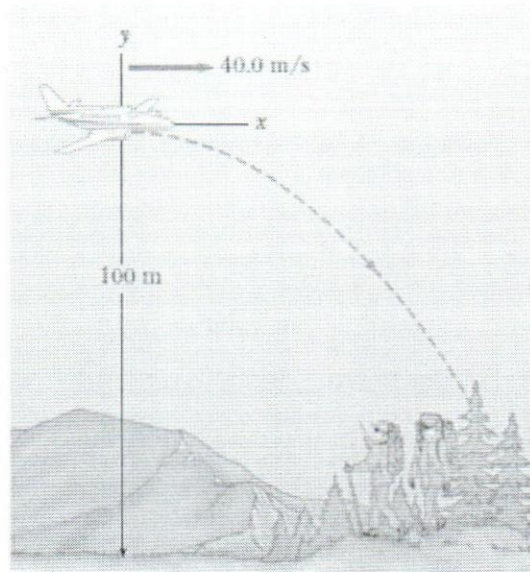
(8marks)

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. Write 3 examples for circular motion

(6 marks)

ii. Define period and frequency of circular motion.

(6 marks)

iii. 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

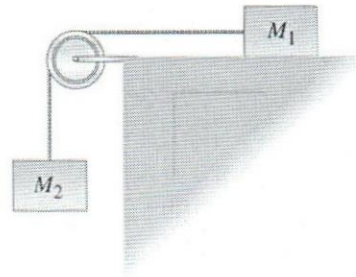
(8 marks)

4.

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

(4 marks)

ii. The two masses of the system shown in the figure are $M_1 = 5 \text{ kg}$ and $M_2 = 10 \text{ kg}$. 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.



a. Find the limiting friction force

b. Find the acceleration of the system.

c. 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 (4 marks)

iii. Explain about 2 applications of Archimedes principle (4 marks)

iv. 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)

i. Find the up thrust on the ice cube.

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

- 6.
- i. State the Kepler's laws (2 × 3 = 6 marks)
 - ii. State Newton's universal law of Gravitation (4 marks)
 - a. 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)
 - iii. 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.
- i. State conservation of energy (4 marks)
 - ii. Define power (4 marks)
 - iii. A car of mass 1000 kg, moving with a velocity of 36 kmh⁻¹. Find its kinetic energy. (3 marks)
 - iv. An object of mass 8kg moving with a velocity of 12 m/s collides with a stationary object of mass 12 kg . Calculate:
 - a. The velocity with which they move off together.
 - b. The kinetic energy before that impact.
 - c. The kinetic energy after impact.(9 marks)

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02



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CINEC CAMPUS

Faculty of Maritime Sciences

Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Officer Cadet Training Course – Phase I

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: 6.12.2022

Time allocated: 3 Hours

1.

a) Write the inequality $6 \geq x > -1$ 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. $2x^2 - 7x - 10 = 0$

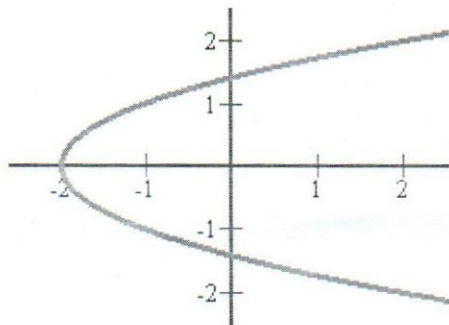
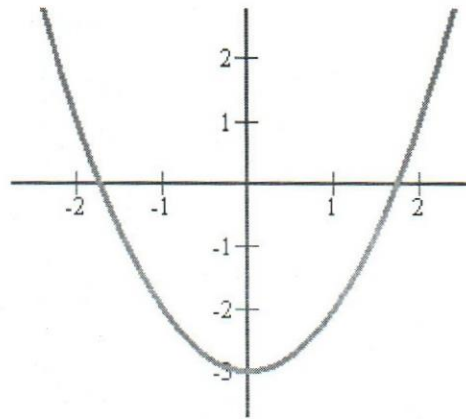
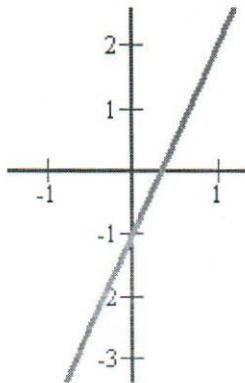
ii. $x^2 + 3x - 4 = 0$

(4 × 2 = 8 marks)

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

(5 marks)

c) Are these functions?



d) 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 × 2 = 4 marks)

c) Find x

i. $\log_4 x = 3$

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

iii. $\log_x 2 = 2$

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

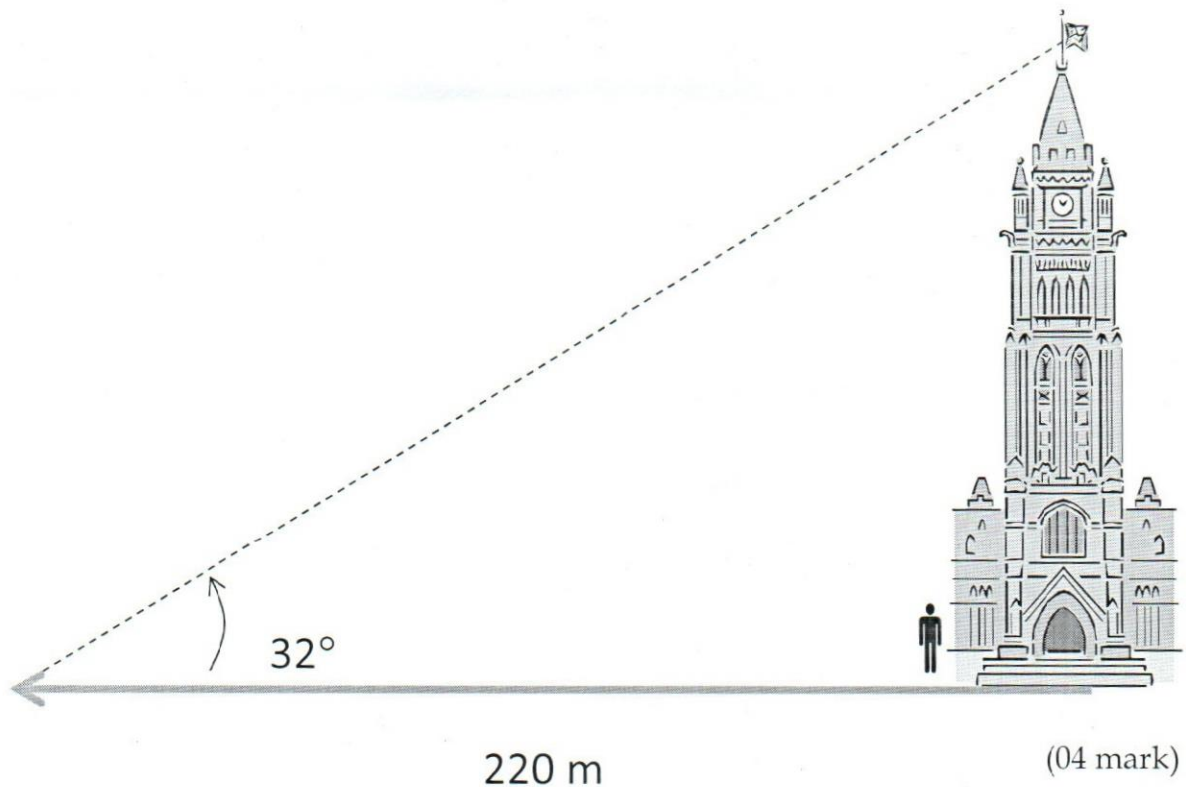
v. $\log_x 8 = 3$

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

($6 \times 2 = 12$ marks)

4.

- a) 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 below.

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)

5.

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. $-3E$

iv. $E - C$

v. $D' + C$

(20 marks)

6.

a. Determine whether the following statements are true or false;

i. -9 is a natural number

ii. $-\frac{1}{5}$ is an irrational number

iii. $\sqrt{16}$ is an irrational number

- iv. -521 is an integer
- v. 0.334 is an irrational number
- vi. $-\sqrt{3}$ is a real number
- vii. 13 is a rational number
- viii. π is a rational number (8 × 1 = 08 marks)

ix.

b. Each of the following expressions can be written as a^n for some value of n. In each case determine the value of n

- | | | |
|-----------------------------------|---|---------------------------------------|
| a) $a \times a \times a \times a$ | b) $\frac{1}{a \times a \times a}$ | c) 1 |
| d) $\sqrt[3]{a^5}$ | e) $a^3 \times a^5$ | f) $\frac{a^6}{a^2}$ |
| g) $(a^4)^2$ | h) $\frac{a^2 \times a^5}{(a^3)^3}$ | i) $\sqrt{a} \times \frac{1}{a^{-2}}$ |
| j) $a^{1/2} \times a^2$ | k) $\frac{1}{a^{-3}} \times \frac{1}{a^{-2}}$ | l) $\frac{1}{(a^{-2})^3}$ |

(12 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 $y = -5 \cos\left(\frac{x}{2}\right)$

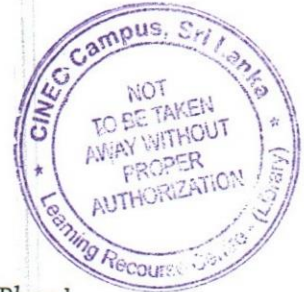
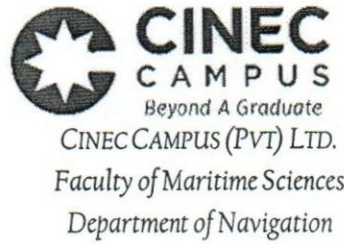
Find the followings.

- iv. Amplitude (01 mark)
- v. Period (01 mark)
- vi. Sketch $y = -5 \cos\left(\frac{x}{2}\right)$ (05 marks)

c) Draw following graphs

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

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EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase 1
COURSE CODE: ND-100PI - BATCH 042/043

MID TERM EXAMINATION - QUESTION PAPER
Bridge Equipment / ROR WK

- All questions should be answered.
- Total Marks: 100

Date: 06.12.2022

Pass mark 70%

Time allocated: 3 Hours

QUESTION-1

- a. Give a brief introduction to what a VDR is? (10 Marks)
- b. Identify 6 (six) on how RNC & ENC types differ to each other. (10 Marks)

QUESTION-2

What is an AIS and an LRIT and explain how they differ to each other? (20 Marks)

QUESTION-3

- a. Illustrate six (6) “common” duties to perform as a watch keeping officer during vessel’s stay at port, sea and anchorage respectively. (10 Marks)
- b. Illustrate three (3) “specific” duties to perform as a watch keeping officer during vessel’s stay at port, sea and anchorage respectively. (10 Marks)

QUESTION-4

With special emphasis to collision regulations, what do you understand by the terms?

- a. Close Quarters Situation
- b. Practice of good seamanship
- c. Navigate with extreme caution
- d. Take all way off

(20 Marks)

QUESTION-5

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)

=== END ===



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 042/043

MID TERM EXAMINATION - QUESTION PAPER

Operational Safety

- Answer all Five questions.
- Total Marks: 100
- Ensure of clear numbering and identifying of the answer to the respective question.

Date: 05. 12. 2022

Pass mark 50%

Time allocated: 3 Hours

QUESTION – 1

- a. List down the markings you may find on cargo lifting appliances (10 Marks)
- b. What are the safety precautions required when rigging up union purchase? (10 Marks)

QUESTION – 2

- a.) Write short notes with special emphasis to why is it essential for the cargo officer in charge to be aware of?:
- a. Angle of repose
 - b. Moisture content
 - c. Moisture migration
 - d. TML
 - e. Liquification of bulk cargo (2 x 5 = 10 Marks)
- b) On what? circumstances and how? should grain cargo surfaces be secured? (10 Marks)

QUESTION – 3

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

(20 Marks)

QUESTION – 4

List down 10 safety precautionary measures when working with mooring lines.

(20 marks)

QUESTION – 5

With the aid of a sketch, show a basic “fixed fire Detection and Extinguishing Installation System” of a General cargo vessel with brief explanatory notes.

(20 marks)

=== E N D ===



Faculty of Maritime Sciences

Department of Navigation

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

COURSE CODE: ND-100 PI

BATCH 042/043



MIDTERM EXAMINATION QUESTION PAPER

INTRODUCTION TO NAVIGATION

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

Date: 2022.09.02

Pass mark 70%

Time allocated: 3 Hours

1. a. 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.

(15 marks)
2. With an aid of sketches define and explain the following Terrestrial References.
 - i. Latitude and Longitude.
 - ii. Meridians and the Prime Meridian.
 - iii. Equator and the Parallels of latitudes.

(15 marks)
3.
 - i. Find d'lat, d'long & m'lat between following positions
P 21° 18' N 075° 10' E, Q 45° 10' N 069° 08' E.
 - ii. On 22nd Sept 1992, GMT 10h 09m 38s, in DR 18° 20' N 085° 40' E, calculate the LHA and declination of the star SPICA.
 - iii. On 29th Nov 1992, GMT 17h 47m 49s, in DR 26° 27' N 030° 27' W, calculate the LHA of the SUN.

(20 marks)
4. 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 available for fixing (obtaining) the position of a vessel, both in coastal waters and in open seas.

(20 marks)

5. a. 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.

(15 marks)

b. i. Find the GMT, given LIT(East) 08h 9m 12s and LMT 14th 06h 12m 19s.

ii. A ship is to sail 5800 nm at an average speed of 17.5 knots. Find the Steaming time in hours and minutes.

If she departs at 10h30m (1030 hrs) GMT on 15th March, calculate her ETA in GMT. If the arrival port is at 90° W Meridian, find the ETA in Local time?

(15 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 PI

BATCH 042/043



MIDTERM EXAMINATION QUESTION PAPER

General Ship Knowledge

- Answer all five questions.
- Total Marks : 100

Date: 2022.09.01

Pass mark 60%

Time allocated: 2 Hours

- Define what is Cb (block Coefficient) and TPC.
 - A ship in Dock Water of RD 1.010 at a draft of 5m, Is 90m long and 10m wide at the water line. If her Block coefficient is 0.72 and her light displacement is 1200t, find the Deadweight aboard. (20 marks)
- What is
 - Load Displacement
 - Dead Weight
 - A ship loads with following conditions. Calculate the maximum quantity of cargo that can be loaded so that she could depart at her permissible load line.

Light Displacement	50,000t
Cargo on board	70,000t
Ballast on board	10,000t
FW on board	8,000t
Load Displacement	170,000t

Consumption of FW prior to departure is expected to be 200t . (20 marks)
- Define FWA and DWA.
 - A ship's stability book gives her load displacement to be 78000 t and TPC to be 65. If she is now loading in DW of RD 1.010, by how much may her load line be immersed so that she would not be overloaded. (20 marks)
- Following readings were observed during a draft survey of a vessel;
Forward Stbd 7.52m Forward Port 7.48m Aft Stbd 9.47m Aft Port 9.33m
Mid ship Stbd 8.75m Mid Port 8.65m.
 - Find the Trim of the vessel
 - State whether she is Sagged or Hogged
 - Find the Quarter Mean Draft. (20 marks)

5. With suitable sketches define the following;

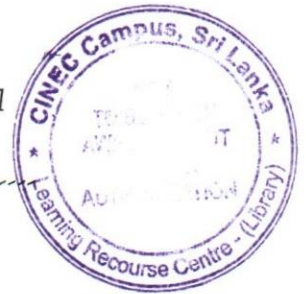
- i. Camber
- ii. Rise of floor
- iii. Flare
- iv. Draft/ Freeboard
- v. Summer draft/ Air draft

(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 042/043



MID TERM EXAMINATION – QUESTION PAPER
COMMUNICATIONS

- Answer 05 questions.
- Total Marks: 100

Date: 01.09.2022

Pass mark 70%

Time allocated: 03 Hours

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

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

(20 marks)

2) Write down the Morse signals for following words.

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

(20 marks)

3) a) Explain the use of substitute flags.

(4 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 |

(12 marks)

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

(4 marks)

4) 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)

5) a) How do you indicate Latitude $25^{\circ} 32'N$ and Longitude $145^{\circ} 56'E$ by flashing light signalling method?

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)

6) a) 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.

(14 marks)

b) How do you indicate a decimal point between numerals in following methods of signalling.

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

(6 marks)



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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program - Phase I
COURSE CODE: ND-100 P1 - BATCH 042/043

MIDTERM EXAMINATION - QUESTION PAPER

Meteorology

- Answer all questions.
- Total Marks: 100

Date: 31.08.2022

Pass mark 50%

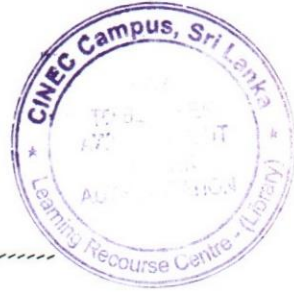
Time allocated: 2 Hours

- Briefly describe the properties of Troposphere (10 marks)
- Define Atmospheric Pressure (10 marks)
 - Name two equipment used to measure it.. (10marks)
 - If the aneroid barometer reading is 1015.0 mb, Index error is + 0.4mb, Bridge Height is 22m, find the pressure that should be written in the log book. (20 marks)
- Briefly describe how the relative Humidity is calculated using wet bulb-- dry bulb thermometers. (20 marks)
- What is Coriolis Force (10 marks)
 - Pressure Gradient Force (10 marks)
 - Name 4 low level clouds (10 marks)

===END ===

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 042/043



MID TERM EXAMINATION - QUESTION PAPER
SEAMANSHIP THEORY

- Answer 05 questions.
- Total Marks: 100

Date: 31.08.2022

Pass mark 70%

Time allocated: 03 Hours

- 1) Different types of ropes are used for different applications on a ship. State the types of ropes used onboard and give a short note of each type. (20 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) a) Explain the safe and proper rigging of the pilot ladder in order to ensure safer transfer of Maritime Pilots. (14 marks)
 b) Describe with the aid of a diagram the purpose & method of doubling a whip of a derrick. (6 marks)
- 4) As long as ships sail the seas, they will need protection from the corrosive environment in which they operate. Explain the procedure of application of paint which will be carried out in order to protect the ship against corrosion. (20 marks)
- 5) Explain the procedure of getting Anchor clear and ready for letting go. (20 marks)

- 6) a) What is the purpose of the spreader steps fitted in a pilot ladder?
- b) With reference to rigging of the pilot ladder, what is the purpose of 9m mark?
- c) How do you make paint brushes last longer?
- d) How does the anchor cable is marked to show the number of the shackle?
- e) With reference to ISM Code, what is a risk assessment?

(20 marks)

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Faculty of Maritime Sciences
Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase 1
COURSE CODE: ND-100 P1 - BATCH 042/043

MIDTERM EXAMINATION - QUESTION PAPER
Meteorology

- Answer all questions.
- Total Marks: 100

Date: 08.12.2022
Hours

Pass mark 50%

Time allocated: 3

- 1) a. Name 4 meteorological equipment and their use. (5 marks)
b. Explain principle of Aneroid Barometer with a suitable diagram. (15 marks)
- 2) a. What are the layers of the atmosphere? (5 marks)
b. What are the characteristics of Troposphere (15 marks)
- 3) a. Explain Relative Humidity with formula. (10 marks)
b. What is absolute humidity. (6 marks)
c. Explain how condensation occur (4 marks)
- 4) a. Name 5 types of precipitations. (5 marks)
b. Classify (Name) clouds as per their base heights (15 marks)
- 5) a. Explain in detail the "Buys Ballot Law". (10 marks)
b. Describe "Veering" and "Backing" related to wind direction. (10 marks)

===END===

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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 042/043

MID TERM EXAMINATION - QUESTION PAPER

Operational Safety

- Answer all Five questions.
- Total Marks: 100
- Ensure of clear numbering and identifying of the answer to the respective question.

Date: 29.08. 2022

Pass mark 50%

Time allocated: 3 Hours

1. With the aid of suitable sketches, explain the following:

- a. Hatch cover W/T system
- b. Internal water drain system of cargo hold hatch covers / coamings.
- c. Important maintenance
- d. Hatch cover securing system

(4x 5 =20 marks)

2. Define following:

- a. Handysize
- b. Handymax
- c. Panamax
- d. Suezmax
- e. Capesize
- f. Supper tanker
- g. ULCC
- h. VLCC
- i. Tug & tow
- j. LASH ship

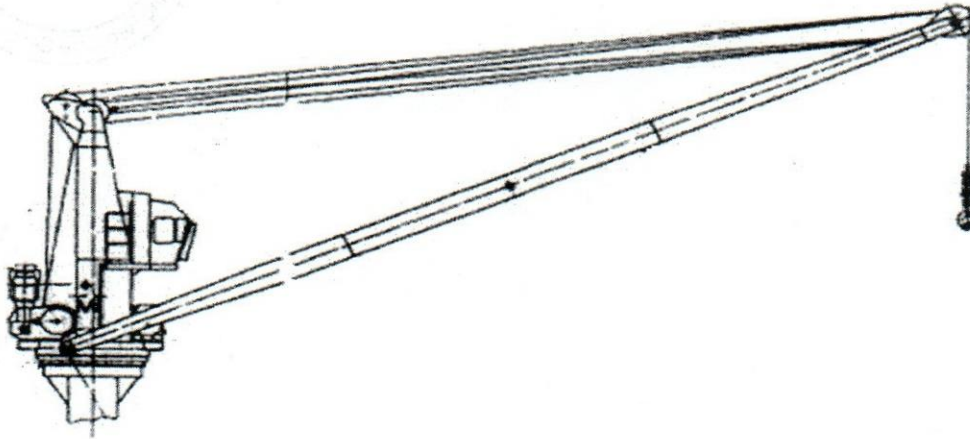
(10 x 2 =20 marks)

3. With the aid of suitable sketches, explain what you understand by the following terms

- I. Light Ship
- II. GT
- III. NT
- IV. DWT
- V. Summer displacement

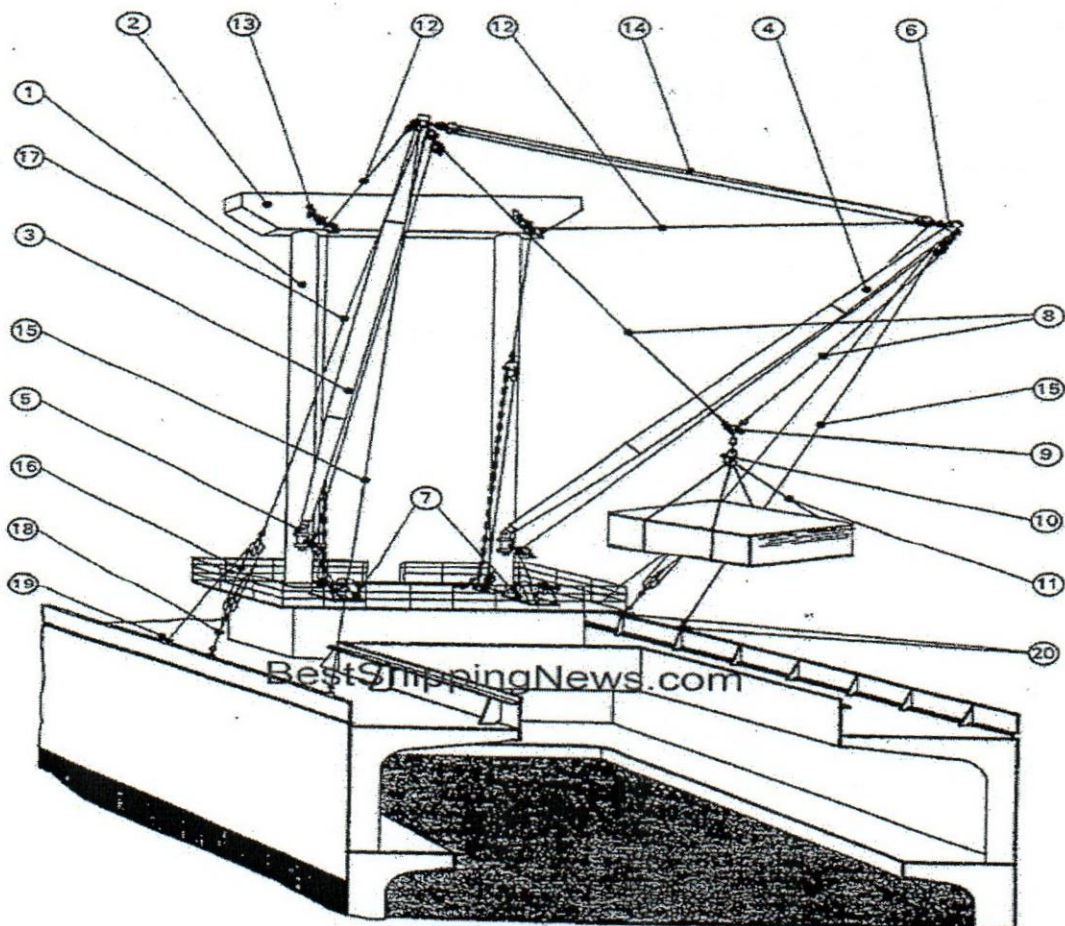
(5 x 4=20 marks)

4. a) Name 6 items in the below sketch.



(10 marks)

b) With a brief introduction to below sketch, name the parts against the given number.



(10 marks)

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Department of Navigation

EDUCATION & TRAINING COURSE: Navigation Cadet Training Program – Phase 1
COURSE CODE: ND-100 P1 - BATCH 042/043

MIDTERM EXAMINATION - QUESTION PAPER
Meteorology

- Answer all questions.
- Total Marks: 100

Date: 08.12.2022
Hours

Pass mark 50%

Time allocated: 3

- a. Name 4 meteorological equipment and their use. (5 marks)
 - b. Explain principle of Aneroid Barometer with a suitable diagram. (15 marks)
- a. What are the layers of the atmosphere? (5 marks)
 - b. What are the characteristics of Troposphere (15 marks)
- a. Explain Relative Humidity with formula. (10 marks)
 - b. What is absolute humidity. (6 marks)
 - c. Explain how condensation occur (4 marks)
- a. Name 5 types of precipitations. (5 marks)
 - b. Classify (Name) clouds as per their base heights (15 marks)
- a. Explain in detail the "Buys Ballot Law". (10 marks)
 - b. Describe "Veering" and "Backing" related to wind direction. (10 marks)

===END ===