



CINEC CAMPUS (PVT) LTD.

Faculty of Maritime Sciences

Department of Navigation

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

COURSE CODE: ND- 0100 PI, BATCH 045 & 045A

FINAL REPEAT EXAMINATION – QUESTION PAPER
INTRODUCTION TO NAVIGATION

- Answer all questions.
- Total Marks: 100

Date: 27.06.2024

Pass mark 70%

Time allocated: 03 hrs

1. a. Indicate the following angles on the diagram of Celestial Sphere.
i. GHA Star ii. LHA Star iii. SHA Star iv. Longitude v. Declination.
b. Define the above angles in Q1(a). (20 marks)

2. i. State the Parallel and Plane sailing formulas.
Given the starting position to be $20^{\circ} 11.0' N$ $072^{\circ} 52.0' W$, Course $032^{\circ}(T)$ and Distance 238 miles find the position arrived using plane sailing. (15 marks)

3. Find the rhumb line course and distance by using Mercator sailing from starting position $02^{\circ} 12.0' S$ $160^{\circ} 18.0' W$ to final position $10^{\circ} 19.0' N$ $140^{\circ} 40.0' W$. (15 marks)

4. On 29th Nov 1992, at ship in DR $260 27' N$ $1300 27' W$ at GMT 17 hours 47 minutes 49 seconds, azimuth of the sun was $1300(C)$. Find the compass error. (15 marks)

P.T.O

5. a. A ship is to sail 15800 nm at an average speed of 15.0 knots. Find the Steaming time. If she departs at 10h 00m GMT on 5th May, calculate her ETA in GMT and in Local time if the arrival port is in 090 E longitude?

b. Briefly explain the followings

- i. Contents of the Admiralty Chart Catalogue.
- ii. methods of obtaining a position line.
- iii. Information that can be obtained by Navigational chart.

(20 marks)

6. At 1000hrs Royal Sovereign Lt. vessel bore 315 (T) at 10.0 miles range. Then the ship sailed on a course of 070 (T) at 16 kts. At 1300hrs S. Foreland Lt was observed due north (000T) at a range of 25 miles.

- i. Find the Course and Distance made Good.
- ii. Set, Drift, and the Rate of current.

(15 marks)



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FINAL EXAMINATION – QUESTION PAPER
INTRODUCTION TO NAVIGATION

- Answer all questions.
- Total Marks: 100

Date: 16.05.2024

Pass mark 70%

Time allocated: 03 hrs

1. Describe the following terms with suitable diagrams;

- Axis of the Earth
- Difference of Latitude
- Equinoctial
- Parallels of Declination
- Celestial Meridians

(03 marks each)

2. On 29th November 1992, AM at ship, in DR $32^{\circ} 54'N / 135^{\circ} 34'W$, the azimuth of the Sun was 132° (C) when the chronometer showed 05h 47m 22s. If the chronometer error was 01m 44s fast and the variation was $3^{\circ} E$, find the deviation of the compass.

(20 marks)

3. Find, by Mercator Sailing, the course and distance between the following two positions,

Initial position: $26^{\circ} 49'N / 085^{\circ} 36'W$

Final position: $42^{\circ} 16'N / 055^{\circ} 10'W$

(15 marks)

4. Find the deviation of the compass in each of the following cases

	T. Hdg	C. Hdg	Var
i.	130	127	2° W
ii.	057	061	6° W
iii.	244	236	4° E
iv.	358	003	1° E
v.	002	359	2° W

(02 marks each)

5. a. A vessel steering 225° (T) at a speed of 20 kts observe a light Gp fl(3) 6s with a bearing of 320° (T) and a range of 13 n miles at 1900 hrs. If she encounters a current setting 340° (T) at a rate of 4 knots throughout, find the followings.

- Her position at 2030 hrs with reference to Dungeness Light.
- Course and Speed made good during her passage.

(12 marks)

b. On 5th May 1000hrs GMT a vessel departs port A on a westerly longitude having a time difference of 3hrs from GMT, bound for port B on 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.

(08 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. From the running fix position at 2300 hrs she continued steering the same course and speed for another 1 hour and 20 mins. At 0020 hrs on the following day, Bill of Portland Lt was observed 020° (T). Find the ship's position at 0020 hrs by using the running fix method,

(15 marks)

- List the information that can be found on Tide Table book for a given standard port.
(5 marks)



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FINAL EXAMINATION – QUESTION PAPER
GENERAL SHIP KNOWLEDAGE

- Select any 6 questions.
- Total Marks: 120

Date: 15.05.2024

Pass mark 60%

Time allocated: 03 Hours

01. A vessel arrives at port 'A' at the mouth of a river. Her displacement is 12000t and arrival draft 5.77m in RD 1.020. She is to cross an obstruction upriver before entering to port 'B'. The depth at the obstruction is 6.0m and RD 1.005. If her TPC in SW is 25,
- find the FWA and the change in draft.
 - find the minimum quantity of cargo to off-load at port 'A' so that she may cross the obstruction with an under-keel clearance of 0.5m.
- (20 marks)
02. a. With the aid of diagram describes a ship with neutral equilibrium.
- b. What is i. Metacenter (M) ii. Righting Lever (GZ) and iii. The relationship of GZ and Metacentric Height (GM).
- (20 marks)
03. a. On a vessel of 6000t displacement KG 7.4 m, how many tons of cargo may be discharged from the lower hold (KG 2.0m) in order to have a final KG of 8.0m?
- (10 marks)

- b. On a ship of 12000t displacement and KG 5.66m, loads 1500t (KG 6.5 m), 3500t (KG 5.60), and takes 1520t of bunkers (KG 1.60). She discharges 2000t of cargo (KG 2.44m) and consumes 900t of bunkers (KG 0.40m). 8000 t of cargo shifted from No 2 TD to No 2 LH, through a vertical distance of 4.0 m.
Find the KG at the end of the voyage.
(10 marks)
04. a. List what are the data that can be found in Hydrostatic particulars (Stability Data booklet) of a ship, issued by the shipyard, briefly explaining the purpose of each.
(12 marks)
- b. With the use of simple sketches explains the difference between Stiff and Tender ships.
(8 marks)
05. 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)
06. What is Angle of loll? With the help of diagrams describe how an unstable vessel may reach "angle of loll"?
(20 marks)
07. a.) Draw a cross section of a hold bilge well, explaining how it operates
(10 marks)
- b.) (i) Explain the purpose of having water tight bulkheads on board ships,
(ii) What are the main watertight (transverse) Bulk heads fitted on ships.
(10 marks)

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FINAL EXAMINATION – QUESTION PAPER

COMMUNICATION

- Answer all questions.
- Total Marks: 100

Date: 15.05.2024

Pass mark 70%

Time allocated: 3 Hours

1. Draw the sketch of the flag indicating colors, of following letters and state the meaning of flags as per International Code of Signals.

- a) A
- b) B
- c) H
- d) Q
- e) Answering Pendent

(20 Marks)

2. Show the following paragraph in Morse Code:

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 123456

(25 Marks)

3. State the Signals used for Distress, Urgency, Safety and briefly explain them.

(18 Marks)

4. a) Explain the use of substitute flags.

(15 Marks)

b) You are required to fly the following flags, indicate the order (No need to sketch them) how you would display?

- | | | |
|------|-------|--------|
| i. F | ii. M | iii. C |
| F | V | M |
| 2 | 5 | M |
| 8 | 5 | K |

(12 Marks)

5. State 5 Distress Signals which can be used in distress, requiring assistance from other vessels or from the shore.

(10 Marks)



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COURSE CODE : ND- 0100 PI , BATCH – 45/45A

FINAL EXAMINATION – QUESTION PAPER
SEAMANSHIP THEORY

- Answer all questions.
- Total Marks: 100

Date: 14.05.2024

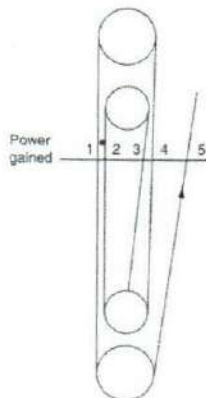
Pass mark 70%

Time allocated: 2 Hours

01)

- a) Name the parts of a Stockless Anchor with a diagram. (10 marks).
- b). Explain the following Anchor Terms. (02 marks each)
- I. Anchor a-cockbill
 - II. Brought Up
 - III. Anchor Aweigh
 - IV. Anchor a-cockbill
 - V. Anchor cable Up & Down

- 02) a). With the aid of a sketch explain how a Gun Tackle use for advantage and disadvantage. (10 marks)
- b). Calculate the stress on the hauling part of a double luff tackle rove to advantage (double purchase 2 and 2 sheaves), when used to lift a load of 5 tonnes. (10 marks)



03) List down the checks Prior use of deck cranes. (20 marks)

04) List down the four important elements in paints and briefly explain. (05 marks each)

05) Describe the Risk involved while carrying out following work and how to mitigate the risk.

- | | |
|----------------------------|------------|
| a) De-rusting on main deck | (05 marks) |
| b) Working with chemicals | (05 marks) |
| c) Working aloft | (05 marks) |
| d) painting on ship side | (05 marks) |



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FINAL EXAMINATION – QUESTION PAPER
METEOROLOGY

- Answer all 6 questions.
- Total Marks: 120

Date: 14.05.2024

Pass mark 50%

Time allocated: 03 Hours

1. i. List down 6 (six) types of meteorological instruments used on board ship with notes on their use.

(15 marks)

- ii. Illustrate in a sketch any one of the following with details of its principals of construction and operation
- a. Aneroid barometer
 - b. Barograph
 - c. Hygrometer

(20 arks)

2. As you may be assisting in watch keeping in port or at sea, give detail information on what you understand about Master's Obligatory Messages to Transmit as required by SOLAS.

(20 arks)

3. Give a brief introduction to following:

- i. Wind
- ii. Monsoons
- iii. Anabatic winds
- iv. Katabatic winds
- v. Land breeze
- vi. Sea breeze
- vii. TRS
- viii. Frontal depressions
- ix. HP ridge
- x. LP trough

(2 marks each)

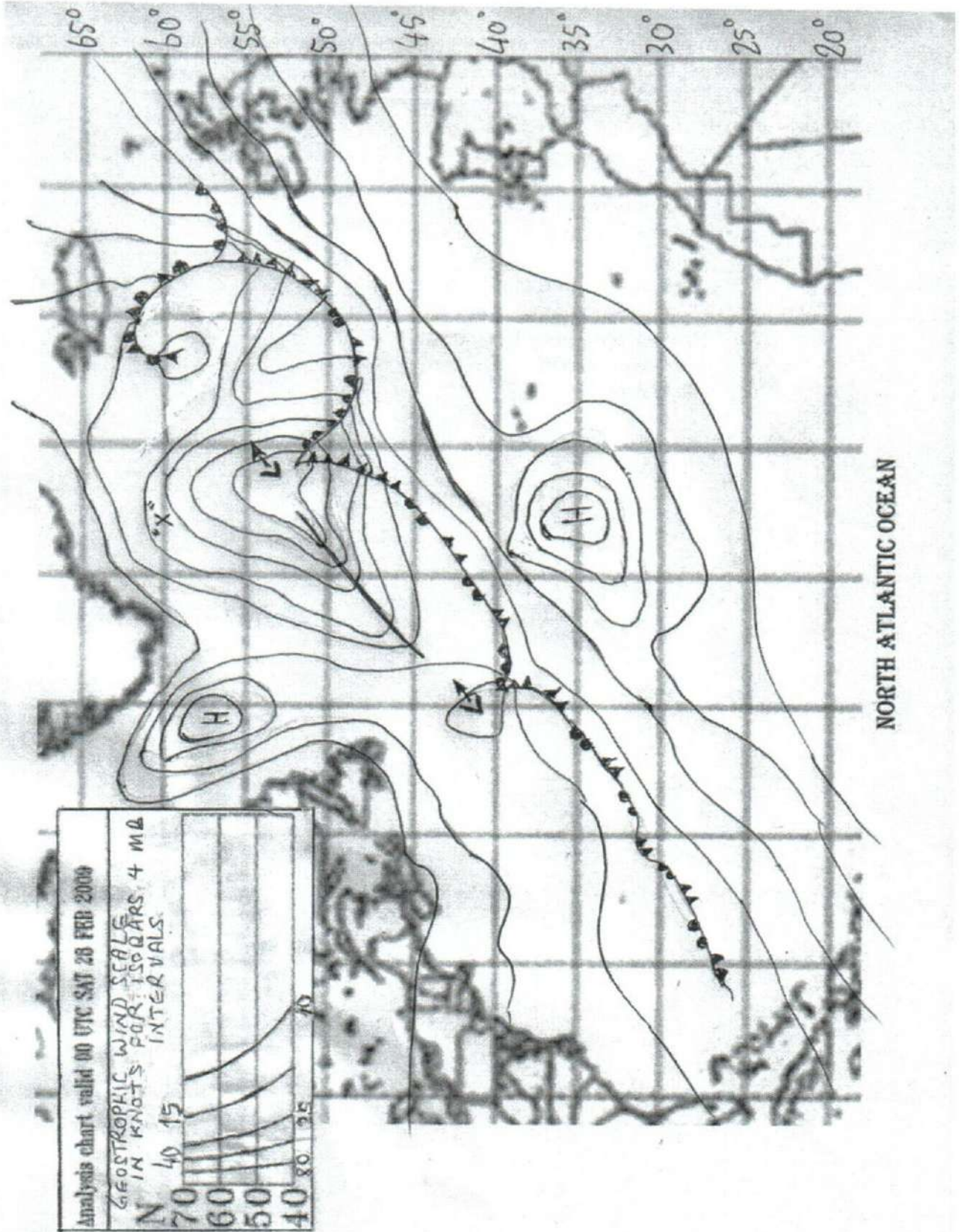
4. In the attached sample weather map of North Atlantic Ocean, identify the following information by jotting down the respective number at the applicable position.

- 1) occlusion,
- 2) frontal depression,
- 3) secondary depression,
- 4) family of depression,
- 5) squall,
- 6) none frontal depression,
- 7) ridge of high pressure,
- 8) coll,
- 9) anti-cyclone,
- 10) cold front,
- 11) warm front,
- 12) occluded front,
- 13) embryo wave,
- 14) quasi stationary front
- 15) geostrophic wind speed at position marked "X"

(1 mark each)

a) What sort weather conditions you can expect in a "Coll"

(5 marks)



5. a. How one would prove that warmer air can contain more w.v. than it is in a cooler range before saturation.

b. Define the following:

- i. Humidity
- ii. Absolute Humidity
- iii. Relative Humidity
- iv. Dew Point
- v. Depression of the wet-bulb
- vi. Diurnal variation of pressure
- vii. Diurnal variation of Temperature
- viii. Pressure gradient.
- ix. Saturation

-END-

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COURSE CODE : ND- 0100 PI

FINAL EXAMINATION – QUESTION PAPER

OPERATIONAL SAFETY

- Answer all questions.
- Total Marks: 120

Date: 13.05.2024

Pass mark 60%

Time allocated: 03 Hours

1. a) Define the following basis explanatory notes:

- Stress
- strain
- Breaking Stress
- Proof Load
- Safe working load (SWL)

(10 marks)

b) Discuss how the breaking stress could be ascertain on the following ropes:

- Natural Fiber
- Grade-1 Manila
- Synthetic Fiber
- Polypropylene
- Polythene
- Polyester (terylene)
- Polyamide(nylon)
- Flexible Steel Wire Rope
- Stud Link chains
- Applying loads to derricks and wires

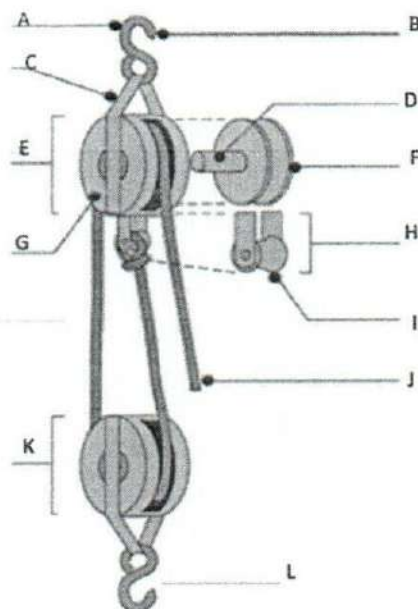
(10 marks)

2) a) What can you explain about the below sketch ?

(10 marks)

b) Name the lettered indicators

(10 marks)



3. Along with an introduction to each, explain the legislative international conventions in force and/or available for the purpose of protection of the marine environment.

(20 marks)

4. a. Discuss the key points you may consider applying when performing a safe cargo watch day and night.

(20 marks)

5. a. How do you go about loading bulk cargos?

(10 marks)

- b. Describe why and how you would secure filled and partly filled bulk cargo surfaces?

(10 marks)

6. a. Give a brief explanation to what fumigation is?

(10 marks)

- b. List down the precautions required for preparation, during and after a vessel is fumigated.

(10 marks)

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FINAL EXAMINATION – QUESTION PAPER
ROR, WK & BRIDGE EQUIPMENT

- Answer all questions.
- Total Marks: 120

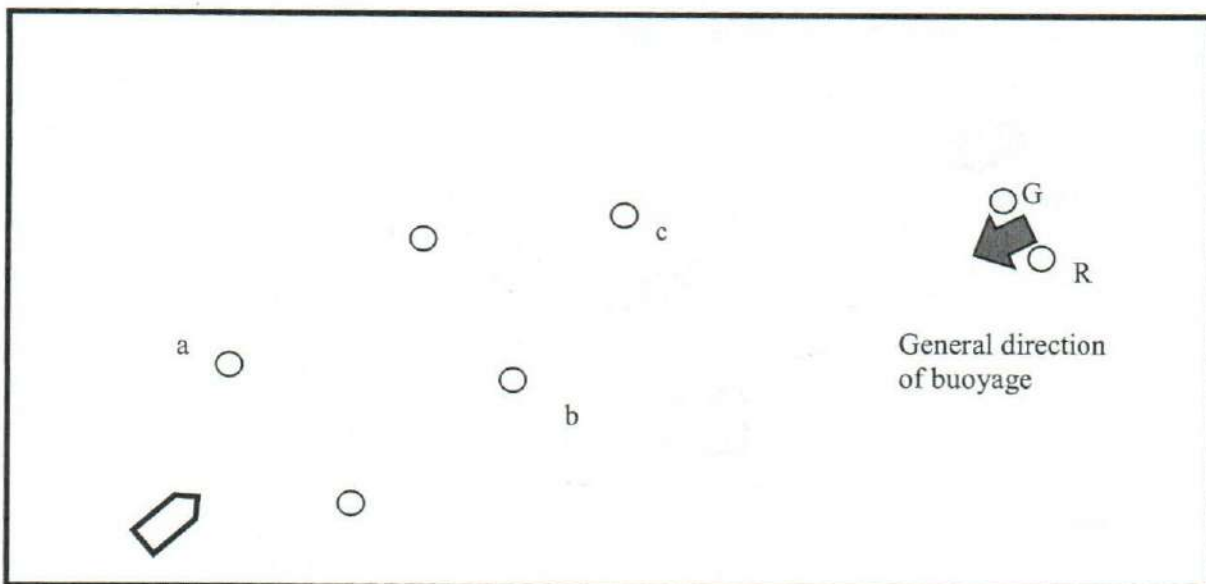
Date: 13/05/2024

Pass mark 70%

Time allocated: 03 hrs

1.

- List out duties of officer on watch performing bridge watch at anchorage (10 Marks)
- A vessel departing from the port of Colombo; Sri Lanka, meets buoys along the channel as per below diagram.



Identify a, b, c buoys correctly and describe characteristics and usage with a sketch. (6 marks)

c.)Draw and describe the characteristics and usage of - South cardinal buoy , Isolated danger mark (4 marks)

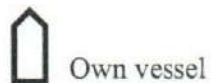
2. Identify below ship's meeting situations in clear visibility and suggest the best possible action to be taken by own vessel , mention the rules referred to based upon your answer assuming that there is a risk of collision involved with.

a.



(3marks)

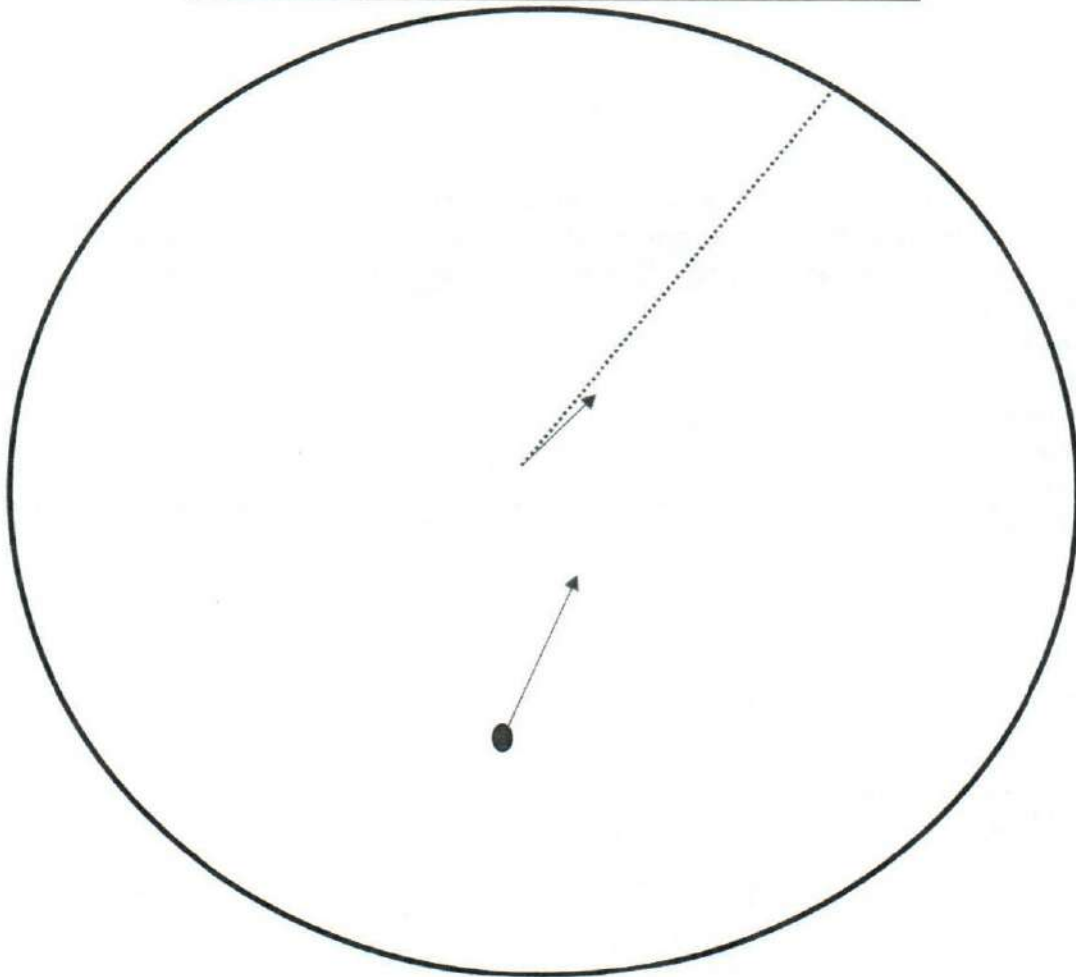
b.



(3marks)

- c. Explain the possible actions for own vessel and state the most suitable action to avoid a close quarters situation /risk of collision.

RADAR SCREEN OF OWN VESSEL IN RESTRICTED VISIBILITY



(4marks)

d. Define following terms :

- Sailing vessel
- Power driven vessel
- Vessel not under command
- Vessel Constrained by her draft
- Proper lookout

(2 marks each)

3.

Sighting	"Lights" are as per the sighting seen from ahead.	Lights"are seen as per the sighting seen STBD side	Lights"are seen as per the sighting seen astern	Sound signal in Restricted visibility
Power-driven vessel engaged in towing, length of the towing vessel 100m, length of the Tow 250 m				
Vessel engaged in underwater operations , restricted to manoeuvre and indicates port side is safe to pass.				
Vessel at anchor 250 m				
Vessel NUC making way				

Vessels engaged in fishing others engaged in trawling				
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(20 marks)

4. State the uses of an echo sounder onboard and describe the main components of an echo sounder. (20 marks)

5.

a) List the 3 types of data transmitted by AIS, with examples for each type of data.

(12 marks)

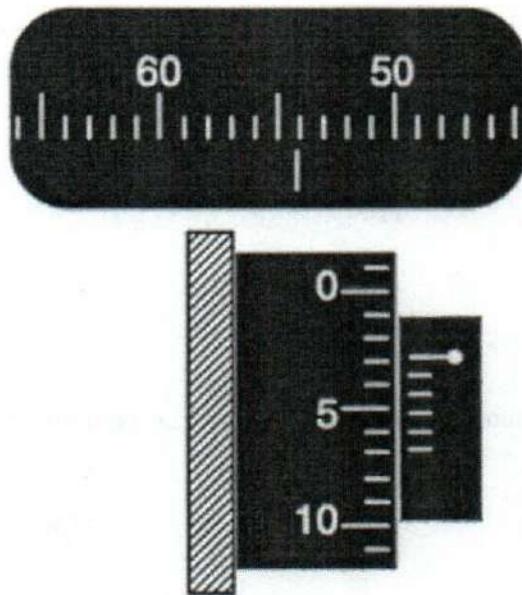
b) Describe the purposes / uses of having an AIS onboard.

(08 marks)

6.

a) With regards to Marine sextants, draw and describe what is the "Side Error", how it is identified and procedure of correcting. (15 marks)

b) Write down the sextant reading shown below;



(05 marks)