NATIONAL SENIOR CERTIFICATE EXAMINATION
NOVEMBER 2017

NAUTICAL SCIENCE: PAPER II

MARKING GUIDELINES

Time: 3 hours Marks: 150

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.

SECTION A SEAMANSHIP

QUESTION 1

1.1 Keeping a constant watch on the target vessel to monitor the relative bearing and distance, or by using the compass binnacle to measure the bearing.

Risk of collision may also be ascertained on the radar by taking a series of compass bearings, and ranges carefully noting the time and range of each bearing.

1.2 (a) This is the day signal of a vessel engaged in dredging, surveying or underwater operations, and she is restricted in her ability to manoeuvre.

(b) If seen right ahead of my own ship, my action would be to sound two short blasts on the ship's whistle and make a bold alteration of course to port to pass the vessel well clear on the safe side of its operations indicated by two black diamonds.

By the very nature of the vessel's operations she would most likely be operating in shallow water. Therefore, action taken by my own vessel must take this into consideration and it will be safe.

1.3 (a) The black cone indicates that the sailing vessel is underway being propelled by sail and machinery (power) with the engine operational (Rule 25).

(b) In accordance with the regulations the vessel is considered to be a power-driven vessel, and as such will exhibit the lights, shapes and sound signals for a power-driven vessel of its length.

In this case, one long blast at intervals of not more than two minutes.

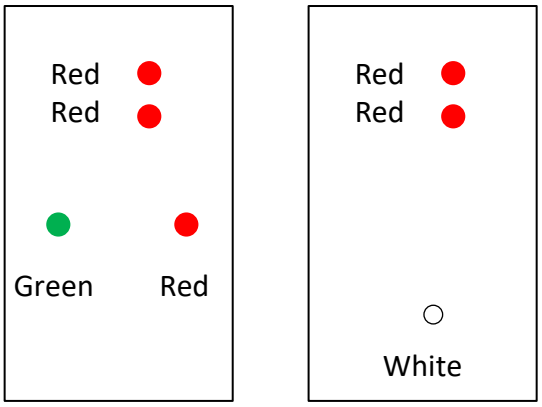
1.4 (a) The term "give-way vessel" means that every vessel which is directed to keep out of the way of another vessel shall, as far as is practical, take early and substantial action to keep well clear of the other vessel (Rule 16).

(b) The term "stand-on vessel" means that where one of two vessels is to keep out of the way, the other shall keep her course and speed (Rule 17 (a) (i)).

1.5 The Regulations are applicable to all vessels upon the high seas and in all the waters connected therewith navigable by seagoing vessels (Rule 1(a)).

1.6 (a) A "vessel not under command" shall exhibit:

(1) two all-round red lights in a vertical line where they can best be seen;
(2) two balls or similar shapes in a vertical line where they can best be seen.



(b) Fog signal is one prolonged blast followed by two short blasts at intervals of not more than two minutes.

QUESTION 2

2.1
- Prepare all lifeboats and rafts for launching.
- Muster the ship's complement wearing life jackets.
- Transmit the distress message (refer Annex IV).
- Shut down the main engine.
- Close all watertight doors.
- Display NUC signals.
- Assemble any additional equipment such as extra blankets, water, first-aid kit, flares, Aldis lamp and battery, emergency radio sets (GMDSS), charts and navigational equipment, SARTs and EPIRBs.
  Or whatever additional items to above the candidate may list within reason and pertinent to the task.

2.2 Once the boats or rafts are launched with the full complement of people on board:
- Cut the painter and clear away from the ship's side to a safe distance.
- Recover any survivors from the water.
- The motor boat or rescue craft must gather all boats and rafts together and secure them together by their painters/lines.
- Once all personnel, boats and rafts have been accounted for, assess the situation and attend to injuries.
- Ensure all boats are closed up and a routine is set for lookouts and safety of personnel, keeping all craft together.
- Set up communications and use the SART & EPIRB.
  Or any other acceptable actions the candidate may list (at least 4).

QUESTION 3

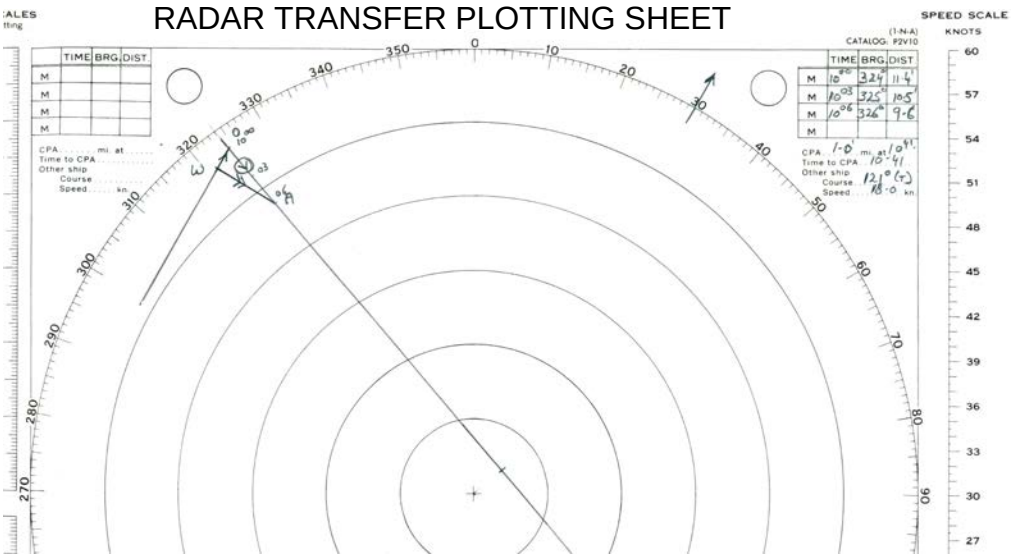
3.1 Moving fuel or weights from the forward tank to the aft central tank will change the trim of the vessel. The aft draught will increase and the forward draught will decrease.

3.2 Moving ballast from a top-side tank to a double bottom lower tank will alter the centre of gravity (G) of the vessel. In this case G will move downwards, increasing the GM and decreasing the KG. At the same time the ballast will have shifted weight from the port to the starboard side causing the vessel to list to starboard.

3.3 Shifting cargo weight from the lower hold to the hatch top will alter the centre of gravity (G) of the vessel. In this case G will move upwards decreasing the GM and increasing the KG. At the same time shifting weight from the starboard to the port side will cause the vessel to list to port.

QUESTION 4

4.1 See attached plotting sheet.



4.2	Target identification	'A'
	Time of initial plot	10:00
	Initial range & bearing	324º (T) × 11,4 miles
	CPA	1,0 mile or nearest
	Time of CPA	10:41
	Target's true course	121º or nearest
	Target's true speed	18,0 knots or nearest

4.3 Stop vessel and navigate with caution. **OR** Bold alteration of course to starboard, steer 110º (T).

Continue to monitor the vessel's course and speed till she has passed clear. When clear, resume the original course and speed.

QUESTION 5

- A break-bulk vessel carries smaller packages of cargo, which are loaded and discharged piece by piece.
- There is greater amount of cargo-handling than in a container ship where the cargo is unitised.
- A break-bulk vessel can load small parcels of bulk cargoes.
- A container ship does not have cranes, and relies on shore gantries to load and discharge cargo.
- Break-bulk vessels can load containers and normally have cranes to handle the containers.
- A break-bulk vessel lower hold is designed to stow large consignments of steel or timber products, while a container ship will be restricted to specialised container bolsters or flat racks for these cargoes.
- A break-bulk vessel is not restricted to specialised berths, whereas a container ship will berth at a specialised container terminal.
  Or any other acceptable differences the candidate may list (at least 5).

SECTION B COMMUNICATIONS AND METEOROLOGY

QUESTION 6

GMDSS (Global Maritime Distress and Safety System) facilitates the ability for a vessel in distress to alert search and rescue (SAR) authorities ashore as well as shipping in the vicinity to ensure a rapid and coordinated response. Shore-based authorities now have the primary role of coordinating assistance and rescue operations.

In the GMDSS the initial acknowledgment of a distress alert should be by the shore-based authorities. Subsequent actions and communications should be controlled by the Rescue Coordination Centre (RCC). It also provides Maritime Safety Information (MSI) enabling vessels to receive valuable maritime information to help prevent potential distress. Such information would be in the form of Navtex weather and navigation information.

Any or all the above, or any alternative pertinent answer the candidate may give.

QUESTION 7

7.1 (a) Cumulus cloud – when air is heated by the surface of the Earth it expands, becomes lighter and rises. As the air rises, it expands further because of the drop in atmospheric pressure and cools because of the expansion. If the cooling continues beyond the point at which the air is saturated (dew point), cumulous (Cu) clouds result.

(b) Stratus clouds – when two masses of air from different sources with different characteristics meet, boundary lines or fronts are formed where the colder, heavier air runs under the warmer, lighter air causing it to rise. The warmer air will expand and cool as it rises, which results in the formation of cloud that spreads as a more or less continuous layer. This is classified as stratiform or stratus type cloud.

7.2 Features of the trade winds:

- Steady, persistent winds with little variation in direction throughout the year; the NE trades north of the equator and the SE trades south of the equator.
- Occur in latitudes 10º N to 10º S.
- The average wind force is BS 3–4, but they can freshen to BS 5–6, or lull to BS 1.
- They are interrupted briefly at times by tropical storms.
- They do not occur in the northern Indian Ocean or the western side of the North Pacific, where they are replaced by seasonal monsoon winds.
  Any of the above or any other pertinent features the candidate may answer.

SECTION C SAILINGS

QUESTION 8

8.1

	LAT	**M. Parts**	**LONG**
Vigo W.P.	42º 00' N	2766.05	009º 30' W
Recife W.P.	08º 00' S	478.31	034º 40' W
Dif	50º 00' S	DMP 3244.36	25º 10' W
	3,000'		1,510'

Tan Course = d'Long / DMP
= 1,510 / 3244,36
= 0,465423072
Course = S025º W
= 205º (T)

Distance = d'Lat / Cos Course
= 3,000 / Cos 25º
= 3,310 Nautical Miles

8.2 Steaming time at 18 knots = Dist / Speed
= 3,310 / 18
= 7 d 16 hrs

Total: 150 marks