NATIONAL SENIOR CERTIFICATE EXAMINATION
MAY 2025

NAUTICAL SCIENCE: PAPER II

MARKING GUIDELINES

Time: 3 hours 150 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

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SECTION A SEAMANSHIP

QUESTION 1

1.1 1.1.1 The power-driven vessel must keep clear of both the trawler and the yacht.

1.1.2 The trawler is the stand-on vessel in respect of the power-driven vessel and the yacht.

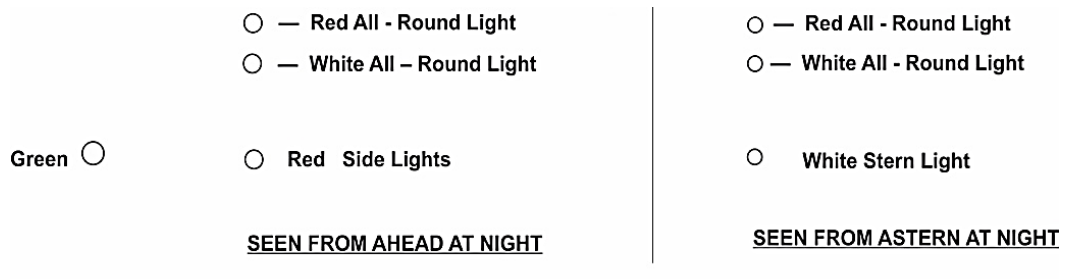
1.1.3 The yacht must keep clear of the trawler, but she is the stand-on vessel in respect of the power-driven vessel.

1.2 1.2.1 Tug towing another vessel in fog should sound at intervals of not more than 2 minutes three blasts in succession, namely one prolonged followed by two short blasts.

1.2.2 A vessel of 100 m or more in length at anchor in fog should, at intervals of not more than 1 minute ring the bell rapidly for about 5 seconds in the fore part of the vessel, immediately followed by the sounding of a gong for about 5 seconds in the aft part of the vessel.

1.2.3 To warn of your vessel's anchor position to another approaching vessel, sound 3 blasts in succession, namely one short, one prolonged and one short blast.

1.3 A vessel engaged in fishing will display two all-round lights in a vertical line, the upper being red and the lower white. A shape consisting of two cones with apexes together in a vertical line, one above the other. Also in addition the red and green sidelights and the white stern light of a vessel underway.





2 CONES APEX TOGETHER

DAY SIGNAL V/L ENGAGED IN FISHING

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QUESTION 2

(1) Raise the alarm.
(2) Check for any injured or trapped personnel in the vicinity.
(3) If the fire is small enough, and only with the aid of a second person, use the fire appliances in the vicinity to attempt to extinguish the fire.
(4) As far as possible shut off all vents, close doors and windows, and reduce the air supply to the compartment and adjacent compartments.
(5) Report the situation to the bridge or control room.
(6) Run fire hoses and prepare for boundary cooling.
(7) Ascertain if there is anyone trapped or injured in the area.
(8) Isolate all power to the area.

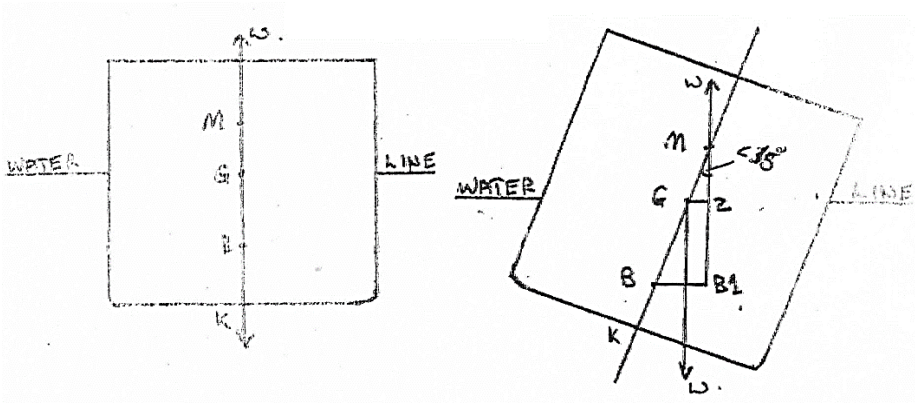
Any 5 of the above or similar appropriate priority actions.

QUESTION 3

3.1 The vertical lines through the centre of buoyancy (B, B¹) at two consecutive angles of heel intersect at a point called the metacentre. For angles of heel up to 15º the vertical through the centre of buoyancy may be considered to cut the centre line at a fixed point called the initial metacentre (M).

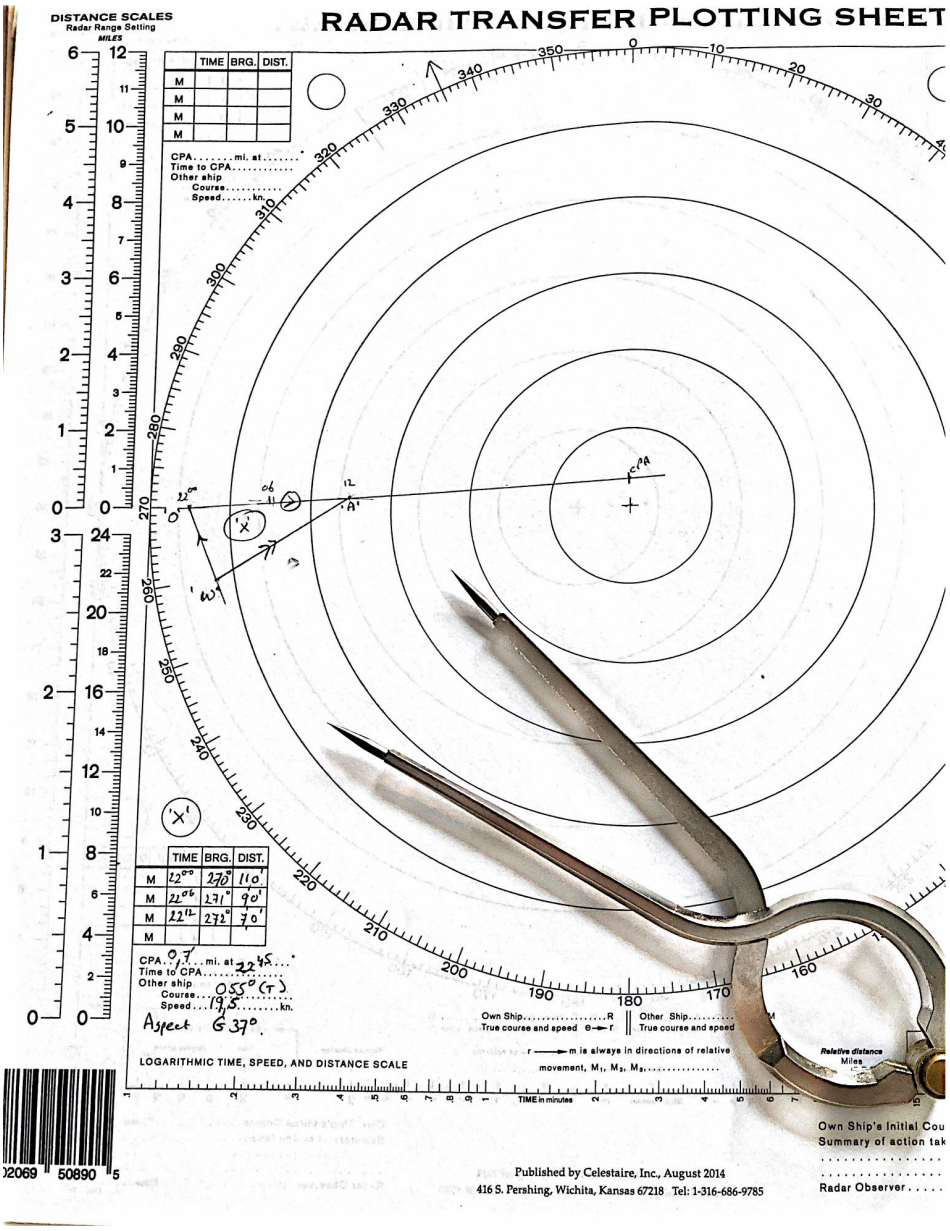
3.2 The vertical distance between the centre of gravity (G) and the metacentre (M) is referred to as the metacentric height (GM). If G is below M the ship is said to have a positive GM, and if G is above M the metacentric height is said to be negative.

3.3 A ship is said to have a stable equilibrium if, when inclined, she tends to return to the initial position. For this to occur, G must be below M, that is, the ship must have a positive initial metacentric height.



QUESTION 4

4.1 Plotting sheet



4.2

1.	Contact ID	'X' see attached plotting sheet
2.	CPA	0,7 miles ahead
3.	TCPA	22:45
4.	Target's heading	055º (T)
5.	Speed of target	19,5 knots
6.	Aspect @22:12	G 37º

4.3 This is a close quarters situation estimating the target CPA 0,7 miles ahead.

Action to take increase the CPA to minimum 2 miles by reducing speed to 6 knots or altering course to starboard to 036º (T).

Continue to plot the vessel, and if the alteration of course alone does not achieve the desired effect, then reduce speed to a minimum maintaining steerage and navigate with caution.

Continue to sound the fog signal of one prolonged blast at intervals not exceeding 2 minutes.

All or part of the above answer or reasonable explanation of safe action accepted.

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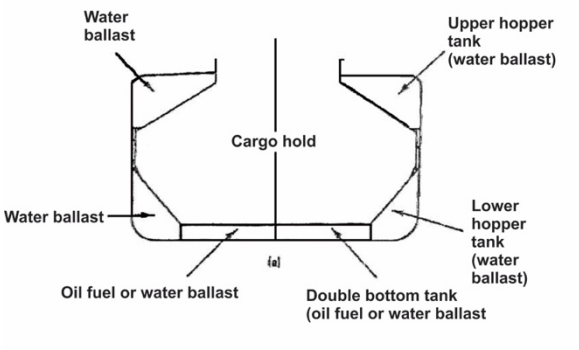
QUESTION 5

Bulk carriers are single deck, muti-hold (4–9 hatches/holds) designed to normally carry one commodity (e.g. iron-ore, coal, grain, etc.) loaded in bulk. The holds are designed with large hatch openings through which the cargo is tipped or poured into the hold, and discharged using grabs or in some cases for light cargoes (for example grain) by evacuators or suction.

The holds are designed for easy loading, self-trimming and minimum man-power or mechanical stowage. On discharge, grabs or conveyor systems remove almost all the cargo with minimum man-power (shoveling) or mechanical (bob-cats) for final sweeping or cleaning.

The vessel may be 'geared' or 'gearless', meaning it will either be equipped with cranes and grabs for loading/discharge, or it will have no equipment and rely entirely on terminal equipment to handle the cargo.

The vessel will be designed to have a comprehensive ballast system for trim and stability purposes. The ballast will also be used to manage the draft and air-draft requirements at the ports and terminals.



SECTION B COMMUNICATIONS AND METEOROLOGY

QUESTION 6

6.1 SECURITE SECURITE SECURITE

THIS IS M V MSC JADE MSC JADE MSC JADE

EXPERIENCING SEVERE SEA STATE AND ABNORMAL HIGH AND DANGEROUS WAVES IN POSITION 12 MILES EAST OF PORT ST JOHNS OUT

6.2 Good operating practices when making a radio call:

(1) Do not transmit during silent periods.

(2) Listen before calling to ensure that there is no distress traffic in progress, and that you are not interrupting any other communications.

(3) Call on the calling frequency for no longer than 1 minute.

(4) Change to a working frequency to send your message.

(5) If a distress, urgency or safety message is received while operating radio equipment, stop and listen to the call and message.

(6) Prepare the message before transmitting.

(7) Speak clearly and deliberately.

(8) Use the phonetic alphabet and spell out and clarify names, letters and numerals.

(9) Transmit important groups of numbers singly and phonetically.

(10) Do not use abusive or foul language.

(11) Use the names and call signs of the stations you are communicating with, not personal names.

Any 5 of the above.

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QUESTION 7

Air masses are large areas or volumes of air that have the same characteristics throughout. They are either **warm or cold** depending on whether their **source is tropical or polar**, and **maritime or continental**.

When two different masses meet they form a boundary which is called a **front**. When the approaching air is colder than the present air the boundary will be referred to as a **cold front**, whereas if the approaching mass is warmer than the present, the boundary is called a **warm front**.

The boundary between polar and tropical air is called a **polar front**. Since polar air is more dense than tropical air the **tropical or warmer air overrides the cooler polar air**. This is not a vertical line but tends to be inclined towards the colder air.

The warm air moves faster than the cold air and now and again forces its way into the colder air mass causing a bulge in the polar front forming a **frontal depression**. Once the depression is fully developed, the air behind the depression moves faster than the air in the warm sector. The warm sector is then undercut and lifted off the ground. The front is then termed **occluded**.

With the movement of the warm sector the temperature of the air mass changes. If the air behind the occlusion is colder than in front, the occlusion is termed a **cold** one or **cold front**. Conversely if the air behind the occlusion is warmer it is termed a **warm occlusion** or **warm front**.

The **warm front** is characterized by a steady or slow rise in temperature and dew point and the atmospheric pressure begins to fall. A rain belt up to 200 miles occurs in advance of the front. As it passes the pressure steadies while temperature and dew point rise. The wind backs (anti-clockwise) in S. Hemisphere and rain ceases.

The **cold front** is marked by a fall in atmospheric pressure near approach, a fall in temperature and dew point and the wind veers (clockwise) in direction. Rain usually occurs in a band 50 – 100 miles ahead and behind the front.

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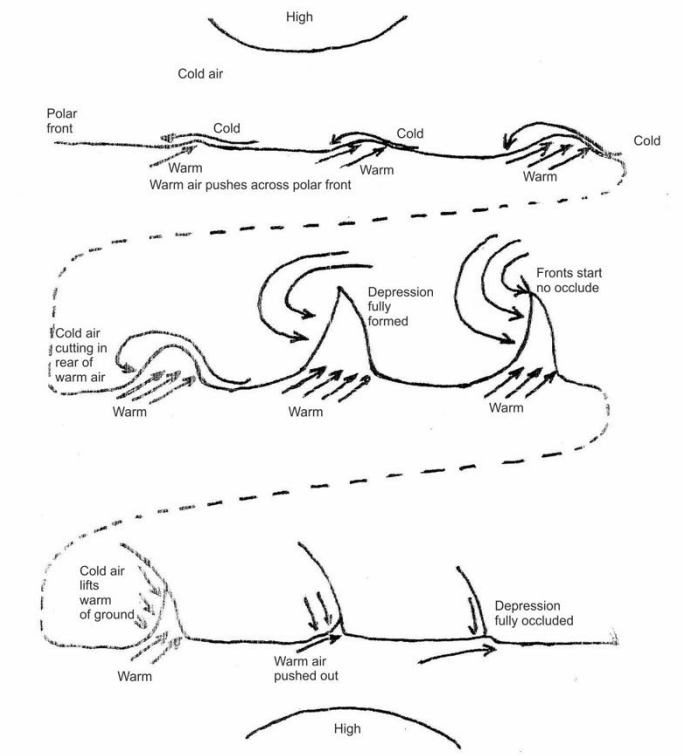


Figure 60 The lite of a frontal depression

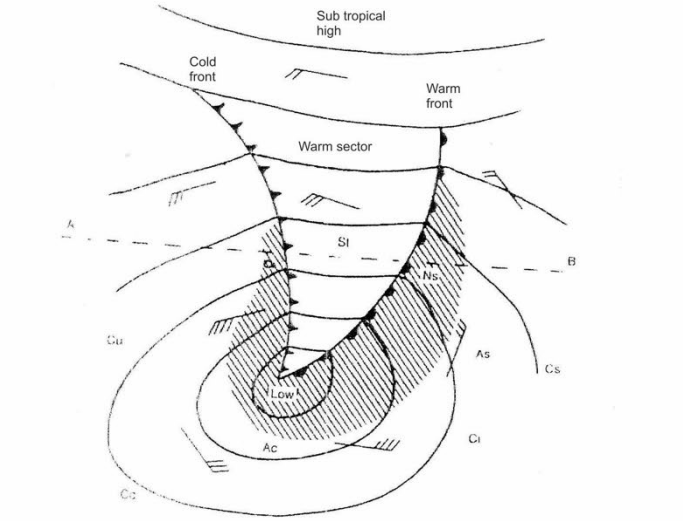


Figure 60 Plan of southern hemisphere frontal depression

SECTION C SAILINGS

QUESTION 8

	Lat.	Mid. Lat	Long.
'A'	33° 15' S	33° 15' S	028° 00' E
'B'	34° 00' S	34° 00' S	026° 00' E
Dif./Mid.	0° 45' S	67° 15' ..	2° 00' W
	45' S	33° 37,5'	120' W

Dep = D'Long × Cos.M. Lat
= 120 × Cos 33° 37,5'
= 99,924

Tan Course = Dep. / D'Lat
= 99,924 / 45
= 2,221

Course = S65 3/4°W
= 245 3/4°

Distance = D.Lat / Cos Course
= 45 / Cos 65 ¾
= 45 / 0,4103
Distance = 109,6 miles.

Total: 150 marks

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